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Minerals Yearbook

1985

Volume III

AREA REPORTS: INTERNATIONAL

Prepared by staff of the

BUREAU OF MINES

UNITED STATES DEPARTMENT OF THE INTERIOR • Donald Paul Hodel, Secretary

BUREAU OF MINES • Robert C. Horton, Director

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

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Foreword

This edition of the Minerals Yearbook discusses the performance of the worldwide minerals industry during 1985 and provides background information to assist in interpreting developments during the year being reviewed. Content of the individual volumes follows:

Volume I, Metals and Minerals, contains chapters on virtually all metallic and nonmetallic mineral commodities important to the U.S. economy. In addition, it includes a statistical summary chapter, a chapter on mining and quarrying trends, and a chapter discussing the statistical surveying methods used by the Bureau of Mines.

Volume II, Area Reports: Domestic, contains chapters on the mineral industry of each of the 50 States, the U.S. island possessions in the Pacific Ocean and the Caribbean Sea, and the Commonwealth of Puerto Rico. This volume also has a statistical summary.

Volume III, Area Reports: International, contains the latest available mineral data on more than 150 foreign countries and discusses the importance of minerals to the economies of these nations. A separate chapter reviews the international minerals industry in general and its relationship to the world economy.

The Bureau of Mines continually strives to improve the value of its publications to users. Therefore, constructive comments and suggestions by readers of the Yearbook will be welcomed.

Robert C. Horton, *Director*

Acknowledgments

The Bureau of Mines, in preparing volume III, utilized extensively statistics and data on mineral production, consumption, and trade provided by various foreign government mineral and statistical agencies through various official publications. The cooperation and assistance of these organizations is gratefully acknowledged. Statistical and informational material was also obtained from reports of the U.S. Department of State, from United Nations publications, and from the domestic and foreign technical and trade press. Of particular assistance were the routine and special reports submitted by the minerals, petroleum, economic, and commercial officers and other members of the Department of State. Their contributions are sincerely appreciated.

The text and tables of this volume were prepared by the staff of the Division of International Minerals, Assistant Directorate, Minerals Information. Final correlation and checking of this volume was performed by the Division of Publication.

The regimes of some countries reviewed in this volume may not be recognized by the U.S. Government. The information contained herein is technical and statistical in nature and is not construed as conflicting with or being contradictory of U.S. policies toward these countries.

Albert E. Schreck, *Chief, Division of Publication*

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Minerals in the World Economy

By Charles L. Kimbell[1] and William L. Zajac[2]

On the basis of world production data alone, 1985 appears to have been a year in which the world's mineral industry took another step upward in its recovery from the very poor years of 1981, 1982, and early 1983. Despite a drop in the output of crude oil, which was the single most significant crude mineral product from the viewpoint of value, the estimated value of world crude mineral production advanced by 3.4% to about $1,054 billion constant 1983 dollars, with output increases logged for nearly two-thirds of the commodities and forms of commodities for which the U.S. Bureau of Mines calculates a total world output. However, the economic well-being of any industry or group of industries cannot be measured solely in terms of the volume and/or value of its production, and examination of statistics reflecting other aspects of mineral industry performance shows that 1985 was a less than ideal year in many respects. In the case of consumption of mineral commodities, although there were gains registered in diverse sectors such as iron and steel, aluminum, fertilizer materials, solid fuels, and gaseous fuels, there were also proportionally small but notable declines in use among the older major nonferrous metals (copper, lead, tin, and zinc) and in the all-important liquid fuels.

In the case of international trade in mineral commodities, although comprehensive data for 1985 were not yet available, there were indications that the value may well have fallen below the estimated 1984 level of $632 billion, although the volume may have increased slightly. This, if true, would be chiefly the result of declining prices of mineral commodities, and indeed, price declines were noted for a number of significant materials in terms of current dollars, and even more would register declines if calculated on the basis of constant dollars, adjusting for inflation.

In the area of investment in mineral industry activities, the relatively incomplete data available suggest that in market economy countries, 1985 saw a reduced level of investment, with higher rates of return in other industrial areas capturing available capital. Certainly, although detailed figures are lacking, investment in the petroleum industry was below that of 1984. In contrast, the centrally planned economy countries apparently continued to invest at a substantial level, but here as in past years, completions of facilities were often behind target dates and performance of newly completed facilities often was below anticipated levels. In the area of mineral commodity transport, there was a reduction of about 9 million tons in goods moving through the Suez Canal (comparable data for the Panama Canal were not available yet), this despite reductions in price indexes for marine shipment of mineral commodities.

Among international political events and situations that had measurable impact on world mineral industry activities, the Iran-Iraq war undoubtedly had the greatest effect, both through the direct effect on mineral production and processing in those two countries and through the threat of that conflict to all countries bordering the Persian Gulf. The reduction in availability of crude oil hardly presented a problem to the world as a whole, nor particularly to other major petroleum producing countries, for it left them with a somewhat larger share of total output than would be the case if the warring countries could devote more time, money, and effort to improving their competitive position.

Of far less significance but having some impact on individual countries were the continuing problems of guerrilla warfare in several Central American countries and in Afghanistan. It was notable, however, in the case of Afghanistan, that with Soviet technical assistance, a modest copper operation came on-stream, this despite the hazardous conditions prevailing in areas outside of main Soviet-occupied towns.

PRODUCTION

The estimated value of world crude mineral production in 1985 was $1,054 billion in terms of constant 1983 dollars, 3.4% above the revised 1984 level, but still short of the historic high of 1980, as shown in the following tabulation, which is based heavily upon the most recent reassessment of world mineral production value by François Callot in the authoritative French language mineral industry journal, Annales des Mines:[3]

Year	Value of 53[1] major crude mineral commodities[2] (billion current dollars)	Billion constant 1983 dollars	
		Value of 53[1] major crude mineral commodities[2]	Value of all crude mineral commodities[3]
1950	25.9	103.5	117.9
1953	37.0	135.1	155.3
1958	50.0	173.5	208.5
1963	59.0	192.0	235.3
1968	77.9	222.3	269.8
1973	159.2	357.3	430.0
1978	477.0	728.5	824.1
1979	656.5	901.2	1,006.5
1980	951.2	1,150.9	1,269.2
1981	1,024.8	1,126.0	1,226.3
1982	892.6	922.1	991.9
1983	930.4	930.4	988.7
1984	995.0	958.9	1,019.0
1985	1,029.5	991.8	1,054.0

[1]The list of commodities included appears in table 3 of this chapter; one commodity covered in 1950-68 (beryl) is excluded from the 1973-85 figures, but the overall impact of this omission is regarded as insignificant.
[2]Data for 1950, 1953, 1958, 1963, 1968, 1973, 1978, and 1983 are as reported in Annales des Mines, July-Aug.-Sept. 1985, p. 9. Data for 1979-82 have been derived from figures appearing in Annales des Mines, Nov.-Dec. 1981, pp. 198-199; Oct.-Nov. 1983, pp. 210-211; and Nov.-Dec. 1984, pp. 206-207, using appropriate price deflators. Constant dollar data for 1984 and 1985 are extrapolated from the 1983 Annales des Mines figures on the basis of the United Nations index of extractive industry production in the United Nations Monthly Bulletin of Statistics, May 1986, p. xiv. Current dollar data for 1984 and 1985 are computed from the constant dollar extrapolated figures using the reciprocals of the most recent available implicit price deflators.
[3]Data extrapolated from values for 53 commodities to compensate for other (additional) mineral commodities. For details on the basis for this extrapolation, see accompanying text under "Value of World Mineral Production."

The foregoing tabulation includes for the first time a column showing the approximate value of production of the 53 commodities surveyed by Callot in terms of current dollars, as well as the now-traditional columns giving the constant dollar value of these 53 commodities and the rough approximation of the value of total crude mineral production.

The foregoing presentation of value of crude mineral output, however, falls far short of adequately depicting the role of the entire minerals industry in the world economy, in that the data included represent only the value of mineral materials as they are extracted from the earth, rather than the considerably enhanced value that results from beneficiation, smelting, refining, and other downstream processing to which those raw materials are subjected while they remain within facilities that are commonly accepted to be mineral industry plants. Comprehensive data on the value added by such processing are not available on a worldwide basis, but a total on the order of $2,500 billion (constant 1983 dollars) for 1985 would be a conservative estimate of the value of the products of the world's mineral industry plants that were derived wholly from primary or newly mined raw materials only. To this, an additional unestimated increment should be added for processed minerals and metals recovered from secondary raw materials—scrap and other reclaimed materials.

It should be stressed that crude and processed mineral commodities constitute not only the overwhelmingly dominant share of the total raw materials supply for all manufacturing operations but also, in the form of fertilizers and other soil treatment materials, are essential raw materials to ensure continued high production by the agricultural-forestry sector. Moreover, the mineral industry, through its output of the various fuel materials, provides all significant supplies of energy for the transportation and transformation of crude nonfuel as well as nonmineral materials to finished industrial and consumer goods.

PRODUCTION INDEX PATTERNS

The following tabulation summarizes the development pattern in world extractive mineral industry output as reflected by United Nations industrial production indexes:

Year	Index numbers (1980=100)			
	Coal	Crude petroleum and natural gas	Metals	Extractive industry total
Annual averages:				
1978[r]	93.6	103.8	97.4	101.3
1979[r]	96.8	108.5	99.7	105.6
1981[r]	100.3	89.4	99.6	92.5
1982[r]	102.1	81.0	93.7	86.0
1983[r]	101.5	79.3	94.1	84.9
1984[r]	100.1	82.0	98.1	87.5
1985[e] [1]	102.7	86.9	98.4	90.2
Quarterly results:				
1984:[r]				
1st quarter	105.0	84.4	99.0	89.7
2d quarter	98.0	78.4	100.3	85.0
3d quarter	100.0	79.9	96.0	85.8
4th quarter[e]	97.5	85.1	97.2	89.4
1985:				
1st quarter	105.4	87.9	99.2	92.4
2d quarter	100.0	81.5	100.7	87.7
3d quarter	102.2	86.8	96.4	91.3
4th quarter[e]	103.0	91.5	97.4	93.6

[e]Estimated. [r]Revised.
[1]Calculated from reported data for the 1st through the 3d quarters and estimates for the 4th quarter.

Source: United Nations. Monthly Bulletin of Statistics. V. 40, No. 5, May 1986, p. xiv. Estimates are by the senior author.

It is evident from the foregoing tabulation that although there were marked differences in the performance of the three major component sectors of the extractive industry through 1984 and 1985, the activities of each sector in each quarter of 1985 were at a higher level than in the corresponding quarter of 1984. As indicated in the 1984 edition of this chapter, the quarterly data and annual averages for the coal sector subsequent to the first quarter of 1984 seem unduly low compared with quantitative data on world coal industry activities compiled by the U.S. Bureau of Mines and presented subsequently in this chapter. Bureau figures indicate an increase of 5.3% in total world coal output between 1983 and 1984, and a further 3.8% increase between 1984 and 1985; in contrast, the United Nations indexes indicate a 1.4% decline in the coal production index between 1983 and 1984, and a 2.6% increase in that index between 1984 and 1985, suggesting either incomplete and/or erroneous reporting to the United Nations or a quite substantial decline in the average unit value of coal produced. It should be noted that the United Nations index numbers for coal presented in this chapter for 1983 and 1984 have been revised upward by that organization from those presented in the 1984 edition of this chapter, but even these upward revisions by the United Nations still seem too low.

Comparison of the foregoing tabulation of extractive industry indexes with the following tabulation of indexes from the same source for certain processing sectors of the mineral industry demonstrates that the processing sectors generally continued to demonstrate a more effective recovery from the slump of 1980-82 than did the extractive sectors, although the rates of growth in nonmetallic mineral products and in base metals between 1984 and 1985 were substantially reduced from those between 1983 and 1984:

Year	Index numbers (1980=100)		
	Non-metallic mineral products	Chemicals, petroleum, coal, rubber products	Base metals
Annual averages:			
1978[r]	95.8	95.6	99.8
1979	99.6	100.6	104.5
1981[r]	97.9	100.8	99.2
1982[r]	94.5	99.6	88.8
1983[r]	96.9	104.9	91.3
1984[r]	100.2	111.5	98.2
1985[e] [1]	101.9	116.4	98.4
Quarterly results:			
1984:[r]			
1st quarter	96.2	112.0	100.5
2d quarter	103.4	112.9	101.3
3d quarter	100.6	109.7	94.0
4th quarter	100.5	111.4	97.2
1985:			
1st quarter	94.8	116.6	100.3
2d quarter	105.5	117.6	101.8
3d quarter	103.2	115.6	95.2
4th quarter[e]	104.0	116.0	96.2

[e]Estimated. [r]Revised.
[1]Calculated from reported data for 1st through 3d quarters and estimates for 4th quarter.

Source: United Nations. Monthly Bulletin of Statistics. V. 40, No. 5, May 1986, p. xv. Estimates are by the senior author.

The slump in the index for base metals in the third quarter of 1984, which was noted in the 1984 edition of this chapter, was repeated in 1985, and although the decline in the latter year between the second and third quarter was not as substantial as that recorded in 1984, the recovery in the fourth quarter of 1985 was not as substantial as that recorded for the fourth quarter of 1984, thus the average performance in the last half of 1985 was only very marginally above that of the last half of 1984.

Both of the foregoing tabulations of indexes reflect the aggregation of results from many world areas that individually showed quite variable results, both from area to area and across the years from quarter to quarter. For regional details too extensive to include here, the reader is referred to the source publication for these tabulations.

QUANTITATIVE COMMODITY OUTPUT

Of the 97 distinct mineral commodities and/or subdivisions of mineral commodities for which total world production, as measured by the U.S. Bureau of Mines, is presented in table 1 for 1981-85,[4] 62 registered increases in 1985 relative to the 1984 level of production. Of the remainder, 33 registered declines and the output levels of 2 were essentially unchanged from those of 1984. These results were somewhat less satisfactory than those of 1984, when gains over 1983 output levels were achieved by 83 commodities, with 13 showing declines and 1 registering no change; but it was a better record than that of 1983, when production of only 51 commodities exceeded 1982 levels, with 46 showing lower levels.

Of the 62 commodities for which output increases were logged between 1984 and 1985, 9 registered declines between 1983 and 1984, 23 showed increases for the second consecutive year, 18 recorded gains for the third year in a row, 5 registered higher output levels for the fourth consecutive year, and 7 showed continuous growth in output levels for 5 years or more. The latter, with the number of years of continually upward output, were fuller's earth, 5; gold, 6; secondary smelter copper, 7; cement, 10; feldspar, 10, natural gas liquids, 11; and lignitic coal, 13. Of the 33 commodities reporting declines in output between 1984 and 1985, 30 had registered increases between 1983 and 1984, 2 recorded declines for 2 consecutive years, and 1 (uranium oxide) registered a decline for 5 years in a row. Of the two commodities whose 1985 output was equal to that of 1984, one had recorded a downturn in 1984 following an increase in 1983, and output of the other was also unchanged between 1983 and 1984, following a drop between 1982 and 1983.

Of the 50 listed metallic commodities, 35 were produced in greater quantities in 1985 than in 1984, output of 15 declined, and that of 1 was unaltered. From the broadest economist viewpoint, upturns in iron ore, pig iron, crude steel, and virtually all of the ferroalloying metals (chromite, manganese, molybdenum, nickel, titanium, and tungsten), as well as in gold, were probably the most notable, while the declines in the aluminum materials (bauxite, alumina, and unalloyed ingot metal) and uranium oxide were the more notable shortfalls. The apparent decline in vanadium output was the result of the exclusion of U.S. data for 1985 rather than from an actual drop in output. Considering the metals production trends from the viewpoint of mine products as opposed to processed forms, 21 of 27 mine products registered gains, while only 13 of 23 processed metals did so.

Of the 36 commodities included under the category "Industrial Minerals," 20 recorded production increases between 1984 and 1985, while 15 registered declines and 1 was essentially unchanged. Within this group of commodities, gains registered by construction materials such as cement and gypsum, as well as those recorded by diamond and by all three listed classes of sulfur and by nitrogen in ammonia among chemical materials, were offset, to some extent, by the lower levels of production recorded for lime, phosphate rock, and potash among the agricultural chemicals, and for salt.

Of the 11 mineral fuel commodities surveyed (excluding uranium, which is included under "Metals"), 8 showed increases and 3 recorded declines. The reductions in output of crude and refined petroleum, in response to the continued world market glut, could have been expected, as could continued growth in the output levels of all three forms of coal listed, these as a result of continuing efforts on the part of many countries to meet a greater share of their energy requirements from sources other than higher cost imported petroleum. Increases in production of natural gas and natural gas liquids reflected increased utilization of such materials associated with crude petroleum as well as shifts, in the case of some countries, away from oil imports. The upturn in metallurgical coke production was a corollary to the growth in steel output.

The overall performance of the nonfuel mineral industry can only be summarized in terms of value of production, and for these commodities, exactitudes on a worldwide basis on a commodity-by-commodity basis are not available for any year subsequent to 1983 (see "Value of World Mineral Production"). Among fuel commodities, however, the overall pattern of output level changes and their interrelationships can be demonstrated by United Nations data, in which production results for all fuels are adjusted to a common energy equivalent basis. The following tabulation summarizes world energy commodity output for 1980-84 as reported by the United Nations, with U.S. Bureau of Mines estimates for 1985:

Year	Million metric tons of standard coal equivalent				
	Coal	Crude petroleum and natural gas liquids	Natural gas	Hydro and nuclear electricity	Total
1980	2,626	4,497	1,840	301	[1]9,265
1981[r]	2,635	4,250	1,859	319	9,063
1982[r]	2,711	4,092	1,845	333	8,981
1983[r]	2,710	4,064	1,863	360	8,997
1984	2,823	4,158	1,989	388	9,358
1985[e]	2,942	4,075	2,051	413	9,481

[e]Estimated. [r]Revised.
[1]Data do not add to total shown because of independent rounding.

Sources: 1980—United Nations. 1983 Energy Statistics Yearbook. New York, 1984, p. 2; 1981-84—United Nations. 1984 Energy Statistics Yearbook. New York, 1986, p. 2; and 1985—U.S. Bureau of Mines estimates.

VALUE OF WORLD MINERAL PRODUCTION

The comprehensive study on value of world mineral production, which has been prepared periodically during the past 33 years for the French language mineral industry periodical, Annales des Mines, was extended for another 5-year increment in the July-August-September 1985 issue of that journal. The series now provides nearly uniform data for the years 1950, 1953, 1958, 1963, 1968, 1973, 1978, and 1983 for a selected list of crude mineral commodities (see table 3 of this chapter for the list of commodities included) for all world producers. The study fixes the constant 1983 dollar value of total world production of these commodities at about $930.4 billion for 1983, an increase of 27.7% over the level of output of 1978 (the last year for which complete commodity-by-commodity and country-by-country data are available), but 9.2% below the historic estimated production value high achieved in 1980. Considering the change between 1978 and 1983 only, without consideration of estimated year-by-year results for 1979, 1980, 1981, and 1982, the indicated annual value growth rate would be about 5%, which the source publication attributes to a 0.7% annual average decline in the physical volume of production, offset by a 5.8% annual average increase in the inflation-corrected price index for crude minerals.

The data on the value of the selected commodities listed in the French source have been roughly extrapolated by the U.S. Bureau of Mines to cover the full range of crude mineral commodities covered in the Minerals Yearbook on the basis of the share of total U.S. crude mineral output value accounted for by those selected commodities covered in the French source. The data upon which the extrapolations were based are as follows:

Year	Million current U.S. dollars: Value of total U.S. crude mineral output	Million current U.S. dollars: Value of U.S. output of selected minerals covered in Annales des Mines[1]	Percentage of total accounted for by selected commodities
1950	11,835	10,405	87.8
1953	14,382	12,511	87.0
1958	16,526	13,754	83.2
1963	19,620	16,002	81.6
1968	24,974	20,591	82.4
1973	36,788	30,579	83.1
1978:			
Nonfuel minerals	19,821	10,008	50.5
Fuel minerals	[2]65,072	[2]65,072	100.0
Total or average	[2]84,893	[2]75,080	88.4
1983:			
Nonfuel minerals	21,116	10,581	50.1
Fuel minerals	[2]158,099	[2]158,099	100.0
Total or average	[2]179,215	[2]168,680	94.1

[1]Values as reported by the U.S. Bureau of Mines, not those reported in Annales des Mines. Corresponding values as reported in Annales des Mines, in million dollars, were as follows: 1950—$10,406; 1953—$12,435; 1958—$12,440; 1963—$15,742; 1968—$20,232; 1973—$29,876; 1978: nonfuel minerals—$8,766; fuel minerals—$65,072; total—$73,838; 1983: nonfuel minerals—$9,544; fuel minerals—$158,099; total—$167,643.

[2]Because the U.S. Bureau of Mines no longer has responsibility for mineral fuel statistics and because the U.S. Department of Energy, which is responsible for such data, has no published series on the value of crude fuel mineral production, the data provided here for fuel minerals are those from Annales des Mines.

The published figures for total value of world production appearing in Annales des Mines for the selected group of commodities were increased on the basis of the percentages in the right-hand column of the foregoing tabulation for each year shown, using the French data for fuels commodities values for 1978 and 1983 in the absence of official U.S. figures. It should be stressed that it is recognized that this is only a very crude estimation of the value of total world mineral production, because in all likelihood, the true ratio between the value of the commodities included in the French study and the value of crude minerals not included therein for other countries does not correspond exactly to the ratio demonstrated for the United States.

The results of the extrapolation outlined above appear in the first tabulation under the heading "Production" in a previous part of this chapter. That tabulation also includes an extrapolation of the Annales des Mines 1983 figures for 1984 and 1985, the latter based on the United Nations index of world extractive mineral industry output.

GEOGRAPHIC DISTRIBUTION OF WORLD MINERAL OUTPUT VALUE

Available information is inadequate to extrapolate to 1984 and 1985 the 1983 data on geographic distribution of world mineral output value published in Annales des Mines. However, those data, together with corresponding data for 1978 and 1950, are presented in table 2 of this chapter to demonstrate the shifts in relative importance of the various countries, particularly the changes that occurred during the 1978-83 period.

Perhaps the most noteworthy change during that period does not involve shifts in ranking, for while there were a number of changes, all countries that ranked among the top 20 countries in 1978 also were among the top 20 in 1983 with the sole exception of Poland. Even that country's drop (from 16th in 1978 to 22d in 1982) was largely the result of the conditions of domestic unrest that were vented openly in 1983 to a far greater extent than in 1982 or 1984. That is to say, leading world producers of 1978 have by and large continued to be leading world producers in 1983. Instead of ranking shifts, it seems appropriate to consider the proportion of the total accounted for by leading countries. In both 1978 and 1983, the U.S.S.R., the United States, Saudi Arabia, and China ranked first to fourth, respectively, among producers. Of these, the Soviet Union, which accounted for slightly under 20% of the world total in 1978, advanced its share to nearly 24% in 1983, and similarly the United States advanced from almost 15.5% in 1978 to over 18% in 1983. In contrast, Saudi Arabia, in curtailing oil production in the face of the market glut, recorded a drop in its production share from over 8% to a little above 6% between 1978 and 1983, while China, despite quantitative production increases, registered a decline in its share of over 0.6%. Moving further down the list of producers in terms of their ranking, the United Kingdom and Mexico each registered very substantial gains in shares of the total, these based on increases in crude oil and natural gas production, the former seeking both independence from energy imports and increased export earnings, and the latter striving chiefly for increased export earnings. In contrast, Iran and Iraq, embroiled in their war since 1980, lost both ranking among leading producers and shares of the total. Among others of the top 20 ranked countries, only 3 showed increased shares in the total between 1978 and 1983—Algeria, Australia, and Canada—while 9 registered declines—the Federal Republic of Germany, Indonesia, Kuwait, Libya, the Netherlands, Nigeria, the Republic of South Africa, the United Arab Emirates, and Venezuela. Considering these last 12 countries mentioned (3 with gains, 9 with loses), most of those recording reduced shares of the total were countries in which petroleum and natural gas were the only significant products, and of these, only Algeria showed an increased share of the world total.

From the viewpoint of constant dollar earnings, and again examining only the top 20 ranked countries, 12 showed an increase in value of output between 1978 and 1983, while 8 showed a drop in the value of output. Among the latter, seven were countries in which the petroleum industry was dominant; only the Federal Republic of Germany could be regarded as diversified, and even in its case, the decline was heavily in the energy products area.

Examining the value of world mineral production from the viewpoint of its subdivision between major groups of countries gives the following results:

Country group	Share of total world value of listed commodities (percent)		
	1950	1978	1983
Market economy countries:			
Developed	67.46	30.20	33.71
Developing:			
Organization of Petroleum Exporting Countries (OPEC)	9.98	30.56	22.02
Other	5.99	9.69	11.48
Centrally planned economy countries	16.57	30.55	32.79

The loss suffered by the Organization of Petroleum Exporting Countries (OPEC) is the most significant shift between 1978 and 1983. This reduced those countries' total share of the value of world mineral production to a level below that of 1973 (27.04%). It seems somewhat surprising that the combined figures for the countries of the European Communities (EC) advanced only by 0.4% from the 7.0% level of 1978, when the growth in the United Kingdom, chiefly the result of that country's vastly increased production of crude oil and natural gas, is considered and when gains by Denmark, Greece, Ireland, Italy, and the Netherlands are also considered. However, substantial reduction in the value of crude mineral output in Belgium, France, and the Federal Republic of Germany, coupled with more substantial value increases elsewhere, served to curb the EC's growth.

Finally, examination of the 1983 value total from the viewpoint of its physical geographic distribution by continent indicates that Eastern Europe (including Asiatic U.S.S.R.) assumed first rank, with 26.6% (23.5% in 1978); followed by Asia (including the Near East), with 24.7% (32.0% in 1978); northern North America (Canada and the United States), with 21.1% (18.5% in 1978); Western Europe, with 9.2% (8.3% in 1978); Africa, with 8.4% (9.6% in 1978); Latin America, with 8.3% (6.4% in 1978); and Oceania, with 1.7% (1.7% in 1978). Within the area categorized as "Asia" in the foregoing breakdown, the countries of the Near East, including the several huge crude oil and natural gas producers of the Persian Gulf, accounted for 14.4% of the 1983 total, far under the 21.1% share for these countries in 1978.

COMMODITY DISTRIBUTION OF WORLD MINERAL OUTPUT VALUE

As in the case of the geographic distribution of world mineral output value, the inadequacy of information on unit value of production in the various countries for the various commodities precludes any reliable extrapolation of the various commodities' shares of the totals published for 1983 in Annales des Mines to 1984 or 1985. Therefore, the commodity breakdown of the 1983 total from that source has been included in this chapter as table 3 to provide the most recent reliable measurement of the relative value of the various mineral commodities.

The continued growth in the preeminence of the fuel minerals is immediately evident:

crude oil alone accounted for 58.2% of the 1983 total of the reported commodities (55.6% in 1978), while natural gas and natural gas liquids advanced to 19.4% (13.3% in 1978). In contrast, the aggregate value for all coals accounted for only 12.7% of the 1983 total compared with 17.6% of the 1978 total, this despite a 9% increase in the constant dollar value of the coal mined comparing 1978 results with 1983 results, and an even greater increase in the weight of coal mined in the years cited.

The following tabulation summarizes the shares of total value of listed commodities accounted for by each of the major commodity groups:

Commodity group	1950	1963	1968	1973	1978	1983
Mineral fuels[1]	76.43	76.62	72.91	76.98	87.05	90.80
Metals[1]	19.18	17.98	20.96	18.64	9.32	6.86
Industrial minerals	4.39	5.40	6.13	4.39	3.63	2.34

[1]Uranium is included with mineral fuels rather than with metals.

Table 1.—World production of major mineral commodities[1]

Commodity	1981	1982	1983	1984[p]	1985[e]
METALS					
Aluminum:					
Bauxite, gross weight[2] thousand metric tons	85,347	79,318	78,644	88,173	85,133
Alumina, gross weight do	32,070	27,972	29,514	33,491	31,928
Unalloyed ingot metal do	15,079	13,408	13,910	15,664	15,289
Antimony, mine output, metal content metric tons	57,719	55,503	50,855	54,779	55,012
Arsenic, white[3] do	43,731	43,525	38,527	44,099	45,030
Beryl concentrate, gross weight[3] do	9,624	8,167	9,026	8,925	8,789
Bismuth[4] do	3,748	3,961	3,838	3,817	4,162
Cadmium, smelter do	17,380	16,422	17,527	19,171	18,662
Chromite, gross weight[3] thousand metric tons	9,088	8,188	8,010	9,355	9,935
Cobalt:					
Mine output, metal content metric tons	30,749	24,522	23,719	32,540	36,203
Metal, refined do	25,780	19,251	17,825	23,231	25,598
Columbium-tantalum concentrate[3 5] do	35,637	25,456	21,146	35,755	38,037
Copper:					
Mine output, metal content thousand metric tons	7,777	7,619	7,712	7,995	8,114
Metal:					
Smelter:					
Primary[6] do	7,489	7,381	7,548	7,691	7,615
Secondary[7] do	513	552	595	653	770
Refined:					
Primary[6] do	7,919	7,769	7,990	7,998	8,019
Secondary[7] do	1,259	1,253	1,240	1,137	1,211
Gold, mine output, metal content thousand troy ounces	41,251	43,127	44,996	46,408	48,217
Iron and steel:					
Iron ore, iron ore concentrates, iron ore agglomerates, gross weight thousand metric tons	858,162	780,338	738,058	830,548	858,817
Metal:					
Pig iron do	501,842	457,221	462,856	495,611	503,690
Ferroalloys do	14,363	13,020	12,918	14,665	14,617
Steel, crude do	706,651	643,801	662,794	709,427	714,970
Lead:					
Mine output, metal content do	3,366	3,422	3,359	3,256	3,392
Metal:					
Smelter:					
Primary[6] do	3,126	3,220	3,251	3,180	3,347
Secondary[7] do	2,257	2,076	2,030	2,314	2,223
Refined:					
Primary[6] do	3,119	3,176	3,236	3,157	3,296
Secondary[7] do	2,211	2,044	2,022	2,309	2,221
Magnesium metal, smelter, primary metric tons	308,199	253,620	259,640	326,801	327,044
Manganese ore, gross weight thousand metric tons	23,557	24,223	21,945	23,611	24,423
Mercury, mine output, metal content 76-pound flasks	210,885	197,901	180,800	195,286	196,250

See footnotes at end of table.

Table 1.—World production of major mineral commodities[1] —Continued

Commodity	1981	1982	1983	1984[p]	1985[e]
METALS —Continued					
Molybdenum, mine output, metal content metric tons	108,864	94,953	63,768	97,298	97,586
Monazite concentrate (source of rare-earth metals and thorium) do.	19,972	16,423	26,044	29,226	31,454
Nickel:					
Mine output, metal content thousand metric tons	726	618	667	755	777
Metal, smelter do.	692	578	636	700	710
Platinum-group metals, mine output thousand troy ounces	6,931	6,424	6,525	7,648	7,951
Selenium, smelter[3,5] metric tons	1,285	1,132	1,325	1,351	1,123
Silver, mine output, metal content thousand troy ounces	361,617	382,969	392,038	415,087	412,273
Tellurium, smelter[3,4,5] metric tons	105	102	86	100	98
Tin:					
Mine output, metal content do.	238,008	219,925	196,902	198,432	191,103
Metal, smelter do.	235,931	221,000	199,828	199,669	193,715
Titanium concentrate, gross weight:					
Ilmenite[3,8] thousand metric tons	3,648	3,029	[4]2,674	[4]3,086	[4]3,315
Rutile[3,4] do.	362	339	310	352	365
Titaniferous slag do.	1,129	1,050	1,052	1,143	1,280
Tungsten, mine output, metal content metric tons	50,269	46,921	40,821	46,478	46,989
Uranium oxide, mine output, U_3O_8 content[3,5] do.	51,590	46,380	42,388	42,105	40,410
Vanadium, mine output, metal content do.	34,983	32,771	28,054	31,108	[4]30,540
Zinc:					
Mine output, metal content thousand metric tons	5,919	6,126	6,351	6,564	6,676
Metal, smelter:					
Primary[6] do.	5,757	5,507	5,841	6,106	6,209
Secondary[7] do.	325	359	360	358	358
Zirconium concentrate[4] do.	645	710	675	734	775
INDUSTRIAL MINERALS					
Asbestos do.	4,349	4,036	4,179	4,106	4,111
Barite do.	8,216	7,259	5,427	5,762	6,052
Boron minerals do.	2,558	2,271	2,235	2,517	2,430
Bromine[3] do.	344	383	364	396	379
Cement, hydraulic do.	886,397	887,556	916,363	947,445	971,800
Clays:[3]					
Bentonite[5] do.	6,845	5,201	5,241	5,891	5,666
Fuller's earth[5] do.	1,886	1,974	2,193	2,294	2,453
Kaolin do.	19,796	18,383	19,480	21,186	21,193
Corundum, natural metric tons	22,420	18,795	14,642	14,755	15,245
Diamond:[3]					
Gem[e] thousand carats	10,171	10,243	23,039	26,153	27,155
Industrial[e] do.	29,597	30,188	32,353	37,364	39,216
Total do.	39,768	40,431	55,392	63,517	66,371
Diatomite[3] thousand metric tons	1,694	1,716	1,697	1,754	1,770
Feldspar[3] do.	3,230	3,479	3,631	3,780	3,895
Fluorspar do.	5,095	4,494	4,224	4,781	4,779
Graphite[4] metric tons	588,848	562,390	602,398	621,882	613,929
Gypsum thousand metric tons	76,176	72,436	78,669	78,714	80,939
Iodine metric tons	12,024	12,254	12,540	12,437	12,311
Lime[3] thousand metric tons	116,955	109,193	110,603	113,698	112,066
Magnesite[4] do.	11,320	11,389	11,116	11,904	11,982
Mica[3] do.	240	216	243	276	244
Nitrogen: N content of ammonia do.	76,972	75,868	78,526	84,395	85,549
Perlite do.	1,677	1,660	1,544	1,640	1,631
Phosphate, gross weight:					
Phosphate rock do.	143,001	127,385	139,404	152,488	151,363
Thomas slag do.	3,381	2,825	2,484	2,591	2,715
Guano do.	8	21	7	7	7
Potash, marketable, K_2O equivalent do.	27,075	24,509	27,418	29,348	28,618
Pumice[3,5] do.	12,423	12,198	10,855	11,487	10,986
Salt do.	171,415	163,584	159,151	171,185	169,241
Sodium compounds, n.e.s.:[3]					
Carbonate do.	28,014	26,800	27,831	28,237	28,693
Sulfate do.	4,602	4,381	4,235	4,261	4,216
Strontium minerals[3,5] metric tons	124,555	113,999	137,059	124,499	125,827

See footnotes at end of table.

Table 1.—World production of major mineral commodities[1] —Continued

Commodity	1981	1982	1983	1984[p]	1985[e]
INDUSTRIAL MINERALS —Continued					
Sulfur, elemental basis:					
Elemental[9] thousand metric tons	16,241	13,929	12,699	14,035	15,002
From pyrites do	10,334	9,966	9,941	9,756	10,044
Byproduct[10] do	26,975	26,975	27,890	28,816	29,810
Total do	53,550	50,870	50,530	52,607	54,856
Talc, soapstone, pyrophyllite do	7,269	7,055	7,072	7,576	7,534
Vermiculite[3] [5] metric tons	523,248	508,387	444,215	494,023	503,953
MINERAL FUELS AND RELATED MATERIALS					
Carbon black[3] [5] thousand metric tons	4,179	4,009	4,101	4,561	4,700
Coal:					
Anthracite million metric tons	280	286	295	308	313
Bituminous do	2,557	2,655	2,663	2,815	2,924
Lignite do	996	1,031	1,051	1,099	1,144
Total do	3,833	3,972	4,009	4,222	4,381
Coke:[11]					
Metallurgical thousand metric tons	353,340	338,855	328,982	339,654	344,887
Other do	11,747	11,556	11,662	11,782	11,669
Gas, natural, marketed billion cubic feet	54,955	54,660	54,745	59,357	60,555
Natural gas liquids[3] million 42-gallon barrels	1,350	1,356	1,406	1,545	1,553
Peat thousand metric tons	250,626	257,191	256,068	256,479	256,830
Petroleum:					
Crude million 42-gallon barrels	20,403	19,338	19,212	19,757	19,365
Refined do	21,586	20,918	20,889	21,360	21,168

[e]Estimated. [p]Preliminary.
[1]Incorporates numerous revisions from the table corresponding to this table in previous editions of this chapter. Figures generally conform to those published in appropriate commodity chapters of volume I of the Minerals Yearbook, 1985 edition.
[2]Includes bauxite equivalent of nepheline syenite concentrate and alunite ore produced in the U.S.S.R. (the only producer on record of such materials as a source of aluminum).
[3]Excludes data for China (no adequate basis for estimation available).
[4]Excludes data for the United States (withheld to avoid disclosing company proprietary data).
[5]Excludes data for the U.S.S.R. (no adequate basis for estimation available).
[6]Includes all metal clearly identified as primary as well as all metal that cannot be subdivided clearly between primary and secondary (see footnote 7).
[7]Includes only that metal that is clearly identified as secondary. Some countries do not distinguish between primary and secondary, and for some of these, no basis is available for estimating the breakdown of total production. For such countries, the total has been included under "Primary" (see footnote 6).
[8]Includes leucoxene.
[9]Comprises sulfur produced by the Frasch process plus sulfur mined in the elemental state from ores.
[10]Comprises sulfur recovered from coal gasification, metallurgical operations (except pyrite processing), natural gas, petroleum, tar sands, spent oxides, and gypsum, whether recovered in the elemental state or as a sulfur compound.
[11]Production of coke other than metallurgical by China and the U.S.S.R. is included with "Coke: Metallurgical."

At this point, it should be noted that had the Annales des Mines staff had available to them comprehensive worldwide data on the mineral commodities excluded from their study—most notably the construction materials such as sand and gravel, stone, cement, lime, etc.—and had they then included such data in the study, the shares reported for mineral fuels and for metals would be marginally lower than those just presented, while the shares for industrial minerals would probably more than double. Thus, the foregoing data array tends to belittle the significance of nonmetallics and to somewhat overstate the relative importance of fuel minerals and metals as a result of incomplete data on the nonmetals.

Among the individual commodities examined in the French study, crude petroleum retained first rank. Among the leading commodities, natural gas, third ranked in 1978, displaced that year's second-ranked anthracite and bituminous coal to third rank in 1983; natural gas liquids advanced from fifth rank in 1978 to fourth rank in 1983; and gold moved up from seventh rank in 1978 to fifth rank in 1983. Lignitic coal also moved ahead from 8th rank in 1978 to 7th rank in 1983, and silver advanced from 18th rank in 1978 to 9th rank in 1983. Notable declines were registered between 1978 and 1983 by iron ore (from 4th to 6th), by copper (from 6th to 8th), and by phosphates (from 9th to 11th). Uranium ranked 10th in both years; potash, 12th; and salt, 13th. These 13 commodities collectively accounted for 95% of the total value of 1978 world mineral output and for over 97% of the 1983 total for the commodities included in Callot's study.

Among noteworthy shifts in the commodities of lesser value was the improvement for elemental sulfur from 21st to 15th (this ranking would be higher if the total value of pyrite, which ranked 32d in 1978 and 27th in 1983, were added), the increase of natural sodium carbonate from 31st to 25th, and declines recorded for tin (11th to 18th), lead (from 15th to 23d), tungsten (from 26th to 33d), antimony (from 39th to 46th), and columbite-tantalite (from 42d to 49th).

TRADE

In 1984, the aggregate value of total world international trade in mineral commodities was estimated at $632.3 billion (current dollars), fractionally below the 1983 level and 20.8% below the historic record high set in 1980. Comparable data for 1985 were not available for inclusion in this chapter, but available partial information suggests that the 1985 level probably will prove to be below that registered for 1984, chiefly as the result of declining values for energy commodities. The following tabulation summarizes the development pattern in mineral commodity trade for 1980-84, inclusive, as well as the role of that trade in total commodity trade:

Year	Estimated value of all mineral commodities traded (million current dollars)	Change from previous year (percent)	Mineral commodities' share of all commodities traded (percent)
1980	r$798,600	r+37.4	39.9
1981	r764,600	r-4.3	38.9
1982	r693,800	-9.3	37.5
1983	r632,500	r-8.8	34.9
1984	632,300	-.0	33.2

rRevised.

Table 4, which serves as the basis for the foregoing estimates of total mineral trade that appear in the foregoing tabulation, provides reported data on the value of major mineral commodity groups' trade and total commodity trade for 1980-84. Details on major mineral commodity trade by region, such as that provided in tables 8-10 in the 1976 edition of this chapter, may be obtained for more recent years from the United Nations Monthly Bulletin of Statistics for May 1986.

Table 5 demonstrates the declining share of major mineral commodity trade accounted for by mineral fuels since the recent peak years of 1981 and 1982. Percentage changes in dollar values for the major mineral commodity groups are given in table 6.

CONSUMPTION

NONFUEL MINERAL COMMODITIES

World consumption of iron ore, iron and steel scrap, aluminum, cadmium, and magnesium advanced in 1985 with respect to levels set in 1984, while that of the traditional older major nonferrous metals—copper, lead, and zinc—together with that of nickel, declined. The declines reported for these metals, however, were relatively modest, and 1985 consumption levels for each exceeded those of 1983. In the case of the four nonmetals, for which world consumption is provided in table 7, there were higher consumption levels in 1985 for a second successive year, and for three of the four, the use level increased for a third consecutive year.

In the case of the nonferrous metals, where total world consumption has been separated between market economy countries and centrally planned economy countries, there are differences in the change in consumption levels between the two major country groups, with the centrally planned economy countries recording a marginal downturn in 1985 only in the case of zinc, with tin use on a par with that of 1984. However, higher consumption levels in these countries for copper, lead, and nickel were not sufficiently higher to compensate for reduced use levels among the market economy countries.

These nonferrous metal consumption figures have been reported in this fashion, separating use by the two major country groups both because of this disparate pattern and because there are substantial differences between production estimates for these commodities made for the centrally planned economy countries by the U.S. Bureau of Mines and by Metallgesellshaft AG, the source for these consumption figures. Inasmuch as such production figures are used to calculate the apparent consumption figures that are published, a considerable difference would result in the use level if Bureau production figures were to be substituted for those of Metallgesellschaft. For instance, if the Bureau estimate of aluminum production were substituted, the use of that metal in centrally planned economy countries would be lower by nearly 120,000 tons than that reported in table 7. Similarly, copper consumption would be about 380,000 tons lower, lead consumption would be about 57,000 tons lower, and zinc consumption would be about 200,000 tons lower. It is noteworthy that the disparities in the cases of aluminum and copper have been reduced over those reported in the 1984 edition of this chapter, and that U.S. Bureau of Mines figures and Metallgesellschaft figures for cadmium, magnesium, nickel, and tin ore now are quite close. In the case of zinc, however, the difference between the two agencies' figures has increased.

MINERAL FUEL COMMODITIES

Table 7 also includes data on mineral fuel consumption, with use of each fuel expressed in terms of standard coal equivalent (SCE), so as to make interfuel comparisons clear, as well as to permit their summation so as to make clear the overall trend in energy consumption. From the data, it is evident that overall world energy consumption increased in 1985, despite the decline in growth registered by liquid fuels, with hydro, geothermal, and nuclear electricity advancing by the largest percentage, followed by solid fuels and by natural gas, although in terms of units of SCE, solid fuels made the largest gain, being the dominant energy source recording a gain. It is perhaps noteworthy that although liquid fuel consumption did decline, the amount of the drop was quite modest, with the result that the 1985 level, although smaller than that of 1984, was above the levels of 1983 and 1982 and only fractionally below that of 1981 and 1.4% below the historic high to date of 3,681 million metric tons of SCE set in 1978.

INVESTMENT

Comprehensive world mineral industry investment data do not exist, but limited materials published on aggregates of investment in some elements of the world mineral industry suggest strongly a reduced investment level, at least in market economy countries, in both 1984 and 1985. Steel industry investment in Organization for Economic Cooperation and Development countries are not yet available for 1985 but, as shown in table 8, declined appreciably in 1984 in European Economic Community countries, Japan, and the United States. Although other countries listed in table 8 recorded increases, these increases by smaller steel producers did not offset reductions by the major countries listed. If data for the world steel industry as a whole, including the centrally planned economy countries, were available, the declining trend presumably would be modified in an upward direction, but the absence of comparable information on these countries makes it impossible to ascertain whether the overall trend was up or down, even for 1984, much less for 1985.

Market economy petroleum industry investment as reported by Chase Manhattan Bank, and as presented for 1980-84 in table 7 of the 1984 edition of this chapter, have not been updated by the source in sufficient time for inclusion here; thus, no table similar to that appearing in the 1984 edition has been included this year. Considering the plight of the petroleum industry, however, it would seem highly unlikely that the 1985 investment level reached even the $115,150 million level of 1984. With the oil industry, as with the steel industry, it is also almost assured that the investment rate in centrally planned economy countries exceeded that of the market economy countries.

The limited data presented on U.S. foreign investment in mineral industry activities in table 8 of the 1984 edition of this chapter have been further reduced by the omission of results of "mining" in the areas of "reinvested earnings" and "equity and intercompany account flows" as can be seen in table 8 of this chapter. Further, data for prior years have been significantly altered by the source agency. Thus, data presented this year are not fully comparable to the historic series.

TRANSPORTATION

MARINE TRANSPORT

Bulk carriers, freighters, and tankers are the three classes of vessels engaged in transporting mineral commodities. It should be noted that vessels in each of the three categories are not devoted wholly to mineral commodity transport. Bulk carriers move agricultural products as well as crude minerals and mineral fertilizers, while freighters, because of their great variety, can be devoted wholly to hauling mineral products or wholly to moving nonmineral goods, as well as carrying mixed mineral and nonmineral cargoes. Tankers, although largely engaged in moving crude oil and refinery products, also transport liquid chemicals, molasses, whale oil, and wine.

Although physical characteristics of vessels—size, draft, age, crew requirements, type of propulsion system, etc.—as well as fuel costs have an undeniable influence on shipping industry performance, problems of and changes in the quantity and type of material moved also significantly affect the shipping sector of the world economy. Unfortunately, comprehensive data in this regard are not available.

Bulk Carriers.—During 1985, the world's bulk carrier fleet increased relative to that of 1984 by 227 vessels, compared with vessel increases of 176 and 169 in 1984 and 1983, respectively, a 4.1% increase in the number of vessels. Again in 1985, as in the past 5 years, there was an increase in the total deadweight tonnage of bulk carriers. The following tabulation shows the distribution of the bulk carrier fleet of the world for 1985:

Country of registry	Number of vessels	Deadweight tonnage (thousand long tons)[1]
Liberia	764	40,072
Panama	952	31,683
Greece	760	26,943
Japan	497	25,535
Korea, Republic of	176	7,264
Norway	90	6,212
China	180	5,954
Philippines	153	5,724
Italy	102	5,406
Cyprus	168	5,320
U.S.S.R	221	5,222
India	116	5,093
United Kingdom	96	4,924
Brazil	90	4,677
Taiwan	68	4,040
Singapore	83	3,985
Belgium	33	2,506
Romania	64	2,446
Spain	79	2,396
France	38	2,351
Poland	90	2,277
Turkey	58	2,072
Yugoslavia	63	1,922
Malta	58	1,602
Australia	31	1,518
Other	757	28,689
Total	5,787	235,833

[1]Erroneously labeled as "thousand metric tons" in the 1984 Minerals Yearbook.

Freighters.—The world's freighter fleet decreased again in 1985 with 82 vessels less than in 1984. In contrast to the decrease in the number of vessels, both the average gross and the average deadweight tonnages again increased. The following tabulation shows the distribution of the freighter fleet of the world for 1985:

Country of registry	Number of vessels	Deadweight tonnage (thousand long tons)[1]
Panama	2,068	18,123
U.S.S.R.	1,793	11,967
Greece	733	8,112
United States	417	7,353
China	692	7,024
Japan	633	6,280
Liberia	386	4,818
Germany, Federal Republic of	414	3,789
Cyprus	451	3,324
Singapore	298	3,292
United Kingdom	206	2,853
Netherlands	363	2,491
India	108	2,357
Yugoslavia	186	1,859
Taiwan	127	1,845
France	138	1,840
Denmark	159	1,816
Korea, Republic of	240	1,778
Italy	230	1,580
Poland	184	1,570
Other	4,111	32,471
Total	13,937	126,542

[1]Erroneously labeled as "thousand metric tons" in the 1984 Minerals Yearbook.

Tankers.—During 1985, the world's tanker fleet decreased by 26 vessels, and the average gross and the average deadweight tonnages decreased by 3.2% and 4%, respectively. The following tabulation presents the distribution of the tanker fleet of the world for 1985:

Country of registry	Number of vessels	Deadweight tonnage (thousand long tons)[1]
Liberia	694	74,137
Japan	468	28,456
Greece	309	21,978
Panama	565	19,685
United States	258	15,535
Norway	182	13,406
United Kingdom	227	12,407
France	86	8,850
Bahamas	58	7,649
U.S.S.R.	448	7,546
Cyprus	91	6,657
Italy	227	5,969
Spain	101	5,733
Denmark	79	4,382
Singapore	97	3,915
Brazil	83	3,723
Saudi Arabia	65	3,356
Netherlands	69	3,250
Other	1,349	45,711
Total	5,456	292,345

[1]Erroneously labeled as "thousand metric tons" in the 1984 Minerals Yearbook.

Since the historic peak in 1977, there has been a steady decline of the overall size of the world's tanker fleet, measured in terms of the deadweight tonnage. In conjunction with this decline, there has also been a steady decrease in the size of the tankers. In 1979, the historic peak for the size of tankers, vessels with a deadweight tonnage of over 200,000 tons, accounted for 57.7% of the total deadweight tonnage in tankers. This figure has declined in each year since, falling to 48.9% in 1985. As the total deadweight tonnage has decreased for ships over 200,000 tons, the percentage of ships under 200,000 tons has steadily increased, as shown in the following tabulation, which is based on data published on page 20 in the British Petroleum Co. PLC annual publication, BP Statistical Review of World Energy, June 1986.

Size group (deadweight long tons)[1]	Percent of total				
	1981	1982	1983	1984	1985
10,000-25,000	4.3	[r]4.4	4.6	4.7	5.0
25,000-45,000	8.1	9.0	9.7	9.8	10.5
45,000-65,000	5.2	5.3	5.4	5.8	6.1
65,000-125,000	17.3	17.1	17.1	17.1	18.0
125,000-200,000	9.7	9.9	10.2	10.7	11.5
200,000-320,000	45.8	[r]44.3	42.5	41.4	38.4
320,000 and over	9.6	10.0	10.5	10.5	10.5

[r]Revised.
[1]Erroneously labeled as "thousand metric tons" in the 1984 Minerals Yearbook.

The same source shows that there was a significant increase in the deadweight tonnage of tankers scrapped in 1985, a new high of 26.5 million tons or 50.6% more than was scrapped during 1984 and 12.8% more than was scrapped during 1983, the previous peak year. Again in 1985, as in every year since 1980, the vast majority of the total of 26.5 million deadweight tons scrapped, 73.1%, was accounted for by vessels over 160,000 deadweight tons, an increase of 73.9% over the tonnage in this size scrapped in 1984. The deadweight tonnage of tankers under construction and on order at yearend 1985 totaled 11.6 million tons, of which 4.5 million tons was in vessels of 65,000 to 125,000 tons, 2.6 million tons was in vessels of 200,000 to 320,000 tons, 2.4 million tons was in vessels of 25,000 to

45,000 tons, 1.1 million tons was in vessels of 45,000 to 65,000 tons, 0.9 million tons was in vessels of 10,000 to 25,000 tons, and 0.2 million tons was in vessels of 125,000 to 200,000 tons.

OCEAN FREIGHT RATES

Data on ocean freight rates, last published by the United Nations in their Monthly Bulletin of Statistics for December 1984, was updated in the December 1985 issue of that periodical through the third quarter of 1985. In overview, the dry cargo rates, which on average fell slightly in 1983 from 1982 levels, edged upward again in 1984, and then moved generally downward through the three reported quarters of 1985. For example, the United Kingdom (British Shipping) time charter average index (1976=100) stood at 107 for 1982, slumped to 98 for 1983, advanced to 105 for 1984, and dropped from 106 for January 1985 to only 82 for September 1985, averaging 94 for the first 9 months of that year. By way of comparison, the Norway (Norwegian Shipping News) time charter average index (1970=100) was recorded as follows: 1982, 171; 1983, 160; 1984, 150; January 1985, 176; September 1985, 149; and the average for January-September 1985, inclusive, was 151.

Norwegian tanker rate indexes, which are divided into five classes (according to vessel size and the cargo handled), generally showed the same pattern noted for dry cargo. The tanker rate indexes were down from 1982 to 1983, up slightly in 1984, and then down across the months of 1985 that were reported—while those for the larger vessels edged upward over those of 1982 through 1984, but recorded drops across the three quarters of 1985. In the latter case, the declines were not so large as to reduce the average for the months of 1985 available to levels below those of 1982.

PANAMA AND SUEZ CANALS

Data on 1985 mineral commodity shipments through the Panama Canal were not available in time for inclusion in this chapter, but data on 1984 shipments showed that the total shipments of mineral commodities remained at about the same level as in 1983, as shown in the following tabulation:

	Fiscal year[1]				
	1980	1981	1982	1983	1984
Number of transits:					
Commercial ocean traffic	13,507	13,884	14,009	11,707	11,230
Other traffic	1,218	1,166	1,262	1,247	1,293
Total	14,725	15,050	15,271	12,954	12,523
Cargo moved (thousand metric tons):					
Commercial ocean traffic:					
Mineral commodities	99,520	99,969	r111,468	r72,229	72,213
Other commodities	70,379	74,001	r76,961	r75,698	70,512
Subtotal	169,899	173,970	188,429	147,927	142,725
Other traffic	403	308	291	364	336
Total	170,302	174,278	188,720	148,291	143,061

r Revised.
[1] Year ending Sept. 30 of that stated.

In fiscal year 1984, mineral commodities accounted for 50.6% of all commercial traffic through the Panama Canal, a figure slightly higher than the 48.8% (revised) recorded for 1983 but still lower than the level for the past several years. Table 11 distributes mineral commodity trade through the canal during 1982-84 by major group.

In terms of major mineral commodity groups, fuels remained dominant in 1984 but were only 57.2% of the total, compared with 62.8% (revised) of the total in 1983 and 74.4% in 1982. Metallic commodities remained in second place, accounting for 22.4% of total mineral commodity tonnage (18.5% in 1983), with industrial minerals again ranking third with 20.3% (18.6% (revised) in 1983). Steel semimanufactures were the dominant single metals class; fertilizer materials remained the overwhelmingly dominant industrial minerals class; refined petroleum became the dominant fuel commodity. The rise in the level of total mineral commodity trade was chiefly the result of lower total commercial cargo coupled with increases in metal commodity trade of 21% and nonmetallic commodity trade of 9% compared with those of 1983.

For greater detail on mineral movements through the Panama Canal, including direction of movements to and from the canal, the reader is referred to the Panama Canal Annual Report.

In contrast to the previous 2 years, the Suez Canal showed a decline in mineral commodity trade in 1985, while the movements of other commodities continued to increase, as shown in the following tabulation:

	1982	1983	1984	1985
Number of transits:				
Commercial ocean traffic	21,398	21,026	r20,157	18,654
Other traffic	1,147	1,198	r1,204	1,137
Total	22,545	22,224	21,361	19,791
Cargo moved (thousand metric tons):				
Commercial ocean traffic:				
Mineral commodities	136,267	r153,999	r159,020	149,833
Other commodities	95,126	r102,706	r104,708	107,763
Total	231,393	256,705	263,728	257,596

rRevised.

In 1985, mineral commodities accounted for 58.2% of all commercial traffic through the Suez Canal, a drop of 5.8% from the amount transited during 1984.

Table 12, which distributes mineral commodity trade through the Suez Canal by commodity and by direction, shows that the fuels remained the single largest major group of mineral commodities moved through the canal, with the metals group ranking second and the industrial minerals group ranking third. As in past years, iron ore was the most significant component of the metallic commodity group while fertilizer materials ranked first among the industrial minerals, as remained the case for the Panama Canal. Significant decreases were registered during 1985 in the amount of cement moved (down 50.4%) and crude petroleum (down 11.1%). Greater detail on Suez Canal mineral shipments can be found in the Suez Canal Annual and Monthly Reports.

OVERLAND TRANSPORT

Limitation of time and inadequacy of comparable data have precluded comprehensive assessment of overland international transportation of mineral commodities, whether by rail or by pipeline. International large-scale rail shipments of mineral commodities were confined chiefly to those movements from Canada and Mexico to the United States and to transfers of mineral commodities within European countries south of the Baltic. Notable exceptions continued to be the shipment of large quantities of iron ore from Sweden to Narvik, Norway, for loading on vessels for export through that port, and to the flow of a variety of minerals from several southern African nations across the Republic of South Africa for export through that country's ports.

Major international pipeline movements of oil and natural gas in 1985, generally speaking, were confined to the same areas cited as centers of rail movement of mineral commodities. Noteworthy here, perhaps, was the continued operation of the pipelines for both oil and gas from the U.S.S.R. into the other centrally planned economy countries of Europe and on into some market economy countries of that continent. Pipeline movement of crude oil from the Persian Gulf fields to the eastern Mediterranean, and of natural gas from Iran to the U.S.S.R. remained impossible because of the political and military situation in that part of the world.

Information on rail and pipeline transport of mineral commodities within certain individual countries is provided in the appropriate country chapter.

PRICES

Comprehensive data on market prices for crude minerals and mineral products for the entire world are not available, and even the data that do exist are often not comparable between countries, particularly between market economy countries and centrally planned economy countries. However, those prices that are regularly published for selected commodities in major market areas can be regarded as indicative of general world price trends. Tables 13, 14, and 15 summarize prices for selected metals in the United States, the United Kingdom, and Canada, respectively, for 1981-85, inclusive, with monthly data provided for 1985. All three markets generally recorded price drops comparing 1985 annual averages with those for 1984 for most of the metals shown. For example, out of the eight metals listed for the United States, only aluminum did not register an actual current dollar price decline, remaining constant at $0.81 per pound throughout 1985, just as it had during 1984, but when this is viewed against the small but nonetheless present inflation, there has been a reduction in the constant dollar inflation-adjusted price for this important material. The average price of copper in 1985 was fractionally above that of 1984, both in the United Kingdom and in Canada, but the increases were hardly sufficient to compensate for inflation, much less adequate to provide any increase in profit margin for producers. Nickel on the Canadian market showed no current dollar price increase, but as with the U.S. aluminum price, there was no adjustment for inflation. Other United Kingdom prices were down, except for tin, but in the case of this commodity, there were no prices quoted for the final 2 months, and had there been, they might well have dropped the 1985 average to a level below that of 1984.

Shifting to major industrial minerals, contract prices for sulfur generally were $5.00 to $10.00 higher per ton, on average, in the second half of 1985 than in the first half, ranging from $135 to $140 for Canadian sulfur, f.o.b. Vancouver, to $150 to $155 for Polish sulfur, f.o.b. Gdánsk, with U.S. sulfur, f.o.b. gulf coast ports, about equal to the Canadian material. In contrast, major fertilizer materials prices trended downward. Urea, with export prices in the range of $165 to $190 per ton at yearend 1984, fell to the levels of $85 to $110 per ton by yearend 1985, roughly paralleling the drop in ammonia export prices from $165 to $190 per ton at yearend 1984 to $125 to $150 per ton at yearend 1985. Potassium chloride's yearend 1984 prices of $84 per ton held constant through June, and then declined, with a small upturn in August, to $75 to $76 per ton at yearend. Phosphatic materials fared slightly better. The export price for phosphoric acid, at about $300 per ton at yearend 1984, dropped below $250 per ton in August 1985, but recovered to $300 per ton at yearend, while the triple superphosphate price, slightly under $125 per ton at yearend 1984, dropped to $115 per ton during the summer, but advanced to the range of $130 to $135 per ton by yearend 1985.

Comparison of the average per barrel prices for crude oils as of January 1, 1985, with those of January 10, 1986, as computed by the U.S. Department of Energy, shows a decline of $0.67 per barrel for OPEC crudes from $28.43 to $27.76, and of $2.28 per barrel for non-OPEC crudes from $28.16 to $25.88, producing a world average decline of $1.31 per barrel, from $28.33 to $27.02. Moreover, these prices do not take into account spot prices, some of which reportedly ranged as low as $18.75 per barrel. Comparison of 1985 prices for a number of specific grades of crude oil with those for 1984 show a general pattern of downturn, as could be expected from the glutted world markets; a few showed marginal increases, but even these gains were less than the annual inflation rate.

STATISTICAL SUMMARY OF WORLD PRODUCTION AND TRADE OF MAJOR MINERAL COMMODITIES

The final 24 tables of this chapter, tables 16-39, extend the statistical series on production that was started in the 1963 edition of the International Area Reports volume of the Minerals Yearbook and was subsequently updated and expanded in the 1965 and 1976-84 editions. They are primarily a supplement to other statistical data within this chapter but also serve as a summary of international production data for major mineral commodities covered in greater detail, on a commodity basis, in volume I of the 1985 Minerals Yearbook and on a country basis in volume III.

In this edition, the data presented in these tables, in most instances, correspond with the data in the individual commodity world production tables appearing in volume I and may differ somewhat from a total that might be obtained by adding figures presented for any single commodity in each of the country chapters of volume III. This apparent disparity results from problems of scheduling the compilation of tables in the numerous commodity and country chapters in the two volumes. In an effort to provide the user with the most up-to-date information possible, data received after completion of worldwide commodity production tables (volume I) have been included in many of the individual country production tables (volume III). Limitations of time, however, have prevented the incorporation of these revisions in the abbreviated versions of the world commodity tables included here. Thus, a more precise figure for total world production of any commodity could be obtained by adding figures presented in the individual country chapters. For summary purposes, however, it is felt that tables 16-39 of this chapter are sufficiently correct without the inclusion of these generally minor revisions.

The series of data on world trade in major mineral commodities that appeared in earlier editions of this chapter (tables 57-69 in the 1976 edition) could not be included owing to scheduling problems.

[1]Senior foreign mineral specialist, Division of International Minerals.
[2]Chief, Branch of Geographic Data, Division of International Minerals.
[3]Callot, F. Production et consommation mondiales de minerais en 1983. Annales des Mines, Nos. 7, 8, 9, July-Aug.-Sept. 1985, pp. 3-123.
[4]Table 1 contains 100 data lines, but 3 of these are totals of others; these total lines are not included in the total of 97 distinct commodities or forms of commodities counted here.

Table 2.—Geographic distribution of world crude mineral production value, by country

Country	Value of production[1] (million 1983 U.S. dollars)			Country's share of total[2] (percent)			Country's rank among world producers[3]		
	1950	1978	1983	1950	1978	1983	1950	1978	1983
U.S.S.R.	11,829.5	145,493.1	221,272.7	11.43	19.96	23.78	2	1	1
United States (including Puerto Rico)	40,681.8	112,758.5	167,643.7	39.31	15.47	18.02	1	2	2
Saudi Arabia[4]	1,391.2	59,956.1	57,125.7	1.34	8.22	6.14	13	3	3
China	1,161.1	46,230.0	53,280.2	1.12	6.34	5.73	16	4	4
United Kingdom	6,020.7	18,860.3	37,567.4	5.82	2.59	4.04	3	7	5
Mexico	1,408.3	11,256.5	31,875.4	1.36	1.54	3.43	12	18	6
Canada	2,807.1	22,482.4	28,762.3	2.71	3.08	3.09	6	6	7
Iran	1,637.8	38,207.1	25,788.2	1.58	5.24	2.77	10	5	8
Indonesia	731.3	13,797.2	17,410.8	.71	1.89	1.87	20	15	9
Venezuela	5,206.8	15,846.9	16,875.8	5.03	2.17	1.81	4	10	10
Australia	1,123.3	11,211.7	15,022.8	1.08	1.54	1.61	17	19	11
South Africa, Republic of	2,148.6	12,381.3	14,780.0	2.08	1.70	1.59	9	17	12
Algeria	85.4	10,400.2	14,741.5	.08	1.43	1.58	51	20	13
United Arab Emirates	--	13,874.2	13,709.8	--	1.90	1.47	--	14	14
Nigeria	76.0	15,165.0	13,656.8	.07	2.08	1.47	53	12	15
Libya	--	16,329.3	13,291.8	--	2.24	1.43	--	9	16
Germany, Federal Republic of	5,185.9	15,295.0	12,735.8	5.01	2.10	1.37	5	11	17
Iraq	333.8	18,367.7	12,564.1	.32	2.52	1.35	32	8	18
Kuwait[4]	745.7	14,933.5	11,754.1	.72	2.05	1.26	19	13	19
Netherlands	428.0	9,814.5	10,514.3	.41	1.35	1.13	27	21	20
Norway	64.6	4,223.2	10,459.7	.06	.58	1.12	55	24	21
Poland	2,240.1	12,581.0	9,113.1	2.16	1.73	.98	8	16	22
India	1,322.3	3,558.2	8,986.0	1.28	.49	.97	15	29	23
Egypt	168.0	3,626.2	8,041.5	.16	.50	.86	45	28	24
Romania	324.8	4,540.7	7,459.0	.31	.62	.80	33	22	25
Brazil	174.2	3,528.1	7,243.8	.17	.48	.78	44	30	26
Argentina	258.1	3,694.8	6,616.0	.25	.51	.71	36	26	27
Malaysia	443.8	2,848.5	4,913.0	.43	.39	.53	26	31	28
German Democratic Republic	650.1	4,051.3	4,576.9	.63	.56	.49	22	25	29
Oman	--	2,305.8	4,444.3	--	.32	.48	--	36	30
Qatar	85.7	3,649.2	3,886.4	.08	.50	.42	50	27	31
Peru	363.9	2,750.3	3,625.1	.36	.38	.39	30	33	32
France	2,595.5	4,326.0	3,620.0	2.51	.59	.39	7	23	33
Chile	991.7	2,803.6	3,049.1	.96	.38	.33	18	32	34
Brunei	278.4	2,000.8	2,939.0	.27	.27	.32	35	38	35
Ecuador	37.9	1,432.6	2,441.6	.04	.20	.26	66	44	36
Spain	549.2	1,772.5	2,348.0	.53	.24	.25	24	41	37

See footnotes at end of table.

Table 2.—Geographic distribution of world crude mineral production value, by country —Continued

Country	Value of production[1] (million 1983 U.S. dollars)			Country's share of total[2] (percent)			Country's rank among world producers[3]		
	1950	1978	1983	1950	1978	1983	1950	1978	1983
Yugoslavia	305.3	1,795.7	2,262.9	0.30	0.25	0.24	34	40	38
Trinidad and Tobago	198.4	2,024.5	2,217.3	.19	.28	.24	40	37	39
Czechoslovakia	664.6	2,631.3	2,182.0	.64	.36	.23	21	35	40
Italy	236.7	1,365.7	2,029.5	.23	.19	.22	38	47	41
Angola	24.0	1,430.6	1,893.0	.02	.20	.20	73	45	42
Gabon	7.3	1,772.0	1,796.1	.01	.24	.19	87	42	43
Korea, North	42.1	2,684.3	1,773.1	.04	.37	.19	63	34	44
Hungary	139.3	1,274.5	1,670.9	.13	.17	.18	47	48	45
Syria	--	1,272.8	1,570.8	--	.17	.17	--	49	46
Japan	1,333.3	1,888.0	1,524.6	1.29	.26	.16	14	39	47
Colombia	407.1	1,378.5	1,318.4	.39	.19	.14	29	46	48
Zaire	567.6	1,449.8	1,301.3	.55	.20	.14	23	43	49
Tunisia	65.7	886.2	1,262.0	.06	.12	.14	54	56	50
Cameroon	(5)	79.6	1,218.4	(5)	.01	.13	(5)	97	51
Turkey	215.0	1,193.4	1,177.4	.21	.16	.13	39	51	52
Pakistan	24.3	477.1	1,138.9	.02	.07	.12	72	68	53
Korea, Republic of	32.2	1,026.4	994.7	.03	.14	.11	67	54	54
Philippines	100.0	789.1	956.6	.10	.11	.10	49	58	55
Greece	(5)	538.8	888.3	(5)	.07	.10	(5)	66	56
Congo	2.3	346.3	886.7	(6)	.05	.10	96	72	57
Namibia	150.9	972.3	876.7	.15	.13	.09	46	55	58
Bahrain	101.1	529.3	870.2	.10	.07	.09	48	67	59
Bolivia	361.1	1,052.0	840.9	.35	.14	.09	31	53	60
Zambia	504.2	1,195.6	788.1	.49	.16	.08	25	50	61
Morocco	248.0	(7)1,099.8	(7)735.5	.24	(7).15	(7).08	37	(7)52	(7)62
Bulgaria	23.5	641.1	685.8	.02	.09	.07	75	61	63
Austria	183.3	872.6	634.7	.18	.12	.07	42	57	64
Botswana	(5)	237.6	621.4	(5)	.03	.07	(5)	78	65
Sweden	420.4	674.4	601.3	.41	.09	.06	28	59	66
Thailand	84.1	654.8	508.0	.08	.09	.05	52	60	67
New Guinea	11.5	571.3	498.5	.01	.08	.05	81	64	68
New Zealand	43.1	269.5	494.6	.04	.04	.05	61	76	69
Denmark	9.2	69.8	479.5	.01	.01	.05	85	101	70
Other[8]	3,429.7	7,506.5	7,576.3	3.33	1.03	.81	XX	XX	XX
Total[9]	103,485.9	729,004.5	930,410.1	100.00	100.00	100.00	XX	XX	XX

XX Not applicable.

[1]Values are as reported in source except that the value assigned therein to Puerto Rico has been added to that for the United States, and the values assigned therein for Abu Dhabi, Dubai, and Sharjah have been combined under the heading "United Arab Emirates."

[2]Percentages are as reported in source except for inclusion of that for Puerto Rico with that for the United States and for the summation of the percentages for Abu Dhabi, Dubai, and Sharjah under the heading "United Arab Emirates." Some percentages differ slightly from percentages calculated from corresponding value data in this table because of rounding of value data.

[3]Rankings are as reported in source except for the adjustments necessary to correspond with the grouping of Abu Dhabi, Dubai, and Sharjah under the heading "United Arab Emirates."

[4]Includes allowance for production in the Kuwait-Saudi Arabia Partitioned Zone.

[5]Not reported separately in source; included with "Other."

[6]Less than 0.005 percent.

[7]Includes former Spanish Sahara.

[8]Values and percentages derived by difference between the sum of figures for individually listed countries above and totals reported in source; for this reason, percentages given may not be calculable from listed values.

[9]Data may not add to totals shown because of independent rounding.

Source: Annales des Mines, July-Sept. 1985, pp. 22-23.

Table 3.—Commodity distribution of world crude mineral production value

Commodity	Value of production (million 1983 U.S. dollars)			Commodity's share of total (percent)[1]			Commodity's rank among listed commodities		
	1950	1978	1983	1950	1978	1983	1950	1978	1983
Petroleum, crude	34,979.0	406,422.4	541,606.5	33.81	55.79	58.21	2	1	1
Gas, natural	1,879.0	81,263.1	149,451.0	1.82	11.15	16.06	6	3	2
Coal, anthracite and bituminous	39,129.1	118,506.3	105,514.0	37.82	16.27	11.34	1	2	3
Natural gas liquids	1,669.7	13,950.8	31,490.1	1.61	1.91	3.38	7	5	4
Gold	3,927.5	11,490.0	19,078.9	3.80	1.58	2.05	5	7	5
Iron ore	4,775.0	17,654.0	14,360.6	4.62	2.42	1.54	3	4	6
Coal, lignite	1,429.3	10,425.1	12,756.7	1.38	1.43	1.37	10	8	7
Copper	3,946.0	13,145.0	10,712.1	3.81	1.80	1.15	4	6	8
Silver	523.3	2,812.9	4,554.3	.51	.39	.49	15	18	9
Uranium	--	4,055.1	4,014.3	--	.56	.43	--	10	10
Phosphates	515.7	4,610.9	3,695.0	.50	.63	.40	16	9	11
Potash	623.9	3,796.0	2,989.7	.60	.52	.32	14	12	12
Salt	728.2	3,721.8	2,810.5	.70	.51	.30	13	13	13
Zinc	1,512.0	2,917.7	2,660.9	1.46	.40	.29	9	16	14
Sulfur	428.5	1,964.0	2,575.0	.41	.27	.28	17	21	15
Diamond	355.3	3,054.8	2,549.3	.34	.42	.27	19	14	16
Nickel	354.0	2,331.1	2,508.9	.34	.32	.27	20	20	17
Tin	1,287.7	3,822.5	2,131.1	1.24	.53	.22	11	11	18
Bauxite	208.9	2,015.2	1,846.4	.20	.28	.20	24	19	19
Platinum-group metals	130.5	1,779.5	1,708.1	.13	.24	.18	28	22	20
Asbestos	395.1	2,915.4	1,462.5	.38	.40	.16	18	17	21
Kaolin	231.2	1,238.8	1,271.0	.22	.17	.14	22	25	22
Lead	1,591.0	3,043.8	1,270.4	1.54	.42	.14	8	15	23
Manganese	788.7	1,369.6	771.1	.76	.19	.083	12	24	24
Sodium carbonate, natural	38.2	580.1	626.8	.037	.08	.067	41	31	25
Borates	65.6	685.7	608.7	.063	.094	.065	36	28	26
Pyrite	169.1	564.9	586.9	.16	.078	.063	26	32	27
Molybdenum	116.6	1,537.8	506.4	.11	.211	.054	31	23	28
Magnesite	67.6	600.9	471.9	.065	.082	.051	34	30	29
Talc and related materials	93.9	611.1	453.5	.091	.084	.049	32	29	30
Fluorspar	129.3	523.0	409.7	.13	.072	.044	29	33	31
Chromite	209.3	948.3	392.2	.20	.13	.042	23	27	32
Tungsten	180.2	1,198.2	363.3	.17	.164	.039	25	26	33
Bentonite	72.3	388.2	293.8	.07	.053	.032	33	36	34
Barite	66.8	345.3	246.0	.065	.047	.026	35	37	35
Vanadium	6.5	420.1	235.4	.006	.058	.025	48	35	36
Cobalt	52.9	428.7	197.9	.051	.059	.021	37	34	37
Feldspar	19.5	125.4	159.2	.019	.017	.017	44	41	38
Sodium sulfate, natural	31.0	116.5	157.1	.030	.016	.017	43	43	39
Ilmenite	46.2	181.6	156.2	.045	.025	.016	38	38	40
Mica	151.2	153.0	151.0	.146	.021	.016	27	40	41
Graphite	31.4	95.7	112.6	.030	.013	.012	42	45	42
Zircon	5.7	88.1	87.3	.006	.012	.009	49	46	43
Rutile	9.6	110.6	78.1	.009	.015	.008	46	44	44
Nitrates, natural only	256.6	65.8	69.7	.250	.009	.007	21	47	45
Antimony	123.4	164.0	62.3	.12	.023	.007	30	39	46
Mercury	43.8	37.9	56.4	.042	.005	.006	39	50	47
Asphalt, natural	39.8	53.6	55.7	.038	.007	.006	40	48	48
Columbite and tantalite	--	120.2	42.7	--	.016	.004	--	42	49
Kyanite and related materials	--	42.5	38.9	--	.006	.004	--	49	50
Cryolite	11.1	3.3	2.0	.011	(2)	.002	45	51	51
Beryl	7.6	NA	NA	.007	NA	NA	47	NA	NA
Total[3]	103,453.8	728,496.3	930,410.1	100.000	100.000	100.000	XX	XX	XX

NA Not available. XX Not applicable.

[1]Percentages as reported in source; some differ slightly from percentages calculated from corresponding value data in this table because of rounding of value data.

[2]Less than 0.001 percent.

[3]Data may not add to totals shown because of independent rounding.

Source: Annales des Mines, July-Sept. 1985, p. 10.

Table 4.—Value of world export trade in major mineral commodity groups[1]

(Million U.S. dollars)

Commodity group	1980[r]	1981[r]	1982[r]	1983[r]	1984
Metals:					
All ores, concentrates, scrap	31,804	28,187	24,220	23,176	25,285
Iron and steel	75,667	73,419	68,461	61,040	65,869
Nonferrous metals	49,907	36,279	31,890	36,869	36,823
Total	157,378	137,885	124,571	121,085	127,977
Nonmetals, crude only	11,748	10,956	9,919	9,326	9,889
Mineral fuels	481,725	474,266	430,963	385,096	377,487
Grand total	650,851	623,107	565,453	515,507	515,353
All commodities	2,001,958	1,965,890	1,848,326	1,813,478	1,907,244

[r]Revised.

[1]Data presented are for selected major commodity groups of the Standard International Trade Classification, Revision 2 (SITC-R2) and as such exclude some mineral commodities classified in that data array together with other (nonmineral) commodities. SITC-R2 categories included are as follows: All ores, concentrates, and scrap—Div. 28; iron and steel—Div. 67; nonferrous metals—Div. 68; nonmetals (crude only)—Div: 27; and mineral fuels—Div. 3. Major items not included are the metals, metalloids, and metal oxides of Group 513; mineral tar and other coal, petroleum, and gas-derived crude chemicals of Div. 52; manufactured fertilizers of Div. 56; and nonmetallic mineral manufactures of Groups 661, 662, 663, and 667. Data include special category exports, ship stores and bunkers, and other exports of minor importance, and exclude the intertrade of the centrally planned economy countries of Asia and trade between the Federal Republic of Germany and the German Democratic Republic.

Source: United Nations. Monthly Bulletin of Statistics. V. 40, No. 5, May 1986, pp. xxxiv-lxi.

Table 5.—Distribution of value of world export trade in major mineral commodity groups[1]

(Percent)

Commodity group	1980[r]	1981[r]	1982[r]	1983[r]	1984
Metals:					
All ores, concentrates, scrap	4.9	4.5	4.3	4.5	4.9
Iron and steel	11.6	11.8	12.1	11.8	12.8
Nonferrous metals	7.7	5.8	5.6	7.2	7.1
Total	24.2	22.1	22.0	23.5	24.8
Nonmetals, crude only	1.8	1.8	1.8	1.8	1.9
Mineral fuels	74.0	76.1	76.2	74.7	73.2

[r]Revised.

[1]For detailed definition of groups, see footnote 1, table 4.

Table 6.—Growth of value of world export trade in major mineral commodity groups[1]

(Percent change from that of previous year)

Commodity group	1980[r]	1981[r]	1982[r]	1983[r]	1984
Metals:					
All ores, concentrates, scrap	+35.0	-11.4	-14.1	-4.3	+9.1
Iron and steel	+7.5	-3.0	-6.8	-10.8	+7.9
Nonferrous metals	+33.9	-27.3	-12.1	+15.6	- .1
All metals	+20.1	-12.4	-9.7	-2.8	+5.7
Nonmetals, crude only	+22.4	-6.7	-9.5	-6.0	+6.0
Mineral fuels	+44.6	-1.5	-9.1	-10.6	-2.0
All major mineral commodity groups	+37.4	-4.3	-9.3	-8.8	0.0
All commodities	+22.3	-1.8	-6.0	-1.9	+5.2

[r]Revised.

[1]For detailed definition of groups, see footnote 1, table 4.

Table 7.—World consumption of selected mineral commodities

(Thousand metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984	1985[p]
Ferrous metals: World:					
Iron ore, gross weight[e] million metric tons	862	776	780	870	895
Iron and steel scrap, gross weight do	[r]318	[r]288	[r]297	313	[e]330
Nonferrous metals:					
Market economy countries:					
Aluminum, refined	11,196	10,803	[r]12,008	12,485	12,744
Cadmium	13	13	14	14	14
Copper, refined	[r]7,252	[r]6,771	[r]6,821	7,551	7,223
Lead, refined	[r]3,803	[r]3,782	[r]3,783	3,936	3,892
Magnesium, primary	179	166	177	193	198
Nickel[1]	476	456	[r]486	578	537
Tin, refined	172	159	160	172	167
Zinc, slab	4,274	[r]4,166	[r]4,527	4,645	4,578
Centrally planned economy countries:					
Aluminum, refined	3,283	3,308	[r]3,317	3,323	3,457
Cadmium	4	4	4	4	5
Copper, refined	2,273	[r]2,271	[r]2,262	2,279	2,318
Lead, refined	[r]1,456	[r]1,468	[r]1,457	1,442	1,474
Magnesium, primary	81	83	88	94	102
Nickel[2]	186	192	[r]202	207	215
Tin, refined	[r]51	[r]54	[r]52	57	57
Zinc, slab	1,729	1,775	1,792	1,850	1,826
World total:					
Aluminum, refined	14,479	14,111	[r]15,325	15,808	16,201
Cadmium	17	17	18	18	19
Copper, refined	[r]9,525	[r]9,042	[r]9,083	9,830	9,541
Lead, refined	[r]5,259	[r]5,250	[r]5,240	5,378	5,366
Magnesium, primary	260	249	265	287	300
Nickel[2]	662	648	[r]688	785	752
Tin, refined	[r]223	[r]213	[r]212	229	224
Zinc, slab	6,003	[r]5,941	[r]6,319	6,495	6,404
Industrial minerals: World:					
Fertilizers:					
Nitrogenous[3] million metric tons of contained N	60,551	60,498	[r]61,079	66,961	70,136
Phosphatic[3] million metric tons of contained P_2O_5	31,572	30,844	[r]30,631	32,864	34,078
Potassic[3] million metric tons of K_2O equivalent	24,325	23,673	[r]22,725	25,408	25,857
Sulfur million metric tons of elemental sulfur equivalent	54,668	[r]51,282	[r]54,113	57,871	[e]58,000
Mineral fuels: World:					
Solid fuels million metric tons of standard coal equivalent	[r]2,649	[r]2,688	[r]2,762	2,863	2,998
Liquid fuels do	[r]3,651	[r]3,581	[r]3,558	3,647	3,629
Natural gas do	[r]1,838	[r]1,825	[r]1,869	1,978	2,043
Hydro, geothermal, nuclear electricity do	320	333	[r]360	387	412
Total[4] do	[r]8,457	[r]8,428	[r]8,550	8,876	9,082

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Primary and secondary combined.
[2]Nickel content of refined nickel, ferronickel, and nickel oxide.
[3]Data are for years ending June 30 of that stated.
[4]Data may not add to totals shown because of independent rounding.

Sources: Based on data provided by the World Bureau of Metal Statistics (market economy countries, nonferrous metals except magnesium); Metallgesellschaft AG (centrally planned economy countries, nonferrous metals and all magnesium consumption); British Sulphur Corp. Ltd. (nonmetals); and 1984 United Nations Energy Statistics Yearbook (all mineral fuels for 1981-84). Data on iron ore and iron and steel scrap for all years and on sulfur and mineral fuels for 1985 compiled from a variety of sources by the U.S. Bureau of Mines.

Table 8.—Annual investment expenditure in the steel industry for selected countries

(Million dollars)

Country or country group	1980	1981	1982	1983	1984
EEC[1]	3,111	2,754	2,427	r2,103	1,999
EFTA[2]	840	537	291	r198	243
Other countries:[3]					
Australia	220	355	217	64	102
Canada	487	698	483	r156	170
Japan	2,865	3,610	3,720	r3,744	3,095
Spain	237	183	204	131	290
Turkey	NA	NA	58	r232	262
United States	3,400	3,365	4,203	r3,137	2,432
Total	11,160	11,502	11,603	r9,765	8,593

rRevised. NA Not available.
[1]Source reports that values for European Economic Community (EEC) countries are in terms of "million units of account." For this tabulation the units in the source have been converted to U.S. dollars using the following factors supplied by the International Monetary Fund: U.S. dollars per European units of account (ECU) at the end of the period: 1980—1.3096; 1981—1.0852; 1982—0.9677; 1983—0.8274; and 1984—0.7089.
[2]European Free Trade Association (EFTA) figures exclude data for Switzerland.
[3]Data for New Zealand have not been available since 1979.

Sources: Organization for Economic Cooperation and Development. The Iron and Steel Industry in 1981. Paris, 1983, p. 32; The Iron and Steel Industry in 1982. Paris, 1984, p. 32; The Iron and Steel Industry in 1983. Paris, 1985, p. 32; The Iron and Steel Industry in 1984. Paris, 1986, p. 32.

Table 9.—Salient statistics on U.S. foreign investment in mineral industry activities[1]

(Million dollars)

	1983	1984	1985
Direct foreign investment:			
Mining, smelting, refining	7,775	7,580	7,481
Petroleum	57,574	59,089	58,347
Reinvested earnings of foreign affiliates:			
Smelting and fabricated metals[2]	-47	6	303
Petroleum	1,567	3,429	2,434
Equity and intercompany account flows:			
Smelting and fabricated metals[2]	-202	70	107
Petroleum	-2,265	-3,425	-4,068
Income:			
Mining, smelting, refining	61	282	397
Petroleum	9,441	9,729	9,204

[1]All data have been revised to reflect the results of the 1982 benchmark survey by the U.S. Department of Commerce of U.S. direct investments abroad.
[2]Data on mining no longer available.

Source: U.S. Department of Commerce. Survey of Current Business, v. 65, No. 8, Aug. 1985; and v. 66, No. 8, Aug. 1986.

Table 10.—World merchant fleet distribution, by type[1]

	1981	1982	1983	1984	1985
Number of vessels:					
Bulk carriers	4,987	5,215	5,384	5,560	5,787
Freighters[2]	14,201	14,280	14,268	14,019	13,937
Tankers	5,517	5,583	5,548	5,482	5,456
Other[3]	405	404	379	363	375
Total	25,110	25,482	25,579	25,424	25,555
Gross tonnage:[4]					
Bulk carriers thousand long tons	111,820	119,341	124,000	129,274	135,366
Freighters[2] do	92,142	93,323	94,222	94,549	97,284
Tankers do	184,551	180,082	173,335	164,451	158,508
Other[3] do	3,867	3,898	3,768	3,705	3,898
Total do	392,380	396,644	395,325	391,979	395,056
Deadweight tonnage:[4]					
Bulk carriers do	194,368	208,153	216,468	225,496	235,833
Freighters[2] do	123,119	124,994	125,646	124,758	126,542
Tankers do	346,439	336,142	322,617	304,589	292,345
Other[3] do	1,827	1,805	1,673	1,579	1,604
Total do	665,753	671,094	666,404	656,422	[5]656,323

[1]Maritime Administration classification. Tankers include whaling tankers. Vessels shown here as "Other" include combination passenger and cargo and combination passenger and refrigerated cargo. Data are as of Dec. 31 of year indicated.
[2]Includes refrigerated freighters.
[3]Excludes refrigerated freighters.
[4]Erroneously labeled as thousand metric tons in the 1984 Minerals Yearbook.
[5]Data do not add to total shown because of independent rounding.

Source: U.S. Department of Transportation, Maritime Administration. Merchant Fleets of the World. Annual issues for 1981-84 and unpublished data supplied by the same agency for 1985.

Table 11.—Movement of mineral commodities through the Panama Canal

(Thousand metric tons)

	1982			1983			1984		
	Atlantic to Pacific	Pacific to Atlantic	Total	Atlantic to Pacific	Pacific to Atlantic	Total	Atlantic to Pacific	Pacific to Atlantic	Total
METALS									
Ore and concentrate:									
Bauxite and alumina	372	183	555	381	109	490	461	906	1,367
Chromite	4	51	55	--	11	11	4	72	76
Copper	29	742	771	1	421	422	--	396	396
Iron	24	266	290	70	55	125	11	74	85
Lead	36	151	187	18	126	144	11	170	181
Manganese	187	69	256	135	89	224	80	92	172
Tin	--	44	44	--	31	31	--	33	33
Zinc	38	564	602	r99	476	r575	133	581	714
Other and unspecified	64	2,133	2,197	r58	1,666	r1,724	200	1,564	1,764
Subtotal	754	4,203	4,957	762	2,984	3,746	900	3,888	4,788
Ingots and semimanufactures:									
Aluminum	317	65	382	403	58	461	317	54	371
Copper	4	959	963	43	1,181	1,224	34	899	933
Iron and steel[1 2]	2,953	5,366	8,319	3,776	3,683	7,459	4,223	5,522	9,745
Lead	18	98	116	14	131	145	14	86	100
Tin[1]	33	29	62	15	21	36	12	19	31
Zinc	6	212	218	13	131	144	29	106	135
Other	43	96	139	77	81	158	36	47	83
Subtotal	3,374	6,825	10,199	4,341	5,286	9,627	4,665	6,733	11,398
Total	4,128	11,028	15,156	5,103	8,270	13,373	5,565	10,621	16,186
INDUSTRIAL MINERALS									
Borax	2	433	435	12	r397	r409	5	421	426
Cement	61	7	68	65	7	72	177	5	182

See footnotes at end of table.

Table 11.—Movement of mineral commodities through the Panama Canal —Continued

(Thousand metric tons)

	1982			1983			1984		
	Atlantic to Pacific	Pacific to Atlantic	Total	Atlantic to Pacific	Pacific to Atlantic	Total	Atlantic to Pacific	Pacific to Atlantic	Total
INDUSTRIAL MINERALS —Continued									
Clays, fire and china	452	9	461	386	28	414	363	25	388
Fertilizer materials	7,013	1,578	8,591	8,078	1,491	9,569	8,755	1,283	10,038
Salt	120	594	714	124	[r]586	[r]710	78	707	785
Sulfur	2	2,616	2,618	11	1,976	1,987	13	2,470	2,483
Other[3]	195	276	471	146	166	312	223	164	387
Total	7,845	5,513	13,358	8,822	[r]4,651	[r]13,473	9,614	5,075	14,689
MINERAL FUELS									
Carbon black	6	[r]81	[r]87	4	1	5	4	1	5
Coal and coke	21,590	1,301	22,891	[r]9,308	1,591	[r]10,899	8,245	1,869	10,114
Petroleum:									
Crude	4,481	40,762	45,243	4,620	14,350	18,970	3,961	10,432	14,393
Refined	9,438	5,295	14,733	9,341	6,168	15,509	8,812	8,014	16,826
Subtotal	13,919	46,057	59,976	13,961	20,518	34,479	12,773	18,446	31,219
Total	35,515	[r]47,439	[r]82,954	[r]23,273	22,110	[r]45,383	21,022	20,316	41,338
Grand total	47,488	[r]63,980	[r]111,468	[r]37,198	[r]35,031	[r]72,229	36,201	36,012	72,213

[r]Revised.
[1]Tinplate is included under "Tin" rather than under "Iron and steel" in source publication.
[2]Includes a category identified simply as "Scrap" in source publication, which may include scrap other than iron and steel scrap.
[3]Comprises asbestos, brick and tile, clinkers, diatomite, dross, marble and other stone, slag, and soda and other sodium compounds.

Source: Panama Canal Commission Annual Report 1983 and 1984.

Table 12.—Movement of mineral commodities through the Suez Canal

(Thousand metric tons)

	1983			1984			1985		
	North-bound	South-bound	Total	North-bound	South-bound	Total	North-bound	South-bound	Total
METALS									
Aluminum ore (bauxite)	1,352	(1)	1,352	1,849	(1)	1,849	1,630	(1)	1,630
Antimony	118	(1)	118	15	(1)	15	--	(1)	(1)
Chromium ore, concentrate, metal	61	(1)	61	95	(1)	95	168	(1)	168
Copper ore, concentrate, metal	201	(1)	201	419	(1)	419	309	(1)	309
Iron and steel:									
Iron ore	5,319	(1)	5,319	6,953	(1)	6,953	6,325	(1)	6,325
Scrap	7	NA	7	9	--	9	4	2	6
Pig iron	(2)	1,087	1,087	(2)	925	925	(2)	1,216	1,216
Unwrought	(2)	3,404	3,404	(2)	2,170	2,170	(2)	2,576	2,576
Plates and sheets	(2)	1,359	1,359	(2)	1,170	1,170	(2)	1,125	1,125
Lead ore, concentrate, metal	121	(1)	121	448	(1)	448	367	(1)	367
Manganese ore, concentrate, metal	544	(1)	544	684	(1)	684	801	(1)	801
Tin ore, concentrate, metal	28	(1)	28	30	(1)	30	92	(1)	92
Titanium ore (ilmenite and rutile)	447	(1)	447	627	(1)	627	358	(1)	358
Tungsten[3]	12	(1)	12	3	(1)	3	--	(1)	(1)
Zinc ore, concentrate, metal	149	(1)	149	322	(1)	322	445	(1)	445
Other and unspecified:									
Ores	792	788	1,580	771	827	1,598	777	1,240	2,017
Metals	1,922	4,563	6,485	2,063	4,275	6,338	2,069	4,883	6,952
INDUSTRIAL MINERALS									
Cement	38	13,180	13,218	2	11,182	11,184	2	5,545	5,547
Fertilizer materials:									
Nitrogenous:									
Urea	(4)	3,093	3,093	(4)	4,744	4,744	(4)	3,388	3,388
Ammonium nitrate	(4)	305	305	(4)	252	252	(4)	214	214

See footnotes at end of table.

Table 12.—Movement of mineral commodities through the Suez Canal —Continued

(Thousand metric tons)

	1983			1984			1985		
	North-bound	South-bound	Total	North-bound	South-bound	Total	North-bound	South-bound	Total
INDUSTRIAL MINERALS —Continued									
Fertilizer materials —Continued									
Nitrogenous —Continued									
Ammonium sulfate	(4)	359	359	(4)	305	305	(4)	187	187
Phosphatic	(4)	2,812	2,812	(4)	3,433	3,433	(4)	3,564	3,564
Potassic	(4)	1,447	1,447	(4)	1,594	1,594	(4)	1,663	1,663
Other and unspecified	2,223	3,531	5,754	2,542	4,058	6,600	2,959	3,831	6,790
Total	2,223	11,547	13,770	2,542	r14,386	r16,928	2,959	12,847	15,806
Salt	--	29	29	--	30	30	--	17	17
Minerals and rocks	588	1,002	1,590	815	857	1,672	707	601	1,308
MINERAL FUELS									
Coal and coke	4,251	399	4,650	7,315	307	7,622	8,172	264	8,436
Petroleum:									
Crude	63,753	2,831	66,584	64,248	2,022	66,270	54,782	4,125	58,907
Refinery products:									
Gasoline	184	1,156	1,340	351	841	1,192	1,397	565	1,962
Naphtha	(5)	(5)	(5)	2,654	(6)	2,654	2,187	161	2,348
Kerosene	278	3,313	3,591	111	2,914	3,025	131	2,932	3,063
Distillate fuel oil	1,784	5,323	7,107	3,181	3,031	6,212	4,348	1,938	6,286
Residual fuel oil	7,975	1,874	9,849	11,425	582	12,007	14,594	1,081	15,675
Lubricating oil	(5)	216	216	(5)	233	233	(5)	224	224
Asphalt	(5)	2	2	NA	NA	NA	NA	NA	NA
Petroleum residues	17	(5)	17	12	(5)	12	54	(5)	54
Other and unspecified	7,249	2,513	9,762	4,658	1,666	6,324	4,353	1,460	5,813
Total mineral commodities	99,413	r54,586	r153,999	111,602	r47,418	r159,020	107,031	42,802	149,833
All goods	141,002	115,703	256,705	154,237	109,491	263,728	151,901	105,695	257,596

rRevised. NA Not available.
[1]Included under "Other and unspecified: Ores."
[2]Included under "Other and unspecified: Metals."
[3]Reported simply as "Tungsten," but believed to consist mainly of tungsten concentrates, with a small amount of metal included.
[4]Included under "Fertilizer materials: Other and unspecified."
[5]Included under "Petroleum: Other and unspecified."
[6]Revised to zero.

Sources: 1983 and 1984: Suez Canal Authority Yearly Report 1984; 1985: Suez Canal Report, Dec. 1985, pp. 53-67.

Table 13.—Nonferrous metal prices in the United States

(Average cents per pound unless otherwise specified)

Year and month	Aluminum[1]	Copper[2]	Lead[3]	Zinc[4]	Tin[5]	Silver[6]	Cadmium[7]	Cobalt[8]
1981	76.000	83.744	36.531	44.555	6.554	10.519	1.870	([9])
1982	76.000	72.909	25.542	38.473	5.869	7.947	1.113	12.50
1983	77.667	77.861	21.677	41.386	6.013	11.441	1.129	12.50
1984	81.000	66.757	25.548	48.601	5.680	8.140	1.693	12.43
1985:								
January	81.000	63.087	19.089	42.942	5.081	6.098	1.400	11.70
February	81.000	65.046	18.820	42.648	5.029	6.069	1.400	11.70
March	81.000	64.147	17.676	43.199	5.266	6.014	1.400	11.70
April	81.000	68.918	19.915	44.878	5.484	6.458	1.400	11.70
May	81.000	68.464	20.108	45.115	5.460	6.280	1.400	11.70
June	81.000	65.694	19.053	43.732	5.598	6.172	1.400	11.70
July	81.000	65.373	18.884	41.440	5.810	6.104	1.097	11.70
August	81.000	64.947	19.099	39.844	5.801	6.247	1.000	11.70
September	81.000	64.316	19.199	37.856	5.585	6.054	1.000	11.70
October	81.000	65.280	18.928	35.756	5.382	6.188	1.000	11.70
November	81.000	64.892	19.053	33.369	4.492	6.134	1.000	11.70
December	81.000	66.626	18.974	33.615	4.119	5.886	1.000	11.70
Average	81.000	65.566	19.067	40.366	5.259	6.142	1.208	11.70

[1]U.S. list price, North American producer.
[2]Electrolytic, f.o.b. refinery.
[3]Refined lead, nationwide.
[4]Prime Western, f.o.b. East St. Louis.
[5]U.S. dollars per pound, New York dealer.
[6]U.S. dollars per troy ounce, 0.999 fine, New York.
[7]U.S. dollars per pound, producer.
[8]U.S. dollars per pound, shot-cathode, 250-kilogram lots.
[9]Price was $25 in Jan.-Feb. 1981; $20 in Mar.-Aug. 1981, inclusive; and suspended from Sept. 1981 through Jan. 1982, inclusive.

Source: American Bureau of Metal Statistics Inc.

Table 14.—Nonferrous metal prices in the United Kingdom[1]

(Average U.S. cents per pound unless otherwise specified)

Year and month	Aluminum[2]	Copper[3]	Gold[4]	Lead[5]	Silver[6]	Tin[7]	Zinc[8]
1981	57.274	79.488	459.715	33.296	10.524	6.500	38.932
1982	44.966	67.192	375.792	24.656	7.920	5.810	33.734
1983	65.342	72.153	424.180	19.273	11.454	5.913	34.727
1984	56.526	62.562	360.438	20.117	8.140	5.566	40.459
1985:							
January	48.778	61.650	302.791	19.029	6.086	5.030	39.198
February	49.814	62.980	299.100	16.689	6.079	4.971	40.141
March	49.684	63.046	303.943	15.951	5.953	5.089	41.701
April	50.180	68.120	325.273	17.650	6.451	5.357	42.138
May	50.132	69.426	316.367	17.037	6.259	5.403	39.871
June	46.822	64.972	316.490	17.638	6.166	5.623	36.558
July	45.884	66.887	317.217	18.267	6.084	5.791	34.698
August	46.236	64.420	329.786	18.743	6.250	5.738	33.294
September	44.685	61.981	323.350	18.147	6.063	5.592	31.239
October	44.019	62.810	325.843	17.828	6.181	5.621	28.624
November	43.108	62.119	325.295	17.856	6.124	NA	27.061
December	47.135	63.088	321.719	17.669	5.892	NA	31.049
Average	47.850	64.904	317.265	17.842	6.132	5.567	36.233

NA Not available.
[1]London Metal Exchange.
[2]Unalloyed ingot, 99.5%.
[3]Electrolytic wirebars, monthly average settlement price.
[4]U.S. dollars per troy ounce, final price.
[5]Refined lead, monthly average cash price.
[6]U.S. dollars per troy ounce, 0.999 fine, spot price.
[7]U.S. dollars per pound, Straits tin.
[8]Monthly average cash price: 1981-Aug. 1984 inclusive, slab; Sept. 1984-Dec. 1985, high grade.

Source: American Bureau of Metal Statistics Inc.

Table 15.—Nonferrous metal prices in Canada

(Average U.S. cents per pound unless otherwise specified)

Year and month	Copper[1]	Lead[2]	Nickel[3]	Silver[4]	Zinc[5]
1981	83.973	37.183	3.429	10.528	44.778
1982	72.395	26.279	3.200	7.951	39.437
1983	75.936	21.929	3.200	11.458	42.329
1984	63.365	25.805	3.200	[r]8.140	49.006
1985:					
January	60.620	20.015	3.200	6.102	43.978
February	62.920	18.897	3.200	6.066	43.044
March	61.940	17.522	3.200	6.012	44.566
April	66.530	20.291	3.200	6.458	46.859
May	68.470	19.991	3.200	6.279	46.525
June	64.980	19.231	3.200	6.174	45.774
July	65.610	19.222	3.200	6.108	42.091
August	64.380	19.293	3.200	6.255	40.884
September	62.780	19.448	3.200	6.059	39.736
October	63.520	19.024	3.200	6.191	38.048
November	63.230	18.888	3.200	6.137	34.871
December	63.870	18.633	3.200	5.897	34.399
Average	64.071	19.205	3.200	6.145	41.731

[r]Revised.
[1]For 1981-82, Canadian domestic producer delivered price for cathode; 1983-85, Hudson Bay Mining and Smelting Co. Ltd. delivered price for cathode.
[2]Producers' price, carload quantities, pig lead, Cominco Ltd.
[3]Canadian producer price, U.S. dollars per pound.
[4]U.S. dollars per troy ounce.
[5]Producers' price, carload quantities, regular high grade, Cominco Ltd.

Source: American Bureau of Metal Statistics Inc.

Table 16.—Leading world producers of bauxite[1]

(Thousand metric tons, gross weight)

Country	1981	1982	1983	1984[p]	1985[e]
Australia	25,441	23,625	24,372	32,182	32,400
Guinea[e]	11,112	11,827	12,421	[2]13,160	13,100
Brazil	5,770	6,289	7,199	6,433	6,650
Jamaica	11,682	8,361	7,683	8,734	6,239
U.S.S.R.[e 3]	6,180	[r]6,182	6,185	6,185	6,185
Yugoslavia	3,249	3,668	3,500	3,347	[2]3,250
Suriname	[r]4,006	[r]4,205	3,400	3,454	3,000
Hungary	2,914	2,627	2,917	2,994	[2]2,815
Greece	3,216	2,853	2,455	2,296	2,500
India	1,923	1,854	1,923	1,994	[2]2,038
Guyana	1,681	1,783	1,087	1,333	1,675
China[e]	1,500	1,500	1,600	1,600	1,650
France	1,827	1,662	1,663	1,607	[2]1,484
Total	[r]80,501	[r]76,436	76,405	85,319	82,986
Other	[r]6,427	[r]4,464	3,824	4,439	3,732
Grand total	[r]86,928	[r]80,900	80,229	89,758	86,718

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available as of July 8, 1986.
[2]Reported figure.
[3]Includes bauxite equivalent of nepheline syenite concentrates and alunite ore (produced in the U.S.S.R. only).

Table 17.—Leading world producers of aluminum[1]

(Thousand metric tons)

Country	1981	1982	1983	1984[p]	1985[e]
United States	4,489	3,274	3,353	4,099	[2]3,500
U.S.S.R.[e]	1,800	1,875	2,000	2,100	2,200
Canada	1,116	1,065	1,091	1,227	[2]1,282
Australia	379	381	478	758	[2]851
Germany, Federal Republic of	729	723	743	777	745
Norway	[r]634	[r]638	715	761	[2]724
Brazil	256	299	401	455	540
China[e]	[r]350	380	[r]400	[r]400	410
Venezuela	314	274	335	386	396
Spain	397	367	358	381	[2]370
France	436	390	361	342	[2]293
United Kingdom	339	241	252	288	[2]275
Yugoslavia	173	[r]220	258	268	270
India	213	217	204	269	268
Netherlands	262	251	235	249	253
Italy	274	233	196	230	[2]245
New Zealand	154	[r]163	219	243	240
Japan	771	351	256	287	227
Romania	[r]242	208	223	215	220
Total	[r]13,328	[r]11,550	12,078	13,735	13,309
Other	[r]1,751	[r]1,858	1,832	1,929	1,980
Grand total	[r]15,079	[r]13,408	13,910	15,664	15,289

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through June 3, 1986.
[2]Reported figure.

Table 18.—Leading world producers of chromite[1]

(Thousand metric tons, gross weight)

Country	1981	1982	1983	1984[p]	1985[e]
South Africa, Republic of	2,870	2,164	2,232	3,006	[2]3,340
U.S.S.R.[e]	2,900	2,940	2,940	[r]2,940	2,940
Albania[e]	[r]710	[r]675	[r]685	[r]720	825
India	335	339	422	423	[2]553
Zimbabwe	536	432	420	477	500
Turkey	[r]401	[r]452	346	487	450
Finland	412	345	245	446	450
Brazil	[r]236	276	155	256	275
Philippines	439	322	267	259	[2]258
Total	[r]8,839	[r]7,945	7,712	9,014	9,591
Other	[r]249	[r]243	298	341	344
Grand total	[r]9,088	[r]8,188	8,010	9,355	9,935

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through July 1, 1986.
[2]Reported figure.

Table 19.—Leading world producers of mine copper[1]

(Thousand metric tons, Cu content of ore)

Country	1981	1982	1983	1984[p]	1985[e]
Chile[2]	1,081	1,242	1,257	1,291	[3]1,356
United States[2]	1,538	1,147	1,038	1,103	[3]1,106
Canada[2]	691	612	653	713	724
U.S.S.R.[e 2]	570	560	570	590	600
Zaire	555	519	536	520	560
Zambia	588	568	574	541	483
Poland	[r]295	[r]376	402	431	431
Peru[2]	342	357	322	375	[3]397
Mexico	233	229	196	304	290
Australia	231	245	262	236	258
Philippines	302	292	271	233	[3]226
South Africa, Republic of	[r]199	189	205	198	[3]202
China[e]	170	175	175	180	185
Papua New Guinea	165	170	202	164	[3]175
Total	[r]6,960	[r]6,681	6,663	6,879	6,993
Other	[r]817	[r]938	1,049	1,116	1,121
Grand total	[r]7,777	[r]7,619	7,712	7,995	8,114

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through July 8, 1986.
[2]Recoverable.
[3]Reported figure.

Table 20.—Leading world producers of gold[1]

(Thousand troy ounces)

Country	1981	1982	1983	1984[p]	1985[e]
South Africa, Republic of	21,121	21,355	21,847	21,907	[2]21,566
U.S.S.R.[e]	8,425	8,550	8,600	8,650	8,700
Canada	1,673	2,081	2,363	[r e]2,638	2,747
United States	1,379	1,466	2,003	2,085	[2]2,475
Brazil[e]	1,200	1,500	1,750	1,750	2,000
China[e]	1,700	1,800	1,850	1,900	1,950
Australia	591	867	984	1,257	[2]1,833
Colombia	529	473	439	800	1,150
Papua New Guinea	540	[r]589	579	[e]835	1,050
Philippines	[r]758	834	817	787	[2]810
Chile	400	544	571	541	[2]554
Zimbabwe	371	426	453	478	480
Total	[r]38,687	[r]40,485	42,256	43,628	45,315
Other	[r]2,564	[r]2,642	2,740	2,780	2,902
Grand total	[r]41,251	[r]43,127	44,996	46,408	48,217

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through June 10, 1986.
[2]Reported figure.

Table 21.—Leading world producers of iron ore, iron ore concentrates, and iron ore agglomerates[1]

(Thousand metric tons, gross weight)

Country	1981	1982	1983	1984[p]	1985[e]
U.S.S.R	242,417	244,411	245,200	247,104	248,000
Brazil	99,499	[r]93,158	88,716	112,057	120,000
Australia	84,661	87,694	71,038	88,969	100,000
China[e]	66,000	69,000	71,000	75,000	80,000
United States	74,348	36,002	38,165	52,092	[2]49,533
India	41,351	40,902	[e]38,800	41,026	[2]44,546
Canada	51,985	35,592	33,495	41,065	39,889
South Africa, Republic of	28,319	24,554	16,605	24,647	24,393
Sweden	23,225	16,143	13,212	18,123	20,454
Venezuela	15,531	11,200	9,715	13,054	15,480
Liberia	19,704	18,165	14,937	15,100	15,300
France	21,598	19,391	15,930	14,839	[2]14,681
Mauritania	8,704	8,255	7,385	9,527	10,000
Korea, North[e]	8,000	8,000	8,000	8,000	8,000
Mexico	[r]8,711	8,155	8,040	8,317	7,800
Chile	[r]8,514	[r]6,470	5,974	7,116	[2]6,510
Spain	8,565	[r]8,370	7,449	7,961	[2]6,452
Yugoslavia	4,794	5,106	5,018	5,321	[2]5,478
Total	[r]815,926	[r]740,568	698,679	789,318	816,516
Other	[r]42,236	[r]39,770	39,379	41,230	42,301
Grand total	[r]858,162	[r]780,338	738,058	830,548	858,817

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through July 8, 1986.
[2]Reported figure.

Table 22.—Leading world producers of crude steel[1]

(Thousand metric tons)

Country	1981	1982	1983	1984[p]	1985[e]
U.S.S.R	148,445	147,165	152,514	154,238	155,000
Japan	101,676	99,548	97,179	105,586	[2]105,281
United States	109,613	67,655	76,762	83,940	[2]80,067
China	35,600	37,160	39,950	43,370	46,700
Germany, Federal Republic of	41,610	35,880	35,729	39,389	[2]40,500
Italy	24,777	23,981	21,674	24,026	[2]23,744
Brazil	13,230	[r]13,000	14,660	18,386	20,456
France	21,258	18,416	17,623	19,000	[2]18,832
Poland	15,719	14,795	16,236	16,533	[2]16,100
United Kingdom	15,576	13,704	14,986	15,121	[2]15,722
Czechoslovakia	15,270	14,992	15,024	14,831	[2]15,036
Canada	14,811	11,762	12,828	14,715	15,000
Spain	12,912	13,160	12,731	13,484	[2]14,235
Romania	13,025	13,055	12,593	14,437	[2]13,800
Korea, Republic of	10,754	11,753	11,915	13,033	13,500
India	10,380	10,715	10,305	10,344	10,860
Belgium	12,379	9,916	10,157	11,303	[2]10,694
German Democratic Republic	7,467	7,169	7,219	7,573	[2]7,900
South Africa, Republic of	9,004	8,271	7,190	7,827	7,500
Mexico	7,663	7,056	6,978	7,509	[2]7,271
Total	641,169	[r]579,153	594,253	634,645	638,198
Other	[r]65,482	[r]64,648	68,541	74,782	76,772
Grand total	[r]706,651	[r]643,801	662,794	709,427	714,970

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Steel ingots and castings. Table includes data available through June 24, 1986.
[2]Reported figure.

Table 23.—Leading world producers of mine lead[1]

(Thousand metric tons, Pb content of ore)

Country	1981	1982	1983	1984[p]	1985[e]
Australia	388	455	481	441	491
U.S.S.R.[e]	425	430	435	440	440
United States[2]	459	530	466	334	[3]424
Canada	332	341	252	264	278
Peru	193	176	213	205	[3]210
Mexico[2]	149	170	184	203	200
China[e]	160	160	160	160	160
Yugoslavia	119	[r]113	114	114	110
Morocco	[r]118	104	98	101	101
Total	[r]2,343	[r]2,479	2,403	2,262	2,414
Other	[r]1,023	[r]943	956	994	978
Grand total	[r]3,366	[r]3,422	3,359	3,256	3,392

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through June 24, 1986.
[2]Recoverable.
[3]Reported figure.

Table 24.—Leading world producers of manganese ore[1]

(Thousand metric tons, gross weight)

Country	1981	1982	1983	1984[p]	1985[e]
U.S.S.R	9,150	9,821	9,876	10,089	9,900
South Africa, Republic of	5,040	5,217	2,886	3,049	[2]3,600
Brazil	2,042	2,341	2,092	2,693	2,700
Gabon	1,488	1,512	1,857	2,119	[2]2,351
Australia	1,411	1,123	1,370	1,829	[2]1,989
China[e]	1,600	1,600	1,600	1,600	1,600
India	1,526	[r]1,490	1,320	1,081	1,140
Mexico	578	509	350	476	463
Ghana	223	160	173	269	307
Hungary	71	83	59	67	66
Romania	57	55	78	66	66
Total	[r]23,186	[r]23,911	21,661	23,338	24,182
Other	[r]371	[r]312	284	273	241
Grand total	[r]23,557	[r]24,223	21,945	23,611	24,423

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through June 10, 1986.
[2]Reported figure.

Table 25.—Leading world producers of mine nickel[1]

(Thousand metric tons)

Country	1981	1982	1983	1984[p]	1985[e]
U.S.S.R.[e]	158	165	170	175	180
Canada	160	89	128	174	152
Australia	74	88	77	76	[2]85
New Caledonia	78	60	46	[r e]57	73
Indonesia	49	46	49	48	49
Cuba	39	36	38	32	32
Dominican Republic	19	[r]5	20	24	26
South Africa, Republic of[e]	[2]26	22	20	25	25
Total	603	[r]511	548	611	622
Other	[r]123	[r]107	119	144	155
Grand total	[r]726	[r]618	667	755	777

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through May 13, 1986.
[2]Reported figure.

Table 26.—Leading world producers of mine tin[1]

(Metric tons, Sn content of ore)

Country	1981	1982	1983	1984[p]	1985[e]
Malaysia	59,938	52,342	41,367	41,307	[2]36,884
U.S.S.R.[e]	[r]21,000	[r]21,000	[r]22,000	[r]23,000	23,000
Indonesia	35,392	33,806	26,553	23,223	[2]22,115
Brazil	[r]8,297	[r]8,218	13,275	19,957	22,000
Thailand	31,474	26,109	19,943	21,920	20,000
Bolivia	29,830	26,773	25,278	19,911	18,000
China[e]	15,000	15,000	15,000	15,000	15,000
Australia	12,267	12,126	9,275	7,699	7,000
United Kingdom	3,869	4,208	4,025	5,216	5,300
Peru	1,519	1,672	2,368	2,991	[2]3,807
Zaire	[r]2,452	[r]2,320	2,163	2,708	2,870
South Africa, Republic of	2,811	3,035	2,668	2,301	[2]2,194
Total	[r]223,849	[r]206,609	183,915	185,233	178,170
Other	[r]14,159	[r]13,316	12,987	13,199	12,933
Grand total	[r]238,008	[r]219,925	196,902	198,432	191,103

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through June 17, 1986.
[2]Reported figure.

Table 27.—Leading world producers of mine zinc[1]

(Thousand metric tons, Zn content of ore)

Country	1981	1982	1983	1984[p]	1985[e]
Canada	1,096	1,036	1,070	1,207	1,175
U.S.S.R.[e]	790	800	805	810	810
Australia	518	665	699	659	[2]734
Peru	499	507	576	558	[2]589
Mexico	207	242	266	304	280
United States	343	326	297	278	[2]252
Japan	242	251	256	253	[2]252
Spain	182	167	168	230	[2]228
Sweden	181	185	203	206	[2]207
Ireland	120	167	186	206	192
China[e]	160	160	160	160	190
Poland	[r]202	[r]184	189	191	187
Korea, North[e]	140	140	140	140	160
Germany, Federal Republic of	111	106	114	113	118
Brazil	[r]92	[r]111	119	103	110
South Africa, Republic of	87	92	110	106	[2]97
Yugoslavia	89	84	87	82	84
Thailand	--	--	--	41	78
Zaire	63	82	76	75	74
Greenland	80	80	73	71	[2]70
Total	[r]5,202	[r]5,385	5,594	5,793	5,887
Other	[r]717	[r]741	757	771	769
Grand total	[r]5,919	[r]6,126	6,351	6,564	6,656

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through July 15, 1986.
[2]Reported figure.

Table 28.—Leading world producers of hydraulic cement[1]

(Thousand metric tons)

Country	1981	1982	1983	1984[p]	1985[e]
China	84,000	94,072	108,250	121,080	142,500
U.S.S.R	127,169	123,681	128,156	129,866	131,000
Japan	84,827	80,688	80,891	78,860	[2]72,857
United States (including Puerto Rico)	66,163	58,369	64,725	71,395	[2]71,540
Italy	41,553	39,728	39,217	37,782	40,000
India	20,760	22,498	25,356	29,030	[2]33,050
Germany, Federal Republic of	31,498	30,078	30,466	28,909	29,000
Brazil	26,051	25,644	20,870	[e]25,000	27,000
Spain (including Canary Islands)	28,571	29,569	30,637	25,435	25,500
France	28,229	26,150	24,504	22,724	23,000
Mexico	17,978	19,298	17,068	18,436	[2]20,580
Korea, Republic of	15,617	17,887	21,282	20,413	[2]20,424
Turkey	15,043	15,778	13,595	15,738	16,000
Poland	14,226	16,100	16,200	16,700	15,000
Taiwan	14,342	13,432	14,810	14,234	[2]14,418
Greece	12,940	12,860	14,196	13,521	13,517
United Kingdom	12,729	12,962	13,396	13,481	[2]13,344
Romania	14,746	14,995	13,968	14,200	[2]12,200
German Democratic Republic	12,204	11,721	11,782	11,555	12,000
Iran[e]	8,000	9,500	10,000	10,500	11,000
Czechoslovakia	10,646	10,325	10,498	10,530	10,265
Total	[r]687,292	[r]685,335	709,867	729,389	754,195
Other	[r]199,105	[r]202,221	206,496	218,056	217,605
Grand total	[r]886,397	[r]887,556	916,363	947,445	971,800

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through July 8, 1986.
[2]Reported figure.

Table 29.—Leading world producers of diamond[1]

(Thousand carats)

Country	1981	1982	1983	1984^{p}	1985^{e}
Zaire	^{r}7,161	^{r}6,164	11,982	18,459	19,617
Botswana	4,961	7,769	10,731	12,914	12,900
U.S.S.R.^{e}	10,600	10,600	10,700	10,700	10,800
South Africa, Republic of	9,526	9,154	10,311	10,143	[2]10,202
Australia	205	^{r}457	6,200	5,690	[2]7,059
China^{e}	950	1,000	1,000	1,000	1,000
Namibia	1,248	1,014	963	930	941
Angola	1,400	1,225	1,034	^{e}1,000	625
Total	^{r}36,051	^{r}37,383	52,921	60,836	63,144
Other	3,717	3,048	2,471	2,681	3,227
Grand total	^{r}39,768	^{r}40,431	55,392	63,517	66,371

^{e}Estimated. ^{p}Preliminary. ^{r}Revised.
[1]Gem and industrial grades undifferentiated. Table includes data available through June 3, 1986.
[2]Reported figure.

Table 30.—Leading world producers of nitrogen in ammonia[1]

(Thousand metric tons, N content)

Country	1981	1982	1983	1984^{p}	1985^{p}
U.S.S.R	12,900	14,000	14,500	^{e}15,000	15,500
China^{e}	12,193	12,711	^{r}13,776	^{r}14,000	15,000
United States	14,272	11,820	10,248	12,127	[2]12,009
India[3]	^{r}3,181	3,469	3,565	3,975	4,100
Canada	2,176	2,062	2,888	3,493	3,500
Romania	2,381	2,587	2,727	2,700	2,700
Netherlands	1,814	1,655	1,747	2,311	2,260
France^{e}	2,270	2,000	1,900	^{r}2,000	2,100
United Kingdom	1,780	1,716	1,720	1,836	1,800
Mexico	^{r}1,796	^{r}2,030	1,936	1,773	1,800
Japan	1,833	1,652	1,545	1,668	1,650
Germany, Federal Republic of	1,962	1,570	1,703	1,963	1,585
Bulgaria	1,023	1,032	1,123	1,138	1,400
Poland	1,389	^{r}1,380	1,425	1,494	1,254
Indonesia	920	1,028	1,150	1,658	1,230
German Democratic Republic	1,205	1,170	1,211	1,202	1,210
Italy	1,207	1,046	1,060	^{e}1,100	1,200
Total	^{r}64,302	^{r}62,928	64,224	69,438	70,298
Other	^{r}12,670	^{r}12,940	14,302	14,957	15,251
Grand total	^{r}76,972	^{r}75,868	78,526	84,395	85,549

^{e}Estimated. ^{p}Preliminary. ^{r}Revised.
[1]Table includes data available through May 13, 1986.
[2]Reported figure.
[3]Data given are for years beginning Apr. 1 of that stated.

Table 31.—Leading world producers of phosphate rock[1]

(Thousand metric tons, gross weight)

Country	1981	1982	1983	1984[p]	1985[e]
United States	53,624	37,414	42,573	49,197	[2]50,835
U.S.S.R.[e]	30,700	31,300	31,600	31,900	32,200
Morocco[3]	18,562	17,754	20,106	21,245	[2]20,737
China[e]	11,500	11,720	12,500	[r]14,210	12,000
Jordan	4,244	4,390	4,749	6,263	[2]6,067
Tunisia	4,596	4,196	5,924	5,346	[2]4,530
Brazil	3,238	2,732	3,208	3,855	4,214
Israel	1,919	2,148	2,969	3,312	4,076
Togo	2,215	2,800	2,081	2,696	2,452
South Africa, Republic of	2,718	[r]3,161	2,887	2,585	[2]2,421
Total	133,316	[r]117,615	128,597	140,609	139,532
Other	[r]9,685	[r]9,770	10,807	11,879	11,831
Grand total	[r]143,001	[r]127,385	139,404	152,488	151,363

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Includes only phosphate rock; Thomas slag and guano are excluded. Table includes data available through Apr. 16, 1986.
[2]Reported figure.
[3]Includes output from Western Sahara.

Table 32.—Leading world producers of marketable potash[1]

(Thousand metric tons, K_2O equivalent)

Country	1981	1982	1983	1984[p]	1985[e]
U.S.S.R	8,449	8,079	9,294	9,776	10,000
Canada (sales)	6,549	5,309	6,938	7,527	6,600
German Democratic Republic	3,460	3,434	3,431	3,465	3,475
Germany, Federal Republic of	2,591	2,056	2,419	2,644	2,580
France	1,831	1,704	1,536	1,739	1,750
United States	2,156	1,784	1,429	1,564	[2]1,296
Israel	839	1,004	[e]1,000	[e]1,100	1,100
Total	25,875	23,370	26,047	27,815	26,801
Other	[r]1,200	[r]1,139	1,371	1,533	1,817
Grand total	[r]27,075	[r]24,509	27,418	29,348	28,618

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through Apr. 29, 1986.
[2]Reported figure.

Table 33.—Leading world producers of salt[1]

(Thousand metric tons)

Country	1981	1982	1983	1984[p]	1985[e]
United States (including Puerto Rico)	35,303	34,392	31,393	35,615	[2]34,820
U.S.S.R.[e]	15,200	15,800	16,200	16,500	17,000
China	18,320	16,384	[r e]16,130	[r e]16,286	14,446
Germany, Federal Republic of	12,541	10,978	10,402	[e]11,200	10,500
Canada	7,240	7,940	8,602	10,235	10,042
India	8,932	7,042	7,013	7,728	7,505
United Kingdom	6,720	7,637	6,311	7,126	7,200
France	6,636	6,703	6,951	[r e]7,007	7,130
Mexico	7,953	5,561	5,703	6,157	6,000
Australia	6,716	4,811	5,170	[e]5,000	5,000
Poland	4,271	3,856	[e]3,630	4,441	[2]4,858
Brazil	3,605	3,724	[3]4,187	4,527	4,650
Romania	5,033	4,756	4,596	[r e]4,600	4,600
Netherlands	3,578	3,191	3,124	3,674	4,450
Italy[e]	4,574	4,605	4,554	4,255	4,175
Spain	3,693	3,289	3,158	3,389	3,300
German Democratic Republic	3,112	3,115	[e]3,126	[r e]3,133	3,055
Turkey	1,396	1,314	[e]1,400	1,299	1,300
Japan	1,002	966	921	[e]1,200	1,200
Total	155,825	146,064	142,571	153,372	151,231
Other	[r]15,590	[r]17,520	16,580	17,813	18,010
Grand total	[r]171,415	[r]163,584	159,151	171,185	169,241

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through June 24, 1986.
[2]Reported figure.
[3]Sales.

Table 34.—Leading world producers of elemental sulfur[1]

(Thousand metric tons)

Country	1982				1983			
	Native	From pyrites	Byproduct	Total	Native	From pyrites	Byproduct	Total
United States	4,210	265	5,312	9,787	[2]3,202	W	6,088	9,290
U.S.S.R.[e]	[3]2,700	3,500	[r]3,550	[r]9,750	[3]2,600	3,400	[r]3,650	[r]9,650
Canada	--	[r e]8	6,272	[r]6,280	--	[r e]9	6,568	6,577
Poland[e]	[r 3]4,920	--	[r]210	[r]5,130	[r 3]4,960	--	[r]220	[r]5,180
China[e]	200	1,800	300	2,300	200	2,300	350	2,850
Japan	--	276	2,319	2,595	--	272	2,341	2,613
Mexico	[2]1,391	--	[e]525	[e]1,916	[2]1,225	--	[e]477	[e]1,702
France	--	--	[r]2,035	[r]2,035	--	--	1,910	1,910
Germany, Federal Republic of	--	229	[e]1,592	[e]1,821	--	--	[e]1,322	[e]1,322
Spain	--	1,029	[e]138	[e]1,167	--	1,073	[e]131	[e]1,204
Saudi Arabia[e]	--	--	900	900	--	--	695	695
South Africa, Republic of	--	465	160	625	--	474	157	631
Iraq[e]	[2]300	--	40	340	[2]300	--	40	340
Finland	--	177	[r]310	[r]487	--	224	312	536
Yugoslavia	--	[r]353	[e]204	[r e]557	--	298	[e]183	[r e]481
Italy	10	269	[e]210	489	9	271	[e]210	[r e]490
Sweden	--	204	[r e]133	[r]337	--	208	[r e]145	353
Bulgaria[e]	--	[r]300	70	[r]370	--	[r]300	70	[r]370
Romania[e]	--	200	150	350	--	200	150	350
Brazil	--	54	130	184	[2]1	55	260	316
German Democratic Republic[e]	--	--	360	360	--	--	360	360
United Arab Emirates	--	--	5	5	--	--	10	10
Norway	--	[r]213	[r e]91	[r]304	--	179	[r e]103	282
Belgium[e]	--	--	270	270	--	--	250	250
Korea, North[e]	--	200	30	230	--	200	30	230
Iran	10	--	10	20	20	--	25	45
Philippines	--	30	--	30	--	29	57	86
Australia	--	--	163	163	--	--	183	183
Greece	--	55	105	[r]160	--	67	[e]120	[r e]187
Total	[r]13,741	[r]9,627	[r]25,594	[r]48,962	12,517	9,559	26,417	48,493
Other	[r]188	[r]339	[r]1,381	[r]1,908	182	382	1,473	2,037
Grand total	[r]13,929	[r]9,966	[r]26,975	[r]50,870	12,699	9,941	27,890	50,530

See footnotes at end of table.

Table 34.—Leading world producers of elemental sulfur[1]—Continued

(Thousand metric tons)

Country	1984[p] Native	1984[p] From pyrites	1984[p] Byproduct	1984[p] Total	1985[e] Native	1985[e] From pyrites	1985[e] Byproduct	1985[e] Total
United States	4,193	W	6,459	10,652	[2] [4]5,011	W	[4]6,598	[4]11,609
U.S.S.R.[e]	[3]2,600	[r]3,400	[r]3,700	[r]9,700	[3]2,550	3,350	3,825	9,725
Canada	--	[r] [e]10	6,596	6,606	--	10	6,738	6,748
Poland[e]	[r] [3]4,990	--	[r]220	[r]5,210	[3]4,876	--	220	5,096
China[e]	200	2,100	350	2,650	300	2,200	400	2,900
Japan	--	259	2,333	2,592	--	[4]253	[2]2,257	2,510
Mexico	[2]1,364	--	[r] [e]621	[r] [e]1,985	[2]1,555	--	635	2,190
France	--	--	1,862	1,862	--	--	1,694	1,694
Germany, Federal Republic of	--	--	1,530	1,530	--	--	1,605	1,605
Spain	--	1,094	[r] [e]137	[r] [e]1,231	--	[4]1,133	126	1,259
Saudi Arabia[e]	--	--	[r] [4]833	[r] [4]833	--	--	1,100	1,100
South Africa, Republic of	--	464	[r] [e]121	585	--	[4]474	120	594
Iraq[e]	[2]500	--	70	570	[2]500	--	70	570
Finland	--	211	310	521	--	210	305	515
Yugoslavia	--	301	[e]163	[r] [e]464	--	[4]323	173	496
Italy	8	192	[e]200	[r] [e]400	[4]1	[4]280	200	481
Sweden	--	[r] [e]230	[r] [e]157	387	--	225	155	380
Bulgaria[e]	--	[r]300	70	[r]370	--	300	70	370
Romania[e]	--	200	150	350	--	200	150	350
Brazil	[e] [2]1	[e]55	[e]260	[e]316	[2]2	60	275	337
German Democratic Republic[e]	--	--	350	350	--	--	330	330
United Arab Emirates	--	--	15	15	--	--	292	292
Norway	--	209	[r] [e]66	275	--	210	68	[4]278
Belgium[e]	--	--	240	240	--	--	240	240
Korea, North[e]	--	200	30	230	--	200	30	230
Iran	30	--	30	60	30	--	180	210
Philippines	--	35	95	130	--	107	100	207
Australia	--	--	203	203	--	--	203	203
Greece	--	78	[r] [e]125	[r] [e]203	--	78	125	203
Total	13,886	9,338	27,296	50,520	14,825	9,613	28,284	52,722
Other	149	418	1,520	2,087	177	431	1,526	2,134
Grand total	14,035	9,756	28,816	52,607	15,002	10,044	29,810	54,856

[e]Estimated. [p]Preliminary. [r]Revised. W Withheld to avoid disclosing company proprietary data.

[1]Includes all recorded production of sulfur, regardless of the form in which it is recovered. Thus, it includes elemental sulfur, whether mined by conventional methods or by the Frasch process, as well as (1) elemental sulfur and the S content of compounds such as H_2S, SO_2, and H_2SO_4 recovered as a principal product of pyrite mining and as a byproduct of the recovery of crude oil and natural gas and as a byproduct of petroleum refining, coal treatment, and metal smelting and/or refining; and (2) sulfur recovered from tar sands, spent oxides, and other miscellaneous sources. Table includes data available through June 3, 1986.

[2]Entirely Frasch process sulfur.

[3]Includes Frasch process sulfur as follows, in thousand metric tons: Poland (estimated): 1982—4,428 (revised), 1983—4,460 (revised); 1984—4,500, and 1985—4,386; the U.S.S.R. (estimated): 1982—800, 1983—800, 1984—800, and 1985—850; and total of individually listed countries and grand total: 1982—11,129 (revised), 1983—9,988 (revised), 1984—11,358 (revised), and 1985—12,304.

[4]Reported figure.

Table 35.—Leading world producers of coal (all grades)[1]

(Million metric tons)

Country	1982			1983			1984[p]			1985[e]		
	Lignite	Bituminous and anthracite	Total	Lignite	Bituminous and anthracite	Total	Lignite	Bituminous and anthracite	Total	Lignite	Bituminous and anthracite	Total
China	(2)	651	651	(2)	715	715	(2)	772	772	(2)	[3]850	[3]850
United States	48	712	760	52	658	710	57	756	813	63	741	804
U.S.S.R	163	555	718	158	558	716	156	557	713	169	557	726
German Democratic Republic	276	--	276	278	--	278	296	--	296	312	--	312
Poland	38	189	227	43	191	234	50	192	242	[3]58	[3]192	[3]250
Germany, Federal Republic of	127	89	216	124	82	206	127	79	206	[3]121	82	203
South Africa, Republic of	--	144	144	--	145	145	--	163	163	--	[3]174	[3]174
Australia	38	119	157	34	120	154	35	125	160	35	[3]136	171
India	7	128	135	7	136	143	8	146	154	[3]8	149	157
Czechoslovakia	99	27	126	102	26	128	105	26	131	[3]100	[3]26	[3]126
United Kingdom	--	125	125	--	119	119	--	51	51	--	96	96
Yugoslavia	54	(4)	54	58	(4)	58	64	(4)	64	[3]69	[3](4)	69
Canada	7	35	42	8	37	45	10	48	58	10	51	61
Spain	24	15	39	25	15	40	24	15	39	24	16	40
Romania	31	2	[r]33	37	3	40	36	3	39	36	3	39
Korea, North[e]	(4)	[r]36	[r]36	(4)	[r]36	[r]36	(4)	[r]36	[r]36	(4)	36	36
Greece	27	--	27	31	--	31	32	--	32	32	--	32
Bulgaria	32	(4)	32	32	(4)	32	32	(4)	32	31	(4)	31
Hungary	23	3	26	22	3	25	22	3	25	[3]21	3	24
Korea, Republic of	--	20	20	--	20	20	--	21	21	--	24	24
France	3	17	20	3	17	20	2	17	19	[3]2	15	17
Total	997	[r]2,867	[r]3,864	1,014	2,881	3,895	1,056	3,010	4,066	1,091	3,151	4,242
Other	34	[r]74	[r]108	37	77	114	43	113	156	53	86	139
Grand total	1,031	[r]2,941	[r]3,972	1,051	2,958	4,009	1,099	3,123	4,222	1,144	3,237	4,381

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through Oct. 1, 1986.
[2]Output small; included under "Bituminous and anthracite."
[3]Reported figure.
[4]Less than 1/2 unit.

Table 36.—Leading world producers of marketed natural gas[1]

(Billion cubic feet)

Country	1981	1982	1983	1984[p]	1985[e]
U.S.S.R	16,430	[r]17,700	18,900	20,700	[2]22,700
United States	19,181	17,758	16,033	17,992	[2]16,428
Netherlands	[r]2,988	[r]2,544	2,703	2,728	[2]2,851
Canada	2,399	2,683	2,465	2,506	[2]2,831
Indonesia	720	926	1,032	1,386	[2]1,450
United Kingdom	1,321	[r]1,352	1,396	1,363	[2]1,389
Algeria	[r]868	1,048	1,427	1,260	1,320
Mexico	1,214	1,279	1,274	1,193	[2]1,145
Romania	[e]1,200	[e]1,100	1,100	1,127	1,110
Norway	924	925	912	964	983
Germany, Federal Republic of	[r]673	569	622	563	[2]511
Italy	496	512	459	489	503
Venezuela	584	527	508	518	[2]498
Australia	401	409	420	446	[2]475
German Democratic Republic	301	286	353	459	459
China	450	414	431	438	455
Total	[r]50,150	[r]50,032	50,035	54,132	55,108
Other	[r]4,805	[r]4,628	4,710	5,225	5,326
Grand total	[r]54,955	[r]54,660	54,745	59,357	60,434

[e]Estimated. [p]Preliminary. [r]Revised.

[1]Comprises all gas collected and utilized as a fuel or a chemical industry raw material as well as that used for gas lift in fields, including gas used in oilfields and/or gasfields as a fuel by producers even though it is not actually sold. Excludes gas produced and subsequently vented to the atmosphere, flared, and/or reinjected to reservoirs. Table includes data available through Oct. 1, 1986.

[2]Reported figure.

Table 37.—Leading world producers of natural gas liquids[1]

(Million 42-gallon barrels)

Country[2]	1981	1982	1983	1984[p]	1985[e]
United States	587	566	569	597	[3]587
U.S.S.R.[e]	134	145	155	160	175
Saudi Arabia	164	[r]160	[e]125	130	146
Canada	120	117	114	139	[3]124
Mexico	88	[e]95	113	142	123
Algeria	78	[r]73	92	119	120
United Arab Emirates (Abu Dhabi, Dubai, Sharjah)[e]	40	[r]50	[r]65	[r]62	70
United Kingdom	[r]18	[r]34	47	55	60
Total	[r]1,229	[r]1,240	1,280	1,404	1,405
Other	[r]121	[r]116	126	141	148
Grand total	[r]1,350	[r]1,356	1,406	1,545	1,553

[e]Estimated. [p]Preliminary. [r]Revised.

[1]Every effort has been made to include only those natural gas liquids produced by natural gas processing plants and to exclude natural gas liquids obtained from field treatment facilities including wellhead separators, because the latter are normally blended with crude oil and thus are included in crude oil output statistics. In some cases, however, sources do not clearly specify whether data presented represent only output of natural gas processing plants or if they include field output. Thus, some of the figures may include field condensate. Table includes data available through Oct. 1, 1986.

[2]In addition to the countries listed, China, Czechoslovakia, the German Democratic Republic, the Federal Republic of Germany, and Italy may also produce natural gas liquids in substantial quantities, but available information is inadequate to make reliable estimates of output levels.

[3]Reported figure.

Table 38.—Leading world producers of crude oil[1]

(Million 42-gallon barrels)

Country	1981	1982	1983	1984[p]	1985[e]
U.S.S.R	[r]4,476	[r]4,500	4,530	4,500	[2]4,370
United States	3,129	3,157	3,171	3,250	[2]3,274
Saudi Arabia[3]	3,580	[r]2,309	1,657	1,645	[2]1,231
Mexico	844	1,002	973	983	960
United Kingdom	[r]640	[r]730	807	882	890
China	739	745	774	836	[2]874
Iran	[r]485	[r]795	892	798	809
Venezuela	768	692	657	658	[2]614
Nigeria	525	472	452	502	537
Canada	468	464	495	526	[2]530
Iraq	326	310	[e]400	438	521
Indonesia	585	488	490	517	[2]484
United Arab Emirates (Abu Dhabi, Dubai, Sharjah)	[r]435	[r]445	400	405	386
Libya	408	[e]418	402	391	386
Total	[r]17,408	[r]16,527	16,100	16,331	15,866
Other	[r]2,995	[r]2,811	3,112	3,426	3,499
Grand total	[r]20,403	[r]19,338	19,212	19,757	19,365

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through Oct. 1, 1986.
[2]Reported figure.
[3]Includes the country's share of production from the Kuwait-Saudi Arabia Partitioned Zone.

Table 39.—Leading world producers of refined oil[1]

(Million 42-gallon barrels)

Country	1981	1982	1983	1984[p]	1985[e]
United States (including Puerto Rico and Virgin Islands)	5,358	5,113	4,998	5,223	5,171
U.S.S.R.[e]	3,332	3,393	3,454	[r]3,445	3,445
Japan	1,464	1,337	1,308	1,399	[2]1,304
Germany, Federal Republic of	752	719	687	682	[2]665
China[e]	450	475	500	550	655
United Kingdom	[r]599	[r]605	608	625	[2]614
Italy	741	693	649	629	[2]595
France	[r]730	617	564	570	569
Canada	696	589	533	539	528
Mexico	471	462	467	502	[2]519
Brazil	385	[r e]410	[r e]395	[r e]405	[2]429
Venezuela	319	318	323	325	[2]379
Netherlands	360	365	402	407	[2]364
Spain (including Canary Islands)	357	337	337	327	[2]351
Saudi Arabia[3]	[r]304	[r]311	314	320	320
Singapore	312	305	306	293	294
Total	[r]16,630	[r]16,049	15,845	16,241	16,202
Other	[r]4,956	[r]4,869	5,044	5,119	4,966
Grand total	[r]21,586	[r]20,918	20,889	21,360	21,168

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through Oct. 1, 1986.
[2]Reported figure.
[3]Includes the country's share of production from the Kuwait-Saudi Arabia Partitioned Zone.

The Mineral Industry of Albania

By Walter G. Steblez[1]

Yearend indicators for Albania's mineral industry revealed that the production of many mineral commodities fell short of planned output goals for the seventh 5-year plan (1981-85). There were some substantial production increases for commodities such as copper ore and blister, nickeliferous iron ore, and coal, but these increases fell below planned output targets set in 1980. During the 5-year period, the production of chromite and petroleum, Albania's chief hard-currency export earners, declined below output levels of 1979 and 1980.[2] Apparently, chromite production in 1985 recovered to only the output level of 1980.

In 1985, Albania's overall economic picture remained bleak, reportedly owing to severe weather conditions that affected the Balkans and southeastern Europe. Severe drought was underscored in official sources as a factor that contributed to economic bottlenecks. The apparent reduction of hydroelectric power during the year resulted in production dislocations in the mineral industry and in the economy in general.[3] Also, the country's centrally planned target for a 6.2% increase in industrial output was not met. Reportedly, planned production increases were registered by the chromite, copper, coal, bitumen, and bituminous gravel mining and extracting sectors, as well as by the heavy manufacturing industry. Actual 1985 yearend data for total industrial production and individual industries as percentage increases over 1984 output levels were not provided. Reported investment activity during the year included unspecified expansion projects at chromite, copper, and coal mines. These projects may have included ongoing work at the Kalimash chromite beneficiation plant and the Reps and Fushe-Arrez copper concentrators. In the energy field, the installation of the first turbine at the Enver Hoxha hydroelectric power station at Koman was completed during the year.

Government Policies and Programs.—Albania's Central Planning Commission did not publish long-term plan goals for the eighth 5-year plan (1986-90) by yearend 1985. Only general results were published on the completion of the 1985 central economic plan. Plans for 1986 called for an overall 7.3% increase in industrial production, about that of 1985; in the mineral industry, chromite mining was to grow by 2.9%, copper by 9%, and lignite by 4.2%. Investment activity in 1986 was to include continued construction on the Enver Hoxha hydroelectric power station at Koman, construction of a lubricants plant at the Ballsh refinery, and construction of a sulfuric acid plant in Lac. To meet the 1985 plan objectives, the Albanian Government called for strict domestic austerity in the consumption of raw materials and fuels and directed efforts against inefficiency and bottlenecks in the economy, especially in the petroleum sector.[4] To maintain a policy of economic self-sufficiency and earn hard currency, Albania must export raw materials and fuels. With production and marketing problems connected with two of the country's most profitable and exportworthy commodities—chromite and petroleum—investment in new technology had become an acute problem. A recent foreign study indicated that Albania's technological base including the mineral industry was outdated and would require an estimated $2.5 billion to bring it up to world standards.[5]

PRODUCTION

Albania's mineral industry was state owned and operated and subject to strict central planning. Implementation of all production plans was entrusted to the Ministry of Industry and Mines and the Ministry of Energy. Apart from the effects of severe drought on the country's economy and mineral industry, official sources cited continued poor management as another major reason for planned production shortfalls.[6] The use of gross output indicators frequently resulted in low-quality production at a high production cost, owing to the tendency of the enterprise management to stress production in gross tons of output rather than output that could be usefully consumed. The result of such policies in 1985 and in previous years was excessive stockpiles on the one hand and shortages on the other. In many cases finished products had to be scrapped and recycled. Employee packing at many enterprises to ensure plan fulfillment, especially in the second half of each month, resulted in underutilization of employees and low productivity.[7] Excessive downtime of machinery and equipment, late delivery of machinery, and late startup of industrial projects were other problems that were cited in official sources. The petroleum, mining, transportation, and foreign trade sectors of the economy were most affected by these dislocations.

Table 1.—Albania: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984	1985[e]
Asphalt and bitumen, natural[e 3] thousand tons	[r]1,000	[r]1,000	1,000	900	900
Cement, hydraulic[e] do.	[r]790	[r]830	[r]840	[4]840	850
Chromium:[e]					
Chromite, gross weight do.	[r]950	[r]900	[r]914	[4]960	[4]1,100
Marketable ore do.	[r]710	[r]675	[r]685	[r]720	825
Coal: Lignite[e] do.	[r]1,505	[r]1,640	[r]1,779	[4]2,010	2,195
Cobalt, mine output, metal content[e 5]	340	[r]400	[r]450	[r]600	600
Copper:					
Ore:					
Gross weight	751,000	826,000	891,000	[4]1,007,000	1,010,000
Metal content	[r]12,000	[r]13,200	16,500	[r]16,100	16,200
Metal, primary:					
Smelter	[r]9,107	[r]10,200	[r]11,000	[4]12,600	12,600
Refined	9,000	[r]9,500	[r]10,500	[r]11,500	11,500
Gas, natural, gross production[e 6] million cubic feet	13,500	[r]14,500	[r]14,000	[r]17,500	13,500
Iron and steel:					
Iron ore, nickeliferous:					
Gross weight	600,000	[r]702,000	[r]850,000	[4]1,082,000	1,130,000
Iron content	200,000	[r]234,000	[r]283,000	[r]360,000	376,000
Ferroalloys, ferrochromium	28,000	30,000	35,000	40,000	43,000
Nickel, mine output, metal content[e]	[r]5,100	[r]6,000	[r]7,200	[r]9,200	9,600
Nitrogen: N content of ammonia[e]	76,000	76,000	76,000	80,000	80,000
Petroleum:[e]					
Crude:					
Weight thousand tons	1,600	1,700	1,500	1,400	1,400
Converted thousand 42-gallon barrels	11,300	11,300	9,900	9,800	9,900
Refinery products	[r]9,000	[r]11,200	[r]9,000	[r]9,000	9,000
Salt[e]	66,500	66,500	70,000	70,000	70,000
Sodium compounds, n.e.s.: Carbonate, calcined (soda ash)[e]	25,500	25,000	25,000	25,000	31,000

[e]Estimated. [r]Revised.

[1]Table includes data available through July 1986.

[2]In addition to the commodities listed, a variety of industrial minerals and crude construction materials (bauxite, common clay, dolomite, olivinite, quartz, sand and gravel, stone, and titanomagnetite) are produced, but output is not reported quantitatively, and available information is inadequate to make reliable estimates of output levels. Also, metallic nickel production reportedly began in 1978, but data on the level of production are not available.

[3]Includes petroleum-refinery-produced asphalt and bitumen.

[4]Reported figure.

[5]Calculated from reported and estimated weight of nickeliferous ore; the amount of cobalt recovered, if any, is conjectural.

[6]Separate data on marketable production are not available, but gross and marketed output are regarded as nearly equal.

TRADE

Albania's commercial treaties for 1986, reached during 1985 with centrally planned economy countries, included a trade agreement with Bulgaria that stipulated Albanian exports of electric power, bitumen, sulfur, and copper wire in exchange for ferrous and nonferrous metals, machine tools, and chemicals. A trade agreement with Czechoslovakia called for Albanian exports of nickeliferous iron ore, chromite, and consumer goods in exchange for steel, sheet iron, pipes, and producer durables. The agreement with the German Democratic Republic provided for Albanian exports of chromite, copper wire, and consumer durables in exchange for machine tools, potash, chemicals, iron rods, and other producer goods. In 1986, Romania will export petroleum equipment, steel, pipes, lubricating oil, and chemical products in exchange for Albanian chrome ore and concentrate, copper wire, coal, electric power, and consumer goods. The trade agreement with Yugoslavia for 1986 provided for Albanian exports of chromite, electricity, and consumer durables in exchange for steel, nonferrous metals, and a wide assortment of producer and consumer durables. A 5-year trade agreement was concluded with China; Albania will export chromite and copper wire and import agricultural products.

Among market economy countries, Italy was one of Albania's most important trading partners. An agreement signed in 1985 called for Albanian exports of minerals, fuels, and consumer goods, in exchange for raw materials, chemicals, and engineering products. During negotiations, the Albanian trade delegation indicated an interest in expanding commercial agreements with Italy that would include purchases of Italian machine tools and the construction of an oil platform in the Adriatic, as well as in a possible linkage to the Italian-Greek electric power grid.

Table 2.—Albania: Apparent exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Principal destinations, 1984
METALS			
Aluminum: Metal including alloys, unwrought	17	15	All to Pakistan.
Chromium: Ore and concentrate	589,536	601,236	Sweden 144,343; Italy 140,944; Yugoslavia 131,174.
Copper: Metal including alloys:			
Unwrought	49	NA	
Semimanufactures	364	337	All to Yugoslavia.
Iron and steel: Metal:			
Ferroalloys:			
Ferrochromium	23,495	20,611	Sweden 9,116; Netherlands 4,309; Belgium-Luxembourg 3,538.
Unspecified	--	777	France 717; United Kingdom 60.
Steel, primary forms	--	11,393	All to Hungary.
Semimanufactures:			
Wire	--	20	Do.
Tubes, pipes, fittings	50	NA	
Nickel:			
Ore and concentrate	93	NA	
Matte and speiss	907	313	All to West Germany.
Ash and residue containing nickel	285	252	All to Netherlands.
Metal including alloys, unwrought	[2]800	NA	
Platinum-group metals: Waste and sweepings value, thousands	$160	$169	All to Italy.
Zinc: Metal including alloys, unwrought	--	59	All to Thailand.
INDUSTRIAL MINERALS			
Cement	112,996	NA	
Clays, crude	--	25	All to Italy.
Magnesium compounds	--	1,217	All to Hungary.
Pyrite, unroasted	59,503	31,489	Italy 27,315; Hungary 4,174.
Salt and brine	--	3,495	All to Yugoslavia.
Stone, sand and gravel:			
Dimension stone:			
Crude and partly worked	1,653	5,939	Italy 3,546; Poland 2,281; Japan 64.
Worked	1	7	Denmark 5; Yugoslavia 2.
Dolomite, chiefly refractory-grade	459	NA	
Gravel and crushed rock	--	17	All to Italy.
Quartz and quartzite	1,348	782	Do.

See footnotes at end of table.

Table 2.—Albania: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Principal destinations, 1984
INDUSTRIAL MINERALS —Continued			
Sulfur: Elemental:			
Crude including native and byproduct	2,313	487	All to Yugoslavia.
Colloidal, precipitated, sublimed	--	60	Do.
Other: Slag and dross, not metal-bearing	3,558	NA	
MINERAL FUELS AND RELATED MATERIALS			
Asphalt and bitumen, natural	500	500	Do.
Coal:			
Anthracite and bituminous	11,265	NA	
Lignite including briquets	--	10	All to Switzerland.
Petroleum refinery products:			
Liquefied petroleum gas thousand 42-gallon barrels	12	17	All to Yugoslavia.
Gasoline do	474	547	Italy 260; France 191; Hungary 96.
Kerosene and jet fuel do	2	2	All to Hungary.
Distillate fuel oil do	315	19	All to Turkey.
Bitumen and other residues do	351	NA	
Unspecified do	256	174	All to Poland.

[p]Preliminary. NA Not available.

[1]Table prepared by Jozef Plachy. Owing to a lack of official trade data published by Albania, this table should not be taken as a complete presentation of this country's mineral trade. Unless otherwise specified, these data have been compiled from United Nations information and data published by the partner trade countries.

[2]World Metal Statistics, World Bureau of Metal Statistics, London, United Kingdom.

Table 3.—Albania: Apparent imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides	4	5	--	All from West Germany.
Metal including alloys:				
Unwrought	832	582	--	Hungary 401; Yugoslavia 134; Norway 47.
Semimanufactures	1,775	1,315	--	Hungary 659; Yugoslavia 606.
Cobalt: Oxides and hydroxides	--	40	--	All from Italy.
Copper: Metal including alloys:				
Unwrought	158	14	--	West Germany 13.
Semimanufactures	525	186	--	West Germany 95; Yugoslavia 53; Switzerland 36.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite	63,745	40	--	All from Italy.
Pyrite, roasted	109,144	42,062	--	All from Morocco.
Metal:				
Pig iron, cast iron, related materials	1,505	10	--	All from Italy.
Ferroalloys:				
Ferromanganese	330	533	--	Yugoslavia 460; France 50.
Unspecified	800	13	--	All from France.
Steel, primary forms	164	NA		
Semimanufactures:				
Bars, rods, angles, shapes, sections	9,225	7,273	--	Yugoslavia 5,569; Hungary 1,359.
Universals, plates, sheets	12,533	7,230	--	Poland 2,859; Hungary 2,513; Yugoslavia 723.
Hoop and strip	950	215	--	West Germany 84; Austria 69; Italy 50.
Rails and accessories	1,431	941	--	All from Yugoslavia.
Wire	546	458	--	Yugoslavia 267; Austria 141.
Tubes, pipes, fittings	12,503	8,677	--	Japan 3,097; West Germany 1,675; Italy 1,615.
Castings and forgings, rough	--	158	--	All from Hungary.
Unspecified	42,262	37,218	--	Poland 19,218; Czechoslovakia 18,000.
Lead:				
Oxides	--	133	--	All from West Germany.
Metal including alloys:				
Unwrought	24	33	--	West Germany 20; Belgium-Luxembourg 13.
Semimanufactures	--	40	--	Netherlands 28; West Germany 12.

See footnotes at end of table.

Table 3.—Albania: Apparent imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Magnesium: Metal including alloys, unwrought	8	1	--	All from Yugoslavia.
Manganese: Oxides	27	NA		
Mercury ... 76-pound flasks	--	174	--	All from Netherlands.
Nickel: Metal including alloys:				
Unwrought	12	5	--	Do.
Semimanufactures	6	7	--	All from West Germany.
Platinum-group metals: Metals including alloys, unwrought and partly wrought ... value, thousands	$5	$18	--	All from Switzerland.
Silver: Metal including alloys, unwrought and partly wrought ... do	$61	$81	--	West Germany $80.
Tin: Metal including alloys, scrap	17	48	--	West Germany 46.
Tungsten: Metal including alloys, all forms	2	NA		
Zinc:				
Oxides	50	6	--	All from Italy.
Metal including alloys, unwrought	--	25	--	All from West Germany.
Other:				
Oxides and hydroxides	5	NA		
Base metals including alloys, all forms	--	4	--	All from Italy.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	4	NA		
Artificial: Corundum	128	273	--	Hungary 172; Yugoslavia 101.
Grinding and polishing wheels and stones	50	18	--	Italy 15; United Kingdom 3.
Asbestos, crude	1,964	1,699	--	Yugoslavia 1,643; Italy 56.
Barite and witherite	--	58	--	All from Turkey.
Boron materials: Oxides and acids	--	6	--	All from Italy.
Cement	--	60	--	Italy 30; Yugoslavia 30.
Clays, crude	40	182	--	France 134; Yugoslavia 48.
Diamond: Gem, not set or strung ... value, thousands	--	$63	--	All from Switzerland.
Diatomite and other infusorial earth	--	10	--	All from Italy.
Feldspar, fluorspar, related materials:				
Fluorspar	1,089	834	--	All from France.
Unspecified	58	358	--	Italy 300; Yugoslavia 58.
Fertilizer materials: Manufactured:				
Ammonia	1	1	--	All from West Germany.
Nitrogenous	5	1	--	Do.
Potassic	5	NA		
Graphite, natural	65	59	--	Do.
Magnesium compounds	410	500	--	All from Yugoslavia.
Mica: Worked including agglomerated splittings	3	3	--	Do.
Phosphates, crude	64,500	45,600	--	All from Morocco.
Pigments, mineral: Iron oxides and hydroxides, processed	58	14	--	All from Italy.
Sodium compounds, n.e.s.: Carbonate, manufactured	--	1,500	--	All from Turkey.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	53	74	--	All from Italy.
Worked	71	51	--	Do.
Sand other than metal-bearing	3,660	3,250	--	Yugoslavia 2,940; Belgium-Luxembourg 310.
Sulfur: Sulfuric acid	47	7	--	West Germany 5; France 2.
Talc, steatite, soapstone, pyrophyllite	943	86	--	All from Italy.
Other: Crude	93	NA		
MINERAL FUELS AND RELATED MATERIALS				
Carbon: Carbon black	43	1	--	Do.
Coal: Anthracite and bituminous	327,392	270,560	179,718	Poland 68,000; West Germany 22,842.
Petroleum refinery products:				
Gasoline ... 42-gallon barrels	4,199	7,761	--	France 7,642; Italy 111.
Mineral jelly and wax ... do	94	2,534	--	Yugoslavia 2,282; West Germany 197.
Kerosene and jet fuel ... do	79	NA		
Distillate fuel oil ... do	226	NA		
Lubricants ... do	16,240	16,072	--	Yugoslavia 10,759; Switzerland 2,149; Austria 1,610.
Bitumen and other residues ... do	--	6	--	All from West Germany.

[p]Preliminary. NA Not available.

[1]Table prepared by Jozef Plachy. Owing to a lack of official trade data published by Albania, this table should not be taken as a complete presentation of this country's mineral trade. Unless othewise specified, these data have been compiled from United Nations information and data published by the partner trade countries.

COMMODITY REVIEW

METALS

Bauxite.—Albania's bauxite deposits, situated in the Alpine region in Krujë, have been mined in recent years. Alpine bauxites formed massive lenses associated with Middle Triassic and Upper Triassic limestones. Those in the Krujë zone are associated with lower and middle Paleocene limestones and are formed into small lenticular deposits. In 1985 Albanian bauxite was marketed with the following typical analysis: aluminum 46%, minimum 44%; silica, 8.5%; iron, 20.3%; titanium dioxide, 2.77%; magnesia, 0.77%; and lime, 0.4%.

Chromite.—Although Albania remained a leading world producer and exporter of chromite, the country's production declined during the 1980-84 period. The decline was, in part, attributed to a deficiency of mine design and engineering specialists as well as a lack of technology.[8] Albania's chief chromite mining area, in the Martanesh District, produced most of the country's exportable metallurgical-grade material at the Bulquizë Mine, which had a capacity of about 800,000 tons per year. The Bulquizë Mine consisted of one shaft to a depth of 300 meters below the surface; a second shaft that would reach 400 meters was under construction, and a third was being developed to a depth of 600 meters. Mining at increasing depths presented problems of both rock pressure and ventilation.

Reportedly, a commercial delegation from the Federal Republic of Germany visited Albania during the year and expressed interest in chromite processing facilities. Although no agreements were announced, the Federal Republic of Germany would have the technical capability to supply Albania with requisite equipment and know-how.

After the disruption of deliveries in the second half of 1984, owing to production bottlenecks, Albania resumed shipment of chromite to contracted customers in early 1985.

Copper.—Although the planned production of copper ore and blister for 1985 was met, the industry reported production shortfalls at the Spac and Kurbnesh Mines in the first half of the year. During this period, reduced output at these mines resulted in a 68% shortfall in exports planned from this district. Smaller shortfalls for the period were reported at the Rehove Mine and concentrator as well.

Iron Ore.—Most of Albania's nickeliferous iron ore was produced at the Prrenjas Mine, southeast of Librazhd in the east-central part of the country. The mine area was serviced by the Prrenjas-Guri i Kuq Railroad, which connected it with processing and smelting facilities at Elbasan. The production of nickeliferous iron ore rose steeply from 1981 to 1985, owing to the opening of new mines and facility expansion at Prrenjas. The ore was processed and consumed domestically and was also offered for export. The marketable-grade ore and concentrate contained 42% to 44% iron, 0.9% to 1.0% nickel, and 0.065% cobalt. During the year, Albanian trade representatives discussed the possibility of offering 100,000 tons per year of iron ore to Yugoslavia. The proposed shipments would reportedly be earmarked for Yugoslavia's newly opened 1-million-ton-per-year refinery at Glogovac in Kosovo and would be contingent on the completion of the new Shkodra-Titograd rail link between the two countries.

Iron and Steel.—In 1985, the Steel of the Party iron and steel complex at Elbasan reported the production of ferrosilicon for the first time. Two grades were reportedly produced, containing 45% and 75% silicon, but quantitative information was not provided.

In other developments, the 6,000-ton-per-year nickel-cobalt refinery under construction at Elbasan would reportedly be completed before the last quarter of 1986 instead of 1985, owing to construction delays. The refinery construction was undertaken by the West German firm Saltzgitter Industriebau AG.

INDUSTRIAL MINERALS

Albania reported the production of quartz, olivinite, dolomite and titanomagnetite in sufficient quantities to meet both domestic and export requirements. However, production, consumption, and trade data were not given.

MINERAL FUELS

Coal.—The steady increase in Albania's lignite production during the seventh 5-year plan was able to partly offset declines in petroleum and gas output during this period.

In 1985, Albania reported the completion of expansion of underground workings at the Mborje-Drenova lignite mine, as well as the discovery of an additional 5 years of reserves at this site. Reportedly, large stockpiles of lignite accumulated at the Memaliaj Mine owing to scheduling difficulties.[9]

Petroleum and Natural Gas.—Severe production shortfalls in this sector continued despite large allocations of capital and labor. The oil and gas industry comprised 37 enterprises and absorbed more than 25% of the capital funds allocated to industry, as well as 10% of the total number of industrial workers. Depletion of reserves and a lack of modern technology and expertise appeared to have been the cause. Foreign officials, who drove through the oilfields while visiting Albania during the year, reported that scarcely any operating wells were in evidence.[10]

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[1]Foreign mineral specialist, Division of International Minerals.
[2]Zeri I Popullit. Dec. 25, 1984, pp. 1-3.
40 years of Socialist Albania. P. 63.
[3]Zeri I Popullit. Dec. 29, 1985, pp. 1-2.
[4]———. Dec. 3, 1985, p. 1.
[5]Radio Free Europe Research. Apr. 22, 1986.
Tanjug. Apr. 9, 1986.
[6]Zeri I Popullit. Aug. 17, 1985, p. 1; Jan 26, 1986, p. 1.
[7]———. July 23, 1985, pp. 3-4.
[8]Bashkimi. Aug. 1, 1985, p. 1.
[9]Zeri I Popullit. Aug. 16, 1985, p. 1.
[10]The Observer. Nov. 10, 1985, p. 17.

The Mineral Industry of Algeria

By Kevin Connor[1]

The hydrocarbon industry remained the dominant force behind Algeria's economy in 1985, accounting for 27% of the country's gross domestic product, 46% of Government revenues, and 98% of all export earnings. At the beginning of 1985, Algeria's natural gas reserves were estimated at 3.7 trillion cubic meters, the fifth largest in the world. The hydrocarbon industry was the country's fourth largest employer, after agriculture, construction, and manufacturing. Besides its hydrocarbon industry, Algeria had other active mineral sectors that produced a variety of minerals including significant quantities of barite, iron ore, limestone, mercury, phosphate rock, and zinc concentrates. Algeria's sole copper mine shut down late in 1984 and remained closed.

Algeria remained a major world producer of natural gas and gas condensates, with the giant Hassi R'Mel nonassociated gasfield dominating production. With reserves estimated at 2 trillion cubic meters, the Hassi R'Mel Field, 500 kilometers south of Algiers, represented over 60% of Algeria's known reserves. Gas produced for liquefaction and export was transported via pipelines to the country's two main hydrocarbon ports on the Mediterranean coastline, Arzew and Skikda, where liquefaction plants in 1985 had a total annual capacity of 31 billion cubic meters.

As part of the Government's plans to continue to increase natural gas exports, work began on expanding the capacity of the Trans-Mediterranean gas pipeline from 9 billion to 16 billion cubic meters per year. Part of this increase in line capacity was expected to be used to transport gas to Yugoslavia, which signed a 20-year agreement in August with the Government of Algeria, for total sales of 20 billion cubic meters.

The country's 1985-89 Development Plan reflected the Government's aim of reducing the national external debt. Austerity measures and cutbacks in large Government-funded programs, such as industrial-scale projects, were introduced during the year. There was also the beginnings of a decentralization program. The state agency for mining and prospecting, Société Nationale de Recherches et d'Exploitations Minières, was restructured and divided into six separate agencies. These included the formation of Entreprises Nationale du Developpement Minières, an agency for developing mineral deposits in the country, and Ferphos, an agency for handling the activities of the iron ore and phosphate rock industries within Algeria. Also set up was the Bureau de Geologique, which was given the overall responsibility for identifying, studying, and coordinating research efforts on the country's mineral resources.

The Government approved measures to increase incentives to international firms to explore for petroleum in Algeria. Exploration efforts had been modest in Algeria for some time, with only about 20 wells drilled per year. The new legislation was expected by the Government to boost this figure to 60 exploration wells per year by 1989. Under the old petroleum code, at a minimum the Government of Algeria owned 51% of any production operation with the foreign partner required to bear all exploration costs. The new codes would modify the contractual obligation by the foreign partner to cover total exploration costs.

PRODUCTION AND TRADE

Algeria's mineral trade balance remained favorable owing to the country's exports of crude and refined petroleum products, liquefied petroleum gas (LPG), natural gas, and liquefied natural gas (LNG). Algeria was the world's largest exporter of LNG. The crude oil share of overall hydrocarbon exports continued to decline. High-quality light crude accounted for approximately 20% of hydrocarbon revenues in 1985, compared with 70% in 1980. Exports of refined petroleum products continued a slight downward trend, while natural gas condensate sales continued to increase, as well as those of natural gas products and LPG. A new plant was completed at Bethioua near Arzew, and LPG exports for 1985 were estimated at 20 million barrels. The other mineral sectors experienced little change in production rates, except for the phosphate rock industry, which enjoyed a substantial 21% increase in production.

Natural gas exports to West European customers remained static at approximately 20 million cubic meters. Although term contracts specified more than this, the shortfall in sales was representative of the relative high cost of Algerian gas and increasing competition from other gas exporting countries. Contract negotiations with major customers were under way at yearend to mitigate the problem of high contract prices versus low spot market prices.

Table 1.—Algeria: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984[p]	1985[e]
METALS					
Cadmium, refined	30	30	30	24	25
Copper concentrate:					
Gross weight	688	627	600	820	--
Metal content	158	144	130	115	--
Iron and steel:					
Iron ore, gross weight thousand tons	[r]3,481	[r]3,892	3,684	3,664	[3]3,377
Metal:					
Pig iron do.	897	1,097	1,100	[e]1,100	1,100
Steel, crude[e] do.	[3]522	575	600	700	750
Lead concentrate, metal content[e]	[r]5,000	[r]5,000	3,000	4,000	3,000
Mercury 76-pound flasks	25,000	11,000	[e]10,000	23,000	[3]23,000
Silver[e] thousand troy ounces	110	110	120	120	120
Zinc concentrate, metal content	[r]10,700	[r]11,100	12,100	14,600	12,000
Smelter	[r]27,000	[r]28,500	31,200	35,000	31,200
INDUSTRIAL MINERALS					
Barite, crude	89,000	102,000	[e]110,000	88,000	[3]60,000
Cement, hydraulic[e] thousand tons	[3]4,460	[r]4,400	4,800	[r]5,500	5,500
Clays:					
Bentonite[e]	35,000	35,000	30,000	[3]24,500	[3]33,000
Fuller's earth[e]	5,100	5,100	5,000	[3]3,500	3,500
Kaolin[e]	19,000	15,000	17,000	[3]8,000	[3]13,000
Diatomite[e]	4,500	4,500	4,500	[3]1,600	[3]2,600
Gypsum and plaster[e] [4] thousand tons	200	200	250	250	250
Lime, hydraulic[e] do.	40	40	40	40	40
Nitrogen, N content of ammonia	[r]43,300	[r]164,000	131,500	146,300	150,000
Phosphate rock thousand tons	916	947	893	1,000	[3]1,207
Salt do.	128	140	[e]150	175	[3]168
Sodium compounds: Caustic soda[e]	700	700	700	700	700
Strontium minerals: Celestite, gross weight[e]	5,400	5,400	5,400	5,400	5,400
Sulfur, elemental[e]	15,000	10,000	15,000	20,000	20,000
MINERAL FUELS AND RELATED MATERIALS					
Gas, natural:					
Gross million cubic feet	[r]2,311,000	[r]2,898,000	3,173,000	[e]3,350,000	3,350,000
Marketed (including liquefied) do.	[r]868,000	[r]1,048,000	1,427,000	1,260,000	[3]1,320,000
Natural gas plant liquids (condensate) thousand 42-gallon barrels	77,745	73,000	91,500	118,950	120,000

See footnotes at end of table.

Table 1.—Algeria: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984[p]	1985[e]
MINERAL FUELS AND RELATED MATERIALS —Continued					
Petroleum:					
Crude ______ thousand 42-gallon barrels__	[r]293,825	[r]259,150	240,900	233,508	[3]236,885
Refinery products:					
Gasoline ________do____	[r]9,855	[r]14,235	12,045	[e]13,000	13,000
Kerosene and jet fuel ________do____	[r]3,285	[r]6,205	4,745	[e]5,500	5,500
Distillate fuel oil ________do____	[r]27,375	[r]41,975	52,925	[e]53,000	53,000
Residual fuel oil ________do____	[r]18,615	[r]28,105	34,675	[e]37,000	37,000
Lubricants________do____	[r]730	[r]1,095	365	[e]350	350
Other________do____	[r]26,280	[r]40,150	40,515	[e]37,500	37,500
Refinery fuel and losses________do____	[r]4,380	[r]6,570	7,300	[e]9,000	9,000
Total ________do____	[r]90,520	[r]138,335	152,570	[e]155,350	155,350

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through July 7, 1986.
[2]In addition to the commodities listed, secondary aluminum, secondary lead, and secondary copper may be produced in small quantities; crude construction materials presumably are produced for local consumption, but output is not reported, and available information is inadequate to make reliable estimates of output levels.
[3]Reported figure.
[4]Includes approximately 50,000 tons of plaster each year.

Table 2.—Algeria: Exports and reexports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS				
Aluminum: Metal including alloys, scrap	199	125	--	All to France.
Copper: Metal including alloys:				
Scrap__________	3,389	1,226	--	Do.
Semimanufactures__________	2	--		
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite __________	1,398,182	974,452	--	Belgium-Luxembourg 655,902; Romania 100,000; Italy 93,550.
Metal:				
Scrap __________	55,388	82,881	--	Spain 60,559; Italy 9,270.
Pig iron, cast iron, related materials __________	212,615	279,684	--	Yugoslavia 75,420; U.S.S.R. 64,219; Italy 30,500.
Steel, primary forms ________	31,001	70,928	7,000	Italy 36,428; West Germany 14,800.
Semimanufactures:				
Bars, rods, angles, shapes, sections__________	--	7,000	--	Italy 4,000; West Germany 2,000; Turkey 1,000.
Universals, plates, sheets __	10,688	19,280	8,341	Italy 9,678.
Tubes, pipes, fittings _____	--	10	--	All to East Germany.
Lead:				
Ore and concentrate__________	2,655	6,777	--	Spain 3,300; France 2,300; Switzerland 1,177.
Metal including alloys, scrap______	568	--		
Mercury ________ 76-pound flasks__	14,562	33,214	11,255	East Germany 8,064; Romania 4,061.
Zinc: Metal including alloys:				
Scrap__________	45	10	--	All to France.
Unwrought __________	31,011	18,713	--	Yugoslavia 9,536; Netherlands 2,524; Poland 2,001.
INDUSTRIAL MINERALS				
Diamond: Industrial stones value, thousands__	$129	$72	--	Ireland $56; Belgium-Luxembourg $16.
Fertilizer materials: Manufactured, ammonia __________	105,003	74,985	--	Tunisia 33,386; Spain 28,454; India 9,937.
Graphite, natural __________	120	130	--	All to France.
Phosphates, crude __________	599,586	547,230	--	Czechoslovakia 109,960; Hungary 72,240; Poland 68,250.
Salt and brine__________	--	3,744	--	All to Niger.
Other: Crude __________	4,000	--		

See footnotes at end of table.

Table 2.—Algeria: Exports and reexports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
MINERAL FUELS AND RELATED MATERIALS				
Coke and semicoke	5,173	19,155	--	All to Tunisia.
Gas, natural:[2] Liquefied value, thousands	$2,486,347	$3,135,080	$360,020	France $1,580,630; Italy $800,368.
Petroleum:				
Crude[3] thousand 42-gallon barrels	179,611	168,624	53,640	France 28,253; Netherlands 22,840.
Refinery products:				
Gasoline, motor do.	67,128	48,793	5,688	Netherlands 14,252; France 14,064.
Kerosene and jet fuel do.	1,910	13,547	187	Italy 10,012; France 715; India 387.
Distillate fuel oil do.	--	39,255	1,680	France 15,082; Italy 12,216; Netherlands 5,380.
Lubricants do.	--	366	--	France 234; Netherlands 132.
Residual fuel oil do.	32,009	36,236	21,454	United Kingdom 4,126; Netherlands 2,297.

[1]Table prepared by Virginia A. Woodson.
[2]Includes unspecified quantity of liquefied petroleum gas.
[3]Includes partly refined.

Table 3.—Algeria: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides	1,233	789	--	France 776.
Metal including alloys:				
Scrap	65	65	--	All from West Germany.
Unwrought	3,414	6,810	--	West Germany 4,614; U.S.S.R. 1,192.
Semimanufactures	14,122	13,536	8	France 5,363; Belgium-Luxembourg 1,845; West Germany 1,687.
Chromium: Oxides and hydroxides	50	527	--	Austria 280; France 219.
Copper:				
Matte and speiss including cement copper	25	--		
Metal including alloys:				
Scrap	1	6	--	All from United Kingdom.
Unwrought	724	1,059	--	France 981; West Germany 78.
Semimanufactures	18,807	27,107	3	West Germany 7,050; France 6,392; Belgium-Luxembourg 4,225.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite	--	16,005	--	Belgium-Luxembourg 16,000.
Pyrite, roasted	--	36	--	All from France.
Metal:				
Scrap	66	15	--	Switzerland 11; Belgium-Luxembourg 3.
Pig iron, cast iron, related materials	13,128	26,722	21	France 9,690; Canada 9,234; West Germany 5,583.
Ferroalloys:				
Ferromanganese	919	8,572	--	Belgium-Luxembourg 3,791; Spain 2,522; Norway 1,224.
Unspecified	6,083	18,317	--	West Germany 10,114; Norway 4,292; Iceland 1,660.
Steel, primary forms	133,239	191,624	--	West Germany 172,256; Japan 18,714.
Semimanufactures:				
Bars, rods, angles, shapes, sections thousand tons	1,034	1,154	NA	Brazil 330; Spain 267; West Germany 110.
Universals, plates, sheets do.	122	160	(3)	West Germany 71; Belgium-Luxembourg 35; France 21.
Hoop and strip do.	7	5	(3)	West Germany 4.
Rails and accessories do.	31	72	--	Austria 58; France 12.
Wire do.	22	29	(3)	Belgium-Luxembourg 9; West Germany 8; Italy 3.
Tubes, pipes, fittings do.	199	137	1	Italy 38; France 34; West Germany 20.
Castings and forgings, rough do.	1	--		

Table 3.—Algeria: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Lead:				
Ore and concentrate	7	--		
Oxides	1,081	1,459	--	Switzerland 1,319; Netherlands 140.
Metal including alloys:				
Unwrought	4,838	6,062	--	Tunisia 2,965; West Germany 2,083; Belgium-Luxembourg 994.
Semimanufactures	347	615	--	Belgium-Luxembourg 378; France 97; Canada 87.
Magnesium: Metal including alloys, semimanufactures	58	18	--	France 16; West Germany 1.
Manganese: Oxides	1,282	1,917	--	Japan 543; Greece 483; Gabon 300.
Mercury value, thousands	$25	$8	--	West Germany $4; France $3.
Nickel: Metal including alloys:				
Unwrought do.	$3	--		
Semimanufactures	170	216	1	West Germany 107; Canada 39; France 27.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$1,273	$573	--	France $293; Belgium-Luxembourg $217.
Silver: Metal including alloys, unwrought and partly wrought do.	$4,279	$2,527	$6	Austria $1,795; West Germany $274.
Tin: Metal including alloys:				
Scrap	114	--		
Unwrought	--	618	--	Singapore 208; Bolivia 150; Malaysia 150.
Semimanufactures	75	158	--	Belgium-Luxembourg 105; West Germany 50.
Titanium: Oxides	5,994	6,786	--	West Germany 5,245; Belgium-Luxembourg 1,498.
Zinc:				
Ore and concentrate	35,630	--		
Oxides	460	232	--	France 141; Italy 50; Netherlands 19.
Metal including alloys:				
Scrap value, thousands	$1	--		
Unwrought	18	20	--	All from Italy.
Semimanufactures	398	516	NA	France 465; West Germany 25.
Other:				
Ores and concentrates	100	107	--	West Germany 87; France 20.
Oxides and hydroxides	272	789	--	France 776.
Base metals including alloys, all forms	23	107	--	China 100; Spain 4.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	75,152	125,149	NA	Italy 77,858; Greece 47,287.
Artificial: Corundum	1,383	527	--	Austria 280; France 219.
Dust and powder of precious and semiprecious stones including diamond value, thousands	$17	$3	--	All from France.
Grinding and polishing wheels and stones	751	678	NA	Italy 287; Switzerland 162; France 147.
Asbestos, crude	27,181	23,503	--	Canada 20,605.
Barite and witherite	4	150	--	All from West Germany.
Boron materials:				
Crude natural borates	--	20	20	
Oxides and acids	165	223	--	Italy 220.
Cement thousand tons	3,354	3,424	20	Greece 1,370; Turkey 499; Spain 448.
Chalk	10,108	24,523	NA	Spain 12,767; Italy 7,149; France 4,591.
Clays, crude	10,660	20,467	--	United Kingdom 11,910; France 4,941.
Diamond:				
Gem, not set or strung value, thousands	$3	$1	--	All from West Germany.
Industrial stones do.	$764	$306	--	All from Zaire.
Diatomite and other infusorial earth	67	12	--	West Germany 11; France 1.
Feldspar, fluorspar, related materials	3,655	3,442	--	Italy 2,150; France 1,067.
Fertilizer materials: Manufactured:				
Ammonia	25	7	--	Mainly from France.
Nitrogenous	7,306	39,223	--	Romania 38,576.
Phosphatic	40,255	13,095	--	Tunisia 9,095; Belgium-Luxembourg 4,000.
Potassic	39,713	93,230	--	Italy 72,230; Belgium-Luxembourg 20,918.
Unspecified and mixed	88	26,245	--	Tunisia 26,196.
Graphite, natural	263	481	--	United Kingdom 202; West Germany 174.

See footnotes at end of table.

Table 3.—Algeria: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Gypsum and plaster	111	3	--	All from France.
Lime	66	86	(2)	Do.
Magnesite, crude	238	567	1	Belgium-Luxembourg 203; Austria 161.
Mica:				
Crude including splittings and waste	11	23	--	Canada 20; Belgium-Luxembourg 2.
Worked including agglomerated splittings	6	18	--	Belgium-Luxembourg 16.
Pigments, mineral: Iron oxides and hydroxides, processed	1,607	3,982	103	France 3,506; West Germany 221.
Precious and semiprecious stones other than diamond: Synthetic value, thousands	$1,079	$445	--	All from Austria.
Salt and brine	17,623	413	--	France 171; Belgium-Luxembourg 162.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	21,115	17,449	--	France 12,466; Turkey 3,800.
Sulfate, manufactured	5,539	15,170	--	Spain 5,282; France 3,039; Romania 3,000.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	27	127	--	France 97; West Germany 30.
Worked	91	2,668	--	Canada 2,229; Italy 432.
Dolomite, chiefly refractory-grade	2,099	5,063	--	Albania 2,000; Spain 1,330.
Gravel and crushed rock	55,583	99,419	--	Italy 87,986; France 11,096.
Quartz and quartzite	1,059	4,567	--	Belgium-Luxembourg 4,405.
Sand other than metal-bearing	4,829	130	--	Netherlands 100; France 16.
Sulfur:				
Elemental:				
Crude including native and byproduct	73,796	42,508	7,769	France 34,739.
Colloidal, precipitated, sublimed	2,507	3,505	--	All from France.
Sulfuric acid	38	83	NA	France 43; East Germany 27; Austria 13.
Talc, steatite, soapstone, pyrophyllite	1,531	1,267	--	France 765; Italy 497.
Other: Crude	34	122	--	France 101; Italy 15.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	382	11	--	All from France.
Carbon black	2,038	3,413	51	West Germany 1,627; Netherlands 1,303.
Coal:				
Anthracite and bituminous thousand tons	1,170	1,499	1,036	Poland 199; Australia 167.
Briquets of anthracite and bituminous coal	--	300	--	All from France.
Coke and semicoke value, thousands	$383	$1	--	Do.
Petroleum refinery products:				
Liquefied petroleum gas 42-gallon barrels	337,920	635,889	--	United Kingdom 260,513; Spain 182,039.
Gasoline, motor do	6,078	20,077	--	Netherlands 15,572; France 4,437.
Mineral jelly and wax do	60,158	60,284	--	West Germany 36,674; Brazil 18,495.
Kerosene and jet fuel do	71,161	12,702	NA	Belgium-Luxembourg 6,882; U.S.S.R. 2,829; West Germany 2,751.
Distillate fuel oil do	--	187	--	All from Netherlands.
Lubricants do	656,754	641,452	77	France 395,619; Netherlands 168,161; Italy 64,897.
Residual fuel oil do	433	1,508	--	All from France.
Bitumen and other residues do	568,779	502,719	--	Austria 172,225; Spain 130,629; Italy 84,919.
Bituminous mixtures do	65,933	93,585	758	France 72,769; Austria 17,671.

NA Not available.
[1]Table prepared by Virginia A. Woodson.
[2]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Progress continued on the development of a 1.1-million-ton-per-year direct-reduction steelworks at Bellara. A total of 10 international companies had submitted technical and cost bids on the project. These bids were still being evaluated at yearend. Preliminary plans developed by the Government agency for steel activities within Algeria, Enterprise Nationale de Siderurgie (Sider), called for constructing a direct-reduction unit for sponge iron production, a pelletization plant, an oxygen furnace, and an electric arc furnace.

Sider was also continuing with plans for building three large mills for processing the expected 1.1 million tons of raw steel from Bellara. Through design and construction contracts, Sider expected to build a 600,000-ton-per-year rod and bar mill at Ain M'Lilla south of Constantine, a 450,000-ton-per-year medium section mill at M'Sila, southwest of Bellara, and a 700,000-ton-per-year rolling mill at Ain Yagourt. Prequalification applications were submitted by interested international companies at yearend.

INDUSTRIAL MINERALS

Cement.—Construction work on Société Nationale des Materiaux de Construction's (SNMC) 3,000-ton-per-day plant at Ain Touta was under way throughout the year and on schedule at yearend. The plant was expected on-line by mid-1986. F. L. Smidth of the United Kingdom supplied the plant's dry-process kiln with a Folax cooler. SNMC also was developing plans for modernization of its 10-year-old Meftah plant, just outside the capital city of Algiers.

Fertilizer Materials.—Early in the year, the French-built ammonium nitrate complex at Annaba finally started full-scale operations, almost 5 years after the turnkey project was handed over to the Algerian Government. In its first month, the plant produced more ammonium nitrate than its entire previous production.

The Government agency, Entreprise Nationale d'Engineering Petrolier (ENEP), began a feasibility study in October for constructing a nitrophosphate plant. ENEP was conducting the study for the agency, Entreprise Nationale Asmidal (ENA), which operated a fertilizer chemical complex at Annaba. ENEP was considering two alternatives, a nitrophosphate plant with a 1,000-ton-per-day capacity and a plant that would have double that capacity. The project was a joint venture with the Tunisian agency, Tunisie Engineering & Construction Industrielle. It was yet to be decided whether the plant would be located in Algeria or Tunisia.

Also in late 1985, ENA invited local and international companies to submit construction bids for a phosphate fertilizer complex to be built at Bir el Ater, near Tebessa. Algeria's largest phosphate mine at Diebel Onk was nearby. The project was probably a reactivation of plans drawn up in the late 1970's for construction of an inland fertilizer complex near the country's phosphate rock mines. The purpose of the project was to expand Algeria's downstream phosphate chemical fertilizer industry and to create an employment center away from the heavily populated coastal areas. Few details were available at yearend; however, the project plans for Tebessa drawn up in the 1970's envisioned construction of a 1,600-ton-per-day sulfuric acid unit, a 500-ton-per-day phosphoric acid unit, and a 750-ton-per-day superphosphoric unit.

MINERAL FUELS

Natural Gas.—Construction began in July to double the capacity of the Trans-Mediterranean gas pipeline, which carried approximately 8 billion cubic meters of natural gas in 1985 from Algeria across Tunisia to Sicily and the Italian mainland. Italy's Ente Nazionale Idrocarburi was awarded the estimated $210 million[2] contract in August 1984. Finalization of payment terms delayed the beginning of construction work for several months. The contract specified building a 120-centimeter-diameter, 550-kilometer stretch of line from the Hassi R'Mel Gasfield to Qued Saf on the Tunisian border. The completion of the line, expected in mid-1987, would bring the capacity of the Algerian section of the pipeline up to the rest of the line to Italy. The original Algerian section was designed for throughput to be raised by either adding additional pumping stations or by building a parallel line. Under contract, Italy was to import 12 billion cubic meters of natural gas in 1986.

During April, the Algerian national hydrocarbon company, Société Nationale pour la Recherche, la Production, le Transport, la Transformation, et la Commercialisation des Hydrocarbures (SONATRACH), awarded two Japanese companies, Japan Gasoline Corp. and C. Itoh & Co. Ltd., a contract valued at $47 million for construction of a gas processing complex to be built at Tin Fouye Tabankort in southeastern Algeria. The plant was to have a processing capacity of 4.5 million cubic meters per day. The contract also covered the construction of compressor facilities and pipelines and was expected to take 26 months to complete.

Petroleum.—*Exploration.*—Late in December, SONATRACH announced that an oil strike had been made by the agency at Adrar, about 1,100 kilometers southwest of Algiers in the Sahara Desert. The discovery well, Decheira One, found oil at approximately 600 meters and was, according to officials, one of SONATRACH's most important petroleum discoveries. At least four other modest discoveries were reported during the year. Chronologically, these discoveries were the Touat-1 well in the southwest near Adrar, which tested at 800 barrels per day; the Moukhag Kebach-1 well in the Hadjira area of eastern Algeria, which tested at 2,000 barrels per day; the Oved Zine discovery, also in the Adrar area; and a small new field at Rhourd Chegga northeast of the Hassi Messaoud Oilfield, where production was expected to reach 8,000 barrels per day.

Production.—Production of crude oil continued to center on the Cambrian reservoirs of the Hassi Messaoud-Haoud el Hamra Oilfields, situated in the Sahara Desert approximately 500 kilometers south of Constantine, and in the Zarzatine-Edjeleh Fields near Ohanet on the Libyan border, another 500 kilometers southeast of Hassi Messaoud. As of yearend, Algeria's petroleum reserves were estimated at 9 billion barrels. In response to the Government's anticipation that domestic consumption would increase to 80% of the country's total petroleum production by the year 2000, considerable priority was being given in the 1985-89 development plans for petroleum exploration activities and enhanced recovery techniques for existing production fields.

Refining and Transport.—Planning continued on replacement of the 380-kilometer northern section of the 640-kilometer crude oil pipeline that linked the Haoud el Hamra Oilfield with the export refinery at Skikda. The original pipeline, installed by Saipem S.p.A. of Italy in 1960, was in poor condition in 1985 and needed replacing. Competition for the project, which had been tendered in September 1984, was narrowed to the JGC Corp. of Japan and the U.S.S.R.'s Tsvetmetproexport. The cost of the project was estimated at $120 million. Actual funding for the project was in question at yearend 1985 owing to continued weak oil export prices, which were reported to have precipitated a 26% downward revision in the Government's hydrocarbon investment plans for 1986.

Petrochemicals.—Three international consortiums were bidding at yearend on a $100 million contract to build a linear alkyl benzene plant in Skikda. The expected design capacity of the plant was 40,000 tons per year as reported by officials of the Government's Entreprise Nationale des Industries Petrochimiques, a subsidiary of SONATRACH. The three groups competing for the plant design and construction contract were Toyo Engineering Corp. and C. Itoh of Japan, Chiyoda Chemical Engineering and Construction Co. of Japan and Dragados y Construcciones of Spain, and Technipetrol of Italy.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Algerian dinars (DA) to U.S. dollars at the rate of DA5.00=US$1.00.

The Mineral Industry of Angola

By Thomas O. Glover[1]

In 1985, the predominant factor in the mineral industry of Angola continued to be petroleum, accounting for more than 90% of the country's export revenue. Cabinda Gulf Oil Co. (CABGOC), a Gulf Oil Corp. affiliate acquired by Chevron Oil Corp. in 1984, produced approximately 70% of Angola's crude oil. Of secondary importance was the production of diamond. Angola's once booming diamond industry had fallen annually since 1980 owing to increasing civil strife, widespread smuggling, and a drop in world market prices for diamond.

Angola exported approximately 220,000 barrels per day (bbl/d) of crude oil in 1985, an increase of 10% over that of 1984. Increased oil production was mostly from new offshore fields. Late in February, production started in the Palanca offshore field at a rate of approximately 12,000 bbl/d.

Specific information on production and planned activities for the mineral industry was generally minimal owing to internal strife. Reports on Angolan minerals tended to reflect continued deterioration in the mining industry, and the petroleum sector appeared to be about the only bright spot in the economy.

The U.S.S.R. scheduled a group of technicians to go to Angola between 1985 and 1987 to participate in planning and technical studies in preparation for the construction of the Kapanda Dam in the Province of Malange. Brazilian technicians were also scheduled to take part in building the dam, which was scheduled to be completed by 1990.

PRODUCTION AND TRADE

In 1985, petroleum sales represented approximately $2.5 billion[2] in revenue, more than 90% of the country's export income. Investment in the country's oil sector between 1985 and 1990 was expected to exceed $1 billion, with an anticipated production by 1990 of 500,000 bbl/d. Unlike Nigeria, Angola refused to join the Organization of Petroleum Exporting Countries, which set production quotas. Recoverable reserves of crude oil were estimated to be 1.8 billion barrels. Angola continued to diversify its oil markets and exported to various foreign customers including Brazil, Japan, Spain, and the United States.

Reliable statistical information on production and trade continued to be unavailable. Production levels have been estimated on the basis of the best available information.

Table 1.—Angola: Production of mineral commodities[1]

Commodity[2]	1981	1982	1983	1984[p]	1985[e]
METALS					
Iron and steel: Steel, crude[e] metric tons	10,000	10,000	10,000	10,000	10,000
INDUSTRIAL MINERALS					
Cement, hydraulic[e] thousand metric tons	250	250	220	350	350
Diamond:					
Gem[e] thousand carats	1,050	915	775	[r]700	375
Industrial stones[e] do.	350	310	259	[r]202	250
Total do.	1,400	1,225	1,034	902	625
Gypsum[e] metric tons	20,000	20,000	20,000	20,000	20,000
Salt[e] do.	50,000	58,000	55,000	50,000	10,000
MINERAL FUELS AND RELATED MATERIALS					
Asphalt and bitumen, natural[e] do.	25,000	25,000	25,000	25,000	25,000
Gas, natural:[e]					
Gross million cubic feet	55,000	52,000	55,000	55,000	55,000
Marketable do.	2,500	2,500	2,500	2,500	2,500
Petroleum:					
Crude thousand 42-gallon barrels	[e]52,000	50,700	58,400	73,000	89,000
Refinery products:					
Gasoline do.					
Jet fuel do.					
Kerosene do.					
Distillate fuel oil do.	NA	NA	NA	NA	NA
Residual fuel oil do.					
Other do.					
Refinery fuel and losses do.					
Total do.	NA	[e]7,240	NA	[e]10,000	10,000

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through Mar. 13, 1986.
[2]In addition to the commodities listed, a variety of crude construction materials (clays, sand and gravel, and broken stone) presumably is produced for local consumption, but information is inadequate to make reliable estimates of output levels.

COMMODITY REVIEW

METALS

The activities of the parastatal company Ferrangol to rehabilitate the Cassinga iron mines in Huila, which have been out of operation for a decade, were at a standstill. The investments made in the mining complexes of Cassinga-Norte (Jamba), in association with Austromineral GmbH, a subsidiary of Voest-Alpine AG, had not produced any compensatory results. Civil strife in the area hampered the rehabilitation process at these mines. The ore reserves, containing 44% iron, were estimated to contain approximately 22 million tons of detrital iron.

INDUSTRIAL MINERALS

Cement.—The production of cement in Angola during 1985 was estimated to be approximately 350,000 tons, the same as that of 1984. Cement was produced at the Cimangola and Encime plants, with Cimangola producing 85% of the total tonnage.

Diamond.—Companhia de Diamantes de Angola (DIAMANG) operated the diamond mines in Angola. In previous years, DIAMANG operated as many as 40 alluvial diamond producing pits. The number of pits operating in 1985 was not known. Owing to civil strife in the country, pits were closed temporarily at times, while some remained closed the entire year. DIAMANG marketed the diamonds under its control to the Central Selling Organization; however, diamonds produced by elements of organizations hostile to the Angolan Government were sold to undisclosed sources, with estimated losses to the Government of $3 million to $4 million per month. Forces opposed to the Angolan Government were estimated to control 80% of the Angolan diamond mine production in 1985.

DIAMANG ownership consisted of the following elements: Angola State (77.21%), the Belgian Société Générale des Mines (17.44%), and various British, Swiss, and United States companies (5.35%). The Angola State share was held by Empresa Nacional de Diamantes de Angola, a parastatal company.

Diamond production continued to decline during 1985 owing to a significant drop in the export price, a shortage of technical equipment, increased production costs, and civil strife. Production of diamonds was estimated to be considerably below the 902,431 carats reported for 1984.

Forces opposed to the existing Angolan Government attacked and destroyed the Kafunfo diamond placer mine on December 31, 1984. During the attack, a chartered *Hercules* C-130 transport aircraft owned by the Transamerican Airlines Co. of the United States was forced down and, subsequently, destroyed. The aircraft had been operating four times daily between Luanda and the minesite, about 1,600 kilometers away, transporting equipment and fuel needed to operate several mines in the Kafunfo Mine area in Lunda Norte Province. The only way supplies could be transported was by air, owing to the destruction of bridges and roads in previous actions. The Kafunfo Mine was of great importance to the Angolan Government owing to the high quality of its diamonds.

DIAMANG sought to diversify its operations to several companies instead of entrusting the task, as had been done previously, to Mining and Technical Services Co. Ltd. (MATS). The MATS contract expired at the end of 1985.

Earnings from diamonds fell by 75% between 1980 and 1984 from $235.9 million to $58 million, when the price of Angolan gem diamonds fell from $158 to $64.24 per carat.

Phosphate.—Large deposits of phosphates were identified in the Provinces of Zaire and Cabinda prior to the startup of the Phosphate Extraction Co., a state firm set up to exploit these deposits. Five contracts were signed in 1979 with Bulgareomina of Bulgaria, which concluded when a $9 million phosphate mining complex in the Province of Zaire was completed in 1980. For various undisclosed reasons, this facility has not operated since construction was completed. The first phase of the exploitation of phosphate from Mongo-Tando, Cabinda, was high on the economic development plan for Cabinda Province in 1982. A second phase of exploitation was scheduled to commence in 1986, even though conditions were not favorable for production in the immediate future. Phosphate was important to Angola's economy because it was used in the manufacture of fertilizer, medicine, soap, and other products.

Salt.—Five salt operations in the Angolan Namibe Province were undergoing repairs. The operations produced 60% less salt in 1984 than in 1983, and were to produce even less in 1985, owing to the ongoing repairs. Salt production at a private salt works with a 7,200-ton-per-year output was being used while the repairs were being made. Upon completion of repairs, production from the five operations was expected to reach 14,500 tons in 1986 and 21,000 tons in 1987.

MINERAL FUELS

Angola's crude oil production was estimated to be about 244,000 bbl/d in 1985, an increase of about 22% over output in 1984. Total crude production for 1985 was approximately 89 million barrels, resulting in export earnings of $2.5 billion. Angola's recoverable oil reserves in 1985 were estimated at 1.8 billion barrels, with investment in the country's oil sector expected to exceed $1 billion between 1985 and 1990.

Petrobras International S.A. (Braspetro), an oil prospecting subsidiary of Petróleo Brasileiro S.A. of Brazil, discovered oil in a wildcat well at the mouth of the Congo River in Angola. The well, Tiburon IV, was producing 2,800 bbl/d. Braspetro was exploring for oil in association with the Angolan Sonangol Oil Co., Total Exploration (a subsidiary of Compagnie Française des Pétroles), and Texaco Petroleos de Angola.

Chevron, in partnership (49%) with the Angolan National Oil Co. (51%), produced approximately 170,000 bbl/d of premium-quality oil from both onshore and offshore wells. Of this amount, 83,000 bbl/d was shipped to the United States, which represented about 8% of U.S. crude oil imports. Chevron's multimillion-dollar expansion program in Angola was expected to bring its production up to 200,000 bbl/d in 1986. Crude oil production in Angola was expected to total 500,000 bbl/d within a few years. In 1985, the United States paid roughly $1 billion to Angola for oil. Approximately 150 expatriates from the United States and Western Europe worked for Chevron in Angola.

Oil production from a field development project led by Elf Aquitaine Angola at an offshore site could exceed 41,000 bbl/d by the end of 1986. Two fields, Palanca and Pacassa, were under development, with a third field, Bufalo, under consideration for development by the end of 1987. Production potential for the three fields was estimated to be 107,400 bbl/d. In addition to the three developed fields, Elf Aquitaine identified the Punja, Veado, Impala, and the southeastern Impala structures as potentially productive.

A group led by Texaco Angola Prospeccao e Producao (Texpro) SARL tested another oil discovery on a 1-million-acre tract off the northwestern coast of Angola. Texpro also planned the development of the Tubarao and East Lombo Fields. In the development program, additional wells were to be drilled in both fields, and a production platform was to be installed in the East Lombo Field to handle combined production from the two fields.

A loan and credit package, valued at $353.2 million, with which to develop Angola's Takula Field offshore at Cabinda, was signed July 26, 1985, in Paris, France. The package involved $91 million in two loans for National Oil, Sonangol, and CABGOC; a $130 million line of credit from the Export-Import Bank for equipment; a $115 million line of credit from the French state financing institution, Cofacredit; and $17.2 million in other loans from commercial banks. The total cost of the Takula development was estimated to be $451 million.

Angola's only refinery was near Luanda, the capital. The refinery processed approximately 10 million barrels of crude oil in 1984. Plans call for the refinery's capacity to be increased to 14.4 million barrels per year within a few years.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been estimated to be convertible from Angolan kwanzas (Kz) to U.S. dollars at the rate of Kz29.918=US$1.00.

The Mineral Industry of Argentina

By Pablo Velasco[1]

Argentina's overall economy remained dominated by agricultural production, which for many years has been the primary foreign exchange source through the export of grain and meat. However, today, Argentina is looking to its largely untapped mineral wealth to ease its enormous debt burden.

The mineral industry's contribution to the gross domestic product (GDP), excluding hydrocarbons, represents 0.3% or less of the GDP, with mineral export trade representing 0.5% of the country's total foreign exchange earnings.

The principal minerals exported in 1985, in order of importance, were sodium borate, boric acid, portland cement, tin and silver concentrates, calcium and magnesium borates, and lead concentrates for a total value of all mineral exports of about $32 million.

The economy showed marked improvement since the Government introduced radical new economic measures in 1985, which have had an unprecedented impact on inflation. The Austral Plan was introduced by the new Minister of Economy, with a commitment to stop printing money, and resulted in a reduction of the monthly inflation rate from 35% to 2%.

The economy was slower than in 1984 in almost all sectors and most industries were running at less than 50% capacity for over 3 years. Mining was no exception, despite the efforts made by many Provincial governments and by the Secretary of Mining of the country. There still has not been any serious commitment to obtain foreign investment, either in exploration, or in the development of smaller scale or low-grade deposits.

Argentine companies have also been reluctant to invest their own capital and were depending too heavily on the availability of Government loans, which were virtually nonexistent. The trade balance in 1985 registered a $4.6 billion surplus, which constitutes a record high, surpassing by 30.1% the 1984 result. This result was achieved through successive import reductions. Imports declined further owing to the low level of activity. The GDP decrease was 4.4% from that of 1984 with a consequent negative performance for all sectors of total demand and supply with the exception of exports, which increased 12.3% over those of 1984.

Government Policies and Programs.—As part of the Government's campaign to modernize and expand the country's economy, the Secretary of Mining has embarked on a far-reaching plan aimed at reorganizing the mineral sector and increasing production. The mining expansion plan called Plan de Expansión Minera (PEM) foresees an increase in production value from $32 million in 1985 to $1,100 million in the year 2000, as well as the creation of about 12,000 new jobs.

The PEM also calls for the creation of a state-owned corporation for the mining sector, similar to the state oil company Yacimientos Petrolíferos Fiscales (YPF). The Secretary of Mining will also set guidelines for private mining concerns and monitor their activities. The Government is currently studying a proposal to elevate the Secretary of Mining to the status of a ministry, a similar change having already been approved for the Secretary of Energy. This would give the mining sector greater independence.

Mining activity represents just 0.3% to 0.4% of the GDP, 0.4% to 0.6% of total exports, and 0.2% to 0.3% of jobs. Argentina also imports from $800 to $1,300 million worth of minerals each year, accounting for 15% to 20% of all imports. The PEM, therefore, plans to focus on the following points:

1. A tax relief on capital investment for the substitution of imports, for exportable raw materials, precious metals, and regional or Provincial projects.
2. The creation of a special agency to promote foreign investment on the basis of a set contract, exploration programs, and feasibility studies designed to identify the mining potential of investment areas to be financed by the Mining Promotion Fund (MPF). The MPF, in turn, will be funded from import duties and Inter-American Development Bank credit.
3. An exploration program aimed at pinpointing deposits of nontraditional minerals.
4. An export promotion plan including tax relief and other benefits.
5. A modernization policy geared toward introducing new technology into the private sector, fixed credit lines, and the supply of raw materials.
6. Increasing the scope of the power and functions of the Secretary of Mining.
7. Centralizing administration of prices, credits, quality control, taxes, and exchange rates.

The PEM establishes two separate categories of minerals and four different mining strategies.

The Secretary of Mining released a model contract to facilitate the participation of foreign investors in the development of a number of mining projects throughout the country. The model contract was based on the risk contracts used in oil and was prepared with the help of the United Nations. The contract guarantees that the risk exploration entitles a firm to investment rights; that firms will be given the widest flexibility in deciding where to explore and when to produce; that an independent authority will be established to mediate any contract dispute; that mining firms will have access to foreign currency to service debts and maintain operations; and that the mining firms will benefit from income tax exemptions on machinery and other tax incentives provided for in the mining promotion law, as well as a reasonable and stable tax structure for mining firms.

The Secretary of Mining emphasizes that property holders retain mineral rights, whereas new deposits are state-owned. To demonstrate Argentina's mining potential, the secretary is focusing its efforts on 12 of the 509 projects on file: Bajo de La Alumbrera (copper and gold); Mina Ethel (manganese); Santa Elena (gold, silver, lead, and zinc); Alto de la Blenda (gold and silver); King-Tut (cobalt and gold); Mina Offir (gold, silver, and copper); Mina Erika (gold); Mina Angela (gold, lead, zinc, and copper); El Carmen (tungsten); Concordia (silver, lead, zinc, and copper); Vicentito (lead, silver, and zinc); and San Martín (tungsten).

PRODUCTION

Output from the mining industry in Argentina during 1985 was 3.9% higher than that of 1984. The country produced enough industrial minerals to meet domestic demand, but continued to import large quantities of iron ore, iron ore pellets, manganese, bauxite, chromium, and coal.

The modest amount of metallic minerals produced reached 1.08 million tons, which included beryllium, gold, iron, lead, manganese, silver, tungsten, uranium, and zinc. The industrial mineral production declined 6%. The construction material sector output was 6% over that of 1984. The steel industry output increased 11%, but domestic consumption decreased from 2.4 million tons in 1984 to 1.5 million in 1985. Aluminum production from Aluminios Argentinos S.A.I.C. (ALUAR), the largest smelter at Puerto Madryn, increased slightly over that of 1984 to 140,000 tons in 1985.

The downturn in the housing and construction industry had an extended adverse impact on the cement industry. Cement producers were operating their plants at 45% of capacity. Cement production reached an estimated 5.0 million tons, slightly less than that of 1984 and nearly 30% lower than that of 1980. Yacimientos Carboníferos Fiscales (YCF), the Government-owned coal company, reported that production of coal from Río Turbio remained at the same level as that of 1984.

Argentina remained the third largest producer of crude oil and natural gas in Latin America, but continued its downward trend from previous years declining in 1985 to nearly 168 million barrels and almost 659 billion cubic feet, respectively.

Table 1.—Argentina: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984[p]	1985[e]
METALS					
Aluminum:					
Primary	133,900	137,600	132,800	137,821	[3]139,947
Secondary	5,000	6,000	7,000	7,000	6,000
Beryllium: Beryl concentrate:					
Gross weight	7	6	24	25	15
BeO content	1	1	2	3	1
Cadmium: Smelter	--	21	19	20	20
Copper: Mine output, metal content	80	38	318	323	320
Gold: Mine output, metal content troy ounces	14,757	20,319	23,374	22,120	22,500
Iron and steel:					
Iron ore and concentrate, gross weight thousand tons	398	587	609	628	630
Metal:					
Pig iron and sponge iron do.	1,720	[r]1,894	1,862	1,818	2,320
Ferroalloys, electric-furnace:					
Ferromanganese	[r]22,433	24,201	25,004	23,976	22,000
Silicomanganese	[r]12,780	15,679	13,523	13,336	16,000
Ferrosilicon	[r]10,158	16,870	15,454	19,932	14,000
Other	[r]2,046	4,246	264	3,939	4,500
Total	[r]47,417	60,996	54,245	61,183	56,500
Steel, crude thousand tons	2,526	2,913	2,943	2,647	[3]2,941
Semimanufactures[4] do.	[r]2,457	[r]2,735	2,864	2,456	[3]1,991
Lead:					
Mine output, metal content	32,652	30,115	31,684	28,542	29,000
Metal:					
Smelter, primary	19,000	17,000	16,000	19,000	17,000
Refined:					
Primary	19,000	17,000	16,000	19,000	18,000
Secondary	15,600	14,600	15,000	17,000	16,000
Total	34,600	31,600	31,000	36,000	34,000
Manganese ore and concentrate:					
Gross weight	2,706	3,900	6,926	8,291	7,500
Metal content	507	789	1,463	1,751	1,600
Silver, mine output, metal content thousand troy ounces	2,518	2,684	2,500	1,662	1,600
Tin:					
Mine output, metal content	413	304	291	274	270
Metal, smelter[e]	200	200	[r]200	[r]200	200
Tungsten, mine output, W content	11	17	41	47	50
Uranium, mine output, U_3O_8 content kilograms	221,000	470,462	135,000	94,430	95,000
Zinc:					
Mine output, metal content	35,150	36,381	36,586	35,909	36,000
Metal: smelter, primary	26,800	28,900	32,000	31,000	31,000
INDUSTRIAL MINERALS					
Asbestos	1,280	1,218	1,240	1,093	1,200
Barite	49,279	36,597	61,094	44,170	50,000
Boron materials, crude	125,617	123,492	113,123	142,880	140,000
Cement, hydraulic thousand tons	6,651	5,624	5,623	5,120	5,000
Clays:					
Ball clay (plastic clay), n.e.s do.	1,681	1,362	1,853	1,870	1,800
Bentonite	122,719	123,254	135,569	81,534	90,000
Foundry earth	41,799	91,533	115,260	124,023	120,000
Fuller's earth (decolorizing clay)	5,246	11,795	6,741	3,611	5,000
Kaolin	66,821	72,421	145,098	90,545	100,000
Laterite (aluminous)	86,853	7,060	23,881	NA	NA
Refractory	105,741	99,959	73,352	70,250	70,000
Other[5]	407,014	372,807	459,208	665,615	550,000
Diatomite	4,972	6,729	10,981	5,227	11,000
Feldspar	26,118	15,091	20,065	17,948	20,000
Fluorspar	20,755	23,727	28,985	23,157	25,000
Graphite	2	12	20	15	18
Gypsum, crude	670,544	615,540	578,188	566,943	530,000
Lithium: Spodumene, amblygonite, gross weight	25	113	152	22	20
Mica:					
Sheet	44	24	28	12	15
Waste and scrap	459	218	285	278	280
Nitrogen: N content of ammonia	40,300	58,000	57,500	51,000	50,000
Phosphates: Thomas slag[6]	673	600	600	500	500
Pigments, mineral, natural: Ocher	739	932	853	757	800
Precious and semiprecious stones: Amethyst kilograms	1,500	23,043	26,000	NA	NA
Pumice and related volcanic materials	51,161	53,540	68,624	54,257	56,000

See footnotes at end of table.

Table 1.—Argentina: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984[p]	1985[e]
INDUSTRIAL MINERALS —Continued					
Salt:					
Rock ---- thousand tons	1	1	1	1	1
Solar ---- do	937	594	677	937	800
Total ---- do	938	595	678	938	801
Sand and gravel:					
Sand:					
Construction ---- do	15,273	14,297	12,524	11,399	11,500
Ferruginous-titaniferous	3	1	--	NA	NA
Silica sand (glass sand) ---- thousand tons	265	227	314	306	310
Gravel ---- do	9,522	8,240	5,878	4,301	5,000
Stone:					
Basalt ---- do	3,762	4,182	2,894	3,302	3,000
Calcareous:					
Calcite, nonoptical	13,920	6,789	7,520	7,100	7,200
Calcium carbonate (chalk)	4,673	17,604	8,325	8,585	8,000
Dolomite	212,928	257,158	239,496	211,270	220,000
Limestone ---- thousand tons	14,491	12,651	12,318	11,167	11,500
Marble:					
Aragonite, broken	3,689	3,323	4,782	2,603	4,000
Onyx, in blocks and broken	15,911	11,420	16,359	13,542	14,450
Travertine, in blocks and broken	12,144	14,399	5,686	4,447	5,000
Unspecified, in blocks and broken	82,379	51,342	74,284	92,282	82,000
Flagstone	73,243	114,519	80,508	41,180	60,000
Granite:					
In blocks	46,812	33,374	41,554	25,359	30,000
Crushed ---- thousand tons	6,235	5,439	5,712	4,144	5,000
Quartz, crushed	180,091	76,149	81,615	96,420	95,000
Quartzite, crushed ---- thousand tons	1,183	1,048	765	996	900
Rhodochrosite	30	35	45	23	30
Sandstone	160	NA	28	200	150
Serpentine, crushed	28,467	21,284	22,460	5,146	15,000
Shell, marl	800,728	819,009	718,000	556,949	650,000
Tuff and tufa ---- thousand tons	3,118	1,135	1,031	458	750
Strontium minerals: Celestite	310	776	673	400	500
Sulfates, natural:					
Aluminum (alum)	4,186	3,850	12,983	11,583	12,000
Magnesium (epsomite)	1,000	2,321	828	5,930	5,000
Sodium (mirabilite)	52,018	42,257	45,065	32,626	40,000
Sulfur: Native from caliche	10	--	--	--	--
Talc and related materials:					
Pyrophyllite	1,026	2,687	4,925	5,012	5,000
Steatite	1,452	1,490	1,387	NA	NA
Talc	33,741	24,716	23,379	22,774	21,000
Total	36,219	28,893	29,691	27,786	26,000
Vermiculite	[r]3,227	3,354	3,951	4,451	4,000
Water, mineral-containing	98,735	88,476	76,819	85,436	85,000
Zeolite	40	50	60	90	80
MINERAL FUELS AND RELATED MATERIALS					
Asphalt and bitumen, natural	1,186	2,480	2,912	994	1,000
Coal, bituminous ---- thousand tons	498	515	486	509	500
Coke, all types, including breeze ---- do	451	536	450	466	300
Gas, natural:					
Gross ---- million cubic feet	481,305	[r]548,190	606,742	662,645	[3]658,600
Marketed ---- do	294,147	333,848	78,651	78,081	[3]78,100
Natural gas liquids:					
Butane ---- thousand 42-gallon barrels	2,211	[e]3,400	[e]3,600	[e]3,800	3,900
Propane ---- do	3,019	[e]4,700	[e]4,900	[r] [e]5,300	5,400
Total ---- do	5,230	8,100	[e]8,500	[e]9,100	9,300
Peat, agricultural (Turba)	2,460	3,800	3,726	2,308	3,000
Petroleum:					
Crude ---- thousand 42-gallon barrels	[r]181,474	179,072	179,097	175,097	[3]167,800
Refinery products:					
Gasoline ---- do	43,658	44,315	43,663	43,817	[3]39,223
Kerosene ---- do	3,298	3,387	4,095	3,549	[3]3,254
Jet fuel ---- do	6,102	5,104	4,852	5,143	[3]5,432
Distillate fuel oil ---- do	56,232	56,095	56,342	57,265	[3]57,138
Residual fuel oil ---- do	51,132	46,835	43,285	38,448	[3]40,526
Lubricants ---- do	1,871	2,199	1,968	1,883	[3]2,107
Other ---- do	12,808	13,966	7,145	8,565	[3]10,621
Refinery fuel and losses ---- do	14,874	11,284	14,612	11,766	[3]6,684

See footnotes at end of table.

Table 1.—Argentina: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984[p]	1985[e]
MINERAL FUELS AND RELATED MATERIALS —Continued					
Petroleum—Continued					
Refinery products—Continued					
Total _ thousand 42-gallon barrels	189,975	183,185	175,962	170,436	[3]164,985

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through June 30, 1986.
[2]In addition to the commodities listed, bismuth, carbon black, columbite, lime, natural gasoline, perlite, and potassium sulfate (kalinite) are or are believed to be produced, but output is not reported quantitatively and available information is inadequate to make reliable estimates of output levels.
[3]Reported figure.
[4]Hot-rolled semimanufactures only; excludes castings and cold-rolled semimanufactures produced from imported hot-rolled semimanufactures.
[5]Includes plastic, semiplastic, and/or ferruginous clays used totally in the manufacture of portland cement.
[6]Thomas slag production was estimated from the Thomas crude steel reported in La Siderurgia Argentina 1980-81 annual publication and from a percentage of slag produced from Thomas crude steel reported during 1974-76; for 1981 from the reports published by the Instituto Argentino de Siderurgia in 1982.

TRADE

The balance of payments improved in 1985, with a trade surplus of $4.6 billion, 30.1% higher than the 1984 results.

On June 14, 1985, the Government of Argentina announced a stringent economic stabilization plan designed to contain inflation, which in May amounted to an annual rate of approximately 1,000%.

In July, inflation fell to 6%, and by October to 1.9%; the budget deficit decreased from 10.9% of the GDP in 1984 to an estimated 2.5% in the second half of 1985. This was accomplished without causing a severe recession or raising unemployment.

The value of exported minerals, mineral products, and metals reached $32 million. Exports of minerals were mainly borate products, portland cement, lead, silver, zinc, and tin concentrates.

Imports of metallic minerals were valued at $478 million, 58% of the total mineral and manufactured metal products value, which amounted to $822 million.

Export value of crude petroleum and refinery products increased 118% compared with that of 1984 for a total value of $680 million. Imports of natural gas from Bolivia reached 2.2 billion cubic meters for a total value of $372 million.

Imports of coal from the United States and Poland increased 41% to 764,000 tons compared with those of 1984.

Table 2.—Argentina: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS				
Aluminum: Metal including alloys:				
Unwrought	53,831	53,052	15,237	Philippines 20,527; Japan 14,217.
Semimanufactures	6,287	6,912	5,056	Japan 557; Chile 553.
Beryllium: Ore and concentrate	NA	72	72	
Chromium: Ore and concentrate	35	2	--	All to Paraguay.
Copper: Metal including alloys, semimanufactures	653	513	373	Uruguay 113; Ecuador 9.
Iron and steel:				
Iron ore and concentrate	62,601	1,000	--	All to Venezuela.

See footnotes at end of table.

Table 2.—Argentina: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal:				
Pig iron, cast iron, related materials	3,141	1,908	--	Brazil 1,900; Uruguay 5; Ecuador 3.
Ferroalloys, unspecified	2,586	4,503	3,250	Japan 1,000; Pakistan 233.
Steel, primary forms	15,831	1,743	--	Paraguay 1,595; Uruguay 148.
Semimanufactures:				
Bars, rods, angles, shapes, sections	330,095	247,188	47,085	China 90,722; Canada 42,776.
Universals, plates, sheets	183,161	147,913	126,910	Thailand 12,006; Uruguay 3,766.
Hoop and strip	318	371	371	
Rails and accessories	115	146	--	All to Paraguay.
Wire	2,163	5,700	703	Cuba 3,579; Chile 542.
Tubes, pipes, fittings	132,989	134,298	26,957	China 37,991; Peru 12,322.
Castings and forgings, rough	75	127	10	Uruguay 117.
Lead: Ore and concentrate	21,414	14,611	--	Belgium-Luxembourg 8,272; Sweden 6,339.
Silver: Waste and sweepings value, thousands	$120	NA		
Tin:				
Ore and concentrate	2,634	2,252	--	All to Belgium-Luxembourg.
Metal including alloys, semimanufactures	2	1	--	All to Uruguay.
Tungsten: Ore and concentrate	r36	NA		
Zinc:				
Ore and concentrate	r2,806	470	--	All to Belgium-Luxembourg.
Oxides	25	15	--	Mainly to Chile.
Metal including alloys, semimanufactures	2	4	--	All to Uruguay.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Artificial: Silicon carbide	309	1,300	--	Brazil 900; Republic of South Africa 172; Mexico 142.
Grinding and polishing wheels and stones	14	6	--	All to Brazil.
Asbestos, crude	5	4	--	Mainly to Uruguay.
Barite and witherite	61	5	--	All to Uruguay.
Boron materials:				
Crude natural borates	20,640	18,294	--	Brazil 18,228; Chile 39; Mexico 18.
Oxides and acids	4,639	3,233	--	Brazil 2,826; Republic of Korea 126; Uruguay 109.
Cement	42,682	66,483	10	Paraguay 46,900; India 12,500; Bolivia 5,017.
Clays, crude	5,504	6,685	--	Brazil 4,215; Chile 2,004; Uruguay 329.
Diatomite and other infusorial earth	r25	59	--	All to Uruguay.
Feldspar, fluorspar, related materials:				
Feldspar	4	NA		
Fluorspar	145	80	--	All to Chile.
Fertilizer materials: Manufactured:				
Ammonia	317	147	--	Uruguay 144; Paraguay 3.
Nitrogenous	2,439	550	--	Uruguay 424; Bolivia 75; Paraguay 51.
Phosphatic	341	NA		
Potassic	5	NA		
Unspecified and mixed	4	83	--	Mainly to Bolivia.
Graphite, natural	r1	6	--	Chile 5; Uruguay 1.
Gypsum and plaster	4,224	5,012	--	Paraguay 4,458; Uruguay 554.
Lime	1,793	954	--	All to Chile.
Mica: Crude including splittings and waste	4	22	--	Chile 18; Uruguay 3.
Pigments, mineral: Iron oxides and hydroxides, processed	r47	63	--	Cuba 27; Paraguay 16; Uruguay 15.
Precious and semiprecious stones other than diamond: Natural value, thousands	NA	$70	$13	West Germany $54; Netherlands $2.
Salt and brine	r13,567	12,550	--	Paraguay 12,515; Uruguay 21.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	60	340	--	All to Paraguay.
Sulfate, manufactured	1,361	NA		

See footnotes at end of table.

Table 2.—Argentina: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	3,931	3,424	1	Italy 2,150; Japan 958; Israel 166.
Worked	3,843	1,416	1,299	Japan 98; West Germany 10.
Dolomite, chiefly refractory-grade	2,427	1,933	4	Chile 1,837; Italy 87; Uruguay 5.
Gravel and crushed rock	22	306	--	Chile 298; Uruguay 8.
Quartz and quartzite	2	2	--	All to Paraguay.
Sand other than metal-bearing	NA	6	--	All to Uruguay.
Sulfur:				
Elemental: Crude including native and byproduct	r11	786	--	Mainly to Paraguay.
Sulfuric acid	210	11,111	--	Brazil 7,500; Chile 3,291; Paraguay 231.
Talc, steatite, soapstone, pyrophyllite	r34	4	--	All to Paraguay.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	360	527	--	Paraguay 477; Brazil 50.
Carbon black	106,894	137,877	30,994	Netherlands 60,615; Venezuela 23,110.
Petroleum refinery products:				
Liquefied petroleum gas thousand 42-gallon barrels	298	568	125	France 311; Paraguay 132.
Gasoline do.	74	538	233	Paraguay 256; Chile 29.
Naphtha do.	NA	103	NA	NA.
Mineral jelly and wax do.	37	37	10	Peru 13; Chile 8.
Kerosene and jet fuel do.	13,151	1,063	542	Japan 140; Netherlands 56.
Distillate fuel oil do.	125	1,356	10	Paraguay 1,219; Japan 16.
Paraffin oil do.	NA	32	NA	NA.
Lubricants do.	2	348	155	Trinidad and Tobago 55; Japan 48.
Residual fuel oil do.	38	7,805	5,976	Brazil 771; Japan 58.
Bitumen and other residues do.	8	5	--	Mainly to Paraguay.
Bituminous mixtures do.	40	26	--	Do.
Petroleum coke do.	3,291	901	95	Canada 414; Belgium-Luxembourg 107.

rRevised. NA Not available.
[1]Table prepared by H. D. Willis.

Table 3.—Argentina: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS				
Alkaline-earth metals	29	43	5	Brazil 27; France 8.
Aluminum:				
Ore and concentrate	r23,791	25,187	--	China 17,500; Brazil 7,615; West Germany 72.
Oxides and hydroxides	214,493	322,592	644	Australia 310,726; Brazil 5,383; West Germany 4,143.
Metal including alloys:				
Unwrought	62	50	30	West Germany 20.
Semimanufactures	843	779	121	West Germany 227; Brazil 221.
Chromium:				
Ore and concentrate	14,103	15,862	1,000	Republic of South Africa 13,760; Cuba 1,102.
Oxides and hydroxides	38	--		
Cobalt: Oxides and hydroxides	31	23	15	Belgium-Luxembourg 6; Finland 2.
Copper: Metal including alloys:				
Unwrought	31,223	40,010	3	Chile 36,185; Peru 3,820.
Semimanufactures	939	810	87	Japan 325; West Germany 129; Brazil 120.

See footnotes at end of table.

Table 3.—Argentina: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Iron and steel:				
Iron ore and concentrate thousand tons	r1,904	2,213	--	Brazil 2,156; Venezuela 30; Peru 27.
Metal:				
Scrap	7,221	1,530	--	Japan 591; Belgium-Luxembourg 322; Spain 295.
Pig iron, cast iron, related materials	224,570	189,056	964	Brazil 177,455; Venezuela 10,000.
Ferroalloys:				
Ferromanganese	805	543	--	Brazil 258; Republic of South Africa 172; West Germany 113.
Unspecified	3,875	4,415	397	Republic of South Africa 2,066; Brazil 1,257.
Steel, primary forms	481,632	661,838	--	Brazil 361,687; Japan 148,074; France 66,009.
Semimanufactures:				
Bars, rods, angles, shapes, sections	26,086	89,285	786	Belgium-Luxembourg 56,787; Italy 10,316; West Germany 9,537.
Universals, plates, sheets	114,886	124,685	3,901	Brazil 81,402; West Germany 12,174; France 6,451.
Hoop and strip	4,372	5,105	481	Belgium-Luxembourg 1,275; Japan 1,128; West Germany 886.
Rails and accessories	10,110	266	18	France 109; West Germany 79.
Wire	4,726	4,315	31	Uruguay 2,749; Brazil 750; Sweden 230.
Tubes, pipes, fittings	12,956	13,513	516	Sweden 3,024; Japan 2,719; Italy 2,608.
Castings and forgings, rough	243	352	16	Spain 176; Uruguay 102.
Lead:				
Oxides	91	40	--	All from Mexico.
Metal including alloys:				
Scrap	411	--		
Unwrought	1,139	555	--	Mexico 420; Chile 75; Peru 50.
Semimanufactures	NA	41	--	Mainly from Uruguay.
Magnesium: Metal including alloys:				
Unwrought	952	657	448	Norway 191; France 18.
Semimanufactures	8	22	19	West Germany 3.
Manganese:				
Ore and concentrate	r95,426	28,969	14	Brazil 28,945; Netherlands 10.
Oxides	1,497	1,381	78	Brazil 1,117; Spain 86.
Mercury 76-pound flasks	1,770	2,176	--	Mainly from Mexico.
Nickel:				
Matte and speiss	--	23	--	All from Cuba.
Metal including alloys:				
Scrap	5	--		
Unwrought	762	735	171	Brazil 140; Netherlands 107.
Semimanufactures	231	191	36	West Germany 46; France 39.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$579	$530	$134	West Germany $192; Spain $191.
Silver: Metal including alloys, unwrought and partly wrought do	$5,334	$8,537	$8	Peru $8,131; West Germany $266.
Tin: Metal including alloys:				
Unwrought	874	914	--	Brazil 712; Bolivia 198.
Semimanufactures	5	8	1	Panama 3; Republic of Korea 2.
Titanium:				
Ore and concentrate	2,402	--		
Oxides	912	704	3	Spain 236; West Germany 187; Belgium-Luxembourg 140.
Zinc:				
Ore and concentrate	270	--		
Oxides	153	53	(2)	Uruguay 45; West Germany 4; Netherlands 3.
Metal including alloys:				
Unwrought	86	3,735	--	Canada 1,396; Netherlands 999; Peru 912.
Semimanufactures	96	49	3	Mexico 45.
Other:				
Ores and concentrates	r3,720	2,467	183	Republic of South Africa 1,146; Bolivia 521.
Oxides and hydroxides	92	130	91	West Germany 35; Japan 3.
Base metals including alloys, all forms	310	372	90	Republic of South Africa 149; Italy 32.

See footnotes at end of table.

Table 3.—Argentina: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	436	219	219	
Artificial:				
Corundum	5,974	7,263	24	Brazil 6,279; France 488; Austria 328.
Silicon carbide	90	52	--	Brazil 40; Austria 4; West Germany 4.
Dust and powder of precious and semiprecious stones value, thousands	$783	$589	$570	Belgium-Luxembourg $8; Brazil $4.
Grinding and polishing wheels and stones	119	157	10	Italy 81; Brazil 41.
Asbestos, crude	14,152	15,022	24	Canada 7,633; Brazil 4,373; Republic of South Africa 2,235.
Barite and witherite	708	1,043	34	Bolivia 1,009.
Boron materials: Oxides and acids	25	12	--	All from Belgium-Luxembourg.
Cement	1,516	1,881	56	France 825; Netherlands 391; Yugoslavia 349.
Chalk	54	--		
Clays, crude	r27,380	29,835	2,990	Brazil 22,034; China 3,500.
Cryolite and chiolite	34	31	--	Denmark 30; Belgium-Luxembourg 1.
Diamond:				
Gem, not set or strung value, thousands	$25	$8	$2	Belgium-Luxembourg $6.
Industrial stones do	$299	$335	$106	Belgium-Luxembourg $228.
Diatomite and other infusorial earth	925	2,810	24	Mexico 2,338; Chile 448.
Feldspar, fluorspar, related materials	598	998	--	All from Mexico.
Fertilizer materials:				
Crude, n.e.s	1,800	3,826	--	Chile 3,590; Belgium-Luxembourg 100; West Germany 100.
Manufactured:				
Ammonia	2,108	2,692	2,692	
Nitrogenous	29,972	99,087	2	Romania 42,025; Bulgaria 28,650; Italy 10,000.
Phosphatic	11,630	11,541	8,731	Brazil 1,560; Uruguay 1,250.
Potassic	11,119	17,247	3,431	Israel 6,707; East Germany 3,160.
Unspecified and mixed	80,093	101,581	97,880	Chile 1,860; Brazil 1,400.
Graphite, natural	312	301	27	Brazil 145; West Germany 30; Peru 28.
Gypsum and plaster	13	--		
Lime	60	105	--	All from Uruguay.
Magnesium compounds	19,304	17,686	611	Brazil 7,825; Mexico 7,169.
Mica:				
Crude including splittings and waste	52	38	34	France 4.
Worked including agglomerated splittings	11	9	4	Belgium-Luxembourg 3.
Pigments, mineral: Iron oxides and hydroxides, processed	407	100	18	West Germany 80; Italy 2.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$33	$27	$1	Brazil $14; Switzerland $11.
Synthetic do	$16	$75	$60	Sweden $14.
Pyrite, unroasted	56	11	--	All from West Germany.
Salt and brine	142	29	--	West Germany 25; Switzerland 2.
Sodium compounds, n.e.s.: Carbonate, manufactured	148,999	215,934	111,599	Romania 21,322; Belgium-Luxembourg 17,882.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	2,992	2,457	1,393	Italy 468; Brazil 287.
Worked	694	453	--	Spain 252; Uruguay 164; Italy 36.
Dolomite, chiefly refractory-grade	902	721	--	Brazil 368; Spain 353.
Gravel and crushed rock	r74,481	51,920	--	Uruguay 31,910; Paraguay 20,000.
Quartz and quartzite	539	147	--	Switzerland 106; Belgium-Luxembourg 31; West Germany 10.
Sand other than metal-bearing	150,966	148,304	3,132	Uruguay 143,623; Brazil 1,527.

See footnotes at end of table.

Table 3.—Argentina: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984	
			United States	Other (principal)
INDUSTRIAL MINERALS —Continued				
Sulfur:				
Elemental:				
Crude including native and byproduct	100,532	129,310	1,887	Canada 127,320; West Germany 100.
Colloidal, precipitated, sublimed	97	105	48	France 54; Spain 1.
Sulfuric acid	39	3	--	All from Bolivia.
Talc, steatite, soapstone, pyrophyllite	728	341	20	Uruguay 120; China 90; Hong Kong 71.
Other:				
Crude	r4,224	6,095	772	Mexico 2,160; Republic of South Africa 1,070.
Slag and dross, not metal-bearing	204	412	3	Brazil 409.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	124	145	145	
Carbon black	669	910	146	West Germany 675; Brazil 45.
Coal:				
Coal excluding briquets	492,087	536,996	361,624	Poland 173,722; West Germany 1,050.
Lignite including briquets	170	134	134	
Coke and semicoke	2	1	1	
Peat including briquets and litter	60	335	335	
Petroleum refinery products:				
Liquefied petroleum gas thousand 42-gallon barrels	19,640	19,484	(2)	Mainly from Bolivia.
Gasoline 42-gallon barrels	4,590	5,015	4,267	Chile 527; Netherlands 128.
Mineral jelly and wax do	6,422	5,375	1,299	Brazil 2,408; Spain 976.
Kerosene and jet fuel thousand 42-gallon barrels	562	816	432	Brazil 269; Italy 115.
Lubricants do	94	187	127	Netherlands Antilles 44; West Germany 7.
Residual fuel oil do	13	--		
Bituminous mixtures 42-gallon barrels	1,854	103	103	
Petroleum coke do	183,931	638	638	

rRevised. NA Not available.
[1]Table prepared by H. D. Willis.
[2]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Aluminum.—Aluminum production reached nearly 140,000 tons. Argentina exported approximately 45,000 tons of semimanufactured products, compared with 30,000 tons in 1984.

ALUAR, the largest aluminum producer in the country, operated throughout the year at 97% of its rated capacity. The apparent aluminum consumption declined to 40,000 tons, the lowest level since 1981. Toward midyear, the local market began to recover gradually, but was unable to surpass that of 1984. The transforming industry decreased its purchases of primary aluminum to about 20% of total sales, leaving a larger share of the production for exports. Exports of aluminum totaled 66,000 tons, more than 10% over the amount exported in 1984.

Copper and Molybdenum.—The Federal Government exploration agency, the Dirección General de Fabricaciones Militares (DGFM), in conjunction with the government of La Rioja Province, were to conduct an extensive study of the Nevados del Famatina area, aimed at increasing known mineral reserves. The study, which was to focus on the disseminated copper-molybdenum deposit, La Estrechura, envisages the drilling of up to 2,600 meters of exploration holes, in addition to a geological survey and geochemical analyses. The study was to commence late in 1985 and will continue for an 18-month period. Preliminary exploration and estimates conducted previously by the Government in one-fourth of the mineralized area of La Estrechura showed 200 million tons of ore reserves containing 0.06% molybdenum and 0.17% copper.

Gold and Silver.—A joint venture has been established between the China National Nonferrous Metals Corp. and the Corporación Minera de Neuquén (CORMINE), a state-owned company, to explore and develop the Erika and Sofía gold and silver deposits in Neuquén Province.

In La Rioja Province, the Swedish Geologic Survey (Sveriges Geologiks) will study two potential gold and silver areas, La Mejicana and Offir. Both prospects will be offered to national and foreign companies for development in the near future.

The Huemules gold-silver deposit near Esquel in the Province of Chubút was offered to national and international bidders on July 1, 1985, with the original bid closing date, December 13, being extended until January 30, 1986. About 16 companies requested tender documents for Huemules, which has estimated reserves of 1 million tons of ore valued at approximately $100 million. These include FMC Corp. and the Homestake Mining Co. of the United States, Société Générale des Minerais S.A. of Belgium-Luxembourg, General Mining Union Corp. Ltd. of the Republic of South Africa, Cominco Ltd. of Canada, and others from Brazil, China, and France. Six companies notified the Argentine officials of their reason for not bidding, stating that, in the light of available data on the deposit, the investment risk involved was too great and they suggested further exploration to be carried out on the deposit.

Iron Ore.—Argentina's iron ore production showed practically no increase in 1985. Argentina's largest iron ore producer, Hierro Patagónico S.A. Minera (HIPASAM), which operates the Sierra Grande Mine in Río Negro Province, reported that the first production line of its new pellet plant was on-stream. HIPASAM also announced that two more lines were to start production early in 1986 with a fourth production line scheduled for startup within the next 10 months. Production during 1986 was expected to reach 1 million tons. Sierra Grande, in addition to its new pellet plant, has a complete integrated industrial complex comprising an underground mine, milling facilities, a slurry pipeline to transport concentrates, and a port facility that can handle carriers of up to 60,000 tons gross weight.

HIPASAM reportedly only uses 50% of its plant capacity, owing to depressed demand in the domestic market.

Imports of iron ore and pellets came mostly from Brazil (98%) and Peru (2%). They totaled 2.6 million tons, which was 7% more than those of 1984.

Iron and Steel.—The severe recession in all industries again caused a drastic reduction in steel consumption. Per-capita steel consumption in Argentina fell by about 40% to about 64 kilograms—lower, for the first time, than the average in Latin America, and considerably below the 100 kilograms and 500 kilograms consumed by Brazil and the United States, respectively.

Idle steelmaking capacity was about 45%. However, the reestablishment of export incentives in the second half of the year has boosted shipments abroad, particularly to China and the United States.

Crude steel production increased 11% over that of 1984 to 2,941,000 tons, but domestic consumption decreased from 2.4 million tons in 1984 to just over 1.5 million tons in 1985. Steel exports increased by 68% over that of 1984 to 800,000 tons, and the production of rolled steel products fell nearly 19% from that of 1984 to about 2.0 million tons. Pig iron and sponge iron production increased nearly 28% over that of 1984 to about 2.3 million tons in 1985.

In 1984, the Argentine steel industry suffered from internal price control measures, which seriously eroded its sales income. The Government eventually agreed to change the pricing policy, and by the second half of 1985, the steelmakers had regained a healthier price-to-cost ratio. The international market for steel was again a significant issue in 1985. The U.S. International Trade Administration (ITA) has initiated preliminary antidumping investigations into imports of oil tubular goods from Argentina and malleable iron pipe fittings from Brazil. A preliminary ruling was due in the Argentine case by December 30 and in the Brazilian case by January 7, 1986.

The ITA was also conducting several ongoing countervailing duty and antidumping investigations of steel products from Latin America. The cases were dropped when domestic petitioners withdrew the complaints they had filed with the ITA after voluntary restraint agreements were reached with the exporting countries.

The U.S. International Trade Commission has ruled that Argentine steel exports to the United States do not pose a threat to domestic steel producers, despite the latter's accusations of dumping by Argentina. Sociedad Mixta Siderúrgica Argentina S.A. (SOMISA), Industria Argentina de Aceros

ACINDAR S.A., and other Argentine steelmakers were negotiating a contract to export up to 1 million tons of steel to China over 5 years—worth up to $400 million in extra revenue. Meanwhile, SOMISA signed a contract to export 200,000 tons of billets to Iran by March 1986.

Expanding exports to the United States may be more of a problem. Argentina is demanding only a slight cut in its exports to the United States, seeking a 0.2% share of the U.S. market until 1989, when the steel import curb program will expire. This would represent exports of about 181,000 tons, down from the 291,000 tons exported to the United States in 1984.

Establecimiento Altos Hornos Zapla has won an export order for the sale of 50,000 tons of special steel to China. This sale represents 28% of the company's total annual production of about 180,000 tons of special steels. Zapla recently started making export shipments via the Chilean town of Iquique, from where it will export to both China and India.

Titanium.—The Argentine Comisión Nacional de Energía Atómica (CNEA) and the Province of Buenos Aires have signed an agreement for the development of a pilot plant to produce titanium dioxide, titanium metal, zircon, and iron oxide. The plant, which is to be in the city of Carmen de Patagones near the Bahía San Blás deposits, will enable Argentina to save about $30 million per year in imports and also to export the remainder.

A sector of the beach of the Bahía San Blás-Segunda Barranca deposit was estimated to contain reserves of 1 million tons of iron, 300,000 tons of titanium dioxide, and 13,000 tons of zirconium. Further increases in reserves were expected from investigations of nearby beaches with similar characteristics.

Tungsten.—Almost all of Argentina's tungsten reserves are in the Precambrian formation of the San Luis and Córdoba Provinces. Several hundred occurrences have actually been detected, the predominant tungsten mineral being wolframite, and measured reserves amount to 3.5 million tons, approximately one-half those of Brazil.

World market factors today have rendered many of the country's tungsten operations uneconomic. The old Los Cónderes Mine, for example, with estimated reserves of 500,000 tons of ore (0.5% WO_3) is at present closed down. The mine contains four ore veins in a mineralization 800 meters long by 400 meters deep. In earlier years, the mine operated at 300 tons per day, processing roughly equal quantities of scheelite and wolframite. An evaluation program is currently being carried out at the mine to study the possible reactivation of the deposit. Close to Los Cóndores is the little explored scheelite-wolframite deposit known as El Águila. Recent studies indicate ore reserves of 1 million tons assaying 0.5% WO_3.

The Los Avestruces scheelite mine, belonging to Empresa Minera Cerrito Blanco S.A., is probably the only mechanized tungsten operation in Argentina, owing to considerable investment made over the last 5 years. The mineralized zone is about 3 kilometers long and has so far been worked down to a depth of about 100 meters.

Probable reserves were estimated at 2 million tons (0.6% WO_3), of which 50,000 tons assaying 0.5% WO_3 have been mined for further processing. A 150-ton-per-day concentrator was being completed, although there were plans to expand it to match the 350-ton-per-day crusher capacity. The nearby Las Asperezas Mine was scheduled to come on-stream by yearend 1986 on completion of mine development. About 50 kilometers from this mine at La Toma in San Luis Province, a 300-ton-per-day-capacity tungsten plant, shelved in 1958, was also being completed in preparation for the startup of mine production.

Another potentially important tungsten producing area is Cerro Aspero in the Province of Córdoba, the site of many small abandoned mines. With so many of its mines now out of operation, Argentina today produces very little tungsten, output having fallen to as little as 11 tons and 17 tons in 1981 and 1982, respectively. Output in 1985 reached 47 tons of WO_3, and forecasts for 1986 are for 50 to 65 tons of output.

INDUSTRIAL MINERALS

Lithium.—The Catamarca Province officials, the Argentine Secretary of Mining of the country, and the state-owned agency DGFM signed an agreement for an international public call for tender for the exploration and development of the Salar del Hombre Muerto deposits in Catamarca. Considerable interest has been shown in the Hombre Muerto deposits by Lithium Corp. of America, a subsidiary of FMC of the United States, which could support production valued at $200 million per year.

Potassium Salts.—Texasgulf Inc., a U.S. affiliate of France's Société Nacionale Elf Aquitaine, and the Argentine Empresa Minera Tea S.A. were negotiating the development of the second largest potassium deposit in the world. According to officials, if the joint venture goes through, a capital investment of $225 million would be needed and Argentina could compete economically in the potassium chloride export market with Canada, Jordan, and the U.S.S.R.

A preliminary Texasgulf proposal calls for production of 1 million tons per year of potassium chloride over a 25-year period, with lesser amounts of potassium sulfate and potassium nitrate. The deposit is at Malargue in Mendoza Province.

Sulfur.—A detailed feasibility study of the Julia sulfur mine at La Casualidad was prepared and submitted to the Governor of Salta Province by a commission comprising representatives of the Federal Government's Mining Department, the Salta Province authorities, and the University of Salta. Mining operations at La Casualidad deposit were suspended during the management of DGFM, and the deposit currently is the property of Salta Province.

The commission's report projects an initial production of 20,000 tons of sulfur per year, based on 240,000 tons of measured reserves and 3 million tons of inferred reserves.

The previous mine administration closed down La Casualidad as it was producing sulfur at $100 per ton when it could be imported for just $60 per ton. In an effort to increase production and to reduce operating costs, the study recommends replacing obsolete mining equipment and processes used by DGFM, with new technology at present being employed in Canada, Italy, Poland, and the U.S.S.R. The projected new processing plant will be 6 kilometers from the mine and would have a work force of 200. A joint holding company, to be set up by the authorities of Salta and the municipality of San Antonio de los Cobres, will be responsible for finding investors for up to 90% of the project.

MINERAL FUELS

Coal.—Coal production reached 500,000 tons, which was slightly less than the output recorded in 1984. Although YCF originally hoped to produce about 800,000 tons of coal in 1985, actual production of about 500,000 tons was well below target. However, this level of production represented an improvement over the 486,000 tons produced in 1983. To prepare for future exports, the capacity of the coal preparation plant in Río Gallegos, which is currently the Atlantic harbor for shipping coal from the Río Turbio complex 160 miles distant, was expanded in 1984 by Kopex of Poland, to a capacity of 750 tons per hour and 1.5 million tons per year. To the north (20 miles) of Río Gallegos, a new coal terminal is being built in Puerto Loyola.

The Government of Argentina is giving higher priority to meeting domestic demand for coal rather than to uncertain export prospects, since in view of the level of foreign indebtedness of more than $48 billion, it wants to limit imports of energy which cost foreign currency. Even so, it is not certain that domestic demand for coal can be met, since considerable investment is necessary to raise production to about 1.5 million tons per year from Argentina's only coal mining complex, Río Turbio in the southern Province of Santa Cruz. The available state resources are scarce, and although the Government has characterized the energy sector as a key area for investment during the current 6-year term (1982-88), YCF is having to compete with the oil and nuclear concerns. In addition, the Secretary of Energy is favoring industrial conversion from oil to natural gas.

Natural Gas.—Natural gas production reached nearly 659 billion cubic feet. New discoveries of natural gas deposits have increased known reserves from 700 billion cubic meters (24.7 trillion cubic feet) to 2,000 billion cubic meters (70.6 trillion cubic feet), guaranteeing supplies for the next half century.

In addition to domestic production, Argentina imported about 2.2 billion cubic meters (78,100 million cubic feet) from Bolivia.

Despite the increase in gas reserves, the low relative consumption was due to an inadequate distribution infrastructure, which has led to a particularly high wastage rate of about 20%. Between 1975 and 1985, about 29 billion cubic meters (1.0 trillion cubic feet) was lost through wastage, or about $5 billion worth at current prices. Problems include low pressure and poorly located pipelines with inadequate capacity.

With crude oil reserves sufficient for 13 years at the 1985 level of demand, and a large and growing reserve of natural gas, Argentina's hydrocarbons sector will undergo major changes in the next decade. The International Bank for Reconstruction and Development (World Bank) agreed to finance major projects to boost natural gas consumption in Argentina, China, and Tanzania. The World Bank will make a sizable contribution to an $802.6 million project in Argentina, designed to reduce the use of liquid fuel and the cost for imported oil.

Argentina has been granted a $60.3 million loan from the Inter-American Development Bank to increase the capacity of its northern gas pipeline and help meet the country's growing demand for natural gas. The $200 million project involves the purchase and installation of 21 compressors and 12 generators.

Argentina's Gas del Estado is seeking bids on a 370-mile, 30-inch gas pipeline from the Loma de la Lata fields near Neuquén to an extraction plant at Cerri, near Bahía Blanca, on the Atlantic coast. The line will later be extended to Buenos Aires, for a total length of 870 miles. Cost of the entire project is estimated at $1 billion.

Argentina and Brazil are studying a major natural gas supply project to transport Argentine gas to Brazil's industrial heart of São Paulo via a 932-mile pipeline. The project calls for transporting about 706 to 882 million cubic feet per day from northern Argentina's Salta Province through Paraguay to São Paulo in southern Brazil.

Argentina is to finance construction of the pipeline. A joint company made up of Argentina's YPF and its gas supply distribution company Gas del Estado, Brazil's Petróleo Brasileiro S.A., and private companies from both countries are to oversee the project.

Petroleum.—Crude oil production in Argentina continued its downward trend since 1980 as a result of both the depressed national economy, which resulted in decreased demand, and reduced new investments by YPF's contractors. Argentina's crude petroleum production in 1985 fell 4% below that of the 1984 level to nearly 168 million barrels. Argentina, which has maintained self-sufficiency in oil in recent years through the state oil company YPF, now has only 14 years of proved reserves left at current consumption levels.

Petroleum has been a highly controversial area in Argentina as political parties venting nationalist sentiment have insisted that exploration and production be carried out by YPF; however, early in 1985, the President of Argentina, while visiting Houston, Texas, during a visit to the United States, announced that Argentina would base much of its energy future on service contracts between YPF and private enterprise. The decision was partly the result of the economic restrictions facing Argentina as a result of its $48 billion foreign debt and its aim to increase exports to help meet debt payments and foster economic growth. YPF is burdened with a debt of almost $6 billion. Despite vigorous exploration over the past 2 years, it has failed to make important oil finds.

Therefore, Argentina has unveiled a new model for oil contracts to attract private investment, bolster shrinking petroleum reserves, and pave the way for a strong expansion in exports. The proposed 30-year contracts would be used in international tenders for 164 potential oilfields, 15 of which are offshore, in the hope of uncovering an "immense treasure of petroleum." The Government aims to attract at least $23 billion in private investment over 15 years. The new contracts will substantially modify the energy panorama of the country and will allow for a significant increase in exports.

Argentina exports about $350 million per year in petroleum byproducts. The Secretary of Energy announced that the Soviet Union would be selling crude oil to Argentina for a total value of $500 million. Deliveries were to be made through different sources, and after processing in the local refineries, the byproducts were to be shipped to other countries in Latin America. Therefore, Argentina will benefit by about $20 million from refined oil, plus the sale of two tankers and a Soviet order of $300 million worth of manufactured products.

YPF and Petróleos Paraguayos (Petropar) entered into a contract for the purchase-sale of fuels, under which YPF undertook to supply variable volumes on a monthly and quarterly basis. The arrangement was for 1,500 to 1,600 cubic meters of special gasoline and 6,500 to 56,000 cubic meters of gasoil.

The Argentine Government and a consortium headed by France's Total Group have reached what appears to be a precedent setting agreement paving the way for development of the Hidra Oilfield off Tierra del Fuego. Development has been stalled because YPF and the Hidra partners couldn't agree on how the companies would be paid for the crude produced. Under the agreement, the Total Group is to be paid 35% in australes and 65% either in U.S. dollars or products refined locally that are exportable. Although payment in crude has been under discussion for some time, the Government has not yet incorporated that idea into agreements with operators. The Hidra Oilfield will be the second field slated for development off Argentina. Compagnie Française des Pétroles (CFP)-TOTAL has drilled 23 wells, of which 19 have been successful.

Last year YPF and Shell Cía. Argentina de Petróleo S.A. agreed on terms for a $290 million development of Shell's nearby discoveries, but because neither YPF nor Shell revealed details of the agreement, it is not known whether CFP-TOTAL won the same, less favorable, or possibly even better terms. The CFP-TOTAL partners are Deminex S.A. of the Federal Republic of Germany (37.5%) and Bridas S.A.P.I.C. of Argentina (25%).

Uranium.—Uranium production in 1985 reached about 95 tons, nearly 80% less than that of 1982 and about the same level as that of 1984. The CNEA and the Argentine nuclear program have already been reduced to a minimum; however, investments in power stations must be approved by the Secretary of Energy. Argentina will complete the Atucha II nuclear reactor in 1992, 5 years behind its original schedule. This will add 692 megawatts to the 935-megawatt capacity already in operation: the 335-megawatt Atucha II plant, in the Buenos Aires Province, and the 600-megawatt Embalse plant in Córdoba Province. Both reactors supply about 13% of the country's electricity. Argentina's reactors are pressurized heavy water reactors.

The Government plans to build a 700-megawatt nuclear plant by the year 2000. The two alternatives under study are to install a 700-megawatt reactor or two 350-megawatt plants.

Argentina was trying to break into the international market: 350-megawatt reactors have the additional appeal of being the ones chosen by developing countries. Argentina was constructing two research reactors, one in Peru and one in Algeria. Public acceptance of nuclear energy is still high. The country's nuclear development is a question of national pride for most Argentines.

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The Mineral Industry of Australia

By Travis Q. Lyday[1]

The mineral industry continued to be the largest primary sector of the Australian economy, generating an estimated 10% of the country's gross domestic product. The estimated value of Australia's nonfuel mineral production ranked fifth after the U.S.S.R., the United States, the Republic of South Africa, and Canada. The value of Australia's mineral production, including fuels, was estimated to rank 10th in the world. Australia accounted for more than one-third of the world's known resources of bauxite, over one-fifth of the market economy countries' uranium reserves, and had vast reserves of coal, copper, iron ore, and lead. Australia continued to be a major producer of alumina, bauxite, bismuth, coal, copper, ilmenite, iron ore, lead, monazite, nickel, rutile, zinc, and zircon.

Australia continued to be virtually self-sufficient in most mineral commodities, with the notable exceptions being chromium, mercury, petroleum, phosphate rock, potassium fertilizers, platinum, and sulfur. However, the country continued to supply 85% of the domestic consumption of crude petroleum, and abundant but undeveloped domestic phosphate deposits exist.

The economy continued to be heavily dependent upon foreign trade, ranking 17th among the trading nations of the world, and mineral commodities, exported to more than 100 countries, represented 40% of the value of exports. Australia was the world's largest exporter of alumina, ilmenite, refined lead, monazite, rutile, and zircon in 1985, the second leading exporter of iron ore after Brazil, and was among the world's leading suppliers of bauxite, coal, cobalt, lead, manganese, nickel, salt, tungsten concentrate, and zinc ore and concentrate.

Australia continued to be one of the few market economy countries to be a net exporter of mineral fuels. Abundant coal, natural gas, liquefied petroleum gas, and uranium supplies enabled Australia to retain a consistently favorable trade balance in energy products.

PRODUCTION

Of the major mineral commodities, alumina, aluminum, bauxite, iron ore, lead, and zinc, and the fossil fuel commodities coal, natural gas, and crude petroleum had record-high production, although gold, ilmenite, manganese, rutile, uranium, and zirconium concentrate still had banner years.

Australian mineral production in 1983, the latest year for which official data were available, was valued at $11.5 billion,[2] an increase of 8.4% over that of 1982. Crude petroleum and natural gas accounted for 43% of mine output, including fuel. Other sectors with significant contributions were coal, 24%; iron ore, 8%; construction materials, 4%; gold, 3%; copper, 2%; lead, 2%; and uranium, 2%. These were followed in descending order by zinc, lignite, manganese, salt, gem diamond, limestone, opal, zircon, clays, ilmenite, tungsten, and sapphire.

Table 1.—Australia: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984[p]	1985[e]
METALS					
Aluminum:					
Bauxite, gross weight thousand tons	25,441	23,625	24,372	32,182	32,400
Alumina do.	7,079	6,631	7,230	8,781	[2]8,792
Metal, refined:					
Primary do.	379	381	478	758	[2]851
Secondary do.	44,000	40,700	37,700	43,000	[2]43,000
Antimony, Sb content of antimony and lead concentrates	1,126	1,146	532	[e]700	1,000
Bismuth, mine output, metal content[e]	[r]1,180	[r 3]1,500	[3 4]1,410	[3 4]1,350	1,400
Cadmium:					
Mine output, metal content	1,753	2,193	2,275	2,315	2,000
Metal, smelter (refined)	1,031	1,010	1,121	1,049	1,000
Cobalt:					
Mine output, analytic content of:					
Nickel ore	2,219	2,511	1,712	[e]2,070	1,600
Nickel concentrate	609	967	492	(5)	--
Zinc concentrate	74	70	83	[e]55	35
Total	2,902	3,548	2,287	[e]2,125	1,635
Recoverable cobalt	1,466	[r]1,480	[e]1,150	1,080	830
Columbium-tantalum concentrate, gross weight	264	116	117	206	187
Copper:					
Mine output, metal content	231,339	245,322	261,476	236,040	258,000
Metal:					
Smelter:					
Primary	172,181	175,536	173,619	179,822	[2]166,978
Secondary	5,015	4,809	8,202	8,285	8,000
Refined:					
Primary	164,241	160,195	168,533	171,180	[2]163,719
Secondary	[r]26,767	[r]17,943	34,070	[e]34,000	35,000
Gold:					
Mine output, metal content troy ounces	590,737	866,815	983,522	1,257,125	[2]1,832,590
Metal, refined (excluding recovery from scrap) do.	481,971	826,627	953,140	1,189,672	[2]1,743,307
Iron and steel:					
Iron ore:					
Gross weight thousand tons	84,661	87,694	71,038	88,969	100,000
Iron content do.	53,361	55,566	45,302	56,817	63,500
Metal:					
Pig iron do.	6,830	5,956	5,045	5,329	[2]5,600
Ferroalloys:[6]					
Ferromanganese	67,563	54,717	53,463	[e]75,000	60,000
Ferrosilicon	18,313	19,678	18,669	[e]25,000	20,000
Silicomanganese	29,916	29,548	19,810	[e]31,000	20,000
Total	115,792	103,943	91,942	[e]131,000	100,000
Steel, crude thousand tons	7,635	6,371	5,625	6,299	6,610
Semimanufactures[e] do.	5,100	5,500	5,500	6,000	6,000
Lead:					
Mine output, metal content	388,122	455,338	480,626	440,676	491,000
Metal:					
Primary:					
Bullion, for export	162,564	181,592	182,594	179,491	[2]183,298
Refined	207,669	218,812	196,335	199,847	[2]196,171
Total	370,233	400,404	378,929	379,338	[2]379,469
Secondary excluding remelt[e]	31,500	28,300	[r]27,000	21,500	15,900
Manganese ore (metallurgical):					
Gross weight thousand tons	1,411	1,123	1,370	1,829	[2]1,989
Manganese content do.	684	539	684	864	970
Nickel:					
Mine output, metal content	74,355	87,552	76,625	76,889	85,000
Metal, smelter (refined metal and metal content of oxide)	42,505	45,931	41,800	38,660	[2]40,807
Platinum-group metals:[7]					
Palladium, metal content troy ounces	12,896	13,379	[e]12,000	[e]12,000	13,600
Platinum, metal content do.	2,093	2,388	[e]1,900	[e]1,900	2,400
Total do.	14,989	15,767	[e]13,900	[e]13,900	16,000
Rare-earth metals, monazite concentrate:					
Gross weight	13,282	9,562	15,141	16,702	15,000
Monazite content	12,337	8,889	14,005	15,528	13,900

See footnotes at end of table.

Table 1.—Australia: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984[p]	1985[e]
METALS —Continued					
Silver:					
Mine output, metal content thousand troy ounces	23,906	29,156	33,208	31,183	35,000
Metal, refined do.	[r]12,093	11,113	10,684	9,677	10,000
Tin:					
Mine output, metal content	12,267	12,126	[8]9,275	7,699	7,000
Metal, refined:					
Primary	4,286	3,105	2,913	2,899	[2]2,683
Secondary[e]	410	380	400	400	400
Titanium concentrates, gross weight:					
Ilmenite thousand tons	1,321	1,149	896	1,143	1,250
Leucoxene	19,261	19,739	13,358	15,884	17,000
Rutile	230,817	220,697	168,217	181,481	205,000
Tungsten, mine output, metal content	3,517	2,618	2,015	1,772	[2]1,912
Uranium, mine output, metal content	2,860	4,422	3,217	4,390	[2]3,251
Vanadium, mine output, metal content	70	23	--	--	--
Zinc:					
Mine output, metal content	518,297	664,800	699,032	658,664	734,000
Metal, smelter:					
Primary	295,852	291,390	298,518	[3]301,940	[2]288,364
Secondary[e]	4,500	4,500	4,800	4,500	4,500
Zirconium concentrates, gross weight	434,246	462,476	382,305	454,534	440,000
INDUSTRIAL MINERALS					
Abrasives, natural:					
Beach pebble	2,178	1,169	[e]2,300	[e]2,500	2,500
Garnet (sales)	3,020	3,266	[e]3,300	[e]3,500	3,500
Asbestos	[r]36,528	[r]18,969	2,137	--	--
Barite	41,266	28,064	11,752	19,511	20,000
Cement, hydraulic thousand tons	[r]6,006	5,744	4,836	5,463	6,000
Clays:					
Bentonite and bentonitic clay	16,905	29,212	30,026	[e]30,000	30,000
Brick clay and shale thousand tons	7,910	8,210	6,203	7,898	8,000
Cement clay and shale do.	386	413	[e]450	[e]400	400
Damourite clay (sales)	3,011	2,473	93	[e]3,000	3,000
Fire clay[9]	142,989	71,092	57,163	[e]150,000	60,000
Kaolin and ball clay	170,472	152,133	115,526	[r] [e]250,000	125,000
Other[9] thousand tons	2,374	1,641	2,581	[e]2,000	2,000
Diamond:					
Gem thousand carats	21	[r]274	3,720	3,414	[2]4,235
Industrial do.	184	[r]183	2,480	2,276	[2]2,824
Total do.	205	[r]457	6,200	5,690	[2]7,059
Diatomite	2,073	1,561	7,921	6,873	7,000
Feldspar including nepheline syenite	[r]4,868	4,335	4,244	3,390	3,500
Gem stones, other than diamond:					
Opal value, thousands	[r]$55,479	[r]$39,861	$40,035	[e]$50,000	$50,000
Sapphire do.	[r]$22,445	[r]$24,283	$18,556	[e]$20,000	$20,000
Other do.	[r]$420	[r]$210	$430	[e]$450	$450
Total do.	[r]$78,344	[r]$64,354	$59,021	[e]$70,450	$70,450
Gypsum thousand tons	1,752	1,864	1,510	[10]1,615	1,500
Lime[3]	874,761	948,000	1,016,367	[e]950,000	1,100,000
Magnesite	26,445	29,671	20,539	[e]25,000	50,000
Nitrogen: N content of ammonia	319,000	244,900	385,000	375,600	375,000
Perlite, crude	1,476	1,148	2,856	[e]1,500	3,000
Phosphate rock	21,997	211,463	4,868	10,945	[2]10,000
Pigments, mineral, natural: Ocher	839	--	--	--	--
Salt thousand tons	6,716	4,811	5,170	[e]5,000	5,000
Sillimanite	331	783	121	507	500
Sodium compounds, n.e.s.: Sodium carbonate[e] thousand tons	[r]300	[r]300	[r]300	300	300
Spodumene, concentrate[3]	--	[e]80	1,000	6,500	[2]11,200
Stone, sand and gravel:					
Construction sand[9] thousand tons	28,001	28,718	23,543	[e]30,000	30,000
Gravel[9] do.	14,639	16,813	13,931	[e]18,000	18,000
Dolomite do.	757	602	585	593	600
Limestone:[e]					
For cement do.	8,382	9,268	8,500	9,000	9,000
For other uses do.	3,601	3,430	3,800	4,000	4,000
Silica in the form of quartz, quartzite, glass sand do.	1,743	1,813	1,928	[e]2,000	2,000
Other:[e]					
Crushed and broken stone do.	58,110	57,100	[2]49,115	50,000	50,000
Dimension stone do.	125	129	[2]97	100	100
Unspecified do.	37,378	31,524	[2]25,869	25,000	25,000

See footnotes at end of table.

Table 1.—Australia: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984[p]	1985[e]
INDUSTRIAL MINERALS —Continued					
Sulfur: Byproduct:					
Metallurgy[e]	171,000	157,000	160,000	160,000	160,000
Petroleum	14,321	17,496	12,897	[e]13,000	15,000
Total[e]	185,321	174,496	172,897	173,000	175,000
Talc, soapstone, pyrophyllite	82,986	152,792	176,578	241,170	250,000
MINERAL FUELS AND RELATED MATERIALS					
Coal:					
Bituminous and subbituminous thousand tons	110,945	119,015	120,493	124,547	[2]135,968
Lignite do.	32,990	37,811	34,191	35,108	35,000
Total do.	143,935	156,826	154,684	159,655	170,968
Coke, metallurgical do.	4,959	3,761	3,018	3,288	3,000
Fuel briquets do.	1,008	854	772	810	1,000
Gas natural, marketed million cubic feet	400,648	409,439	420,115	445,966	[2]475,481
Natural gas liquids thousand 42-gallon barrels	23,524	18,255	23,000	21,175	[2]25,939
Peat[10]	13,760	10,101	10,026	[r] [e]10,000	10,000
Petroleum:					
Crude thousand 42-gallon barrels	143,672	136,251	152,417	181,863	[2]209,939
Refinery products:					
Gasoline:					
Aviation do.		1,095	1,023	1,281	[2]1,177
	92,922				
Motor do.		94,206	94,214	96,642	[2]99,702
Jet fuel do.	15,136	15,330	14,836	16,452	16,373
Kerosene do.	2,984	3,084	761	812	[2]611
Distillate fuel oil do.	51,899	53,533	53,128	55,273	[2]54,673
Residual fuel oil do.	21,732	21,678	19,898	18,086	[2]18,019
Lubricants do.	34,809	3,556	3,324	3,753	[2]3,692
Liquefied petroleum gas do.	3,816	6,171	4,027	4,600	[2]6,069
Bitumen do.	2,875	3,115	2,766	3,171	[2]3,220
Unspecified do.	7,365	4,219	10,879	9,943	[2]7,476
Refinery fuels and losses do.	15,000	17,696	13,433	11,872	12,000
Total do.	248,538	223,683	218,289	221,885	223,012

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Includes data available through Aug. 26, 1986.
[2]Reported figure.
[3]Data are for years ending June 30 of that stated.
[4]Bismuth-rich residues reportedly have been stockpiled owing to weak demand and low prices.
[5]Revised to zero.
[6]Data are for years ending Nov. 30 of that stated for plants owned by The Broken Hill Pty. Co. Ltd.
[7]Western Australia only. Metal content of nickel ore.
[8]Excludes tin content of copper-tin concentrates.
[9]Excludes production from Western Australia.
[10]Excludes data from some States.

TRADE

The value of Australia's mineral exports in 1983, the latest year for which official data were available, rose by 22% over that of 1982, setting a new record high despite continued depressed market conditions. The value of most minerals increased following the devaluation of the Australian dollar in March 1983 and, in some cases, because of increases in the quantity exported.

Coal continued to be the largest export earner, representing 34% of primary mineral product exports in 1983. Iron ore was in second place with 16% of primary mineral exports, followed by alumina, 12%; liquefied petroleum gas, 5%; lead bullion, 4%; nickel, 3%; and uranium, 3%. Other mineral products for which export earnings were significant included aluminum, copper, gold, iron and steel, mineral sands, tin, and zinc.

Table 2.—Australia: Exports and reexports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides thousand tons	6,379	6,924	--	NA.
Metal including alloys:				
Scrap	25,964	13,246	--	Japan 11,865.
Unwrought	238,674	413,484	118	Japan 243,720; China 34,401; France 23,542.
Semimanufactures	50,360	54,800	6	NA.
Chromium: Ore and concentrate	102	24	--	Indonesia 15; New Zealand 9.
Copper:				
Ore and concentrate	264,425	217,440	1,145	Japan 213,211; United Kingdom 858.
Matte and speiss including cement copper	4,987	3,977	--	West Germany 2,981; Netherlands 996.
Metal including alloys:				
Scrap	646	516	--	United Kingdom 205; Belgium-Luxembourg 118; India 74.
Unwrought	86,928	81,351	37	United Kingdom 27,128; Japan 20,985; France 14,157.
Semimanufactures	29,204	36,349	862	Saudi Arabia 14,413; New Zealand 14,309.
Gold: Metal including alloys:[2]				
Content of ores and concentrates troy ounces	92,337	34,433	NA	NA.
Unwrought and partly wrought do.	570,450	979,342	NA	NA.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite -- thousand tons	76,507	88,830	--	Japan 58,000; West Germany 6,010; Republic of Korea 5,128.
Metal:				
Scrap do.	562	371	--	NA.
Pig iron, cast iron, related materials	468,958	71,010	--	Japan 59,884; Republic of Korea 10,033.
Ferroalloys:				
Ferromanganese	28,556	19,184	--	Indonesia 10,869; Qatar 3,035; New Zealand 2,423.
Unspecified	22,279	27,360	16,208	Singapore 5,527; Japan 3,109.
Steel, primary forms	609,587	414,154	6,565	China 234,094; Japan 54,477; Thailand 27,188.
Semimanufactures:				
Bars, rods, angles, shapes, sections	123,782	58,877	5,002	New Zealand 29,829; Papua New Guinea 8,167; Thailand 4,537.
Universals, plates, sheets	473,069	361,743	111,262	New Zealand 62,591; Pakistan 34,036; China 33,211.
Hoop and strip	35,069	15,623	536	New Zealand 9,615; Canada 3,184; Singapore 1,686.
Rails and accessories	2,120	741	22	Indonesia 403; Malaysia 136.
Wire	10,038	11,002	2,002	New Zealand 3,094; Japan 1,763; Papua New Guinea 1,506.
Tubes, pipes, fittings	35,800	50,600	NA	NA.
Castings and forgings, rough	3,361	5,269	1,342	Singapore 1,455; Thailand 1,072; Papua New Guinea 485.
Lead:				
Ore and concentrate	93,351	157,828	60,078	Japan 53,731; Sweden 15,101.
Oxides	4,245	4,416	--	NA.
Metal including alloys:				
Scrap	4,633	9,237	--	Philippines 2,326; Republic of Korea 2,052.
Unwrought	352,563	336,158	10,883	United Kingdom 163,452; Japan 50,650; India 30,326.
Semimanufactures	432	591	--	Singapore 203; New Zealand 154; Malaysia 103.
Manganese: Ore and concentrate[2] thousand tons	1,004	1,460	NA	NA.
Nickel:				
Ore and concentrate value, thousands	$18,496	$11,195	$9,330	Finland $2.
Matte and speiss do.	$149,178	$201,873	NA	NA.
Metal including alloys:				
Scrap	565	566	--	Japan 261; United Kingdom 205.
Unwrought and semimanufactures -- value, thousands	$119,264	$124,911	NA	NA.
Platinum-group metals: Metals including alloys, unwrought and partly wrought do.	$1,226	$3,245	$1,504	France $815; United Kingdom $520; Singapore $105.

See footnotes at end of table.

Table 2.—Australia: Exports and reexports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued				
Rare-earth metals: Monazite concentrate	17,670	18,124	6,883	France 10,031.
Silver:				
Ore and concentrate[3] value, thousands	$684	$102	$5	Fiji $78.
Waste and sweepings[3] do	$611	$7,307	--	United Kingdom $6,674; Japan $424.
Metal including alloys, unwrought and partly wrought do	$94,943	$55,721	$362	United Kingdom $42,721; Japan $6,118.
Tin:				
Ore and concentrate	100,173	12,974	--	Malaysia 12,312.
Metal including alloys:				
Scrap	350	144	--	All to United Kingdom.
Unwrought	501	473	342	New Zealand 93.
Semimanufactures	271	197	31	Papua New Guinea 79; Fiji 29.
Titanium: Ore and concentrate[2] thousand tons	r1,044	1,395	533	Japan 239; United Kingdom 183; Spain 106.
Tungsten:				
Ore and concentrate	14,094	3,256	312	West Germany 1,109; Netherlands 267.
Metal including alloys, all forms	49	193	5	Austria 102; West Germany 34.
Uranium and thorium: Ore and concentrate value, thousands	$273,454	$280,390	$91,439	West Germany $76,505; United Kingdom $43,588; France $38,161.
Zinc:				
Ore and concentrate thousand tons	810	878	--	Japan 497; Belgium-Luxembourg 118; Republic of Korea 117.
Oxides	153	203	--	India 128; Papua New Guinea 22.
Metal including alloys:				
Scrap	1,587	1,020	--	NA.
Unwrought	260,545	215,605	25,098	Indonesia 39,936; China 31,442; Thailand 21,044.
Semimanufactures	12,308	11,793	1,350	United Kingdom 9,561.
Zirconium: Ore and concentrate[2]	379,975	437,770	NA	NA.
Other:				
Ores and concentrates	1,429,515	1,871,503	578,253	Japan 408,303; United Kingdom 196,625; Spain 169,961.
Oxides and hydroxides	22	63	--	Papua New Guinea 44; New Zealand 11.
Ashes and residues	23,838	29,742	2,347	Japan 14,194; India 4,899; West Germany 1,738.
Base metals including alloys, all forms	1,471	1,502	528	Netherlands 487; France 80; Japan 80.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	343	321	91	United Kingdom 150; Japan 37.
Artificial: Corundum	55	2	--	Papua New Guinea 1.
Dust and powder of precious and semiprecious stones including diamond value, thousands	$54	$173	--	Ireland $130; New Zealand $30.
Grinding and polishing wheels and stones	628	193	--	New Zealand 97; Pakistan 51.
Asbestos, crude	4,583	22	--	Malaysia 19.
Barite and witherite	823	1,682	--	New Zealand 1,502.
Cement	183,856	(4)	NA	NA.
Clays, crude	7,782	17,030	4	Indonesia 6,412; Japan 2,892; United Kingdom 2,243.
Diamond:				
Gem, not set or strung value, thousands	$32,966	$23,171	$645	Switzerland $15,842.
Industrial stones do	$9,645	$5,273	$6	Switzerland $4,158; Republic of South Africa $449.
Diatomite and other infusorial earth	100	2,512	--	Papua New Guinea 2,401.
Fertilizer materials:				
Crude, n.e.s	1,350	561	--	Malaysia 270; United Arab Emirates 96; Oman 57.
Manufactured:				
Ammonia	75,635	12,278	--	Republic of Korea 11,735.
Nitrogenous	20,515	29,877	--	Indonesia 10,829; India 8,109; Thailand 6,869.
Phosphatic	1,002	528	--	New Caledonia 252; China 67; Fiji 53.
Potassic	16	23	--	Papua New Guinea 20.
Unspecified and mixed	17,309	25,020	--	Republic of Korea 24,184.

See footnotes at end of table.

Table 2.—Australia: Exports and reexports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984	
			United States	Other (principal)
INDUSTRIAL MINERALS —Continued				
Graphite, natural	130	17	6	New Zealand 5.
Gypsum and plaster	803,180	732,481	14,000	Indonesia 251,734; New Zealand 128,499; Republic of Korea 164,124.
Lime	283	321	--	Indonesia 205; Papua New Guinea 70.
Magnesite	2,812	3,985	234	New Zealand 3,387.
Mica: Worked including agglomerated splittings	47	9	--	Mainly to Papua New Guinea.
Nitrates, crude	1	3	--	Republic of South Africa 2.
Phosphates, crude	4,620	26,312	1	Japan 15,225; Republic of Korea 11,000.
Pigments, mineral: Iron oxides and hydroxides, processed	80	85	--	New Zealand 43; Pakistan 21.
Potassium salts, crude	40	31	--	New Zealand 21; Papua New Guinea 9.
Precious and semiprecious stones other than diamond: Synthetic value, thousands	$35,966	$32,162	$3,443	Hong Kong $8,328; Japan $5,900; Thailand $5,713.
Salt and brine thousand tons	4,582	4,766	--	Japan 3,122; Republic of Korea 621.
Sodium carbonate, n.e.s.: Carbonate, manufactured	23	974	--	Fiji 924.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	1,224	4,260	--	Italy 3,290; Japan 494.
Worked	56	24	--	New Zealand 8; Papua New Guinea 8.
Dolomite, chiefly refractory-grade	27	27	--	Mainly to China.
Gravel and crushed rock	784,921	686,632	2	NA.
Limestone other than dimension	79	35	--	Papua New Guinea 25.
Sulfur:				
Elemental: Crude including native and byproduct	418	320	--	All to New Zealand.
Sulfuric acid	300	457	--	Fiji 177; Papua New Guinea 130; New Zealand 92.
Talc, steatite, soapstone, pyrophyllite	131,940	163,398	--	Japan 119,678; Netherlands 14,327; Republic of Korea 14,167.
Other:				
Crude	2,301	21,061	74	Japan 20,051; New Zealand 730.
Slag and dross, not metal-bearing	21	266	85	Papua New Guinea 92.
MINERAL FUELS AND RELATED MATERIALS				
Carbon black	27,845	27,840	--	Indonesia 12,841; New Zealand 7,715; China 2,147.
Coal:				
Anthracite and bituminous thousand tons	61,081	77,770	26	Japan 41,089; Republic of Korea 6,811; Netherlands 5,004.
Lignite including briquets do	54	55	--	Republic of Korea 47.
Coke and semicoke do	38	65	--	Japan 19; Norway 18; Singapore 12.
Petroleum:				
Crude thousand 42-gallon barrels	687	19,567	13,923	Singapore 2,029; Japan 1,930; Republic of Korea 620.
Refinery products:				
Liquefied petroleum gas do	17,500	16,715	NA	NA.
Gasoline do	3,784	3,553	--	New Zealand 2,152; Papua New Guinea 568; Fiji 422.
Mineral jelly and wax do	20	22	3	New Zealand 8; Indonesia 3.
Kerosene and jet fuel do	5,234	6,477	(5)	New Zealand 1,529; Fiji 747; bunkers 3,316.
Distillate fuel oil do	7,785	7,261	(5)	New Zealand 1,856; Papua New Guinea 1,299; bunkers 1,438.
Lubricants do	1,271	1,721	416	New Zealand 253; Singapore 249; Kenya 166.
Residual fuel oil do	8,472	9,861	1,856	Singapore 987; bunkers 5,953.
Bituminous mixtures do	5	2	--	New Zealand 1.

[r]Revised. NA Not available.
[1]Table prepared by Audrey D. Wilkes. Import data were not available at the time of publication.
[2]Data from Australian Mineral Industry Annual Review Preliminary Summary 1985.
[3]May include platinum-group metals.
[4]Unreported quantity valued at $2,674,000.
[5]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Alumina, Aluminum, and Bauxite.—Australia remained the undisputed leading producer of alumina and bauxite in the world. Estimated production of bauxite rose by 0.7% compared with that of 1984, while alumina production remained the same. Australia exported 20% of its bauxite production, consuming the remaining annual output domestically in the production of alumina, a product of much higher value. The country did, however, export a large portion of its alumina, because the domestic primary aluminum industry was relatively small in proportion to the country's raw material capacity. Domestic aluminum production increased more than 12% over that of 1984, reflecting operating rates close to capacity at all smelters.

Bauxite was produced during the year from three principal regions. Two mines were operated by Comalco Pty. Ltd. at Weipa in the north of the Cape York Peninsula, Queensland; Nabalco Pty. Ltd. operated a mine at Gove in Arnhem Land, Northern Territory; Alcoa of Australia Ltd. operated the Del Park, Huntly, and Willowdale Mines in the Darling Ranges to the south of Perth in Western Australia; and Reynolds Australia Alumina Ltd. operated the Mount Saddleback Mine in the same area.

Australia's six alumina refineries were Alcoa's Kwinana, Pinjarra, and Wagerup facilities in Western Australia south of Perth; Queensland Alumina Ltd.'s Gladstone plant on the eastern coast of Queensland; Nabalco's refinery at Gove; and Reynold's Worsley operation south of Perth.

Primary aluminum was produced at five smelters: Bell Bay in Tasmania (Comalco); Boyne Island in Queensland (Boyne Smelters); Kurri Kurri at New Castle, New South Wales (Alcan Australia Ltd.); Point Henry at Geelong, Victoria (Alcoa); and Tomago in New South Wales (Tomago Aluminium Co. Pty. Ltd.).

A seventh smelter at Portland, Victoria, was under construction. The long-delayed smelter continued having problems throughout most of the year. In January, the Commonwealth Superannuation Fund Investment Trust decided not to proceed with its planned 15% equity in the project, and in April, the Republic of Korea's Hyundai Construction and Engineering Co. Ltd. announced that it would not take up its planned 10% equity share. As a result, the joint venture partners Alcoa and the Victoria State government agreed to raise their equity in the project—Alcoa from 45% to 60%, and the State government from 25% to 40%. The situation began improving late in the year. In September, it was announced that a public trust had been set up by the merchant bank First National Ltd. to acquire a 10% share in the smelter, and in October the China International Trust and Investment Corp. signed a letter of intent to purchase a 10% interest in the smelter.

Alcan announced in May that it would increase capacity at its Kurri Kurri smelter from 90,000 to 150,000 tons per year, with the addition of a third potline scheduled to be fully operational by May 1986. It was originally planned to come on-stream at the end of 1984, but the company delayed startup because of low international market prices for primary aluminum ingot.

In July, the Western Australian government, based on a feasibility study conducted by the State's Aluminum Task Force, announced that the 220,000-ton-per-year smelter proposed to be built at Kemerton, south of Perth, would not go ahead. The study made it clear that the smelter could only be viable with a substantial power subsidy from the Federal Government.

In November, Comalco announced its intention of withdrawing its 50% equity from its venture with the Japanese firm Showa Light Metal Co. Ltd. (SLM), a subsidiary of Showa Denko K.K., because of depressed metal prices. Comalco originally teamed up with SLM as part of a plan to gain extra processing facilities and outlets for its own growing aluminum industry. Discussions were being held at yearend with SLM to reach an agreement on how the proposal would be implemented.

Copper.—As a result of a slight increase in price, a decrease in metal supply, and a continued lowering of world stock levels, estimated mine production of copper increased 9% over 1984 levels and was almost equal to 1983's all-time record high. Despite a slight increase in blister copper production by The Electrolytic Refining and Smelting Co. of Australia Ltd. at its Port Kembla, New South Wales, plant, blister production decreased 7% because of decreased production at Mount Isa Mines Ltd.'s (MIM) facility at Mount Isa, Queensland. Primary refined metal decreased by 4% from the 1984 level because of lower output from both the Port Kembla refinery and Copper Refineries Pty. Ltd.'s Townsville, Queensland, facility.

Despite a 2-week strike in November, mine production at Mount Isa by MIM, Australia's largest copper producer and a wholly owned subsidiary of M.I.M. Holdings Ltd., increased 12% over that of 1984, primarily because of a higher average grade of ore being treated. Seltrust Mining Corp. Pty. Ltd., which closed its mine at Teutonic Bore, Western Australia, in 1984 owing to ore depletion, increased concentrate production in October from its stockpiled ore.

In addition to Mount Isa, other major copper-producing mines in Australia in 1985 were CRA Ltd.'s large mine at Cobar, western New South Wales, and its smaller Woodlawn Mine just northeast of Canberra; Peko-Wallsend Ltd.'s Warrego Mine at Tennant Creek, Northern Territory; and Renison Goldfields Consolidated Ltd.'s Mount Lyell Mine, Tasmania.

In addition, Electrolytic Zinc Co. of Australasia Ltd. (EZ) produced copper from its predominantly lead-zinc Rosebery Mine in Tasmania, and the EMAC-Gunson Partnership recovered and treated remnant ore at its Mount Gunson Mine in South Australia. In addition to the increased production at Mount Isa, production also increased at the Mount Gunson, Rosebery, and Woodlawn Mines compared with that of 1984. Lower output than that recorded in 1984 was produced at the Cobar, Mount Lyell, Teutonic Bore, and Warrego Mines.

The installation of new underground ore hauling facilities was completed at Cobar as part of an expansion program that included development of the lower leads of the mine to raise capacity to about 850,000 tons of ore annually.

Western Mining Corp. Holdings Ltd. (WMCH) and BP Australia Ltd. announced in December that development of the huge Olympic Dam copper-gold-silver-uranium project at Roxby Downs Station, South Australia, would begin construction in early 1986. Scheduled startup was to be in 1987, rather than the early 1990's as earlier announced, but at a significantly lower production rate than originally planned. Mining was expected to begin on a small, high-grade gold section of the ore body, and mining of the copper-uranium ore was planned to start in 1988 that would also concentrate on a high-grade section. Initial copper mining was expected to yield 55,000 tons of copper per year.

Gold.—Estimated gold production increased for the fifth successive year, exceeding the 1984 output by nearly 46%. Output, although at its highest since 1915, was still well below Australia's peak production of 3.8 million troy ounces in 1903. Australia was the world's seventh largest gold producer in 1985. The increase in gold production was primarily due to the expansion of production at existing mines and to the commissioning of several new mines, but also to the trend of re-treating mine tailings dumps for the gold left from previous treatment.

Kidston Gold Mines Ltd.'s large Kidston open pit gold-silver mine in Queensland, owned by Canada's Placer Development Ltd. (70%), Australia's Elders IXL Ltd. (15%), and the Australian public (15%), started production in January, 3 months ahead of the original target date, and was officially opened in April. With the year's output of more than 200,000 troy ounces, Kidston became Australia's largest gold producer.

Gold production came from all six States and the Northern Territory; that from New South Wales, South Australia, and Tasmania was almost entirely recovered as a byproduct of base metal mining operations. The gold circuit at WMCH's Kambalda nickel operation in south-central Western Australia remained that State's largest producer. The Stawell Mine, a joint venture composed of WMCH (75%) and Central Norseman Gold Corp. Ltd. (25%), that commenced in 1984, remained Victoria's major producer with 83% of the State's output. Peko-Wallsend's Warrego Mine at Tennant Creek continued as the Northern Territory's leading producer.

Exploration for gold continued to flourish in Australia, and particularly Western Australia, with an estimated 40% of exploration expenditures for minerals other than petroleum allotted to the search for gold. The gold mining and exploration industry continued to be quite viable owing to historically low prices for some metals, the absence of any income tax on gold mining, the exemption of royalty payments in most areas, and the comparatively high prices of gold in Australian dollars.

In addition to the Kidston Mine in Queensland, although not an exhaustive listing, the following mines and gold treatment plants commenced operation during the year: Argo Mine, Northern Territory (Peko-Wallsend); Bluebird Mine treatment plant, Western Australia (Endeavour Resources Ltd.); Broad Arrow treatment plant, Western Australia (Electrum NL, 30%, in joint venture with H.M.C. Australasia Ltd., 70%); Galtee More Mine, Western Australia (Brunswick Oil NL); Harbour Lights Mine, Western Australia (joint venture with Esso Exploration and Production Australia Inc. as the majority holder); Lawless Mine treatment plant, Western Australia (Forsayth Oil and Gas NL); Mount Percy Mine, Western Australia (Windsor Resources NL); Ora Banda Mine, Western Australia (BHP Minerals Ltd.); Paddington Mine, Western Australia (Pancontinental Mining Ltd.); and Pine Creek Mine, Northern Territory (Renison Goldfields, 60%, in joint venture with Enterprise Gold Mines NL, 40%).

WMCH and BP Australia announced in December that the huge Olympic Dam copper-gold-silver-uranium deposit at Roxby Downs Station in South Australia would begin to be developed early in 1986. Initial gold production was planned to be 100,000 troy ounces per year, beginning in 1987.

Iron and Steel.—Iron ore production increased for the second consecutive year owing to a continued increase in demand from export markets, predominantly the developing countries of Asia, and to replenish reduced stockpiles. Output increased 12%, exceeding the previous record high of 95.5 million tons set in 1980. Exports exceeded the record high set in 1984. Substantial increases in output occurred at Hamersley Iron Pty. Ltd.'s Mount Tom Price and Paraburdoo Mines and Mount Newman Mining Co. Ltd.'s Orebody 29, Mount Whaleback, and Newman Mines following the decision in late 1984 to increase production rates to near capacity levels.

Australian iron ore production remained heavily concentrated in the Pilbara District of Western Australia, accounting for more than 95% of the country's total. Four companies mined iron ore in the Pilbara District during the year: Cliffs Robe River Iron Associates, with mines at East Deepdale near Pannawonica; Goldsworthy Mining Ltd., with mines at Shay Gap and Sunrise Hill; Hamersley Iron; and Mount Newman Mining. Iron ore was also mined in Western Australia at Koolan Island, Yampi Sound, and stockpiled ore was shipped from the depleted mine at Cockatoo Island, also in Yampi Sound, by BHP Minerals.

Outside Western Australia, The Broken Hill Pty. Co. Ltd. (BHP) produced iron ore from its Iron Baron group of mines (Baron, Cavalier, Iron Baron South, Iron Prince, and Iron Queen) and from the Iron Knob and Iron Monarch Mines in the Middleback Ranges, South Australia. Savage River Mines Ltd. produced iron ore from its Savage River Mine in Tasmania.

An agreement was signed in April with the Government of Romania for the Australian company Hancock Prospecting Pty. Ltd. to supply 53 million tons of iron ore over a 15-year period from Marandoo near the Mount Tom Price Mine. Romania would supply 60% of the mining equipment in a barter arrangement for the ore. During the early years of the mine, shipments of ore to Romania would be no less than 1 million tons per year, and in later years, this amount would increase to no more than 5 million tons per year.

Reportedly, an agreement was reached in August for the transfer of the iron ore resources held by BHP Minerals at East Deepdale to Cliffs Robe River. These resources are adjacent to those being mined at East Deepdale by Cliffs Robe River, and were expected to be sufficient to extend mining for an additional 25 years.

BHP Minerals announced in September that it would purchase from Amax Iron Ore Corp., a subsidiary of AMAX Inc. of the United States, and Pilbara Iron Ltd., a subsidiary of Australia's CSR Ltd., their 25% and 30% interests, respectively, in the Mount Newman joint venture, thereby increasing its share in the project to 85%. The Japanese firm Mitsui-C Itoh Iron Pty. Ltd. and Australia's Seltrust Iron Ore Ltd. held the remaining 10% and 5%, respectively.

Production of pig iron increased by 5%, consistent with increased steel output, mainly to meet a substantial increase in exports.

BHP began building its $35 million steel minimill at Acacia Ridge in the Brisbane area in March. The steel rolling mill will produce merchant and reinforcing bar products using semifinished billets supplied by BHP's plants at Newcastle and/or Port Kembla. The mill was targeted to be operational by early 1987.

Authorization was approved in February 1985 for the installation of a continuous bloom caster and reheat furnace at the Newcastle Steelworks. The plant was planned to be commissioned in 1987 with an annual capacity of 2 million tons per year. In addition, upgrading of the rod mill at Newcastle, also to be completed in 1987, was approved in June.

Lead and Zinc.—Since the closing of Seltrust Holdings' Teutonic Bore Mine in

Western Australia in 1984, all lead and zinc was produced from mines that produced both commodities, since the two metals occur as associated minerals in the same ore bodies.

Estimated mine production of lead and zinc both increased 11% to a record-high level because of the return to more normal levels of production at several mines owing to the 20% decline in value of the Australian dollar, which reduced costs expressed in U.S. dollars, and by productivity increases at some of the mines. There also was a notable decline in labor interruptions from the 1984 levels. Significant increases in output were recorded by three of the four mines at Broken Hill, New South Wales, owned by New Broken Hill Consolidated Ltd. (NBHC), North Broken Hill Ltd., and Zinc Corp. Ltd. Significant increases were also seen at the Rosebery and Hercules Mines owned by EZ; the Que River Mine owned jointly by Aberfoyle Ltd. (90%) and Paringa Mining and Exploration Co. PLC (10%), all on Tasmania's western coast; and the Elura Mine at New South Wales, also owned by EZ. More modest increases were recorded for the mines at Woodlawn and Mount Isa, New South Wales. The Woodlawn Mine, formerly owned by St. Joseph International Explorations Ltd., Phelps Dodge Exploration Corp., and NBHC, each with a one-third interest, became wholly owned by NBHC in 1985. Production decreased slightly at Minerals Mining and Metallurgy Ltd.'s CSA Mine at Cobar, New South Wales. Concentrate production from stockpiled ore at Seltrust Holdings' Teutonic Bore Mine ceased in October.

The Woodcutters lead-silver-zinc mine in the Northern Territory near Darwin, acquired by a consortium led by Nicron Resources Ltd. in 1983, came on-stream toward yearend. Construction of plant and equipment, together with prestripping the ore body, had been completed by July. Planned production was 140,000 tons of ore per year, producing 11,000 tons of lead, 600,000 troy ounces of silver, and 23,000 tons of zinc in concentrate.

Extensive exploration continued throughout the year at MIM's Hilton silver-lead-zinc deposit 20 kilometers north of Mount Isa, although the trial mining program scheduled to begin in 1985 was postponed until mid-1986. It was still planned, however, to phase in a mining operation at Hilton and integrate its ore with that from Mount Isa in the late 1980's.

Pancontinental acquired Mount Isa's interest in the Lady Loretta lead-zinc deposit in northwestern Queensland in August, and secured an option to buy the remaining one-fifth interest from Société Nationale Elf Aquitaine's Triako Mines NL within 6 months.

Production of lead bullion, produced both at MIM's Mount Isa smelter and Sulphide Corp. Pty. Ltd.'s (SC) Cockle Creek, New South Wales, smelter increased slightly in 1985, with the increased production at Mount Isa more than offsetting the decrease at Cockle Creek. Primary refined lead production from Broken Hill Associated Smelters Pty. Ltd.'s (BHAS) Port Pirie, South Australia, refinery—Australia's sole producer—also declined slightly and remained well below target owing to continued feed shortages and technical difficulties.

Production of primary refined zinc declined by 4%. Primary refined zinc was produced at three refineries—BHAS at Port Pirie, EZ's at Risdon, and SC's at Cockle Creek. Production was down at all three plants.

Manganese.—All manganese ore in Australia was produced by Groot Eylandt Mining Co. Pty. Ltd. (GEMC), a wholly owned subsidiary of BHP, at Groot Eylandt in the Gulf of Carpentaria, Northern Territory. Production increased 9% over that of 1984. Exports of manganese ore, however, declined 4%, as reduced demand for shipments to Japan and Europe were only partially offset by increased shipments to the United States and to other Asian markets.

GEMC announced that it was going to increase manganese ore production capacity at the Groot Eylandt Mine from 1.7 million tons per year to 2.4 million tons per year.

Ferromanganese and silicomanganese production at Bell Bay, Tasmania, by Tasmanian Electro Metallurgical Co. Pty. Ltd., also a wholly owned subsidiary of BHP, decreased by 9% and 13%, respectively. A 3-year, $37 million expansion program to increase production capacity for manganese alloys at the Bell Bay facility began early in the year. The increase will go from 135,000 to 190,000 tons per year.

The feasibility of establishing a manganese alloy sinter plant at GEMC and the use of GEMC manganese ore for batteries was under study during the year.

Nickel.—Australian mine production of nickel was estimated to have increased by

10% in 1985, mainly owing to Queensland Nickel Pty. Ltd., an equal joint venture of Metals Exploration Queensland Pty. Ltd. and Freeport Queensland Nickel Inc., increasing production at its Greenvale, Queensland, mine to full capacity beginning January 1. Ore railed to the joint venture's Yabulu refinery near Townsville increased 66% over that of 1984.

With the exception of the Greenvale Mine, all of Australia's mined nickel production was from Western Australia. WMCH remained the country's largest producer, operating 12 mines at Kambalda-St. Ives in the Kalgoorlie District of Western Australia, as well as the Windarra nickel project consisting of the Mount Windarra and South Windarra Mines. The South Windarra opencut was reopened during the year. WMCH also operated Australia's only nickel smelter 12 kilometers south of Kalgoorlie and Australia's second nickel refinery at Kwinana.

Mining at the Nepean Mine, owned by Metals Exploration, resumed in August. The mine and infrastructure had been on care-and-maintenance status since February 1983.

Production at the Agnew Mine, operated by Agnew Mining Co. Pty. Ltd., a joint venture of Seltrust Holdings (60%) and M.I.M. Holdings (40%), decreased an estimated 11% in 1985 owing to difficult mining conditions in the disseminated ore—a major stope collapsed in January. Reportedly, the joint venture partners have formulated a program that was expected to overcome the problem.

The Yabulu refinery increased throughput to full capacity on February 1, which increased production of nickel oxide sinter by 37% and nickel in nickel-cobalt sulfide by 36%. Queensland Nickel was reportedly studying the feasibility of importing laterite nickel ore from New Caledonia and/or Indonesia to supplement the Greenvale reserves whose ore has supplied the refinery.

A coal-fired air preheater was commissioned at the Kalgoorlie smelter in the third quarter that will increase the proportion of coal used to fuel the smelter to 60%.

INDUSTRIAL MINERALS

Diamond.—Production from Argyle Diamond Mines Pty. Ltd.'s Upper Smoke Creek and Limestone Creek alluvial deposits and the Argyle pipe scree in the eastern Kimberley region of northern Western Australia ceased in October. Production was then directed to the processing of the higher grade ore that had been stockpiled from the AK-1 kimberlite pipe. The second stage of the Argyle Mine ore body, that of the AK-1 pipe, became operational on December 1 following completion of the development and construction programs. The newly commissioned 3-million-ton-per-year treatment plant was scheduled to produce 25 million carats of diamond per year. The Argyle Mine joint venture consisted of CRA (56.8%), Ashton Mining Ltd. (38.2%), and the Western Australian government-owned Northern Mining Corp. NL (5%).

Argyle Diamond Sales Ltd. (ADS), which marketed CRA's and Ashton's shares of production, began selling gem-quality polished diamonds in Australia in August through authorized retailing jewelers. The remaining gem and 75% of the cheap gem and industrial-quality rough diamonds were marketed to De Beers Central Selling Organization. ADS sold the remaining 25% of cheap gem and industrial rough diamonds internationally through its Antwerp, Belgium, office.

Exploration for diamonds continued in the Kimberley region of Western Australia, the Coanjula area of the Northern Territory, and in an adjacent area across the Queensland border. Gem Exploration and Minerals Ltd. recovered 3,274 carats of diamond from bulk samples collected from the alluvial deposits in Limestone Creek near Argyle's leases. The Australian Exploration Joint Venture, composed of Aberfoyle, AOG Minerals Ltd., and Ashton, completed 5,566 meters of drilling in 43 holes to test 35 magnetic anomalies in the Coanjula area.

Gem Stones.—The gem stone industry of Australia, aside from diamond, continued to consist almost entirely of opal and sapphire, although small quantities of amethyst, chrysophase, garnet, nephrite jade, rhodonite, and zircon were also produced.

Australia continued to be the world's leading producer of opal, accounting for over 80% of the world market. Most of the opal mined in Australia was from three South Australian fields at Andamooka, Coober Pedy, and Mintabie. The Lightning Ridge District in central-northern New South Wales accounted for a small percentage of production and was virtually the world's sole source of black opal. Most of the boulder opal was from Queensland where it occurs in a broad zone between Opalton in the north to Yowah near the New South

Wales border.

Australia produced over 70% of the world's uncut sapphire. Production was from the Anakie District, central Queensland, and the Inverell-Glen Innes District of New South Wales.

MINERAL FUELS

Coal.—Production, consumption, and exports of black coal reached record-high levels for the third successive year. The continued worldwide overcapacity again adversely affected exploration in Australia.

New South Wales was replaced by Queensland as Australia's largest coal-producing State. These States together accounted for more than 95% of Australia's coal production and all of the country's coal exports. Queensland continued its rapid increase in production, yielding 20% more coal than in 1984.

Domestic coal consumption was estimated at 42.6 million tons, of which just under 90% was used for electricity generation and in the iron and steel industry.

Coal exports grew by just over 15% to 87.9 million tons, with Queensland remaining the leading exporting State. Three companies negotiated sales of coking coal to the Chinese Boashan Steelworks: Capricorn Coal Management Pty. Ltd. with 125,000 tons per year from its German Creek, Queensland, operation; Kembla Coal and Coke Pty. Ltd. with 50,000 tons per year from its South Coast Coal Cliff/Darkes Forest, New South Wales, mines; and Clutha Development Pty. Ltd. with 100,000 tons annually from its Tahmoor Mine near Sydney. Curragh Queensland Mining Ltd. was reported to have contracted to supply 200,000 tons of coking coal per year to Yugoslavia. Kembla Coal and Coke was able to sell 105,000 tons from its stockpiled coking coal to Japanese steel mills. Australian Mining Investments Ltd. sold an additional 520,000 tons of weak coking coal to Japanese steel mills from its Gunnedah, New South Wales, colliery. CSR was reported to have negotiated to supply 750,000 tons of steaming coal over a 3-year period to the Kowloon Electricity Supply Co. of Hong Kong from its South Blackwater, Queensland, opencut. Pacific Coal Pty. Ltd., a wholly owned subsidiary of CRA, was to supply an additional 1.3 million tons of Blair Athol, Queensland, steaming coal to the Suralaya power station in Indonesia.

Within Australia, Western Collieries Pty. Ltd., a subsidiary of CSR, was to supply the State Energy Commission of Western Australia with 26 million tons of coal over an 18-year period, with an option to sell an additional 12 million tons. The coal was to come from the company's mines at Collie, Western Australia, where a new mine, the Western No. 2 underground pit, was opened during the year.

A coal combustion test facility financed by both the Commonwealth and Queensland governments was opened at Ipswich, enabling steaming coal to be tested at pilot plant scale for a variety of properties.

BHP and Australian Gas Light Co. Ltd. (AGL) were to begin a methane drainage project at BHP's Tower Colliery on the southern coast of New South Wales. Technology developed by AGL and Occidental Petroleum Corp. will be used to drain pure methane, rather than mixed gas, from the coal seam. Gas recovery was expected to commence in the first half of 1986.

It was announced in September that BHP would purchase CSR's 22% share of Theiss Dampier Mitsui Coal Pty. Ltd., giving BHP an 80% holding in the company, with Mitsui & Co. of Japan holding the remainder. At the same time, CSR purchased BHP's 50% share of Western Collieries, thereby making CSR the sole owner of Western Collieries. Earlier, BHP had agreed to purchase Utah Development Co.'s remaining share of the Central Queensland Coal Associates and Gregory joint ventures.

Toward yearend, BHP's Utah International Div. recommissioned one of its three inoperative draglines and expected to bring a second one back into operation early in 1986.

Uranium.—Production of uranium oxide (U_3O_8) was less than in 1984 owing to significant decreases in production at both of Australia's uranium mines. Energy Resources of Australia Ltd. (ERA) reported that production at its Ranger opencut mine in the Alligator Rivers region in Arnhem Land in the Northern Territory was 2,519 tons of U_3O_8. The company was proceeding with engineering design work to increase the capacity of the mill from 3,000 to 4,500 tons of U_3O_8 per year, and considering further expansion to 6,000 tons per year by 1990. Queensland Mines Ltd. (QML) reported that production for 1985 from the stockpiled ore at the Nabarlek treatment plant, also in the Alligator Rivers region, was 1,315 tons of U_3O_8. Ore at the Nabarlek opencut was mined and stockpiled in 1979.

ERA negotiated five new long-term sales contracts during the fiscal year ending

June 30 for supplying uranium concentrate. The contracts were with Belgium's Synatom SA, the Korea Electric Power Corp., and three U.S. firms—the American Electrical Power Service Corp., the Pennsylvania Power and Light Co., and one electric utility not named.

In accordance with the decision made in 1984, whereby the Commonwealth would purchase those uranium orders originally scheduled for delivery to the French utility Électricité de France by Australia's two producers, the Government began receiving deliveries of the first of a scheduled 1,542 tons of U_3O_8 contracted to be delivered by October 1988 to the French firm. The Government was purchasing the material to protect the profit and cash-flow position of QML because of the announced policy to ban exports of uranium to France until such time as France discontinued testing nuclear weapons in the South Pacific.

Roxby Mining Corp. Pty. Ltd., a wholly owned subsidiary of WMCH (51%) and BP Australia (49%), announced its commitment on December 8 to develop the copper-gold-silver-uranium Olympic Dam project at Roxby Downs Station, South Australia, with construction to begin in early 1986. The final feasibility study completed earlier in the year was based on an annual production of 2,000 tons of U_3O_8, expected to begin in 1988.

The final delivery from Mary Kathleen Uranium Ltd.'s U_3O_8 stockpile at the Mary Kathleen Mine, Queensland, was made in January, 4 years after the cessation of mining in 1981. The fixed assets of Mary Kathleen, in which CRA held a 51% share, were sold off in 1983.

In May 1985, the Government announced its response to the report released in May 1984 by the Australian Science and Technology Council (ASTEC) regarding Australia's role in the nuclear fuel cycle. ASTEC recommended that exports of Australian uranium should not be limited as a matter of principle, but that they should be permitted subject to stringent conditions of supply designed to strengthen the nonproliferation regime. The Government essentially agreed with the recommendation and decided that the mining and export of uranium would be continued, subject to strict safeguards, but only from the Nabarlek, Olympic Dam, and Ranger Mines. The Government also decided that it would not permit the development of further stages of the nuclear fuel cycle in Australia.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Australian dollars (A$) to U.S. dollars at the rate of A$1.00=US$0.687 as of Dec. 31, 1985.

The Mineral Industry of Austria

By George A. Rabchevsky[1]

Complex geology and varied mineral resources have made Austria a leader in mining technology, and mineral production continued to be an important aspect of the country's traditions and economy in 1985. The country is small, however, and the easily accessible mineral resources are being depleted rapidly. The siderite iron ore deposit at Erzberg is the largest in Western Europe and has been providing manganese-rich ore for the iron and steel industry for many centuries. At present, tourism is Austria's major industry, even though minerals and mining continue to play a significant role in the overall economy. The mining and energy sectors in 1985 employed about 11,500 workers of the 2.8 million labor force, 39% of which were in oil and gas and 27% in coal. The official total unemployment stood at 4.8%, one of the lowest in Europe. There were 85 mines and quarries and 5 oil and gas drilling stations. Oil and gas provided 47.5% of the revenues generated by the mining industry; industrial minerals, 33%; coal, 8%; metallic minerals, 8%; and salt, 3.5%. The total value of the mineral industry was $816 million[2] in 1984.

The gross national product (GNP) grew by 3%, while inflation decreased by 3%. This marked the fourth year of moderate economic recovery. Österreichische Industrieverwaltungs AG (OIAG) was the largest industrial concern managed by the state and included the Austrian iron and steel producer Voest-Alpine AG (VA), the oil production and refining company Österreichische Mineralölverwaltungs AG (OMV), and several other mineral production and mining companies. VA, the steel, engineering, electronics, and trading company, experienced spectacular losses, causing a reevaluation of the country's nationalized industries. The Government announced that subsidies to OIAG companies would be terminated after the current fiscal year.[3]

PRODUCTION

The upward trend in industrial output continued, registering 4.5% real growth. In the mining industry, the output of crude oil, iron ore, magnesite, natural gas, tungsten, and other minerals declined. In 1984, by contrast, the production of kaolin and talc was at a record high. The steel industry reported decreases in production of up to 4%. Furthermore, iron and steel processing branches such as steel construction and mechanical engineering reported sluggish demand. Because of additional energy demand for heating owing to the exceptionally cold winter, energy output, primarily of refined products, again increased, but at a more moderate rate than the economy.

The shorter work week has become an important element of Austrian production in the various sectors. A 38-hour work week had been in effect for the printing industry since April 1985, and for the oil industry, it will become effective in October 1986. Metal workers will have a flexible work week of 37 to 40 hours as of November 1986. The shorter work week, however, did not appreciably affect the productivity of the minerals industry in 1985.

Exploration continued and new projects were initiated throughout Austria to augment future production capacities. Ongoing exploration projects included lead-zinc mineralization at Silberberg-Stubing north of Graz, lithium-bearing pegmatites at Koralpe on the Styria-Carinthia border, copper and barites in dolomite formations at Schwaz in Tyrol, gold at Kliening in Carinthia, and antimony near Schlaining in Burgenland.

Because Austria depends on imports for about 75% of its mineral raw material requirements, the Government has a policy of funding exploration and research through the Ministry of Trade, Commerce and Industry, and the Ministry of Science and Research. The search for new mineral deposits utilized sophisticated techniques, such as airborne magnetics, stream sediment geochemistry, geophysics, aeromagnetic surveys, helicopter proton magnetometer surveys, satellite remote sensing, and the newly developed high-frequency radio wave absorption by metal deposits. Special single projects were financed from public funds.[4]

Table 1.—Austria: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984[p]	1985[e]
METALS					
Aluminum metal:					
Primary	94,219	93,908	94,200	95,352	[2]94,106
Secondary	46,343	39,066	56,785	56,579	55,500
Total	140,562	132,974	150,985	151,931	149,606
Antimony, mine output, metal content of concentrate	603	667	659	523	600
Cadmium metal	55	48	46	49	50
Copper:					
Smelter, secondary	27,100	30,000	[r]30,000	30,000	[2]36,000
Refined:					
Primary	8,804	8,802	8,769	9,592	9,000
Secondary	30,313	32,757	33,131	34,222	[2]34,000
Total	39,117	41,559	41,900	43,814	[2]43,000
Germanium, metal content of concentrates kilograms	4,000	4,000	6,000	4,800	5,000
Iron and steel:					
Iron ore and concentrate:					
Gross weight thousand tons	3,050	3,330	3,540	3,600	[2]3,300
Metal content do.	948	1,045	1,107	1,138	1,040
Metal:					
Pig iron do.	3,477	3,115	3,320	3,745	[2]3,735
Ferroalloys, electric-furnace do.	12	14	14	13	14
Steel, crude do.	4,656	4,258	4,411	4,870	4,700
Semimanufactures do.	3,477	3,381	3,555	3,842	3,750
Lead:					
Mine output, metal content of concentrate	4,320	4,086	4,290	4,151	6,100
Metal:					
Smelter:					
Primary	3,343	3,410	4,210	1,707	1,700
Secondary	12,789	14,512	12,860	16,476	16,800
Total	16,132	17,922	17,070	18,183	[2]18,500
Refined:					
Primary	5,000	10,400	12,000	7,200	4,500
Secondary	11,600	11,100	11,500	13,400	[2]14,700
Total	16,600	21,500	23,500	20,600	[2]19,200
Manganese, Mn content of domestic iron ore	55,876	61,549	65,284	67,101	66,000
Tungsten, mine output, metal content of concentrate	[r]1,616	[r]1,465	1,408	1,632	[2]1,565
Zinc:					
Mine output, metal content of concentrate	18,181	19,065	19,432	20,879	21,500
Metal refined	22,674	23,000	23,000	24,000	20,000
INDUSTRIAL MINERALS					
Cement, hydraulic thousand tons	5,288	5,012	4,907	4,899	4,500
Clay:					
Illite	331,448	441,497	381,598	285,553	290,000
Kaolin:					
Crude	315,560	351,392	402,511	455,695	430,000
Marketable	79,064	77,288	83,558	99,541	85,000
Other	52,173	15,598	32,946	18,058	19,000
Feldspar, crude	10,357	2,960	1,063	2,554	2,600
Graphite, crude	23,807	24,451	40,418	43,789	40,000
Gypsum and anhydrite, crude	800,515	727,520	750,921	740,117	750,000

See footnotes at end of table.

Table 1.—Austria: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984[p]	1985[e]
INDUSTRIAL MINERALS —Continued					
Lime ________ thousand tons__	1,034	1,027	1,140	1,262	1,300
Magnesite:					
Crude ________ do____	1,159	1,031	1,006	1,183	1,050
Sintered or dead-burned ________ do____	361	370	320	377	325
Caustic calcined ________ do____	102	98	89	93	90
Nitrogen: N content of ammonia ________ do____	486	485	495	[e]500	500
Pigments, mineral: Micaceous iron oxide ______	11,320	9,570	11,734	[e]11,500	10,000
Pumice (trass) ________	8,308	10,551	2,458	9,666	6,000
Salt:					
Rock ________ thousand tons__	1	1	1	1	1
In brine:					
Evaporated ________ do____	462	434	359	419	420
Other ________ do____	264	214	141	239	230
Total ________ do____	727	649	501	659	651
Sand and gravel:					
Quartz sand ________ do____	869	864	816	782	800
Other ________ do____	17,210	15,192	[r]15,318	15,274	15,300
Total ________ do____	18,079	16,056	[r]16,134	16,056	16,100
Sodium compounds, n.e.s.:[e]					
Carbonate, synthetic ________ do____	170	170	170	150	150
Sulfate, synthetic ________ do____	55	55	55	50	50
Stone:[3]					
Dolomite ________ do____	1,227	1,029	938	981	1,000
Quartz and quartzite ________ do____	184	177	171	223	200
Other including limestone and marble__ do____	13,645	12,559	11,964	[e]12,000	12,600
Total ________ do____	15,056	13,765	13,073	13,204	13,800
Sulfur:					
Byproduct:					
Of metallurgy ________	9,133	9,504	9,429	10,113	9,500
Of petroleum and natural gas ________	27,861	38,243	32,000	28,342	[2]30,659
From gypsum and anhydrite ________	25,143	27,102	26,122	26,449	26,000
Total ________	62,137	74,849	67,551	64,904	66,159
Talc and soapstone ________	116,425	117,092	122,128	134,011	130,000
MINERAL FUELS AND RELATED MATERIALS					
Coal, brown and lignite ______ thousand tons__	3,061	3,297	3,041	2,901	2,800
Coke ________ do____	1,686	1,622	1,725	1,854	1,800
Gas, natural:					
Gross ________ million cubic feet__	50,730	46,758	42,850	44,931	[2]41,102
Marketed ________ do____	41,835	38,088	34,205	37,084	33,000
Oil shale ________	970	1,010	1,060	900	900
Petroleum:					
Crude ______ thousand 42-gallon barrels__	9,324	8,994	8,847	8,404	[2]7,999
Refinery products:					
Gasoline ________ do____	16,251	15,378	16,407	17,499	[2]17,604
Kerosene and jet fuel ________ do____	1,242	1,059	1,079	1,461	[2]1,449
Distillate fuel oil ________ do____	15,767	15,484	15,267	15,538	[2]16,479
Residual fuel oil ________ do____	21,821	17,740	11,646	13,064	[2]16,037
Lubricants ________ do____	767	538	603	557	[2]602
Liquefied petroleum gas ________ do____	4,808	3,876	4,966	5,509	5,500
Bitumen ________ do____	1,657	1,605	1,218	1,658	[2]1,364
Unspecified ________ do____	1,283	270	676	235	270
Refinery fuel and losses ________ do____	3,320	3,072	3,064	3,090	3,200
Total ________ do____	66,916	59,022	54,926	58,611	62,505

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through June 20, 1986.
[2]Reported figure.
[3]Excluding stone used by the cement and iron and steel industries.

TRADE

Austria's economy continued to rely heavily on trade, with more than 40% of all goods and services, including minerals, exported, primarily to other Western Europe countries. Exports grew by 12.5%, the best performance in a decade. The growth was attributed to increased exports of unfinished goods, processed materials, chemical products, and raw materials. Real growth in imports reached 6.5%. Consumer durables and energy were the dominant import items. The moderate recovery in Austria was attributed to favorable economic conditions in the Federal Republic of Germany and the United States, but the expansion also responded to domestic consumption.

The share of Council for Mutual Economic Assistance (CMEA)[5] in Austrian foreign trade has been relatively stable. The stagnation in exports in 1985 was attributed to decreased demand in the U.S.S.R. and the German Democratic Republic, where large cooperative mining and metals production projects were concluded in 1984.[6] Approximately 30% of Austria's iron and steel and 16% of chemical products were exported to CMEA countries. Austria also exported complete metalworking and chemical plants. The U.S.S.R. was Austria's most important trade partner. The largest items shipped to the U.S.S.R. were oilfield pipes, starting in 1981, and equipment for the Zhlobin metallurgical plant in Byelorussia.[7]

Table 2.—Austria: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS				
Alkali and alkaline-earth metals:				
Alkali metals	1	1	--	NA.
Alkaline-earth metals	8	(2)	--	NA.
Aluminum:				
Ore and concentrate	47	--		
Metal including alloys:				
Scrap	59,547	29,843	--	West Germany 14,094; Italy 13,958; Belgium-Luxembourg 836.
Unwrought	30,153	28,817	--	West Germany 10,779; Japan 6,594; Italy 3,094.
Semimanufactures	89,207	92,353	3,288	West Germany 31,991; Italy 7,259; Switzerland 6,708.
Antimony:				
Ore and concentrate	4	4	--	All to Yugoslavia.
Oxides	(2)	19	--	West Germany 10; Belgium-Luxembourg 9.
Metal including alloys, all forms	(2)	5	--	Mainly to Yugoslavia.
Arsenic: Oxides and acids kilograms	--	500	NA	NA.
Beryllium: Metal including alloys, all forms value, thousands	(2)	$1	NA	NA.
Cadmium: Metal including alloys, all forms	51	43	--	Czechoslovakia 23; United Kingdom 20.
Chromium:				
Ore and concentrate	622	349	--	Italy 306.
Oxides and hydroxides	4	9	--	West Germany 5.
Cobalt: Oxides and hydroxides	2	54	NA	Norway 52; West Germany 1.
Columbium and tantalum: Metal including alloys, all forms, tantalum	12	12	NA	NA.
Copper:				
Ore and concentrate	--	1	--	All to Spain.
Matte and speiss including cement copper	24	24	--	All to West Germany.
Oxides and hydroxides	7	6	--	NA.
Sulfate	41	157	NA	Syria 70; West Germany 38; Switzerland 25.
Metal including alloys:				
Scrap	9,075	15,451	NA	West Germany 8,108; Belgium-Luxembourg 5,914; United Kingdom 508.
Unwrought	23,028	21,588	--	Italy 11,863; West Germany 6,693; Hungary 1,545.
Semimanufactures	15,879	18,254	326	West Germany 5,127; Italy 3,529; France 2,547.

See footnotes at end of table.

Table 2.—Austria: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued				
Gold:				
Waste and sweepings value, thousands	$27	$9	--	NA.
Metal including alloys, unwrought and partly wrought troy ounces	20,094	13,986	NA	West Germany 11,285; Italy 1,865; Ireland 64.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite	50	932	--	Sweden 908.
Metal:				
Scrap	12,642	20,910	--	Italy 8,411; West Germany 6,540; Switzerland 3,273.
Pig iron, cast iron, related materials	4,841	7,290	176	West Germany 1,827; Sweden 1,235; Bulgaria 1,074.
Ferroalloys	12,771	12,668	872	Romania 2,071; West Germany 1,472; Italy 1,468.
Steel, primary forms	342,849	472,623	13,773	East Germany 183,445; West Germany 169,645; Italy 65,741.
Semimanufactures:				
Bars, rods, angles, shapes, sections	379,621	433,179	20,994	West Germany 145,734; Italy 86,736; East Germany 46,567.
Universals, plates, sheets	1,350,701	1,471,572	21,137	U.S.S.R. 509,341; West Germany 324,408; East Germany 141,999.
Hoop and strip	126,174	134,104	244	West Germany 48,146; Italy 20,949; Switzerland 20,927.
Rails and accessories	72,232	130,904	10	Algeria 57,205; Switzerland 24,579; Iraq 20,158.
Wire	59,595	67,678	1,890	West Germany 30,940; Italy 10,149; Bulgaria 5,387.
Tubes, pipes, fittings	383,556	491,751	70,188	U.S.S.R. 194,504; West Germany 63,345.
Castings and forgings, rough	13,285	13,947	500	West Germany 5,027; Italy 2,259; Netherlands 1,300.
Lead: Metal including alloys:				
Scrap	2	93	--	All to West Germany.
Unwrought	767	467	--	Greece 303; West Germany 137; Hungary 7.
Semimanufactures	58	64	--	Algeria 50; West Germany 4; France 3.
Magnesium: Metal including alloys:				
Scrap	340	172	--	West Germany 142; Italy 30.
Unwrought	656	717	NA	West Germany 574; Italy 93; Switzerland 40.
Semimanufactures	761	845	NA	Belgium-Luxembourg 6; France 4; unspecified 833.
Manganese: Oxides	70	107	--	Yugoslavia 42; Denmark 38.
Mercury 76-pound flasks	104	180	NA	West Germany 110; Libya 32.
Molybdenum:				
Oxides and hydroxides	6	(2)	--	NA.
Metal including alloys, all forms	1,201	1,284	NA	NA.
Nickel:				
Matte and speiss	5	1	--	All to Yugoslavia.
Metal including alloys:				
Scrap	457	773	1	West Germany 420; United Kingdom 209; Switzerland 143.
Unwrought	6	45	--	Netherlands 23; Yugoslavia 22.
Semimanufactures	430	856	99	West Germany 262; Iran 188.
Platinum-group metals: Metals including alloys, unwrought and partly wrought troy ounces	11,478	427,444	NA	West Germany 425,772; Sweden 643; Cyprus 193.
Silver:				
Waste and sweepings[3] value, thousands	$445	$260	--	France $178; West Germany $44; United Kingdom $38.
Metal including alloys, unwrought and partly wrought thousand troy ounces	1,703	1,612	NA	West Germany 542; Switzerland 430; Yugoslavia 313.

See footnotes at end of table.

Table 2.—Austria: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued				
Tin:				
Oxides	12	18	--	Bulgaria 16; Portugal 2.
Metal including alloys:				
Scrap	17	6	--	All to West Germany.
Unwrought	49	56	--	West Germany 31; Denmark 13; Yugoslavia 9.
Semimanufactures	53	3	--	West Germany 1; Netherlands 1.
Titanium: Oxides	3	208	--	West Germany 183; Egypt 20.
Tungsten:				
Ore and concentrate	73	25	--	All to Netherlands.
Oxides and hydroxides	53	(3)	--	NA.
Metal including alloys, all forms	874	1,050	NA	NA.
Uranium and thorium: Oxides and other compounds	1,928	2,661	NA	NA.
Zinc:				
Oxides	1,748	2,649	--	Yugoslavia 1,259; Hungary 1,012; West Germany 300.
Blue powder	--	27	--	Switzerland 26.
Metal including alloys:				
Scrap	448	832	--	West Germany 668; Taiwan 164.
Unwrought	4,861	4,520	--	Yugoslavia 2,885; Hungary 646; Italy 475.
Semimanufactures	1,074	236	(3)	West Germany 90; Italy 66; Yugoslavia 38.
Other:				
Ores and concentrates	130	86	11	West Germany 41; Belgium-Luxembourg 22.
Ashes and residues	111,179	129,093	--	Italy 109,138; West Germany 16,644; Spain 1,938.
Base metals including alloys, all forms	2,209	2,888	238	Italy 1,816; United Kingdom 487.
Waste and sweepings of unspecified precious metals value, thousands	$3,254	$5,833	--	West Germany $2,800; United Kingdom $551; France $151.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	95	97	17	West Germany 65; Yugoslavia 3.
Artificial:				
Corundum	23	--		
Silicon carbide	--	4	NA	NA.
Dust and powder of precious and semiprecious stones including diamond	3	4	--	West Germany 2.
Grinding and polishing wheels and stones	11,862	13,624	110	West Germany 2,423; Italy 1,404; Sweden 979.
Asbestos, crude	31	3	--	Czechoslovakia 2; Japan 1.
Barite and witherite	48	6	--	West Germany 3.
Boron materials:				
Crude natural borates	2	2	--	All to Yugoslavia.
Oxides and acids	29	15	NA	Yugoslavia 13.
Cement	15,644	16,904	--	West Germany 13,253; Italy 1,132; Yugoslavia 1,062.
Chalk	1,335	1,752	--	Hungary 299; Czechoslovakia 264; Italy 121.
Clays, crude:				
Bentonite	26	6	--	NA.
Chamotte earth	39	22	--	NA.
Kaolin	35,664	49,853	--	Hungary 33,151; West Germany 9,918; Italy 5,515.
Unspecified	13,500	20,618	--	West Germany 19,583; Turkey 469; Hungary 317.
Cryolite and chiolite	1	15	--	All to Switzerland.
Diamond:				
Gem, not set or strung value, thousands	$196	$187	$52	West Germany $54; Belgium-Luxembourg $33.
Industrial stones do	$47	$129	--	Yugoslavia $60; Hungary $57; Poland $10.
Diatomite and other infusorial earth	1,357	2,425	22	Yugoslavia 722; Bulgaria 495; Hungary 412.
Feldspar, fluorspar, related materials	1	8	--	West Germany 6; Italy 1.

See footnotes at end of table.

Table 2.—Austria: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Fertilizer materials:				
Crude, n.e.s	278	335	--	Switzerland 264; West Germany 61.
Manufactured:				
Phosphatic	30,831	39,486	NA	Hungary 28,614; Czechoslovakia 9,945; Italy 921.
Potassic	1,702	75	NA	Italy 63.
Unspecified and mixed	866,399	919,923	1,028	West Germany 415,161; East Germany 188,311; Italy 137,712.
Graphite, natural	11,404	11,552	29	Poland 5,138; West Germany 3,514; Italy 1,150.
Gypsum and plaster	190,463	191,804	--	West Germany 188,561; Italy 1,571; Iraq 150.
Lime	1,732	1,497	--	West Germany 1,148; Hungary 204; U.S.S.R. 117.
Magnesium compounds:				
Magnesite, crude	r1,461	697	NA	NA.
Oxides and hydroxides	r129,274	167,334	NA	NA.
Mica:				
Crude including splittings and waste	829	829	--	Greece 474; West Germany 88; Spain 84.
Worked including agglomerated splittings	189	246	--	West Germany 57; Bulgaria 34; Yugoslavia 29.
Phosphates, crude	929	--		
Pigments, mineral:				
Natural, crude	7,507	7,374	106	West Germany 2,397; United Kingdom 1,767; Netherlands 878.
Iron oxides and hydroxides, processed	1,185	2,124	NA	West Germany 1,372; Taiwan 450; United Kingdom 152.
Precious and semiprecious stones other than diamond:				
Natural kilograms	341	2,480	14	West Germany 743; Switzerland 317.
Synthetic do	4,025	3,347	272	Switzerland 1,212; West Germany 231.
Pyrite, unroasted	46	81	--	Netherlands 74; Italy 7.
Salt and brine	1,014	924	--	Italy 362; Hungary 343; West Germany 157.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	26	15	--	NA.
Sulfate, manufactured	72,748	80,515	NA	NA.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	96,948	115,789	--	West Germany 93,867; Switzerland 21,537; Yugoslavia 243.
Worked	27,573	34,917	238	West Germany 29,490; Switzerland 4,687.
Dolomite, chiefly refractory-grade	3,826	23,124	--	West Germany 19,542; Venezuela 2,400; Tanzania 444.
Gravel and crushed rock	620,554	691,655	--	West Germany 346,593; Switzerland 320,833; Hungary 7,774.
Limestone other than dimension	914	964	--	West Germany 963.
Quartz and quartzite	86	53	--	West Germany 7; Hungary 5; Switzerland 3.
Sand other than metal-bearing	158,753	181,396	--	Switzerland 106,976; West Germany 69,262; Italy 4,222.
Sulfur:				
Elemental:				
Crude including native and byproduct	575	4,667	--	Yugoslavia 4,663; Argentina 2.
Colloidal, precipitated, sublimed	2	--		
Sulfuric acid	9,961	11,501	NA	Italy 7,242; West Germany 2,454; Yugoslavia 1,532.
Talc, steatite, soapstone, pyrophyllite	104,252	114,084	--	West Germany 58,089; Italy 12,840; Switzerland 8,984.
Other:				
Crude	17,530	27,648	NA	West Germany 2,535; Switzerland 95; Hungary 69.
Slag and dross, not metal-bearing	113,327	109,499	--	West Germany 101,374; Italy 6,226; Netherlands 1,174.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	23	89	--	Hungary 64; Italy 7; Egypt 6.
Carbon black	27	21	NA	NA.

See footnotes at end of table.

Table 2.—Austria: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Coal:				
Anthracite	6	13	--	All to Switzerland.
Bituminous	741	14	--	Do.
Briquets of anthracite and bituminous coal	114	97	--	Switzerland 77; Yugoslavia 20.
Lignite including briquets	9,489	8,275	--	West Germany 8,180; Switzerland 76.
Coke and semicoke	283	2,618	--	West Germany 2,411; Switzerland 126; Sweden 81.
Peat including briquets and litter	6,262	11,652	--	Italy 9,367; West Germany 1,101; Jordan 453.
Petroleum:				
Crude 42-gallon barrels	7	--		
Refinery products:				
Liquefied petroleum gas do.	572,076	301,414	--	Italy 187,526; Yugoslavia 99,412; West Germany 7,842.
Gasoline, motor do.	127,585	1,370,464	--	West Germany 776,475; Hungary 416,950; Poland 164,080.
Mineral jelly and wax do.	211,797	120,663	--	Netherlands 48,432; West Germany 45,308; Italy 9,822.
Kerosene and jet fuel do.	59,628	179,273	--	Yugoslavia 128,154; West Germany 21,584; Poland 14,834.
Distillate fuel oil do.	6,751	418,394	--	West Germany 409,987; Yugoslavia 6,751; Czechoslovakia 1,462.
Lubricants do.	338,275	411,040	14	Czechoslovakia 117,425; Hungary 114,506; Iran 55,657.
Nonlubricating oils do.	62,258	NA		
Residual fuel oil do.	110,037	279,001	--	Yugoslavia 201,811; Hungary 76,557; Switzerland 340.
Asphalt do.	2,082	NA		
Bitumen and other residues do.	85,539	161,099	--	West Germany 43,062; Algeria 41,687; Italy 31,906.
Bituminous mixtures do.	49,474	39,269	--	Algeria 18,016; West Germany 9,987; Somalia 4,000.
Petroleum coke do.	NA	1,612	--	All to West Germany.
Unspecified do.	2,401	NA		

[r]Revised. NA Not available.
[1]Table prepared by staff, Branch of Geographic Data.
[2]Less than 1/2 unit.
[3]May include other precious metals.

Table 3.—Austria: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS				
Alkali and alkaline-earth metals:				
Alkali metals	36	17	--	West Germany 15; United Kingdom 2.
Alkaline-earth metals	7	14	--	West Germany 12; France 2.
Aluminum:				
Ore and concentrate	27,762	39,174	NA	NA.
Oxides and hydroxides	217,800	250,607	324	Hungary 4,621; West Germany 2,834; United Kingdom 161.
Metal including alloys:				
Scrap	68,354	47,516	NA	NA.
Unwrought	52,155	74,676	36	West Germany 37,570; Norway 12,887; U.S.S.R. 11,284.
Semimanufactures	48,326	51,923	16	West Germany 21,004; Switzerland 9,414; Belgium-Luxembourg 4,621.
Antimony:				
Ore and concentrate	--	36	NA	Bolivia 30.
Oxides	212	140	--	U.S.S.R. 80; Belgium-Luxembourg 46; West Germany 11.
Metal including alloys, all forms	32	31	NA	Belgium-Luxembourg 17; Taiwan 10; West Germany 3.
Arsenic: Oxides and acids	2	17	--	All from West Germany.
Beryllium: Metal including alloys, all forms value, thousands	$35	$15	$14	NA.

See footnotes at end of table.

Table 3.—Austria: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Cadmium: Metal including alloys, all forms	2	5	--	All from West Germany.
Chromium:				
Ore and concentrate	40,390	56,814	--	Republic of South Africa 47,632; Turkey 3,914; Cuba 2,694.
Oxides and hydroxides	456	701	--	West Germany 454; U.S.S.R. 182; Italy 42.
Cobalt: Oxides and hydroxides	5	8	--	West Germany 6; Belgium-Luxembourg 1; Finland 1.
Columbium and tantalum: Metal including alloys, all forms, tantalum	12	29	6	West Germany 12; Belgium-Luxembourg 7.
Copper:				
Ore and concentrate	1	22	--	United Kingdom 15; Spain 7.
Matte and speiss including cement copper	2	(2)	--	NA.
Oxides and hydroxides	44	58	--	Belgium-Luxembourg 51.
Sulfate	634	1,182	--	Italy 596; Czechoslovakia 195; Hungary 188.
Metal including alloys:				
Scrap	27,728	30,616	38	U.S.S.R. 11,109; West Germany 10,770; Hungary 4,468.
Unwrought	10,833	15,027	515	Namibia 5,851; West Germany 2,647; Republic of South Africa 2,379.
Semimanufactures	60,025	72,756	58	West Germany 39,030; Belgium-Luxembourg 8,408; Italy 6,904.
Gold:				
Waste and sweepings value, thousands	--	$3	--	NA.
Metal including alloys, unwrought and partly wrought[3] troy ounces	142,074	105,294	1,222	Switzerland 32,762; West Germany 27,875; Singapore 24,113.
Iron and steel:				
Iron ore concentrate:				
Excluding roasted pyrite thousand tons	2,391	3,890	(2)	U.S.S.R. 1,333; Sweden 828; Brazil 700.
Pyrite, roasted do	21	10	--	Yugoslavia 7; West Germany 3.
Metal:				
Scrap	218,822	363,084	163	West Germany 208,975; U.S.S.R. 63,642; Czechoslovakia 47,784.
Pig iron, cast iron, related materials	38,200	50,788	4	U.S.S.R. 16,368; Canada 14,637; France 6,358.
Ferroalloys:				
Ferrochromium	18,524	25,904	51	Yugoslavia 8,874; U.S.S.R. 4,053; Czechoslovakia 2,760.
Ferromanganese	22,710	25,430	NA	Norway 13,209; West Germany 9,562; Republic of South Africa 1,289.
Ferromolybdenum	67	62	--	West Germany 26; United Kingdom 22; Spain 8.
Ferronickel	3,337	4,580	--	Greece 2,197; Dominican Republic 706; Colombia 625.
Ferrosilicon	13,670	14,726	NA	Yugoslavia 6,020; U.S.S.R. 3,003; West Germany 2,236.
Unspecified	5,420	9,466	181	Czechoslovakia 3,445; Norway 2,580; West Germany 1,536.
Steel, primary forms	125,210	142,334	--	West Germany 63,899; Hungary 33,499; Poland 23,723.
Semimanufactures:				
Bars, rods, angles, shapes, sections	230,552	262,562	491	West Germany 108,865; Italy 81,121; Belgium-Luxembourg 18,358.
Universals, plates, sheets	259,666	264,811	97	West Germany 120,356; Belgium-Luxembourg 48,782; France 19,956.
Hoop and strip	77,810	92,038	13	West Germany 60,607; Italy 10,961; Switzerland 4,672.
Rails and accessories	2,996	2,663	--	West Germany 2,222; Belgium-Luxembourg 253; France 139.
Wire	35,419	39,574	2	West Germany 13,895; Belgium-Luxembourg 11,425; France 5,177.
Tubes, pipes, fittings	151,704	181,364	43	West Germany 84,794; Italy 27,108; Hungary 13,392.
Castings and forgings, rough	13,811	14,295	5	West Germany 10,877; Italy 700; Yugoslavia 564.

See footnotes at end of table.

Table 3.—Austria: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Lead:				
Ore and concentrate	4,611	7,730	--	Italy 5,472; Canada 1,675; France 111.
Oxides	460	998	NA	West Germany 750; France 246.
Metal including alloys:				
Scrap	2,925	4,332	--	Switzerland 2,160; Hungary 1,028; West Germany 890.
Unwrought	31,362	39,271	289	West Germany 16,274; United Kingdom 5,866; Belgium-Luxembourg 5,445.
Semimanufactures	792	1,192	(3)	West Germany 892; United Kingdom 253; Belgium-Luxembourg 30.
Magnesium: Metal including alloys:				
Scrap	116	29	--	West Germany 20; Belgium-Luxembourg 8.
Unwrought	2,301	2,185	509	Italy 827; Norway 389.
Semimanufactures	135	138	13	West Germany 89; Italy 20.
Manganese:				
Ore and concentrate, metallurgical-grade	362	441	--	Netherlands 299; West Germany 103; Australia 36.
Oxides	180	121	NA	Belgium-Luxembourg 44; West Germany 43; Japan 8.
Mercury 76-pound flasks	368	331	--	Turkey 131; West Germany 107; Spain 49.
Molybdenum:				
Oxides and hydroxides	1,768	2,062	NA	NA.
Metal including alloys:				
Scrap	31	63	NA	West Germany 45; United Kingdom 12; Italy 5.
Unwrought	6	4	NA	Mainly from West Germany.
Semimanufactures	106	106	3	West Germany 47; France 36; United Kingdom 14.
Nickel:				
Matte and speiss	622	1,122	110	Netherlands 416; Cuba 397.
Metal including alloys:				
Scrap	490	607	53	U.S.S.R. 291; West Germany 138.
Unwrought	2,620	3,105	145	U.S.S.R. 448; Canada 444; Republic of South Africa 386.
Semimanufactures	510	774	208	West Germany 377; United Kingdom 60.
Platinum-group metals: Metals including alloys, unwrought and partly wrought troy ounces	16,493	14,564	--	West Germany 9,520; Switzerland 1,865; U.S.S.R. 1,575.
Rare-earth metals including alloys, all forms	91	59	--	U.S.S.R. 45; West Germany 13; France 1.
Silver:				
Waste and sweepings[4] value, thousands	$4	$8	--	Portugal $5; West Germany $3.
Metal including alloys, unwrought and partly wrought thousand troy ounces	4,348	5,329	9	West Germany 3,911; Switzerland 654; North Korea 322.
Tin:				
Oxides	5	8	NA	West Germany 6; United Kingdom 1.
Metal including alloys:				
Scrap	(3)	40	--	Hungary 39.
Unwrought	438	509	(3)	Bolivia 189; West Germany 168; Netherlands 61.
Semimanufactures	181	135	1	West Germany 122; Netherlands 8.
Titanium: Oxides	9,215	10,004	115	West Germany 7,027; Finland 968; United Kingdom 592.
Tungsten:				
Ore and concentrate	3,090	3,920	NA	NA.
Oxides and hydroxides	67	197	NA	NA.
Metal including alloys:				
Scrap	344	495	93	West Germany 234; United Kingdom 57.
Unwrought	77	132	30	West Germany 52; United Kingdom 31.
Semimanufactures	7	13	NA	Mainly from West Germany.
Uranium and thorium: Oxides and other compounds	1,635	2,409	NA	NA.

See footnotes at end of table.

Table 3.—Austria: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984	
			United States	Other (principal)
METALS —Continued				
Zinc:				
Ore and concentrate	6,649	11,804	--	Italy 10,639; Czechoslovakia 672; Yugoslavia 463.
Oxides	1,472	2,098	--	West Germany 1,849; Yugoslavia 78; France 11.
Blue powder	1,250	1,027	--	Belgium-Luxembourg 711; West Germany 219; Norway 85.
Metal including alloys:				
Scrap	265	321	--	Yugoslavia 202; Hungary 117.
Unwrought	6,139	9,626	--	West Germany 7,382; Belgium-Luxembourg 1,356; Poland 295.
Semimanufactures	2,486	2,476	([2])	West Germany 1,838; France 500; Belgium-Luxembourg 85.
Other:				
Ores and concentrates	10,189	11,117	2,332	Netherlands 2,180; Chile 1,836.
Ashes and residues	181,217	196,304	1,471	U.S.S.R. 122,755; Republic of South Africa 17,528; Hungary 17,254.
Base metals including alloys, all forms	1,949	3,080	146	U.S.S.R. 1,877; Belgium-Luxembourg 248; West Germany 241.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	340	308	7	Italy 131; West Germany 60; Spain 16.
Artificial:				
Corundum	11,735	12,393	1,219	West Germany 4,193; Hungary 2,576; France 2,496.
Silicon carbide	2,701	2,854	--	West Germany 1,516; Norway 353; Italy 314.
Dust and powder of precious and semiprecious stones including diamond kilograms	722	862	762	Switzerland 66; West Germany 24.
Grinding and polishing wheels and stones	1,410	1,607	3	West Germany 703; Italy 305; Spain 240.
Asbestos, crude	26,076	22,654	20	Canada 11,417; U.S.S.R. 3,947; Italy 3,222.
Barite and witherite	9,278	11,325	--	West Germany 5,576; Ireland 3,670; Czechoslovakia 2,030.
Boron materials:				
Crude natural borates	17,307	17,200	3,310	Turkey 13,480; Belgium-Luxembourg 304.
Oxides and acids	796	605	NA	France 380; Italy 106; United Kingdom 68.
Cement	35,229	39,336	--	Yugoslavia 12,463; Italy 9,836; West Germany 6,741.
Chalk	2,319	3,832	--	France 2,047; West Germany 1,354; Belgium-Luxembourg 312.
Clays, crude:				
Bentonite	1,733	1,391	NA	West Germany 1,237; France 93; United Kingdom 23.
Chamotte earth	13,688	15,067	--	Czechoslovakia 13,991; West Germany 815; France 165.
Kaolin	95,034	102,598	8,756	United Kingdom 32,705; Czechoslovakia 32,350; Brazil 10,340.
Unspecified	73,731	75,486	55	West Germany 54,395; Czechoslovakia 14,125; France 2,363.
Cryolite and chiolite	228	180	--	All from Denmark.
Diamond:				
Gem, not set or strung value, thousands	$6,208	$4,391	$66	Israel $2,019; Belgium-Luxembourg $1,120; West Germany $426.
Industrial stones do	$445	$615	$10	Republic of South Africa $198; Hungary $155; Belgium-Luxembourg $114.
Diatomite and other infusorial earth	11,395	11,142	693	Czechoslovakia 3,062; Hungary 2,588; Denmark 2,345.
Feldspar, fluorspar, related materials:				
Feldspar	4,300	4,485	50	Sweden 2,421; West Germany 1,445; Italy 448.
Fluorspar	11,894	14,416	--	East Germany 5,981; West Germany 3,999; Italy 3,351.

See footnotes at end of table.

Table 3.—Austria: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Fertilizer materials:				
Crude, n.e.s	5,873	5,365	NA	West Germany 3,423; Italy 1,299; Hungary 400.
Manufactured:				
Ammonia	24,980	61,745	NA	Czechoslovakia 30,517; East Germany 26,226; Hungary 4,845.
Nitrogenous	167,983	110,283	NA	West Germany 42,587; Romania 20,522; Hungary 14,379.
Phosphatic	69,309	69,551	154	France 43,439; East Germany 3,313; Belgium-Luxembourg 3,072.
Potassic	245,624	255,680	NA	NA.
Unspecified and mixed	193,808	149,609	3,542	West Germany 66,619; Italy 27,653; Yugoslavia 27,585.
Graphite, natural	3,738	7,134	--	Italy 4,113; China 2,477; West Germany 448.
Gypsum and plaster	8,917	11,252	5	West Germany 8,914; Italy 1,950; Hungary 120.
Lime	2,033	2,479	--	Yugoslavia 1,599; West Germany 363; Italy 306.
Magnesium compounds:				
Magnesite, crude	r111	221	--	Czechoslovakia 218.
Oxides and hydroxides	r94,417	116,497	NA	China 4,420; Greece 2,579; unspecified 106,989.
Mica:				
Crude including splittings and waste	203	205	5	West Germany 105; Norway 26; France 24.
Worked including agglomerated splittings	173	195	(2)	France 107; Belgium-Luxembourg 31; West Germany 30.
Nitrates, crude	1,550	1,345	--	All from West Germany.
Phosphates, crude	442,367	470,132	NA	West Germany 63; unspecified 470,069.
Pigments, mineral:				
Natural, crude	1,976	1,130	--	Spain 721; France 350; Japan 18.
Iron oxides and hydroxides, processed	4,486	4,557	--	West Germany 4,211; United Kingdom 255; Italy 64.
Potassium salts, crude	16,598	11,628	--	West Germany 9,750; East Germany 1,878.
Precious and semiprecious stones other than diamond:				
Natural kilograms	4,507	2,666	88	West Germany 959; Republic of South Africa 354; Thailand 350.
Synthetic do	11,577	17,749	3,166	Switzerland 6,636; West Germany 3,439.
Pyrite, unroasted	804	775	--	Italy 610; West Germany 94; Cyprus 71.
Salt and brine	232	153	1	Israel 88; West Germany 32; United Kingdom 19.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	3,179	3,389	NA	West Germany 1,701; East Germany 1,210; Poland 477.
Sulfate, manufactured	666	340	--	All from West Germany.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	43,327	45,696	103	Italy 25,621; Republic of South Africa 7,302; France 2,479.
Worked	48,052	54,717	1	Italy 38,560; West Germany 9,165; Yugoslavia 3,336.
Dolomite, chiefly refractory-grade	3,993	3,718	--	West Germany 2,425; Italy 431; Norway 217.
Gravel and crushed rock	263,112	259,515	5	West Germany 240,770; Italy 18,389; East Germany 140.
Limestone other than dimension	372	496	--	West Germany 456; France 25.
Quartz and quartzite	42,601	33,161	--	Hungary 19,956; West Germany 11,544; Norway 685.
Sand other than metal-bearing	453,435	426,925	1	West Germany 243,791; Czechoslovakia 159,970; East Germany 12,400.
Sulfur:				
Elemental:				
Crude including native and byproduct	93,489	113,304	--	West Germany 41,228; Poland 32,926; Czechoslovakia 27,669.
Colloidal, precipitated, sublimed	248	53	--	West Germany 49.
Sulfuric acid	13,243	18,253	--	West Germany 13,400; Czechoslovakia 2,562; East Germany 1,507.

See footnotes at end of table.

Table 3.—Austria: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Talc, steatite, soapstone, pyrophyllite	1,729	3,609	--	France 1,051; India 1,020; Norway 532.
Other:				
Crude	67,698	75,682	1,548	West Germany 29,674; Hungary 20,248; Czechoslovakia 7,444.
Slag and dross, not metal-bearing	33,382	45,222	106	Italy 33,094; West Germany 7,783; Belgium-Luxembourg 1,857.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	1,762	3,368	45	Trinidad and Tobago 3,278; West Germany 43.
Carbon black ---- value, thousands	$15,512	$16,832	$16	West Germany $8,172; Italy $6,134; Canada $1,237.
Coal:				
Anthracite ---- thousand tons	27	52	--	U.S.S.R. 41; West Germany 5; Hungary 5.
Bituminous ---- do	2,933	3,271	494	Poland 1,711; Czechoslovakia 769.
Briquets of anthracite and bituminous coal ---- do	22	19	--	West Germany 18.
Lignite including briquets ---- do	791	638	--	East Germany 324; Yugoslavia 169; West Germany 143.
Coke and semicoke ---- do	890	1,083	--	West Germany 388; Czechoslovakia 354; Poland 222.
Gas, natural: Gaseous million cubic feet	88,125	143,968	--	U.S.S.R. 141,591; West Germany 2,377.
Peat including briquets and litter	65,496	59,653	--	West Germany 31,814; U.S.S.R. 9,437; Poland 6,188.
Petroleum:				
Crude ---- thousand 42-gallon barrels	39,552	43,982	--	U.S.S.R. 9,397; Libya 7,581; Nigeria 6,678.
Refinery products:				
Liquefied petroleum gas ---- do	940	1,418	--	Hungary 433; West Germany 401; U.S.S.R. 345.
Gasoline ---- do	5,000	5,122	(2)	Italy 2,405; West Germany 1,933; Hungary 418.
Mineral jelly and wax ---- do	107	116	(2)	West Germany 66; Poland 20; Hungary 10.
Kerosene and jet fuel ---- do	450	733	(2)	Hungary 462; Czechoslovakia 201; West Germany 49.
Distillate fuel oil ---- do	4,266	4,346	(2)	Hungary 1,846; West Germany 901; Czechoslovakia 576.
Lubricants ---- do	1,460	3,055	7	Hungary 1,300; Romania 295; West Germany 194.
Nonlubricating oils ---- do	108	NA		
Residual fuel oil ---- do	6,309	5,774	--	Czechoslovakia 1,975; West Germany 1,906; Romania 636.
Asphalt ---- do	1,280	NA		
Bitumen and other residues ---- do	629	1,956	--	Yugoslavia 984; West Germany 516; Hungary 279.
Bituminous mixtures ---- do	32	29	(2)	West Germany 19; Netherlands 5; Italy 1.
Petroleum coke ---- do	509	524	(2)	West Germany 322; United Kingdom 29.
Unspecified ---- do	83	NA		

[r]Revised. NA Not available.
[1]Table prepared by staff, Branch of Geographic Data.
[2]Less than 1/2 unit.
[3]Total for 1984 excludes unreported quantity valued at $7,000.
[4]May include other precious metals.

COMMODITY REVIEW

METALS

Aluminum.—Over 80% of aluminum was produced by Austria Metall AG (AM), previously Vereinigte Metallwerke Ranshofen-Berndorf AG, a wholly owned subsidiary of VA, which in turn belongs to the Government's OIAG. All alumina was imported and smelted into metal at the company's plant in Ranshofen. The smelter has five electrolytic potlines, each containing 168 cells, working at 40,000 amperes. About 2 pounds of alumina and 16 kilowatts of electrical energy were required to produce 1 pound of aluminum metal in 1985. The finished metal was cast into 9- or 33-pound pigs, up to 10-ton ingots, and billets. Bismuth, boron, copper, lead, magnesium, manganese, nickel, silicon, titanium, and zinc were added to some orders to produce improved properties. The capacity of primary aluminum at Ranshofen was about 150,000 tons; secondary aluminum capacity was 18,000 tons. The capacity of the rolling mills was 75,000 tons. The company produced a record 73,000 tons of rolled products. In 1985, it signed an agreement with China for delivery of rolled aluminum valued at about $7.3 million.

Copper.—AM produced copper metal at Brixlegg and copper and alloy products at Amstetten. The company employed about 4,000 workers, and earned over $16 million in 1984, with 55% of it from exports. About 3,000 of the work force was at Ranshofen.

Iron and Steel.—The production of manganese-rich iron ore at Erzberg decreased to the 1982 level. The production of crude steel also declined. Iron ore and steel from ore were all produced by VA. Austria's private steel industry was scrap-based, with a capacity of about 170,000 tons, and produced long products such as rebars. The private steel sector had reduced its capacity in 1983 with the closure of Felten AG, which had a capacity of about 150,000 tons of wire. In 1985, five private steel companies produced mainly rebars in electric furnaces. The scarcity of scrap in Austria was a significant factor limiting the production capacities of the companies.

VA suffered unprecedented losses, causing the resignation of its chairman and the entire management board.[8] VA was Austria's largest industrial group, with 70,000 employees and with broad international interests, including steel and other interests also in the United States. VA's $537 million losses were attributed mainly to unsuccessful diversification, speculation on the oil market, and new areas of activity taken on to compensate for the decline of the steel industry. In addition, VA suffered operating losses and investment costs of about $290 million at Bayou Steel Inc., its U.S. minimill subsidiary in Mississippi, since Bayou's establishment in the late 1970's.[9] The Austrian steel industry, nevertheless, has provided the most important technological development in the steel industry in the postwar period, the Linz-Donawitz process, which has been adopted in every major steelmaking region in the world.

Of Austria's 5 million tons of steel capacity, about 94% was held by VA, and the balance by private sector enterprises. Between 90% and 95% of VA's crude steel capacity was used for the production of carbon steel, and the rest for the manufacture of commercial grades of unalloyed and alloyed specialty steel. Specialty steel was produced almost exclusively by VA's subsidiary Vereinigte Edelstahlwerke AG. The company was constructing a rod-bar mill at its Kapfenberg Works. The 100,000-ton-per-year mill, to replace an older mill due to close at the company's Judenburg Works, was expected to be completed by 1989, with startup set for 1990. Austria's steel capacity has remained relatively constant at 5 million tons, after an initial decline from a 5.5-million-ton capacity in 1975.

The main sources of coal and coke for the Austrian steel industry were the CMEA countries, about 1.8 million tons; the United States, 500,000 tons; and the Federal Republic of Germany, 200,000 tons. In addition to its own iron ore, Austria imported ore from the U.S.S.R., 1.3 million tons; Sweden, 800,000 tons; and Brazil and Canada, 700,000 tons each.

Lead and Zinc.—Bleiberger Bergwerks-Union AG in Carinthia was the only producer of lead and zinc, employing 559 people in mines, 69 in lead smelters, and 147 in zinc smelters. Owing to ore depletion and complex mining conditions, the ore grade declined to 3.8% zinc and 1.3% lead. The ore was mixed with old tailings material containing 2% zinc. About 423,000 tons was mined from underground mines, and 414,00 tons came from tailings dumps. Ongoing exploration in the western section of the ore deposit added only small quantities to the ore reserves.

Tungsten.—The only Austrian tungsten mine, in Felbertal, about 6 miles south of Mittersill-Salzburg, was also the largest in Europe. The processing plant was at Bergla in Styria. Open pit operations at Ostfeld were terminated; since its start in 1975, about 2.1 million tons of ore was extracted. Underground mining at Westfeld, across the valley, continued from seven known ore bodies. Wolfram Bergbau-und Hüttengesellschaft mbH employed 93 people at the Felbertal Mine.

INDUSTRIAL MINERALS

Austria produced a variety of industrial minerals and building materials. Anhydrite and gypsum were extracted from 11 mines in the eastern Alps in Styria and Salzburg. Calcite was mined at Kainach and Salla, and precipitated calcium carbonate was produced at Ebensee. There were eight gypsum mines and plants distributed along the northern calcareous Alps. Graphite was mined at Zettlitz, Trandorf, Kaiserberg, and Trieben. The largest kaolin mine was at Aspang, south of Vienna, and another was at Schwertberg near Linz. Limestone was quarried for cement at Kirchbichl in Tyrol, Gartenau in Salzburg, Wietersdorf in Carinthia, and Mannesdorf in Lower Austria. Salt was mined from underground and brine wells near Bad Ischl, Alt Aussee, Hallein, and Hallstatt east of Salzburg.

Magnesite.—Magnesite was extracted from six mines, four in Styria, one in Carinthia, and another in Tyrol. The processing plants were situated at the minesites. The mines employed 267, and the beneficiation plants had 3,286 workers in 1984. Production fell slightly in 1985, but essentially the same mines and plants have operated at the same level over several decades. Veitscher Magnesitwerke AG at Breitenau and Trieben, and Österreichische-Amerikanische Magnesit AG near Radenthein were the largest producers of basic refractory products. Opencast mining at Breitenau began in 1907, and the deposit was almost depleted in 1985. Almost all mining in 1985 was from underground by room-and-pillar system. Access into the mine was by a decline, and the ore was hauled by train through an adit at a lower level leading to the surface crusher. The ore was crushed and sintered, the 0 to 40 millimeters in a rotary kiln and the 40 to 200 millimeters in a shaft kiln; other ore was sintered. Of the 1,000,000 to 1,200,000 tons of crude magnesite produced, the Breitenau plant produced about 450,000 tons.[10]

Talc.—Talkumwerke Naintsch GmbH, north of Graz, was the major producer of talc. The output is about 120,000 tons per year of talc and other associated minerals. The company was almost totally owned by Talcs de Luzenac S.A. of France. In the Naintsch Valley in Styria, the Oberfeistritz mill processed talc and chlorite talc from an open pit and underground mine, at about 90,000 tons per year. About 80% was mined in the open pit. The mines are high in the mountains above the Naintsch Valley at Rabenwald-Krughof, and the ore was transported down to the plant by aerial ropeway. Screening and hand sorting was done at the minesite before transport by ropeway to the plant. The products were bagged or delivered in bulk from silos. About 65% of the mine output was processed at Oberfeistritz, and the rest at Weisskirchen.

The company also operated another mine at Lassing, where a new mill and mine shaft were installed in 1981. Mining was at a depth of about 650 feet. The product was a combination of magnesium hydrosilicate (talc) and calcium magnesium carbonate, with a high degree of whiteness.

Other Industrial Minerals.—Talkumwerke Naintsch, which had acquired a facility at Weisskirchen in 1952, produced a number of products for the paint and a varnish industry including mica, chlorite, and quartz from Weisskirchen raw materials.[11]

MINERAL FUELS

Coal.—Austrian production of coal has remained at about 3 million tons since 1975. Austria's overall demand for coal was forecast to grow by about 10% over the next several years, reflecting a national energy policy that aims at the substitution of coal and natural gas for heating oil and an expansion of thermal powerplants for public utilities.

In the last few years, between 70% and 80% of Austria's overall demand for solid mineral fuels has been supplied from abroad; this share was expected to grow further in the years ahead. Austria has been obtaining about 75% to 80% of its coke and coal from CMEA countries.[12] In addition to price advantages, a Austro-Polish loan agreement limits Austria in purchasing coal from market economy countries. Other main suppliers were Czechoslovakia, the Federal Republic of Germany, and the United States.

Austria operated 7 coal mines, worked by 3,164 employees, in 1984. About 29% of total output was from surface operations. The Oberdorf surface coal mine at Koflach, near Graz, was the largest in Austria, operated by Graz-Köflacher Eisenbahn und Bergbau GmbH, a subsidiary of VA. Surface operations started in 1979, and its entire 1-million-ton annual lignite output was used by steam powerplants at Voitsberg and Graz. The area had been mined over the past 200 years by underground methods, and in 1985, two small, deep mines continued to be worked adjacent to the surface mines at Zangtal and Karlschacht. About 1,600 people worked at the Oberdorf complex, which included the 2 underground mines and a preparation plant.

Wolfsegg-Traunthaler Kohlenwerk AG operated one mine at Schmitzwerke and another at Hinterschlagen in Upper Austria by longwall and caving. About 30% of the output came from a small surface mine. The total production was 500,000 tons per year, with a work force of 750 people.[13]

Natural Gas.—The output of natural gas was in gradual decline. Domestic production accounted for 24% of Austria's consumption of about 170 billion cubic feet of natural gas, which was 16% of primary energy consumption. The state-owned oil and gas company, OMV, was investing heavily in developing a new gasfield 15 miles northwest of Vienna at Hoflein near Klosterneuburg, which was estimated capable of producing 5.3 billion cubic feet per year for at least 30 years. The gas is to be transported through a 13-mile pipeline across the Danube to the OMV's station at Aderklaa. The deposit was discovered in 1982. Thirteen wells have been sunk at about 10,000 feet. In 1984, proven and probable dry gas reserves were estimated at 420 billion cubic feet.

In 1985, 88% of gas imports came from the U.S.S.R., the rest from the Federal Republic of Germany. A possibility of imports from Norway's new gas deposit in the Troll Field in the North Sea north of Bergen could diminish Austria's dependence on the U.S.S.R. for gas supplies in the future.[14]

Petroleum.—The production of crude oil continued its gradual decline for the 20th year, since its record-high output of 19.9 million barrels in 1965. Austria has been a minor producer of crude for more than half a century. Proven and probable reserves were estimated at the end of 1984 to be 120 million barrels. The refineries depended on increased imports of crude for operation. Imports from the U.S.S.R. accounted for 26%, and those from the Organization of Petroleum Exporting Countries, for 57%. Austria was affected by the cutback in the U.S.S.R.'s oil deliveries in 1985. To broaden its sources of supply, OMV entered into a number of foreign ventures, most of which were not successful. An agreement with Libya and Occidental Petroleum Corp. to take 25% of Occidental's production in Libya, however, was an exception. With a yearly production of about 76 million barrels, Occidental was Libya's largest producer. As of July 1, 1985, with the purchase of 25% of the company's rights, OMV held a 12.5% share, thus giving OMV access to about 4.6 million barrels of crude per year.

The two main petroleum-producing companies were OMV and the various multinational oil companies, operating under the name of Rohöl-Aufsuchungs GmbH (RAG), controlled by Shell Oil Co. and Mobil Oil Co. OMV produced about 75% and RAG produced 23% of domestic output. Almost 430,000 feet were drilled in 78 holes, some under 20,000 feet deep in the Kalkalpen calcareous formations below the Alpine arc. OMV drillers set a record in 1985 by sinking the deepest borehole in Europe at Zistersdorf, reaching 28,225 feet. Secondary recovery methods accounted for 37.6% of production, and both OMV and RAG were experimenting with tertiary recovery. In the Ried Field, RAG undertook the first pilot test in Western Europe aiming to increase recovery from 30% to 40% by injection of carbon dioxide and water.[15]

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[1]Physical scientist, Division of International Minerals.
[2]Values have been converted from Austrian schillings (S) to U.S. dollars at the rate of S20.69=US$1.00, the average rate in 1985.
[3]Financial Times (London). Mar. 26, 1986, sec. III, p. 5.
[4]Pearse, G. Mining in Austria. Min. Mag. (London), Oct. 1985, pp. 282-295.
[5]An organization of 10 centrally planned economy countries involved in economic cooperation and coordination, comprising the following countries: Bulgaria, Cuba, Czechoslovakia, the German Democratic Republic, Hungary, Mongolia, Poland, Romania, the U.S.S.R., and Vietnam. Yugoslavia has permanent observer status.
[6]Die Presse (Vienna). Mar. 8-9, 1986, p. 9.
[7]Industrie (Vienna). Jan. 29, 1986, pp. 9-11.
[8]Clark, R. Voest: Diversification No Substitute for Rationalization. Met. Bull. Mon. (London), Feb. 1986, pp. 30-33.
[9]Blum. P., and W. L. Luetkens. Austria—Consensus Shaken by Crisis. Financ. Times (London), Mar. 26, 1986, sec. V.
[10]Page 291 of work cited in footnote 4.
[11]Page 293 of work cited in footnote 4.
[12]Berg-und Hüttenmannische Monatshefte (Vienna). Heft 2, 1986, p. 53.
[13]Pages 282-284 of work cited in footnote 4.
[14]Die Presse (Vienna). Mar. 19, 30-31, 1986.
[15]Petroleum Economist (London). Oct. 1985, p. 355.

The Mineral Industry of Belgium-Luxembourg

By George A. Rabchevsky[1]

BELGIUM

The Belgian economy grew for the third successive year, despite new austerity measures. The main characteristics of the economy in 1985 were a slight increase in the overall industrial production, relatively strong investment, and reduction in the trade balance deficit. The metals, minerals, and petroleum processing sectors were significant contributors to the economy, although the country has limited mineral resources and only a small mining industry. Most of the nonferrous minerals sector showed a slowdown in economic growth.

The overall gross national product (GNP) rose about 1.0%, compared with 2.3% on the average for the European Economic Community (EEC) countries. Unemployment, one of the highest in the EEC, declined slightly in 1985 for the first time in 14 years, but still remained at about 13.5%. The declining number of white- and blue-collar workers in mines and in mineral and metal processing plants continued, while subsidies, such as for coal and steel, continued to support employment. Between 1979 and 1984, $8 billion[2] in subsidies was spent by the Government in the coal, glass, shipbuilding, steel, and textile industries.[3]

PRODUCTION

Belgian overall industrial production rose by about 2%, excluding construction, but preliminary information indicated that production from mining and minerals processing declined slightly. Pig iron, steel, metal production, and other processing industries, traditionally large contributors to the Belgian GNP, either stagnated or declined after 3 years of vigorous growth. Production in the industrial minerals sector was, as usual, more irregular, but most commodities showed a declining trend in 1985. Production of coal continued its fourth year of gradual climb. Belgium, a significant processor of petroleum products from imported crudes, continued to slow down its production. The small production of indigenous natural gas declined by over 45% in the last 5 years.

Table 1.—Belgium: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984[p]	1985[e]
METALS					
Aluminum	3,408	4,188	5,784	5,712	5,000
Cadmium, smelter	1,176	996	1,260	1,476	1,200
Copper:					
Blister:[e]					
Primary	3,100	2,500	2,800	[r]500	450
Secondary	47,500	47,500	47,500	[r]10,000	9,750
Total	50,600	50,000	50,300	[r]10,500	10,200
Refined, primary and secondary, including alloys	[r]436,584	[r]501,636	431,268	427,704	400,000
Iron and steel:					
Pig iron thousand tons	9,729	7,836	8,028	8,964	[3]8,719
Ferroalloys: Electric-furnace ferromanganese[e] do.	90	90	90	95	90
Steel:					
Crude do.	12,379	9,916	10,157	11,303	[3]10,694
Semimanufactures do.	8,892	7,368	7,056	8,136	7,600
Lead:					
Smelter:[e]					
Primary[4]	60,200	52,950	[r]54,400	[p]71,500	59,600
Secondary[5]	28,000	28,020	30,000	[r]30,000	28,000
Total	88,200	80,970	[r]84,400	[r]101,500	87,600
Refined:					
Primary	73,900	66,000	96,300	89,600	77,600
Secondary	36,032	33,720	37,848	38,116	37,400
Total[6]	109,932	99,720	134,148	127,716	115,000
Selenium[e]	60	60	60	65	65
Tin:					
Primary	65	--	--	--	--
Secondary	2,443	2,208	2,220	2,408	2,000
Total	2,508	2,208	2,220	2,408	2,000
Zinc:					
Slab:					
Primary	234,700	228,300	262,600	270,700	277,000
Secondary (remelted zinc)	10,200	12,552	13,244	14,624	9,000
Total	244,900	240,852	275,844	285,324	286,000
Powder	26,208	23,532	25,104	29,652	29,800
Other, nonferrous: Precious metals, unworked, n.e.s.[7] thousand troy ounces	37,563	33,237	37,152	40,815	39,000
INDUSTRIAL MINERALS					
Barite[e]	39,900	39,900	39,900	39,000	40,000
Cement, hydraulic thousand tons	6,691	6,320	5,719	5,715	5,250
Clays: Kaolin do.	54	53	60	69	69
Gypsum and anhydrite, calcined	154,428	--	--	--	--
Lime and dead-burned dolomite:					
Quicklime thousand tons	2,004	1,368	1,596	1,980	1,400
Dead-burned dolomite do.	148	159	174	190	--
Nitrogen: N content of ammonia do.	589	509	449	452	340
Phosphates: Thomas slag, gross weight do.	496	393	250	254	260
Sodium compounds:					
Carbonate	273,000	327,648	259,764	409,344	450,000
Sulfate[e]	250,000	250,000	250,000	250,000	260,000
Stone, sand and gravel:					
Calcareous:					
Dolomite thousand tons	2,697	2,581	2,713	2,982	3,100
Limestone do.	27,588	24,660	22,044	20,520	19,000
Marble:					
In blocks cubic meters	5,976	7,848	1,332	3,624	5,000
Crushed and other	312	108	108	108	105
Petit granite (Belgian bluestone):					
Quarried thousand cubic meters	804	626	507	677	500
Sawed do.	63	56	48	49	48
Worked do.	9	8	9	15	8
Crushed and other do.	807	610	545	768	600
Porphyry, all types thousand tons	[r]5,100	[r]5,033	4,166	3,315	3,000
Quartz and quartzite	193,417	216,643	469,720	349,720	300,000

See footnotes at end of table.

Table 1.—Belgium: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984[p]	1985[e]
INDUSTRIAL MINERALS —Continued					
Stone, sand and gravel —Continued					
Sandstone:					
Rough stone including crushed thousand tons	2,014	2,036	1,962	2,436	2,500
Paving	15,264	11,112	12,444	7,596	8,000
Sand and gravel:					
Construction sand thousand tons	6,516	6,348	6,768	6,636	6,600
Foundry sand do	660	624	540	612	750
Dredged sand do	889	1,244	1,368	1,127	1,200
Glass sand do	1,860	1,716	1,668	1,680	1,500
Other sand do	1,332	1,572	1,644	1,452	1,400
Gravel, dredged do	4,284	3,984	4,788	5,340	5,100
Sulfur, byproduct:[e]					
Elemental do	110	110	105	105	105
Other forms do	160	160	145	135	135
Total do	270	270	250	240	240
MINERAL FUELS AND RELATED MATERIALS					
Carbon black[e]	2,000	2,000	2,000	1,750	1,700
Coal:					
Anthracite thousand tons	317	263	187	340	--
Bituminous do	5,815	6,277	5,909	5,960	7,300
Total do	6,132	6,540	6,096	6,300	7,300
Coke, all types do	6,000	5,220	5,112	5,928	5,960
Fuel briquets, all kinds do	54	50	46	24	--
Gas:					
Manufactured million cubic feet	24,371	20,987	21,989	25,337	25,000
Natural do	1,342	1,165	670	650	630
Petroleum refinery products:					
Gasoline thousand 42-gallon barrels	40,571	31,243	33,514	31,527	28,000
Jet fuel do	14,264	13,492	11,333	9,782	9,000
Kerosene do	256	295	295	300	275
Distillate fuel oil do	65,469	59,277	56,271	59,889	49,000
Residual fuel oil do	55,648	47,271	30,616	35,208	25,000
Lubricants do	280	300	252	260	250
Other do	28,223	26,210	15,479	14,560	12,000
Refinery fuel and losses do	14,304	10,680	10,690	7,580	6,250
Total do	219,015	188,768	[r]158,450	159,106	129,775

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through Apr. 25, 1986.
[2]In addition to the commodities listed, Belgium produced a number of other metals for which only aggregate output figures were available.
[3]Reported figure.
[4]Data not reported; derived by taking reported primary lead output, plus exports of lead bullion, minus imports of lead bullion.
[5]Data represent secondary refined lead output minus remelted lead; as such, the figures are probably high, because they include some lead that was sufficiently pure as scrap that it did not require remelting, but data are not adequate to permit differentiation.
[6]Includes remelted lead as follows, in metric tons: 1981—8,000; 1982—6,000 (revised); 1983—7,900 (revised); 1984—8,100; and 1985—8,000 (estimated).
[7]Known to include gold, silver, and platinum-group metals.

TRADE

Domestic demand has remained weak in Belgium, as a result of the Government's austerity policy, which has been designed to handle the heavy Government deficit. Industrial expansion has been based largely on exports and approximately 60% of the value of the GNP came from this source. Preliminary estimates for the first three quarters of 1985 showed continued real growth, with exports up 3.5%; imports increased also. The trade balance continued to improve, but at a slower rate than in 1984, with the steel and metalworking sectors leading the way in heavy industry. The Federal Republic of Germany, France, and the Netherlands were Belgium's principal trading partners. All metals raw materials were imported, as were mineral fuels. The United States exported small quantities of ore and metal to Belgium and imported steel and finished metals. The major exports in the minerals industry were processed metals and petroleum products.

Because of excellent ports, Belgium provided convenient facilities for reexport to many mineral and metal producing countries. Because of their central location in Western Europe, all three Belgian North Sea ports, Antwerp, Ghent, and Zeebrugge, were among the largest maritime concentrations in Europe.

Table 2.—Belgium-Luxembourg: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984	
			United States	Other (principal)
METALS				
Alkali and alkaline-earth metals:				
Alkali metals	24	25	--	Netherlands 24.
Alkaline-earth metals	--	52	--	West Germany 25.
Aluminum:				
Ore and concentrate	1,699	1,702	--	France 1,678; West Germany 24.
Oxides and hydroxides	757	732	--	United Kingdom 268; France 136; Sweden 78.
Ash and residue containing aluminum	9,817	7,111	--	West Germany 3,298; Netherlands 3,059.
Metal including alloys:				
Scrap	46,727	51,395	--	France 18,390; West Germany 16,343; Netherlands 11,270.
Unwrought	17,009	10,277	102	France 4,144; West Germany 3,209; Netherlands 1,752.
Semimanufactures	267,841	280,145	33,229	France 53,285; West Germany 43,506; United Kingdom 36,136.
Antimony: Metal including alloys, all forms	301	1	--	All to France.
Arsenic: Oxides and acids	12	--		
Beryllium: Metal including alloys, all forms	1	1	--	All to Ireland.
Cadmium: Metal including alloys, all forms	556	727	20	France 492; West Germany 170.
Chromium:				
Ore and concentrate	8	51	--	Netherlands 26; France 25.
Oxides and hydroxides	336	21	6	West Germany 10; Netherlands 4.
Metal including alloys, all forms	65	112	--	West Germany 48; Italy 22; United Kingdom 20.
Cobalt: Metal including alloys, all forms	36	80	5	France 24; West Germany 13; Romania 13.
Columbium and tantalum:				
Ash and residue containing columbium and/or tantalum	336	237	10	West Germany 227.
Metal including alloys, all forms:				
Columbium (niobium)	(2)	(2)	--	Mainly to Netherlands.
Tantalum	1	12	2	France 6.
Copper:				
Ore and concentrate	674	742	--	Netherlands 397; West Germany 160; France 81.
Matte and speiss including cement copper	--	162	--	Netherlands 99; Spain 48.
Oxides and hydroxides	1,689	1,644	28	West Germany 641; France 274; Italy 101.
Sulfate	7,428	8,141	54	Netherlands 2,656; West Germany 2,302; Denmark 1,454.
Ash and residue containing copper	3,945	1,840	--	France 1,102; Sweden 211; Spain 179.
Metal including alloys:				
Scrap	27,835	32,176	--	West Germany 11,675; Netherlands 8,516; France 5,072.
Unwrought	240,906	219,059	4,572	France 73,151; West Germany 46,886; United Kingdom 24,287.
Semimanufactures	238,160	270,232	409	West Germany 97,335; France 51,862; Netherlands 35,061.
Gold:				
Waste and sweepings value, thousands	$26,785	$8,861	--	Netherlands $4,135; Switzerland $2,941.
Metal including alloys, unwrought and partly wrought thousand troy ounces	784	738	32	Switzerland 320; United Kingdom 260.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite	1,432	302	--	France 122; Italy 72; Venezuela 54.
Pyrite, roasted	60,061	54,834	--	West Germany 23,249; France 10,375; Netherlands 8,481.

See footnotes at end of table.

Table 2.—Belgium-Luxembourg: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal:				
Scrap	681,749	773,616	--	West Germany 240,228; France 191,726; East Germany 117,525.
Pig iron, cast iron, related materials	8,947	10,581	11	Netherlands 4,284; France 3,879; West Germany 955.
Ferroalloys:				
Ferrochromium	3,909	2,914	--	West Germany 1,545; France 1,092.
Ferromanganese	18,892	23,741	--	West Germany 8,774; France 7,931; Thailand 1,748.
Ferromolybdenum	15,947	17,740	--	NA.
Ferronickel	177	7	--	All to West Germany.
Ferrosilicochromium	--	64	--	West Germany 58.
Ferrosilicon	2,627	877	208	West Germany 405; France 239.
Silicon metal	39	65	--	France 25; Japan 14.
Unspecified	2,799	2,696	44	France 836; Italy 666; West Germany 514.
Steel, primary forms thousand tons	2,675	3,384	200	France 1,548; Italy 614; West Germany 476.
Semimanufactures:				
Bars, rods, angles, shapes, sections do	3,064	3,115	282	West Germany 727; Denmark 549; Netherlands 385.
Universals, plates, sheets do	4,271	4,727	286	France 1,085; West Germany 937; Netherlands 424.
Hoop and strip do	460	501	9	West Germany 211; France 79; Netherlands 53.
Rails and accessories do	70	93	12	France 38; Italy 14; Canada 5.
Wire do	302	315	42	West Germany 60; France 41; Netherlands 25.
Tubes, pipes, fittings	526	584	53	U.S.S.R. 232; West Germany 61; Netherlands 55.
Castings and forgings, rough do	10	12	([2])	Netherlands 6; France 2; West Germany 1.
Lead:				
Ore and concentrate	37	--		
Oxides	4,846	4,844	11	West Germany 3,317; Netherlands 839; France 275.
Ash and residue containing lead	3,663	6,363	--	France 5,754.
Metal including alloys:				
Scrap	6,063	7,427	--	Netherlands 2,522; France 2,232; West Germany 1,827.
Unwrought	76,388	84,701	7	West Germany 20,540; France 18,664; Netherlands 16,593.
Semimanufactures	17,470	21,058	41	Netherlands 7,180; United Kingdom 4,162; France 4,107.
Lithium:				
Oxides and hydroxides	2	--		
Metal including alloys, all forms	--	1	--	All to Singapore.
Magnesium: Metal including alloys:				
Scrap	334	2,034	--	West Germany 1,234; Italy 495.
Unwrought	220	134	--	West Germany 93; Italy 21; Netherlands 18.
Semimanufactures	335	317	--	Italy 181; West Germany 84; Netherlands 51.
Manganese:				
Ore and concentrate, metallurgical-grade	2,882	2,757	1,843	United Kingdom 620; France 144.
Metal including alloys, all forms	1,186	1,489	1	West Germany 841; Norway 255; Sweden 109.
Mercury 76-pound flasks	2,239	777	--	Netherlands 345; Finland 145; Taiwan 102.
Molybdenum:				
Ore and concentrate	8,649	10,847	249	United Kingdom 3,038; West Germany 2,099; France 1,721.
Oxides and hydroxides	35	39	--	United Kingdom 31.
Metal including alloys:				
Scrap	11	3	--	West Germany 2; France 1.
Unwrought	27	24	--	Sweden 20; Finland 2.
Semimanufactures	52	63	--	Netherlands 46; France 9; United Kingdom 5.

See footnotes at end of table.

Table 2.—Belgium-Luxembourg: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984 United States	Destinations, 1984 Other (principal)
METALS —Continued				
Nickel:				
Ore and concentrate	51	10	1	Netherlands 9.
Matte and speiss	3	(²)	--	All to Netherlands.
Oxides and hydroxides	26	1	--	Mainly to Yugoslavia.
Ash and residue containing nickel	5,938	4,441	--	Canada 2,551; Finland 1,351.
Metal including alloys:				
Scrap	708	843	119	West Germany 456; Switzerland 133.
Unwrought	441	254	--	West Germany 70; Turkey 70; Italy 65.
Semimanufactures	232	271	5	West Germany 108; Netherlands 57; United Kingdom 32.
Platinum-group metals:				
Waste and sweepings value, thousands	$10,136	$5,043	--	West Germany $2,159; United Kingdom $1,482; Switzerland $818.
Metals including alloys, unwrought and partly wrought thousand troy ounces	1,194	289	203	United Kingdom 16; Netherlands 9; France 7.
Rare-earth metals including alloys, all forms	(²)	39	--	All to West Germany.
Rhenium: Metal including alloys, all forms value, thousands	$17	$56	--	United Kingdom $22; West Germany $20.
Silicon, high-purity	1	1	--	All to France.
Silver:				
Waste and sweepings value, thousands	$5,843	$1,938	--	Netherlands $1,173; West Germany $339; United Kingdom $214.
Metal including alloys, unwrought and partly wrought thousand troy ounces	34,381	26,383	2,047	United Kingdom 12,976; Switzerland 2,191; Italy 2,148.
Tellurium and arsenic, elemental	46	93	6	United Kingdom 37; West Germany 27.
Tin:				
Oxides	19	(²)	--	Mainly to France.
Ash and residue containing tin	2,189	2,315	--	United Kingdom 2,133.
Metal including alloys:				
Scrap	107	50	--	Netherlands 34; West Germany 8.
Unwrought	1,160	1,648	114	West Germany 511; United Kingdom 498; Netherlands 395.
Semimanufactures	105	75	15	West Germany 17; Iraq 10; France 8.
Titanium:				
Ore and concentrate	13	1	--	All to France.
Oxides	37,690	35,053	7,227	West Germany 8,765; Italy 1,993; Algeria 1,830.
Metal including alloys:				
Scrap	25	43	--	United Kingdom 16; France 13; West Germany 8.
Unwrought	3	1	--	All to United Kingdom.
Semimanufactures	109	140	8	Italy 43; Finland 21; France 19.
Tungsten:				
Oxides and hydroxides	(²)	(²)	--	All to West Germany.
Ash and residue containing tungsten	--	22	--	Do.
Metal including alloys:				
Scrap	18	28	--	West Germany 25; Austria 3.
Unwrought	8	17	2	Austria 9; Iran 2.
Semimanufactures	72	94	--	Netherlands 59; United Kingdom 15; France 10.
Uranium and/or thorium:				
Ore and concentrate	--	2	--	Netherlands 1.
Oxides and other compounds value, thousands	$30	$99	--	Netherlands $72; France $22.
Metal including alloys, all forms, thorium	--	3	--	United Kingdom 2.
Vanadium:				
Ore and concentrate	4	--		
Oxides and hydroxides	83	598	--	Canada 302; France 205.
Ash and residue containing vanadium	1,163	4,477	--	West Germany 3,094; Netherlands 1,193.
Metal including alloys, all forms	15	139	--	West Germany 98; Italy 38.
Zinc:				
Ore and concentrate	41,821	23,282	--	France 15,847; West Germany 4,935; Netherlands 2,500.

See footnotes at end of table.

Table 2.—Belgium-Luxembourg: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued				
Zinc —Continued				
Oxides	3,227	4,980	9	West Germany 2,388; France 1,822; Netherlands 389.
Blue powder	17,877	18,765	52	West Germany 9,933; France 2,257; Netherlands 1,799.
Matte	2,925	4,280	--	France 2,594; West Germany 698; Netherlands 685.
Ash and residue containing zinc	53,959	49,302	--	France 18,376; Netherlands 17,267; West Germany 10,526.
Metal including alloys:				
Scrap	13,165	14,585	62	Netherlands 6,974; France 3,249; West Germany 2,745.
Unwrought	190,151	197,107	16,640	West Germany 62,801; France 31,967; Italy 19,883.
Semimanufactures	9,495	7,540	90	West Germany 4,053; Netherlands 1,534; Iraq 427.
Zirconium:				
Ore and concentrate	30	163	--	France 139; West Germany 22.
Metal including alloys:				
Scrap	--	4	--	All to West Germany.
Unwrought	--	11	--	West Germany 9.
Semimanufactures	1	7	--	France 4.
Other:				
Ores and concentrates	141	194	1	Spain 70.
Oxides and hydroxides	r1,603	2,028	416	West Germany 609; France 368; Taiwan 118.
Ashes and residues	10,218	42,665	38,162	Netherlands 333; West Germany 312.
Base metals including alloys, all forms	289	323	9	Austria 79; West Germany 75; France 50.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	10,688	12,095	--	Netherlands 10,951; France 1,076.
Artificial:				
Corundum	737	569	--	Netherlands 262; France 190; West Germany 68.
Silicon carbide	1,786	2,430	--	France 1,474; West Germany 374.
Dust and powder of precious and semiprecious stones including diamond kilograms	692	1,548	443	Netherlands 246; United Kingdom 216; Israel 131.
Grinding and polishing wheels and stones	2,443	3,051	2	France 1,659; West Germany 402; United Kingdom 279.
Asbestos, crude	568	350	--	Netherlands 147; United Kingdom 71; West Germany 40.
Barite and witherite	30,948	33,912	--	Netherlands 11,428; United Kingdom 9,290; Norway 5,659.
Boron materials:				
Crude natural borates	23,613	19,534	--	West Germany 8,518; Netherlands 6,995; Denmark 1,281.
Elemental	2	1	--	Mainly to Netherlands.
Oxides and acids	103	109	--	Argentina 22; Venezuela 15; France 13.
Bromine	2	5	--	Brazil 4.
Cement thousand tons	2,634	2,723	10	Netherlands 1,508; West Germany 494; France 349.
Chalk	80,630	85,087	--	West Germany 20,530; Saudi Arabia 18,264; Netherlands 13,157.
Clays, crude:				
Bentonite	6,192	1,488	--	West Germany 1,250; France 71.
Chamotte earth	4,556	689	--	West Germany 440; Italy 125.
Dinas earth	953	659	--	Netherlands 578; West Germany 39.
Kaolin	25,080	31,728	--	Netherlands 16,526; West Germany 8,878; France 4,950.
Unspecified	645	7,252	--	Netherlands 5,930; France 1,234.
Cryolite and chiolite	69	2	--	All to Argentina.
Diamond:				
Gem, not set or strung thousand carats	37,238	40,313	1,513	India 20,798; United Kingdom 10,291; Israel 3,719.
Industrial stones do	9,469	11,794	1,594	United Kingdom 5,019; Ireland 1,544; West Germany 732.
Diatomite and other infusorial earth	229,664	162,749	(3)	Netherlands 162,222.

See footnotes at end of table.

Table 2.—Belgium-Luxembourg: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Feldspar, fluorspar, related materials:				
Feldspar	--	70	--	All to France.
Fluorspar	3,524	1,902	--	West Germany 1,662; Egypt 153.
Unspecified	15	35	--	Netherlands 26; West Germany 9.
Fertilizer materials:				
Crude, n.e.s	33,751	43,108	--	France 21,263; Netherlands 17,709; West Germany 3,889.
Manufactured:				
Ammonia	31,918	46,936	--	France 38,487; Netherlands 7,395.
Nitrogenous thousand tons	2,122	2,216	72	France 931; West Germany 437; United Kingdom 195.
Phosphatic do	680	635	--	West Germany 352; France 184; Netherlands 48.
Potassic do	27	27	--	West Germany 11; Netherlands 11; France 2.
Unspecified and mixed do	1,896	1,858	7	France 885; West Germany 217; United Kingdom 85.
Graphite, natural	2,746	3,254	1	Egypt 2,939; United Kingdom 106; France 96.
Gypsum and plaster	136,928	110,011	--	Netherlands 68,567; West Germany 38,700.
Iodine	171	123	--	Spain 65; France 15; Italy 9.
Lime	689,984	906,974	--	Netherlands 649,099; West Germany 164,663; Sweden 35,281.
Magnesium compounds:				
Magnesite	r365	404	--	Netherlands 379.
Oxides and hydroxides	r1,242	2,610	2	France 1,191; Algeria 787; Turkey 100.
Other	r3,706	3,768	--	Netherlands 1,611; France 796; Zaire 466.
Mica:				
Crude including splittings and waste	32	26	--	France 7; West Germany 7; United Kingdom 7.
Worked including agglomerated splittings	11	4	--	Netherlands 2; Hong Kong 1.
Nitrates, crude	12,180	11,805	--	Italy 3,917; West Germany 3,681; Netherlands 1,822.
Phosphates, crude	28,715	19,886	--	France 9,685; West Germany 6,945; Netherlands 1,817.
Phosphorus, elemental	(2)	15	--	All to France.
Pigments, mineral:				
Natural, crude	139	228	--	France 186; Philippines 18.
Iron oxides and hydroxides, processed	8,899	9,166	747	France 2,065; West Germany 2,003; United Kingdom 1,793.
Potassium salts, crude	468	--		
Precious and semiprecious stones other than diamond:				
Natural kilograms	795	498	21	West Germany 269; Israel 55; France 51.
Synthetic do	14,353	16,242	800	South Korea 7,653; Netherlands 4,200; Taiwan 3,304.
Pyrite, unroasted	1,051	73	--	Netherlands 44; France 24.
Quartz crystal, piezoelectric kilograms	(2)	(2)	--	All to West Germany.
Salt and brine	170,974	227,719	25	Netherlands 103,111; France 89,328; West Germany 33,213.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	3,703	9,400	--	Venezuela 5,000; France 1,621; Netherlands 800.
Sulfate, manufactured	651	NA		
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked thousand tons	439	495	(2)	Netherlands 465; West Germany 16.
Worked do	24	29	(2)	West Germany 17; Netherlands 6; France 3.
Dolomite, chiefly refractory-grade do	1,304	1,390	--	Netherlands 868; West Germany 256; France 251.
Gravel and crushed rock do	9,223	8,814	--	Netherlands 5,705; France 2,578; West Germany 525.
Limestone other than dimension do	507	604	--	Netherlands 210; France 205; West Germany 188.
Quartz and quartzite do	83	139	(2)	France 128; West Germany 7.
Sand other than metal-bearing do	3,036	3,403	(2)	Netherlands 1,250; France 1,045; West Germany 253.

See footnotes at end of table.

Table 2.—Belgium-Luxembourg: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Sulfur:				
Elemental:				
Crude including native and byproduct	7,479	8,787	--	West Germany 3,873; France 2,827.
Colloidal, precipitated, sublimed	79	79	--	United Kingdom 26; West Germany 19; Italy 7.
Sulfuric acid	77,137	160,456	21	Netherlands 65,584; United Kingdom 45,922; France 25,725.
Talc, steatite, soapstone, pyrophyllite	25,510	38,566	--	West Germany 9,121; United Kingdom 6,731; Sweden 5,915.
Vermiculite, perlite, chlorite	20,016	18,820	19	France 10,349; United Kingdom 8,056.
Other:				
Crude thousand tons	r541	308	(2)	Netherlands 233; France 21.
Slag and dross, not metal-bearing do	2,484	2,225	--	West Germany 944; France 585; Netherlands 544.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	67,579	105,181	--	France 87,079; Netherlands 18,068.
Carbon black	948	5,545	237	United Kingdom 4,073; France 612.
Coal:				
Anthracite thousand tons	79	120	--	United Kingdom 58; France 46.
Bituminous do	722	1,099	--	West Germany 602; France 288; United Kingdom 67.
Briquets of anthracite and bituminous coal do	17	83	--	Netherlands 64; United Kingdom 10; France 7.
Lignite including briquets do	(2)	5	--	United Kingdom 3; France 1.
Coke and semicoke do	481	804	--	France 383; West Germany 160; United Kingdom 110.
Gas, natural: Gaseous million cubic feet	(2)	3	--	All to Netherlands.
Peat including briquets and litter	7,037	8,531	5	France 6,851; Netherlands 1,589.
Petroleum:				
Crude thousand 42-gallon barrels	546	570	(2)	Netherlands 569.
Refinery products:				
Liquefied petroleum gas do	3,350	2,547	--	Netherlands 1,777; United Kingdom 221; West Germany 197.
Gasoline do	31,963	29,520	2,695	West Germany 7,788; Switzerland 7,147; Netherlands 6,606.
Mineral jelly and wax do	59	10	--	Netherlands 3; Egypt 2.
Kerosene and jet fuel do	11,252	8,001	220	West Germany 2,164; United Kingdom 668; bunkers 2,495.
Distillate fuel oil do	31,142	29,042	742	West Germany 16,455; France 3,947; Netherlands 2,903.
Lubricants do	2,374	2,757	2	Netherlands 695; West Germany 214. Iran 204.
Residual fuel oil do	38,554	44,377	3,898	United Kingdom 14,174; Netherlands 6,520; bunkers 8,826.
Bitumen and other residues do	2,531	1,399	--	Netherlands 474; United Kingdom 322; France 274.
Bituminous mixtures do	84	89	--	Netherlands 37; France 23; West Germany 14.
Petroleum coke do	101	161	--	France 140; Netherlands 14.

rRevised. NA Not available.
[1]Table prepared by Jozef Plachy.
[2]Less than 1/2 unit.

Table 3.—Belgium-Luxembourg: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS				
Alkali and alkaline-earth metals:				
Alkali metals	306	503	15	West Germany 473; France 12.
Alkaline-earth metals	85	96	--	France 74; Netherlands 19.
Aluminum:				
Ore and concentrate	34,802	40,536	--	West Germany 25,081; China 7,547; Guyana 4,508.
Oxides and hydroxides	26,597	28,189	2,098	West Germany 20,847; Netherlands 2,888.
Ash and residue containing aluminum	4,589	7,916	--	France 5,576; West Germany 1,917.
Metal including alloys:				
Scrap	53,085	57,981	1,640	France 28,547; Netherlands 11,543; West Germany 7,507.
Unwrought	288,993	311,597	18	Netherlands 165,808; West Germany 29,455; Norway 23,411.
Semimanufactures	90,226	94,007	558	West Germany 44,766; France 21,070; Netherlands 15,479.
Antimony:				
Ore and concentrate	4,265	6,097	20	Bolivia 2,686; Turkey 1,381; Netherlands 758.
Oxides	272	646	8	France 415; United Kingdom 105.
Metal including alloys, all forms	540	201	--	Netherlands 175; France 11.
Arsenic: Oxides and acids	39	34	6	United Kingdom 10; France 6.
Beryllium:				
Oxides and hydroxides	--	17	--	China 5.
Metal including alloys, all forms	6	1	([2])	Mainly from West Germany.
Cadmium: Metal including alloys, all forms	1,663	1,190	--	Netherlands 471; Zaire 151; France 117.
Cesium and rubidium: Metal including alloys, all forms	11	2	--	Italy 1.
Chromium:				
Ore and concentrate	3,848	4,223	--	Netherlands 4,117; Republic of South Africa 68.
Oxides and hydroxides	993	865	([2])	West Germany 632; Netherlands 93; United Kingdom 74.
Metal including alloys, all forms	284	232	17	France 64; United Kingdom 64; West Germany 45.
Cobalt:				
Ore and concentrate	20	1	--	All from United Kingdom.
Oxides and hydroxides	34	30	--	Finland 13; West Germany 8; Netherlands 8.
Metal including alloys, all forms	15	85	5	France 27; West Germany 14; Romania 10.
Columbium and tantalum:				
Ore and concentrate	997	1,378	66	Canada 1,299.
Ash and residue containing columbium and/or tantalum	581	1,108	--	Netherlands 780; West Germany 313.
Metal including alloys, all forms:				
Columbium (niobium)	1	1	--	All from West Germany.
Tantalum	17	43	37	Austria 3; West Germany 3.
Copper:				
Ore and concentrate	10,706	2,047	586	Peru 610.
Oxides and hydroxides	200	135	--	West Germany 54; Netherlands 37; Norway 30.
Sulfate	1,531	1,611	--	Netherlands 893; U.S.S.R. 257; United Kingdom 190.
Ash and residue containing copper	37,102	45,577	5,870	Brazil 10,376; France 10,093; Sweden 6,449.
Metal including alloys:				
Scrap	131,918	115,166	2,830	France 32,842; United Kingdom 17,906; Netherlands 16,733.
Unwrought	339,285	396,725	1,576	Zaire 213,363; Republic of South Africa 35,760; Zambia 28,596.
Semimanufactures	43,649	47,599	895	West Germany 24,675; France 8,318; Netherlands 5,450.
Gold:				
Waste and sweepings value, thousands	$1,616	$2,263	([2])	France $998; Netherlands $798.
Metal including alloys, unwrought and partly wrought thousand troy ounces	7,741	1,987	288	Switzerland 1,103; West Germany 151.
Hafnium: Metal including alloys, all forms	--	20	--	All from Netherlands.

See footnotes at end of table.

Table 3.—Belgium-Luxembourg: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite thousand tons	17,519	19,701	--	France 4,386; Brazil 3,909; Sweden 3,704.
Pyrite, roasted do.	41	55	--	All from West Germany.
Metal:				
Scrap do.	1,045	1,672	21	West Germany 611; France 520; Netherlands 372.
Pig iron, cast iron, related materials	55,247	103,796	67	France 63,703; West Germany 23,339.
Ferroalloys:				
Ferrochromium	34,836	44,974	1,003	West Germany 9,028; Yugoslavia 7,412; Netherlands 5,624.
Ferromanganese	53,479	52,460	--	France 23,094; Norway 16,199; West Germany 10,790.
Ferromolybdenum	312	298	--	Netherlands 110; West Germany 62; Austria 59.
Ferronickel	6,407	6,322	--	France 1,534; Greece 1,531; Brazil 1,026.
Ferrosilicochromium	1,909	3,189	--	West Germany 3,021.
Ferrosilicomanganese	21,326	35,439	6	Norway 25,182; France 4,872.
Ferrosilicon	33,056	29,170	--	West Germany 13,678; Norway 7,101; France 3,920.
Silicon metal	452	594	--	France 472.
Unspecified	7,702	4,395	41	France 2,056; West Germany 789; United Kingdom 750.
Steel, primary forms thousand tons	1,018	1,141	([3])	France 410; West Germany 307; Netherlands 232.
Semimanufactures:				
Bars, rods, angles, shapes, sections do.	1,012	1,009	3	France 319; West Germany 243; Netherlands 124.
Universals, plates, sheets do.	716	850	([3])	Netherlands 348; West Germany 191; France 153.
Hoop and strip do.	124	132	([3])	France 61; West Germany 54; Netherlands 11.
Rails and accessories do.	8	6	([3])	France 5; West Germany 1.
Wire do.	64	82	([3])	West Germany 51; France 13; Netherlands 12.
Tubes, pipes, fittings do.	303	299	2	West Germany 94; France 69; Netherlands 58.
Castings and forgings, rough do.	54	66	3	France 27; West Germany 22; Netherlands 10.
Lead:				
Ore and concentrate	85,480	67,774	300	Peru 39,955; Greece 12,544; Mexico 2,569.
Oxides	1,589	2,056	([3])	West Germany 1,064; France 940.
Ash and residue containing lead	71,773	69,913	10,954	United Kingdom 9,474; France 9,130.
Metal including alloys:				
Scrap	13,485	15,053	20	Netherlands 6,376; France 3,270; Ireland 2,268.
Unwrought	63,301	57,950	149	United Kingdom 16,938; France 14,840; Mexico 12,386.
Semimanufactures	1,771	3,897	1	West Germany 1,625; France 1,020; United Kingdom 988.
Lithium:				
Oxides and hydroxides	160	156	--	West Germany 128.
Metal including alloys, all forms	2	1	--	Mainly from West Germany.
Magnesium: Metal including alloys:				
Scrap	132	194	--	United Kingdom 47; West Germany 42; Netherlands 23.
Unwrought	2,317	3,304	([3])	Netherlands 1,106; Italy 880; France 414.
Semimanufactures	458	646	101	West Germany 270; France 84.
Manganese:				
Ore and concentrate, metallurgical-grade	162,653	221,558	1	Republic of South Africa 97,358; Congo 41,116; Brazil 26,555.
Oxides	4,007	637	30	United Kingdom 264; Japan 93; France 84.
Metal including alloys, all forms	1,757	2,333	923	France 796; West Germany 70.

See footnotes at end of table.

Table 3.—Belgium-Luxembourg: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Mercury ---- 76-pound flasks	7,604	9,541	116	Spain 4,785; Netherlands 2,349; Finland 1,015.
Molybdenum:				
Ore and concentrate	22,976	21,952	4,255	Netherlands 7,296; Canada 3,529.
Oxides and hydroxides	298	282	--	Netherlands 133; United Kingdom 81.
Metal including alloys:				
Scrap	26	54	29	Austria 9; France 8; West Germany 8.
Unwrought	42	20	--	West Germany 14.
Semimanufactures	209	100	(2)	Netherlands 92.
Nickel:				
Matte and speiss	423	2,402	1	Netherlands 1,245; West Germany 853.
Oxides and hydroxides	349	384	--	Netherlands 188; West Germany 116.
Ash and residue containing nickel	1,799	1,985	510	United Kingdom 495; West Germany 459.
Metal including alloys:				
Scrap	327	601	208	Netherlands 142; Sweden 51.
Unwrought	4,340	3,050	324	Netherlands 1,117; West Germany 946.
Semimanufactures	812	820	54	West Germany 519; United Kingdom 123.
Platinum-group metals:				
Waste and sweepings value, thousands	$6,378	$7,176	--	Netherlands $5,818.
Metals including alloys, unwrought and partly wrought troy ounces	66,056	67,099	86	United Kingdom 34,594, West Germany 11,414.
Rare-earth metals including alloys, all forms	15	18	--	Austria 17.
Rhenium: Metal including alloys, all forms ---- value, thousands	$35	$149	$74	United Kingdom $45.
Selenium, elemental	26	71	22	United Kingdom 34; Netherlands 8.
Silicon, high-purity ---- kilograms	(2)	5	--	All from Italy.
Silver:				
Ore and concentrate[3] value, thousands	$5,342	$9,040	$195	Netherlands $5,845; Canada $717.
Waste and sweepings ---- do	$3,861	$2,126	$195	Canada $717; West Germany $352; France $278.
Metal including alloys, unwrought and partly wrought thousand troy ounces	51,433	61,756	37,910	Netherlands 16,271; United Kingdom 5,239.
Tellurium and arsenic, elemental	100	123	--	Sweden 121.
Tin:				
Ore and concentrate	2,692	2,944	--	Argentina 2,664; Netherlands 278.
Oxides	17	11	--	Netherlands 7; France 2.
Ash and residue containing tin	26	127	--	Netherlands 55; Malaysia 30.
Metal including alloys:				
Scrap	98	172	--	France 70; Netherlands 53; Ireland 16.
Unwrought	2,286	2,310	49	Netherlands 717; Singapore 427; Malaysia 371.
Semimanufactures	288	331	1	Netherlands 142; West Germany 95; France 56.
Titanium:				
Ore and concentrate	104,128	91,502	--	Canada 78,352; Republic of South Africa 12,383.
Oxides	8,334	7,080	1,400	West Germany 4,399; France 677.
Metal including alloys:				
Scrap	579	197	107	United Kingdom 64.
Unwrought	35	80	15	United Kingdom 54.
Semimanufactures	176	186	10	Italy 40; West Germany 38; France 16.
Tungsten:				
Ore and concentrate	(2)	272	--	China 188; Netherlands 65; Austria 18.
Oxides and hydroxides	15	32	--	China 5; France 2; West Germany 2.
Ash and residue containing tungsten	59	2	--	All from Netherlands.
Metal including alloys:				
Scrap	39	60	4	France 19; United Kingdom 16; West Germany 9.
Unwrought	40	14	--	France 4; West Germany 4; United Kingdom 4.
Semimanufactures	109	102	--	Netherlands 99; France 2.

See footnotes at end of table.

Table 3.—Belgium-Luxembourg: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Uranium and/or thorium:				
Ore and other compounds value, thousands	$29	$413	--	United Kingdom $367.
Metal including alloys, all forms:				
Uranium do	$18	$639	--	France $635.
Thorium do	$1	$16	--	West Germany $11; Netherlands $5.
Vanadium:				
Ore and concentrate	24	--		
Oxides and hydroxides	4,062	4,796	733	China 1,470; Netherlands 961; Republic of South Africa 589.
Ash and residue containing vanadium	3,137	13,579	--	Republic of South Africa 12,197.
Metal including alloys:				
Scrap	--	2	--	Mainly from West Germany.
Unwrought	27	206	199	Republic of South Africa 6.
Semimanufactures	2	--		
Zinc:				
Ore and concentrate	572,584	577,076	--	Canada 159,368; France 93,234; Mexico 55,728.
Oxides	10,801	12,489	181	France 4,627; Netherlands 4,137; United Kingdom 1,345.
Blue powder	494	393	--	Netherlands 226; West Germany 99.
Matte	5,466	4,079	19	West Germany 2,220; Netherlands 717; France 592.
Ash and residue containing zinc	42,223	47,066	4,775	West Germany 23,727; Netherlands 5,964.
Metal including alloys:				
Scrap	10,978	9,159	142	West Germany 4,465; Netherlands 2,717; France 1,083.
Unwrought	53,149	49,352	--	Netherlands 31,000; France 7,763; West Germany 6,157.
Semimanufactures	19,485	16,459	3	France 14,088; West Germany 1,761.
Zirconium:				
Ore and concentrate	3,818	4,476	45	Netherlands 3,124; West Germany 1,049.
Metal including alloys:				
Scrap	28	41	--	France 40.
Unwrought	(3)	2	--	All from West Germany.
Semimanufactures	107	108	36	France 68.
Other:				
Ores and concentrates	88,041	121,917	--	Norway 121,824.
Oxides and hydroxides	r198	269	3	France 105; West Germany 50.
Ashes and residues	16,398	19,682	9,505	United Kingdom 739; Netherlands 157.
Base metals including alloys, all forms	(3)	(3)	--	Mainly from United Kingdom.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	13,949	8,509	100	West Germany 6,681; Greece 572; Netherlands 474.
Artificial:				
Corundum	5,487	7,885	29	West Germany 2,504; France 2,741; Austria 1,606.
Silicon carbide	3,212	4,911	1	West Germany 2,521; Italy 1,084; Spain 953.
Dust and powder of precious and semiprecious stones including diamond kilograms	3,681	3,033	768	Ireland 1,591.
Grinding and polishing wheels and stones	3,054	3,629	100	West Germany 1,002; France 571; Netherlands 557.
Asbestos, crude	35,332	34,882	175	Canada 16,245; Italy 4,343; Republic of South Africa 916.
Barite and witherite	7,250	8,165	--	West Germany 6,605; France 956; Netherlands 276.
Boron materials:				
Crude natural borates	97,434	78,611	17	Turkey 43,798; Netherlands 34,468.
Elemental	(3)	1	--	Mainly from United Kingdom.
Oxides and acids	1,885	2,731	--	France 1,980; Italy 349; Turkey 271.
Bromine	911	1,653	--	Israel 1,172; United Kingdom 354.
Cement	191,177	277,653	40	Netherlands 147,782; West Germany 109,132.
Chalk	155,989	170,804	23	France 149,996; Netherlands 18,749.

See footnotes at end of table.

Table 3.—Belgium-Luxembourg: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Clays, crude:				
Bentonite	24,828	19,873	15	West Germany 14,986; United Kingdom 2,117.
Chamotte earth	52,760	90,695	1,975	West Germany 68,201; France 15,817.
Dinas earth	7,979	9,470	428	Netherlands 8,567; West Germany 354.
Kaolin	247,264	275,863	1,404	United Kingdom 135,226; Netherlands 73,709; France 27,951.
Unspecified	146,699	135,864	195	West Germany 99,429; France 12,691; Spain 8,751.
Cryolite and chiolite	54	72	6	Denmark 65.
Diamond:				
Gem, not set or strung thousand carats	34,309	40,445	277	United Kingdom 23,903; Zaire 6,568; Switzerland 981.
Industrial stones do	14,148	16,534	2,631	Zaire 4,400; Ireland 4,398; India 2,653.
Diatomite and other infusorial earth	6,400	8,008	944	France 5,262; Denmark 1,112; Netherlands 193.
Feldspar, fluorspar, related materials:				
Feldspar	21,895	24,778	--	France 21,450; West Germany 2,138.
Fluorspar	7,744	8,310	--	France 4,377; East Germany 1,675; West Germany 1,256.
Unspecified	32,157	34,879	--	Norway 31,727.
Fertilizer materials:				
Crude, n.e.s	72,289	85,373	1	Netherlands 75,357; France 5,041; West Germany 2,522.
Manufactured:				
Ammonia	2,468	2,846	--	Netherlands 2,474; West Germany 351.
Nitrogenous thousand tons	513	545	(³)	West Germany 284; Netherlands 147; France 88.
Phosphatic do	92	130	58	Netherlands 24; Senegal 16.
Potassic do	1,026	1,102	--	West Germany 552; U.S.S.R. 241; East Germany 143.
Unspecified and mixed do	571	544	98	West Germany 232; France 119.
Graphite, natural	963	991	(³)	West Germany 883; United Kingdom 28; France 26.
Gypsum and plaster	364,263	420,528	214	France 348,040; West Germany 44,723; Netherlands 27,540.
Iodine	226	194	22	Japan 78; Netherlands 77.
Kyanite and related materials	2,829	1,655	78	West Germany 614; Japan 291; Netherlands 217.
Lime	103,078	107,017	12	France 72,937; West Germany 31,295.
Magnesium compounds:				
Magnesite	r1,500	524	10	Netherlands 346; France 59.
Oxides and hydroxides	r16,515	20,905	112	Italy 4,966; Austria 3,773; United Kingdom 3,405.
Other	r24,624	23,587	--	West Germany 17,930; East Germany 5,657.
Mica:				
Crude including splittings and waste	4,731	4,004	--	India 2,278; France 916; Madagascar 250.
Worked including agglomerated splittings	34	24	(³)	Switzerland 14; South Korea 5; France 3.
Nitrates, crude	23,720	23,709	--	Chile 22,443; France 931.
Phosphates, crude thousand tons	2,317	2,472	450	Morocco 1,625; Togo 259.
Phosphorus, elemental	306	222	--	United Kingdom 141; France 63.
Pigments, mineral:				
Natural, crude	338	183	--	Cyprus 64; France 43; United Kingdom 19.
Iron oxides and hydroxides, processed	7,373	8,522	268	West Germany 7,098; France 381.
Potassium salts, crude	28,880	32,653	--	West Germany 18,789; France 9,223; East Germany 4,622.
Precious and semiprecious stones other than diamond:				
Natural kilograms	10,230	3,962	NA	NA.
Synthetic do	720	819	95	Ireland 458; France 11.
Pyrite, unroasted	276,252	286,067	--	Spain 202,761; Norway 53; Finland 22.
Quartz crystal, piezoelectric kilograms	2	5	--	All from France.
Salt and brine thousand tons	1,102	1,134	(³)	Netherlands 653; West Germany 438; France 30.

See footnotes at end of table.

Table 3.—Belgium-Luxembourg: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984 United States	Sources, 1984 Other (principal)
INDUSTRIAL MINERALS —Continued				
Sodium compounds, n.e.s.:				
Carbonate, manufactured	123,687	109,610	--	West Germany 70,919; Netherlands 21,003; France 16,068.
Sulfate, manufactured	1,590	NA		
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked thousand tons	95	264	(3)	West Germany 186; France 42; Republic of South Africa 13.
Worked do.	86	103	(3)	Netherlands 30; France 27; Italy 18.
Dolomite, chiefly refractory-grade do.	44	38	--	West Germany 16; Netherlands 11; France 10.
Gravel and crushed rock do.	4,899	5,750	(3)	Netherlands 3,158; United Kingdom 1,357; West Germany 559.
Limestone other than dimension do.	176	226	--	United Kingdom 181; France 40.
Quartz and quartzite do.	82	88	(3)	West Germany 68; France 12; Sweden 6.
Sand other than metal-bearing do.	8,482	8,491	(3)	Netherlands 7,197; West Germany 871; France 312.
Sulfur:				
Elemental:				
Crude including native and byproduct	399,067	535,236	241,184	Netherlands 76,380; Canada 71,028.
Colloidal, precipitated, sublimed	1,505	982	3	West Germany 503; France 463.
Dioxide	4,748	6,322	--	West Germany 4,157; France 1,634.
Sulfuric acid	561,044	557,989	--	Netherlands 200,278; France 186,216; West Germany 126,786.
Talc, steatite, soapstone, pyrophyllite	34,390	35,610	5,042	France 11,774; Netherlands 5,654.
Vermiculite, perlite, chlorite	83,043	79,042	4,311	U.S.S.R. 51,357; Spain 7,925.
Other:				
Crude thousand tons	r1,319	1,106	5	France 573; Spain 227; West Germany 177.
Slag and dross, not metal-bearing do.	1,062	846	--	France 498; Netherlands 249; West Germany 98.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	70,036	70,853	280	France 68,519; Netherlands 1,594.
Carbon black	46,533	44,860	580	Netherlands 15,683; France 14,759; West Germany 12,020.
Coal:				
Anthracite thousand tons	1,217	1,289	6	West Germany 857; Netherlands 85; China 83.
Bituminous do.	6,748	8,074	3,114	West Germany 1,274; Republic of South Africa 1,735.
Briquets of anthracite and bituminous coal do.	86	101	--	West Germany 89; France 9.
Lignite including briquets do.	226	304	--	West Germany 263; East Germany 34.
Coke and semicoke do.	1,973	2,621	68	West Germany 1,887; Netherlands 442; France 162.
Gas, natural, gaseous million cubic feet	324,735	325,964	--	Netherlands 196,965; France 60,939.
Peat including briquets and litter	130,826	132,902	--	Netherlands 84,143; West Germany 30,192; U.S.S.R. 17,367.
Petroleum:				
Crude thousand 42-gallon barrels	114,614	131,196	--	United Kingdom 27,565; Nigeria 21,790; U.S.S.R. 19,200.
Refinery products:				
Liquefied petroleum gas do.	5,354	6,299	NA	Netherlands 3,796; United Kingdom 1,652; West Germany 365.
Gasoline do.	22,308	23,625	9	Netherlands 14,331; Spain 1,756; Algeria 1,088.
Mineral jelly and wax do.	139	153	1	West Germany 85; France 33; Netherlands 21.
Kerosene and jet fuel do.	1,134	1,455	4	Netherlands 1,132; United Kingdom 212.
Distillate fuel oil do.	35,497	35,096	(3)	Netherlands 21,017; U.S.S.R. 10,122; United Kingdom 503.
Lubricants do.	3,592	3,960	94	Netherlands 1,303; France 918; West Germany 602.

See footnotes at end of table.

Table 3.—Belgium-Luxembourg: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984 United States	Sources, 1984 Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum —Continued				
Refinery products —Continued				
Residual fuel oil thousand 42-gallon barrels	50,788	60,984	--	Netherlands 21,835; U.S.S.R. 18,474; United Kingdom 6,372.
Bitumen and other residues do	460	635	5	Netherlands 232; France 204; West Germany 185.
Bituminous mixtures do	69	57	2	France 24; Netherlands 16; West Germany 11.
Petroleum coke do	1,464	1,373	1,133	Netherlands 124; United Kingdom 44.

[r]Revised. NA Not available.
[1]Table prepared by Jozef Plachy.
[2]Less than 1/2 unit.
[3]May include other precious metals.

COMMODITY REVIEW

Metals.—*Iron and Steel.*—In 1985, world raw steel set a new record high of 715 million tons. Belgium's production, however, dropped and slipped one notch in the ranking, to 17th place. Belgium's total steelmaking capacity was cut to 14.7 million tons in 1985 from 15.5 million tons in 1984 and 16.8 million tons in 1983. Over 90% of Belgian steel was produced in oxygen converters. There was again a drop in the number of employees in the iron and steel industry, by about 8.5%, to 35,600 in May 1985.

Cockerill-Sambre SA (CS) was Belgium's largest iron and steel producer and ranked 25th among world producers. In 1985, it produced 4.5 million tons of steel, considerably below capacity. The company lost about $117 million, which was attributed to low steel prices, a strong U.S. dollar, and high labor costs. According to the company's development plans, drawn up by the Government, a decrease to a loss of $39 million in 1986 was forecast. CS's board of directors approved plans to invest about $195 million in improvements to flat product rolling and processing. The hot-strip mills at Carlam and Chertal as well as the cold-rolling mills at Tilleur, Liège Province, are to be modernized, and tinplate production concentrated at Tilleur.

By midyear, CS had closed 14 of its coking, steel, tinplate, and wire plants. The closures reportedly affected 5,522 manual and administrative workers. On the other hand, $163 million was invested in new projects, which included modifications in blast furnaces, continuous casting mills, chrome- and tin-plating lines, and others.

Sidmar SA, Belgium's second largest steel producer, installed a continuous slab caster at Ghent, at a cost of $119 million. The new caster is a twin-strand unit with annual capacity of 2.4 million tons of slabs, which is about two-thirds of the plant's raw steel production level of 3.2 million tons per year. At the inauguration in September, the company announced plans to deliver 1.5 million tons of cold-rolled (CR) sheet to the U.S.S.R. between 1985 and 1990. The steel, sold by Sidmar under a long-term contract with Promsyrioimport, is to go mostly to the Soviet motor industry. The increase in the CR sheet trade will increase Sidmar's total shipments to the U.S.S.R. to 5 million tons by 1990.

Usines Gustave Boel SA, the third largest Belgian steel producer, producing 13% of the national output, and the largest privately owned steelworks, ordered a new continuous slab caster from Siemag Transplan GmbH of the Federal Republic of Germany, which will mean ending its ingot casting. The machine is to be a single-strand unit with a capacity of 600,000 tons of slabs per year, 650 to 1,300 millimeters wide and 200 millimeters thick; it is to be installed at the company's steelworks in La Louvière. The cost of the project was set at $32 million and was scheduled for completion in 1987.

Nonferrous Metals.—Metallurgie Hoboken-Overpelt SA (MHO) was the major producer of nonferrous metals. Vieille-Montagne SA (VM) was the only other producer of nonferrous metals, and surpassed MHO in the output of zinc only, at about 58% of domestic capacity. Both companies were totally owned by the Société Générale de Belgique SA (SGB). All nonferrous metals were produced from imported raw and secondary materials.

Belgium was the third largest producer of cadmium in the world, after the U.S.S.R. and Japan, and in first place in Europe in the production of copper. The Belgian nonferrous industry ranked fifth among the world's producers.

In 1985, MHO began operating a new plant at Olen for the treatment of complex cobalt-bearing materials, including its own cobalt-bearing byproducts and imported scrap, by a proprietary process. The total investment was about $11 million. The plant at Olen also processed complex nickel-bearing scrap and produced other specialty and rare metals.

Belgium was the largest producer of smelter zinc in Western Europe. Zinc was produced by VM at Balen and by MHO at Overpelt. Over 60% of production was exported. The output of zinc continued to rise for the fourth year, despite a slowdown in demand, and in 1984 was the highest in the past 10 years. The increase in production was attained with existing capacity, which has been underutilized. The production of semifinished zinc products, however, declined for a third year.

VM, the largest Belgian zinc producer, operated mines in Sweden, produced metals in Belgium and France, and processed rare metals in Belgium, France, and the Federal Republic of Germany. Most raw minerals used at VM's electrolytic plants were zinc concentrates, preroasted in fluidized-bed furnaces and leached according to a process developed by the company and licensed all over the world. The company operated a large zinc refinery in Balen, and another at Auby, France; production facilities in Angleur for zinc powder and dust; and semifinished products facilities at Viviez, France. Balen and Viviez also recovered copper; cadmium was recovered at the Balen plant; lead, at 50% concentrates, was obtained by flotation of the electrolytic sludge; and silver was recovered at Balen and at Viviez. The extra large tankhouses handled large cathodes, and had a total capacity of 180,000 tons of high-purity electrolytic zinc per year. VM operated three roasting plants near the electrolytic plants at Balen, Belgium, and at Viviez and Calais, France. VM planned to do its roasting in 1986 at a new plant at Balen, with 850 tons per day of capacity, and at Calais with 190,000 tons per year of capacity; the Viviez plant was to be shut down. Semifinished products were still to be manufactured at Viviez.

Zinc powder and dust were produced at VM's plants in Angleur and in Creil, France, using three different processes: electrolytic zinc pulverization, the crucible distillation process, and the fractional distillation process.

Industrial Minerals.—*Cement.*—There were 7 major cement companies operating in Belgium, encompassing 13 separate plants. SA des Cimenteries (CBR), owned by SGB, was one of the largest. CBR completed construction of a new dry-process clinker plant at its facility in Antoing in 1985. The plant cost about $50 million, and will have a clinker production capacity of 2,600 tons per day. The dry process was considered more economical than the wet process, which is more common in Belgium. The plant was expected to be completed in the early part of 1986. Plans were prepared by the company's own engineering department, which chose the equipment for all parts of what will be a fully automated plant. CBR has awarded the contract for major equipment to Aumund-Forderbau GmbH of Rheinberg in the Federal Republic of Germany. In 1984, CBR also increased the clinker production capacity of the dry-process kiln at its subsidiary, Eesrste Nederlandse Cement Industrie NV, at Maestricht, the Netherlands, from 600,000 to 850,000 tons per year. The company also began the full conversion of all its existing kilns from natural gas or fuel oil to coal.

Diamonds.—The Antwerp diamond trade and industry continued to play an important part in the overall Belgian economy. Antwerp also remained the world's most important trading center for rough diamonds in 1985. According to the Antwerp High Diamond Council, 1985 was another good year for the Belgian diamond sector, which continued its upward trend of the past several years. Turnover increased 3.8% to a total of over $6 billion. Diamond imports amounted to about $3.1 billion, and exports amounted to $3.2 billion.

The United States and Japan remained the top markets for Belgian diamonds, while the European market weakened somewhat. Imports from India stabilized, while imports from Israel declined. Imports from the U.S.S.R. rose in volume, but not in value owing, reportedly, to Soviet dumping of diamonds until May of 1985. A total of 56 million carats of rough diamonds was imported, 35 million of which were of gem stone quality.

Salt.—Solvay & Cie. S.A. was the sole domestic producer of salt, and one of Western Europe's largest. Solvay had salt operations in France, the Federal Republic of Germany, Italy, Portugal, Spain, and Switzerland, and was the largest importer of salt. Of the total of about 6 million tons of crystallized salt produced by the company, only a small amount originated in Belgium. Solvay transported undisclosed quantities of brine from its saltworks in the Federal Republic of Germany to its chemical plants by pipeline. Most of the brine came from the EEC countries, principally the Federal Republic of Germany and the Netherlands; reexports went primarily to France and back to the Netherlands.

Sodium Sulfate.—Western Europe's largest single producer of synthetic sodium sulfate was Belgium's Tessenderlo Chemie SA, which accounted for at least 90% of Belgium's production capacity. The company is based in Brussels and controlled a 300,000-ton-per-year plant at Tessenderlo. About 85% of Tessenderlo's production was exported within the last few years mostly to Western Europe and some to the United States. The product is sold in bags with a minimum sodium sulfate content of 98.5%. Capacity of the plant has remained unchanged since 1980, when total Belgium production was on a par with that of the Federal Republic of Germany. The closure in 1983 of the Federal Republic of Germany's leading producer, Duisburger Kupferhütte GmbH, and the consequent reshuffling of production levels to compensate for the shortfall within the Western European market, enabled Belgium to maintain its position as a leading producer of synthetic sodium sulfate.

Mineral Fuels.—The energy sector in Belgium was highly dependent on imported energy. In 1983, Belgium defined a set of energy policy objectives. Priority was given to the use of domestic energy for reducing the country's dependence on imported fuels. Since then, there have been no significant changes in the policy guidelines.

Belgium had a fairly comprehensive energy conservation policy. Government spending on energy conservation, which rose dramatically in 1983, was increased in 1984, and again in 1985, by a total of almost 25%. Belgian research and development activities concentrated on developing the use of coal, nuclear power, and renewable energy sources, and on improving energy efficiency. An important project for underground coal gasification continued with West German cooperation.

Coal.—Several industries of the EEC countries continued to receive subsidies from their governments. France's subsidies were the highest, followed by Belgium, the United Kingdom, and the Federal Republic of Germany. In 1984, Belgian mines received at least $105 million in aid, including $2 million toward the cost of stockpiling coal. In addition, those mines in the Campine area in northern Belgium that produced coking coal received $82 million for operating losses, while the southern Belgian mines received $7 million.

Belgian coal production, mostly of bituminous coal, continued its slow but steady growth, principally as a result of the Government's effort to retain jobs and because of security reasons. In 1985, however, the production increase was spurred by increased export opportunities created by the United Kingdom's coal miner's strike. Belgian coal exports jumped 13.7% to 1.07 million tons. Belgian coal consumption remained fairly steady at 14.5 million tons, despite the commissioning of two new nuclear powerplants, a depressed cement industry, and the closure of the coal mine at Raton in the south.

Coal, once the backbone of the industrialization of Belgium, was an industry maintained through Government subsidies. Wallonia, the French-speaking southern region of Belgium, and once the major coal producing region, accounted for only 3% of total Belgian production in 1984, and mine production stopped altogether in 1985. Wallonia's production was all from reworked slag heaps. Production in the Flanders region was concentrated in the economically depressed Limburg area. The five remaining Limburg mines were operated by NV Kempense Steenkolenmijnen (KS), owned 78% by the Belgian Government, which had been established in 1967 to consolidate management of the faltering mines and to phase out mining operations. Previous plans to phase out production were postponed following the 1973 oil crisis. KS employed about 18,900 workers in a region that suffered from 25% unemployment. Because of the employment issue, Belgium may keep the Limburg mines operating for the foreseeable future.

Natural Gas.—All natural gas requirements were imported, 60% from the Netherlands, and almost 20% each from Algeria and Norway. After 1987, Algerian deliveries are expected to be handled through the new regasification plant at Zeebrugge. Because natural gas import contracts had been made when forecasts of energy demand growth and oil prices were higher than currently expected, Belgium had contracted for greater quantities than it needed, and at prices higher than those being negotiated in 1985. The Zeebrugge project also reflects high demand expectations, and it had more capacity than Belgium effectively needed.

In 1984 and 1985, Belgium signed new gas contracts, two of which were with Norway. One was for 105 billion cubic feet to be supplied during the next 20 years; the other, which was to become effective in 1986, was to supply 8 billion cubic feet of gas per year. A revised contract with the Netherlands ensured a supply of 123 to 158 billion cubic feet of gas per year to the year 2010. These new contracts are likely to provide Belgium with a more flexible supply position, offering prices that are expected to make gas competitive enough to continue replacing oil.

Nuclear Power.—Nuclear power production in Belgium, which was almost zero in 1973, has been the fastest growing energy sector. The last two units of the nuclear construction program, Doel 4 and Tihange 3, at 980 megawatts each, were completed in 1985. There were seven nuclear powerplants operating in Belgium. The share of nuclear generation of electricity in the domestic sector is expected to be 56% in the late 1980's and almost 60% by the year 2000.

Petroleum.—Belgium has no indigenous oil production, and its refining industry operated wholly on imported crude. Despite the growing energy consumption, the reliance on oil continued to decrease. In 1984, oil's share in fuel inputs for electricity production was only 7.6%, and was even less in 1985, compared with 50.5% in 1973 and 12.3% in 1983. Total oil requirements have been decreasing by 8.5% per year for the last 4 years. Refining capacity utilization continued to be low.

LUXEMBOURG

Luxembourg's principal sources of revenues were banking and tourism. The production of steel, however, continued to be the largest and sole smokestack industry, contributing significantly to the GNP and employment. It accounted for about 43% of all exports excluding services, 10% of GNP, 38% of industrial employment, and 9% of the work force of about 13,500. The economy of Luxembourg improved after 1983, owing to an increase in Western European demand for steel. The upturn in exports more than offset the generally weak domestic demand. The rapid growth of the financial sector over the past decade has also offset the long-term decline of the steel industry. The GNP increased 2% in 1984 to 3% in 1985, inflation remained at about 4%, and unemployment was about 1.7%, one of the lowest in Western Europe.

Almost 80% of Luxembourg's GNP was foreign-trade related. The country's economic well-being depended on the economic strength of its major trading partners and on the market economy countries' economy in general. Luxembourg exported finished aluminum, steel products, and a wide range of other industrial products. Three-quarters of all exports went to other EEC countries; approximately 92% of all imports also came from EEC countries. The Federal Republic of Germany, supplying 40% of imports, was its most important trading partner, followed by Belgium, 35%, and France, 15%.

Table 4.—Luxembourg: Production of mineral commodities[1]

(Thousand metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984[p]	1985[e]
METALS					
Cement, hydraulic	342	344	353	340	320
Gypsum and anhydrite, crude ____ tons	702	443	[e]400	450	400
Iron and steel:					
Ore and concentrate	429	--	--	--	--
Metal:					
Pig iron (including blast furnace ferroalloys)	2,889	2,587	2,316	2,768	2,755
Steel:					
Crude	3,790	3,510	3,294	3,987	[3]3,945
Semimanufactures	3,088	2,945	2,828	3,550	[3]3,878
Phosphates: Thomas slag, gross weight	595	572	586	728	750
Sand and gravel:					
Foundry sand ____ tons	3,500	3,100	--	2,000	2,000
Other sand except glass sand ____ thousand cubic meters	713	783	703	140	500
Gravel ____ do	191	203	129	135	125
Stone:					
Construction:					
Crushed ____ do	713	888	1,135	471	500
Dimension:					
Rough cut ____ do	9	4	12	8	6
Facing ____ square meters	--	974	598	560	550
Finished ____ cubic meters	564	584	623	729	700
Flagstone:					
Polished ____ square meters	1,943	1,225	1,775	1,260	1,300
Rough ____ tons	275	225	299	209	200
Slate slabs ____ thousand pieces	1,298	1,199	834	646	600
Industrial:					
Dolomite	295	331	330	350	325
Quartzite	6	24	20	25	20

[e]Estimated. [p]Preliminary.
[1]Table includes data available through Apr. 25, 1986.
[2]In addition to the commodities listed, refractory clays and manufactured phosphatic fertilizers other than Thomas slag are produced, but data are not published, and information is inadequate to make reliable estimates of output levels.
[3]Reported figure.

COMMODITY REVIEW

Metals.—Semimanufactures from aluminum, plus pig iron and steel, were the only metals produced in Luxembourg. Most raw materials were imported from neighboring EEC countries, with ownership in the principal companies jointly held by the member countries. Luxembourg's National Aluminium SA (Luxalum), with its first plant at Dudelange, is a subsidiary of National Aluminum Inc. of Pittsburgh, Pennsylvania, of the United States.

Iron ore mining ceased in Luxembourg in 1981, and all pig iron was produced from French ores mined underground near the Luxembourg border. The Government began reducing capacity in 1974, while increasing its ownership of Arbed SA, the only steel producer. The Government's ownership of Arbed rose from 24% to about 31% by 1985, including nonvoting shareholdings; Government ownership of Arbed may now be 43%. As a result of modernization of facilities, cutbacks in production and employment, and agreements with the Belgian steel concern CS, Arbed returned to profitability in 1984 and 1985, after a decade of heavy losses. The Arbed Group included Sidmar in Belgium and plants in the Federal Republic of Germany (Arbed Saarstahl AG and Lech Stahlwerke AG), all of which contributed to the steady performance of the parent company. An agreement with the Belgian steel industry resulted in an exchange of products between Arbed and CS. Under the terms of the agreement, CS will hot-roll 510,000 tons per year of flat products for Arbed, while Arbed will hot-roll 225,000 tons of sections per year and 210,000 tons of wire rod for CS, as well as producing 300,000 tons of semimanufactures for the company.

Most of Arbed's production and sales were controlled by quotas imposed by the EEC. EEC countries used about 75% of Arbed's output, and the United States imported 5%. The company specialized in the production of large steel beams used in skyscrapers throughout the United States.

Arbed's steelmaking capacity in Luxembourg was at 5.4 million tons, a reduction of 1 million tons from that of 1984. The Arbed Group ranked as the 10th largest steel producer in the world. In an agreement with Belgian producers, the steelmaking blast furnaces and a hot mill at Dudelange were closed down, while CS closed down its steelworks at Seraing and the wire rod mill at Valfil. Despite the Dudelange closures, the works will continue to be an important part of Luxembourg's steel industry as a producer of flat products. A new cold mill was to be set up in Dudelange also, and a continuous caster at Esch-Belval was to be built in the near future.

Industrial Minerals.—Cement, construction stone, limestone, and sand and gravel were virtually the only materials mined in Luxembourg after the closure of the iron mines on the French border. There was also a modest mining of gypsum. These nonmetals were all mined by surface methods, in small pits and quarries, operated by small independent operators. Luxembourg imported all its requirements for fertilizers and other industrial minerals from the Federal Republic of Germany and the Netherlands.

Mineral Fuels.—Luxembourg had no indigenous energy resources, with the exception of some hydropower. The country was entirely dependent on energy imports.

In 1984, for the first time in 4 years, and in 1985, total energy requirements rose 8% to 3.17 million tons of oil equivalent, but oil use dropped 5.8% to 0.96 million tons of oil equivalent. The gap was filled mainly by increased imports of coal and gas. Coal demand was closely linked to the country's steel industry, since almost 90% of total coal consumed was used by the steelmaker Arbed. Coal demand went up about 17.7%, corresponding to a 21% jump in steel production in 1984; steel production remained virtually the same in 1985. The steel industry accounted for over 80% of total industrial energy demand.

Luxembourg had no oil refineries, and oil products were imported from Belgium, France, the Federal Republic of Germany, and the Netherlands. About 85% of natural gas imports were also from Belgium, through two pipelines; this quantity was reexported from Belgium. A small gas pipeline also operated between France and Luxembourg.

Luxembourg had no Government stocks of petroleum products. However, a Grand-Ducal decree of October 31, 1973, requires private oil companies to maintain stocks amounting to 90 days' consumption. Under bilateral agreements with Belgium, France, the Federal Republic of Germany, and the Netherlands, a major portion of Luxembourg's petroleum stocks were held in those countries.

Luxembourg had two electricity distribution networks, one from Belgium, which distributed power to the steel industry, and the other from the Federal Republic of Germany, which was for all other sectors. Small-scale hydropower accounted for about 3% of total electricity consumption.

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[1]Physical scientist, Division of International Minerals.
[2]Where necessary, values have been converted from Belgian francs (BF) to U.S. dollars at the 1985 exchange rate of BF51.15=US$1.00.
[3]Knack (Brussels). July 10, 1985, pp. 19-22.

The Mineral Industry of Bolivia

By Pablo Velasco[1]

During 1985, Bolivia experienced an even more severe decline in its mining industry than during the previous 3 years. All export-oriented industries, of which mining is by far the most important, were strongly affected as a result of the discrepancy between the official and the free market peso-U.S. dollar exchange rate. Output of almost all minerals was below the level of 1984. Production of tin was the lowest in 80 years, and the collapse of the international tin market in October had a devastating effect upon any hopes for a reversal of this trend. The foreign exchange income generated by mining fell once again, and the mining sector was no longer the most important source of overseas income. The prospects for any substantial investments in the industry seem remote.

The c.i.f. value of Bolivian mineral exports in 1985 amounted to $263.7 million, about $100 million less than that of 1984. Actual output was seriously affected by strikes, equipment and raw materials shortages, and increasing production costs. Tin output fell from 19,911 tons in 1984 to 16,136 tons in 1985, and was forecast to decrease to just 10,000 tons in 1986.

Many mines were closed or faced imminent closure at yearend. Employment in mining and related activities fell, and alternative job opportunities for displaced miners were nonexistent. Metallurgical plants dependent upon the mines were in a similar position.

The state mining concern, Corporación Minera de Bolivia (COMIBOL), loaded with financial, technical, and social problems, had its worst drop in mineral output, and only 2 of its 16 mining operations made a profit during the year. COMIBOL nevertheless continues to be the biggest single mineral producer in the country. The national smelting concern, Empresa Nacional de Fundiciones (ENAF), was the chief foreign exchange earner in the mining and metals sector in 1985, despite extreme administrative and technical difficulties with both the tin smelters and its antimony unit. The medium- and small-mine sectors and the mining cooperatives also suffered reduced output levels. Wages were frozen and the subsidies lifted for basic foodstuffs in COMIBOL and union-run mine stores. COMIBOL was ordered to lay off 7,000 of its 27,000 work force, and most of them have received no severance pay or welfare benefits.

An even greater source of difficulty for both ENAF and COMIBOL has, for the last 5 years, been problems associated with the lead-silver complex at Karachipampa. This 51,000-ton-per-year-capacity smelter has been continuously hindered by a lack of concentrate feed. The smelter came onstream in 1984, but with current available concentrate supplies, could only function at 50% capacity, which is uneconomic. The future of the complex will thus depend on the success of negotiations with suppliers that were demanding incentives for exploiting new lead-silver deposits and guaranteed reasonable prices for their material, despite currently depressed international prices.

The Bolivian hydrocarbons sector has become the most important sector in the national economy. It has not only provided substantial foreign exchange earnings, but above all, has insulated the Bolivian economy for the last 15 years from the need to import expensive energy products. Over the next 5 years, the economy will become even more dependent on the foreign exchange earnings from the hydrocarbons sector, since tin mining, the traditional foreign exchange earner, is in a deep crisis.

The mineral industry of Bolivia contributed about 4.9% to the gross domestic product (GDP) in 1985. Petroleum and natural gas accounted for 6.9% of the GDP. The mineral industry provided 39% and the hydrocarbons sector 56% of the total value of Bolivia's exports. The tin industry no longer remained as the cornerstone of the economy. The economy continued its downward trend with real GDP estimated to have declined by 4.8% in 1985.

On August 29, Bolivia's new Government implemented daring new economic policies (Supreme Decree No. 21060), referred to as the New Economic Policy (NEP), which were unusually successful. Details regarding the NEP follow in the next section.

Government Policies and Programs.—Under Bolivia's NEP, the following changes were made: (1) all price controls were abolished, as well as virtually all import and export restrictions; (2) the entire tax system was being overhauled; (3) the wage and salaries legislation was being simplified; (4) the Bolivian banking system was being modified; (5) COMIBOL was being decentralized, as is Yacimientos Petrolíferos Fiscales Bolivianos (YPFB), the state oil company (these companies are being split into semiautonomous subsidiaries, but they will still be owned and operated by the state); and (6) Corporación Boliviana de Fomento (CBF), a holding company of state-owned agroindustrial enterprises, was dissolved, and its 24 companies were transferred to the autonomous development corporations of the Departments where they operate.

Inflation was the primary target of NEP. To reduce the public sector deficit, all subsidies were abolished. Gasoline prices were increased sixfold to world market levels. Public sector wages were frozen until December 31. Once these policies were in effect, inflation almost disappeared. At yearend, the peso stabilized at about 1.9 million pesos to the U.S. dollar.

Such strong measures to institute financial stability were favorably viewed by the international lending agencies. The International Monetary Fund (IMF) recently signed an agreement with Bolivia, which reopens its world banking credit lines. Bolivia also has arranged a rescheduling of its bilateral debt. The Government announced plans to reopen talks with private banks early in 1986. As a result of these positive measures, money returned to the banking system, and credit became available again. Business sales also increased.

During 1985, the Government also enacted several other laws, supreme decrees and supreme resolutions regulating the different activities of the mining industry. The most important ones were: D.S. 20737, March 25, 1985—establishes a deadline of March 3, 1985, for the National Gold Commission to present to the Ministry of Mining and Metallurgy the strategic alternatives for the gold mining industry in Bolivia—and D.S. 20890, June 6, 1985—approves the Precambrian project created by D.S. 13165, December 10, 1975, as a high national priority project.

PRODUCTION

Preliminary statistics show that Bolivia produced 16,136 tons of tin in 1985, which was significantly less than that of 1984 (19,911 tons). Tungsten output at 1,643 tons of metal content was 13.2% lower than in 1984 (1,893 tons, tungsten content), and silver production fell 21.5% from 4.6 million troy ounces to 3.6 million troy ounces. Antimony production also fell to 8,925 tons, compared with 9,281 tons in 1984. Private and Government sources indicate that gold was produced on an increasing scale. However, the official amount purchased by Banco Minero de Bolivia (BAMIN) in 1985 was only 18,051 troy ounces, compared with 40,827 troy ounces in 1984. The Bureau of Mines estimated output at 30,000 troy ounces. Government officials as well as the private sector believe that the real 1985 output was five times higher than the official one.

COMIBOL produced 10,038 tons of tin or 62% of Bolivia's total. This was the lowest amount in the history of the corporation. ENAF produced an estimated 14,000 tons of tin metal in 1985. Hormet smelter produced 231 tons of lead metal or 25% more than that of 1984. Production of natural gas and liquids (crude petroleum plus lease condensate) continued to decline in 1985. Liquids production was down 4.9%, compared with the 1984 output. Gross natural gas output fell 5.2% compared with that of 1984.

As a result of YPFB's program of substitution of gas products for liquids, started in 1980, domestic consumption of liquefied petroleum gas (including butane and propane) increased 28.5% compared with that of 1984.

Table 1.—Bolivia: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984[p]	1985[p]
METALS[3]					
Antimony:					
Mine output, metal content	15,301	13,978	9,951	9,281	8,925
Metal	5,116	1,820	2,001	NA	NA
Arsenic, mine output, arsenic trioxide, arsenic sulfide	127	261	107	144	361
Bismuth:					
Mine output, metal content	11	5	6	3	159
Metal	6	18	--	--	--
Cadmium, mine output, metal content[4]	165	134	143	124	104
Copper, mine output, metal content	2,637	2,270	1,982	1,610	1,665
Gold, mine output, metal content[5] troy ounces	66,372	40,146	49,217	40,827	[e]30,000
Iron ore:[6]					
Gross weight[e]	6,477	7,832	10,939	256	--
Metal content	4,113	4,891	7,001	4	--
Lead:					
Mine output, metal content	16,757	12,433	11,838	7,448	6,242
Metal including alloys	232	236	301	185	231
Manganese ore:[6]					
Gross weight[e]	543	120	61	NA	NA
Metal content	250	55	28	NA	NA
Silver, mine output, metal content thousand troy ounces	6,394	5,472	6,025	4,560	3,580
Tin:					
Mine output, metal content	29,830	26,773	25,278	19,911	16,136
Metal, smelter	20,005	19,032	14,164	15,842	14,205
Tungsten, mine output, metal content	2,779	2,534	2,449	1,893	1,643
Zinc, mine output, metal content	47,029	45,667	47,132	37,770	37,110
INDUSTRIAL MINERALS					
Barite	2,130	607	516	984	1,282
Calcite	271	267	165	[e]150	23
Cement, hydraulic	374,862	324,923	327,300	[e]327,000	[e]300,000
Feldspar-related minerals: Sodalite	2	1	--	--	--
Gypsum, crude	748	756	[e]750	[e]700	[e]700
Salt[e]	10,000	10,000	10,000	10,000	10,000
Sulfur	10,202	5,914	3,010	1,878	2,741
MINERAL FUELS AND RELATED MATERIALS					
Gas, natural:					
Gross million cubic feet	175,478	[r]188,877	178,059	173,206	164,106
Marketable do	77,542	[r]81,115	78,652	78,047	78,255
Natural gas liquids:					
Natural gasoline thousand 42-gallon barrels	[r]768	710	728	601	593
Liquefied petroleum gas do	[r]38	234	509	1,136	1,460
Petroleum:					
Crude do	8,091	[r]8,921	8,100	7,621	7,248
Refinery products:					
Gasoline do	3,330	3,562	2,917	2,728	2,784
Jet fuel do	704	531	569	548	573
Kerosene do	725	699	647	653	578
Distillate fuel oil do	1,390	1,701	1,544	1,496	1,489
Residual fuel oil do	87	850	928	727	535
Lubricants do	150	171	115	74	67
Liquefied petroleum gas do	1,112	615	475	1,712	1,788
Unspecified do	1,360	1,099	550	20	12
Refinery losses[7] do	9	77	66	87	8
Total do	8,867	9,305	7,811	8,045	7,834

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.

[1]Table includes data available through June 1986.

[2]In addition to the commodities listed, a variety of crude construction materials (clays, crushed and broken stone, dimension stone, and sand and gravel) are produced, but available information is inadequate to make reliable estimates of output levels.

[3]Unless otherwise specified, data represent actual production by Corporación Minera de Bolivia (COMIBOL) and small- and medium-scale mines.

[4]Cadmium contained in zinc concentrates produced by COMIBOL. (Cadmium is not recovered in elemental form in Bolivia.)

[5]Small- and medium-scale mines output sales to Banco Minero de Bolivia (BAMIN) and COMIBOL exports (small- and medium-scale mines cannot legally export gold).

[6]Data represent exports and are regarded as being virtually equal to production.

[7]Refinery fuel not reported separately, if at all, in recorded data.

TRADE

Both Bolivian imports and exports of traditional and nontraditional products dropped dramatically in 1985.

Total c.i.f. value of Bolivian exports was $672.8 million in 1985 or 16.4% below that of 1984. However, the trade balance for the year was positive. Mineral export revenues fell 27.6%, compared with those of 1984, to $263.7 million. Natural gas and liquefied petroleum gas contributed 56% or $374.5 million of the country's total export value, exceeding the mineral export revenue for the third consecutive year.

Tin, traditionally Bolivia's main export, totaled 16,607 tons valued at $186.6 million, a decrease of nearly 20% in volume and 24.7% in value from the 1984 figures.

Exports of other metallic minerals such as copper, lead, zinc, tungsten, silver, gold, and antimony also decreased in volume and value, respectively.

The European Economic Community accounted for 49% of the export value of mining and metallurgical products, and the United States, 31%. The remaining 20% was distributed among the European Free Trade Association, the Council for Mutual Economic Assistance, Asia, the Andean Pact, the Latin American Integration Association, and others.

Table 2.—Bolivia: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1984	1985
Antimony:		
Ore and concentrate	10,027	6,987
Trioxides	664	385
Regulus (impure metal)	9	263
Alloys, all forms	187	114
Arsenic:		
Ore and concentrate	20	--
Trioxides and other compounds	--	361
Barite and witherite	984	1,282
Copper: Metal including alloys, all forms	1,333	1,245
Gold: Metal including alloys, unwrought and partly wrought troy ounces	29,283	17,164
Lead: Metal including alloys, all forms	2,361	1,369
Silver: Metal including alloys, unwrought and partly wrought thousand troy ounces	2,561	1,660
Sulfur, all forms	1,878	2,741
Tin:		
Ore and concentrate	4,663	4,434
Ash and residue containing tin	--	282
Metal including alloys, all forms	16,006	11,891
Tungsten: Concentrate (WO_3)	2,471	1,644
Zinc: Metal including alloys, all forms	36,868	33,941

[1]Table prepared by Harold D. Willis. Table includes partial provisional export data; information on export destinations and on imports was not available at the time of publication.

COMMODITY REVIEW

METALS

Antimony.—Bolivia's antimony output fell 43.3% below the record high of 1980 and 3.8% below that of 1984. Its share of world production dropped to third place after China and the U.S.S.R. owing to depressed world demand, lowered prices, and internal problems. In 1984, antimony prices improved, but Bolivian output was down and continued declining throughout 1985 owing to Empresa Minera Unificada S.A. (EMUSA), the country's largest producer, losing 42 days of output to strikes.

Despite the internal problems and the depressed market, Bolivia has, since 1980, decided to produce refined products rather than concentrates to improve profit margins. Of the exports to the United States in 1980, 48% were in the form of ores and concentrates, and 52%, metal and oxides. By 1983, the respective figures had changed to 29% and 71%. There were problems in 1984 and 1985 at the country's two major antimony processing plants. The state-owned smelter, ENAF, produced no antimony at all in 1984 and 1985. The Empresa Minera Hermanos Bernal S.A. of Tupiza recently raised its capacity to 4,000 tons per year.

The market fundamentals are now looking somewhat better for antimony. Although higher prices in 1984 did not boost mine production, they did prompt a considerable drawdown of stocks. At EMUSA's Consolidated Murchinson Ltd., stocks at yearend 1983 were 10,000 tons, and at yearend 1984, were down to 4,600 tons. Consumption prospects in the automobile, construction, and plastics industries remain uncertain, but growth is widely expected in the fire-retardant sector, now antimony's major end use. Two other factors could impact price recovery. First, the pace of antimony disposals from the U.S. General Services Administration (GSA) stockpile, and the second is future consumption in China.

Bismuth.—Bismuth has had one of the most remarkable price recoveries of all the so-called minor metals. In 1984, it rose from below \$1.70 per pound in January to over \$6.30 per pound by yearend. In 1985, it reached a peak price of \$6.43 in February, then the price gradually fell to \$3.03 per pound in December. The drop came somewhat sooner than anticipated, partially as a result of a drop in the level of speculative buying. However, it was primarily due to low-priced offers from at least one well-stocked trader.

Assuming favorable market conditions, COMIBOL should begin production in March-April 1986. Little repair work needs to be done on its mine at Quechisla, which has been closed since 1979. Only the accesses need to be cleared. Similarly, the smelter is almost ready for operation. The company has a production target of 500 tons per year from its four mines, but COMIBOL officials doubt that this level of production could be reached in 1985. Production statistics from the Ministry of Mining and Metallurgy show a total output of bismuth at 159 tons in 1985, compared with 3 tons produced in 1984. COMIBOL mines produced 98% of the 1984 total, and 2% was from the small-mine sector.

Senior officials stressed that COMIBOL would try not to disrupt the market and would release bismuth output cautiously. Bolivian stocks are currently estimated at about 200 tons of concentrates and 36 tons of metal. Production reportedly had resumed at the Tasna-Rosario deposit in Potosí Department after being closed for over 4 years.

Gold.—It is believed that gold is being produced in Bolivia in increasing amounts. However, the official figure purchased by BAMIN in 1985 was only 561 kilograms, compared with 1,270 kilograms in 1984. Both Government and private sources believe that the real figure in 1985 was about five times the official one.

The Government's recent attempts to integrate the cooperative mining sector into the state-controlled areas of the Bolivian mining enterprise so far have not produced any positive results. The rapid devaluation of the Bolivian peso in the "parallel" (unofficial) market has caused great concern in the cooperatives of the Potosí area that they are not receiving a fair price. The cooperatives produce most of Bolivia's gold from alluvial deposits in the Tipuani and Mapiri Rivers in the foothills north of La Paz.

Starting in April 1984, COMIBOL and the Bolivian Armed Forces development corporation, Corporación de las Fuerzas Armadas para el Desarrollo Nacional (COFADENA) (another state-owned enterprise), were in the process of receiving concessions covering almost 1.3 million hectares (13,000 square kilometers). This represented about 90% of the total gold concession areas in the country. So far, neither COMIBOL nor COFADENA have produced any gold. All Bolivian gold production has been from the private sector, almost entirely the cooperatives and one of the medium-mining companies, Compañía Minera del Sur S.A. (COMSUR). In 1983, the National Gold Commission was set up to study and make recommendations on gold production in Bolivia. This study (covering the years 1952-84) has been completed and the four volume report given to the Government. The main recommendations were the creation of a National Gold Co., the formulation of a new "Gold Law," and the establishment of the National Gold Commission itself as a permanent body.

A 5-year exploration plan (1985-89), to complement existing studies, has also been drawn up. This covers work on alluvial deposits in northern and eastern Bolivia where the Río Madre de Dios and the Río Madera are considered promising targets. It also studied hard-rock gold deposits in the Cordillera Oriental, an area considered to be the source of the alluvial gold to the north and east. This exploration program costs were estimated at \$30 million. A new Gold Law has been outlined in the commission's report. If accepted, this will be passed to the legislature for confirmation and/or modification. The objective of the law was to "rationalize" the legal environment for gold mining.

The National Gold Commission's recommendations amount to a considerable increase of state control over gold mining in Bolivia. There are estimates that only 1 in 8 tons of gold mined is sold to BAMIN.

In the private sector, some companies had been moving away from tin even before the tin crisis. EMUSA, the leading antimony producer, was developing a tungsten mine in the Quime area with an eventual capacity of 2,000 tons per year of 60% concentrates. The company has also been negotiating for the opportunity to develop a gold placer deposit in Ecuador. COFADENA and COMSUR had agreed to dredge the gold deposits in the high terraces of the upper Mapiri and then those of the lower Mapiri and Kaka Rivers. The COFADENA concession may contain 60 million cubic meters of gold-bearing gravels with 0.25 to 0.5 gram of gold per cubic meter. COMSUR has been working on this project several years. One problem is that some of the gold deposits have been worked illegally by up to 2,000 members of mining cooperatives.

Iron and Steel.—During the year, another alternative to an earlier plan to locate a steel mill in Santa Cruz was proposed by the Regional Development Corp. of Santa Cruz (CORDECRUZ); it called for the installation of an integrated iron and steel plant using the large Mutún iron ore resources. CORDECRUZ has proposed the installation of a steel miniplant of 68,000 tons per year capacity instead of the 100,000 tons per year plant proposed previously by Empresa Siderúrgica Boliviana S.A. (SIDERSA). The new plant would be located at Mutún and use charcoal from local wood sources. The advantages of this proposal are the following: (1) proximity to iron ore, manganese, gypsum, calcite, and other resources; (2) the proposed area is unpopulated and establishing the plant there would allow a shifting of the present large population migrations from the capital, La Paz, to the Mutún area, which would be beneficial; (3) the plant would directly employ more than 2,000 workers, which is extremely important because of the high unemployment rate in both regions; and (4) establishing the plant at Mutún would also have strategic and geopolitical advantages because of its location near the borders with both Brazil and Paraguay. The above alternative has been studied by the Brazilian consulting firm Cía. Brasileira de Proyectos Industriaís (COBRAPI). The updated COBRAPI study concluded that a total project investment of $144 million would be required. This investment includes the cost of the required infrastructure as well as obtaining the wood for charcoal, reforestation, suitable power facilities, and food requirements for the estimated 2,050 workers and families. An open pit mine would provide 250,000 tons of iron ore per year. The plant would have a capacity of 77,000 tons of cast iron per year. The process would require 2,000 tons of manganese, 54,000 tons of charcoal, and 3,850 tons of limestone, all three of which are locally available at Mutún. A basic oxygen steel plant would then provide 88,500 tons of molten steel to a continuous casting machine, which would form bar steel. The study estimates operating costs of $214 per ton at the start and $177 per ton after the 10th year of operation.

Lead, Silver, and Zinc.—Production of lead declined for the sixth consecutive year since 1980. It was down 16.2% compared with that of 1984. COMIBOL continued to be the largest lead producer in the country with 64% of the total output. The medium-size mines produced 25%, and the small mines, 11%. Silver was mainly produced as a byproduct of tin and lead. Silver production decreased 21.5% compared with that of 1984. COMIBOL accounted for 67% of the total production; the medium-size mines, 25%; and the small mines, 8%. Exports of silver decreased 35.2% in volume and 52.5% in value compared with those of 1984. The medium-size mines produced 62% of the zinc output; COMIBOL produced 34%; and the small mines, 4%. COMIBOL's and the small mines' production declined 16.7% and 40.7%, respectively, and the medium-size mines' increased 22.6% compared with those of 1984.

Exports of lead and zinc declined 42% and nearly 8% in volume and 81% and 35% in value, respectively, compared with those of 1984.

COMIBOL has accepted the tenders put forward by Dowa Mining Co. Ltd. of Japan and Indemi Trading Interandina S.A. of Argentina for the expansion of the Bolivar polymetallic mine. The project included the construction of a new 750-ton-per-day flotation plant and the development of reserves in a new mine area that contained 3.8 million tons grading 0.92% tin, 15.2% zinc, 1.25% lead, and 5.25 grams of silver per ton. The project would produce 9,000 tons of lead-silver concentrates per year, 75,000 tons of zinc and silver concentrates, and 41,000 tons of tin concentrates.

Tenders were first issued in April 1984

by a Japanese and a Finnish firm, but because three tenders were necessary for this type of project, the bids were suspended. The same companies came back with tenders in November, but this time the Finnish firm, Outokumpu Oy, had joined Indemi of Argentina. COMIBOL awarded the contract to the Indemi-Outokumpu joint proposal for its $80 million Bolivar polymetallic project. The 750-ton-per-day plant should produce 9,000 tons per day of lead-silver concentrates for the troubled Karachipampa smelter, 41,000 tons per year of tin preconcentrates for the volatilization plant being built at Machacamarca, and 75,200 tons per year of zinc-silver concentrates.

The $80 million Indemi-Outokumpu bid for the development of the Bolivar polymetallic project has run into criticism from Bolivian engineers and COMIBOL union leaders. They reportedly feel that the project's mine plan, which involves a spiral ramp to a depth of 600 meters and trackless mining equipment, may prove to be too costly and technically unsound owing to the plasticity of the slate wall rock. Furthermore, the tin content reportedly diminishes rapidly below 200 meters.

It appears to be widely accepted that the Karachipampa smelter can only expect to obtain about 35% to 40% of its feed requirements from domestic mines until the Government is able to stimulate the development of further deposits.

COMIBOL and the Japan International Cooperation Agency (JICA) were drilling and evaluating the polymetallic deposit of Mesa de Plata, south of Bolivia near the Argentina-Bolivia border. The exploration program is known as Proyecto Los Lipez and was designed with the only purpose to increase the availability of lead for the Karachipampa smelter before considering several alternatives. One is importing it from Peru. Another is to have Argentina's Aguilar Mine, situated near the border, enter into a toll-refining contract with Bolivia.

The Bolivian Government has proposed that the ill-fated Karachipampa lead-silver smelter be leased out to the company that installed the plant, Klöckner Industries of the Federal Republic of Germany. A Klöckner delegation visited Bolivia to discuss the various conditions that will have to be resolved before it can take over the running of the plant under a lease contract. The plant has operated sporadically in the past, but technical problems and the shortage of concentrate supplies have prevented continuous smelting operations. At full capacity, Karachipampa would process 50,000 to 55,000 tons of concentrates per year. Plant maintenance alone is currently costing COMIBOL about $20,000 per month.

Tin.—In earlier years, Bolivia was ranked as the world's second largest tin producing country. Its output has been declining since 1978. In 1984, Bolivia maintained its position as the world's fourth largest producer of tin concentrate and metal. In 1985, its production declined to sixth place following Malaysia, U.S.S.R., Indonesia, Brazil, and Thailand. Reasons for this decline in output include declining ore grades in the mines as they go deeper, difficulties in obtaining supplies and replacement equipment owing to the rate-of-exchange controls, and the lack of exploration programs. In the past, COMIBOL inherited about 100 undeveloped tin prospects and numerous concessions covering the best exploration areas in Bolivia. It also acquired additional concessions and areas of reserve. By decree, no one could apply for a concession within 2 kilometers of COMIBOL-held concessions. Nevertheless, there have been no new tin mines put into production, with the exception of the Bolivar Mine, which is a polymetallic zinc-tin-silver deposit with complex metallurgical problems. Both the medium mines and the small mines have done considerably better, and several new tin deposits have been developed.

Another reason for the decline in tin output was the imposition of exchange controls that hit all sectors of the mining industry. Three other major factors have resulted in the drop in tin production in 1985. These were (1) labor problems and strikes, (2) problems within the state-owned mining sector, and (3) the collapse of the international tin market on October 24.

The collapse of the world tin market in late 1985 was the dominant factor that affected the country's tin mines. Over 1,000 miners have already been dismissed from smaller mining companies. Many more in the state and private sectors face dismissal or indefinite layoffs. According to Government officials, COMIBOL was under an emergency review. Solutions under consideration were possible retrenchments, tight cost controls, concentration on high-yielding deposits, and the nonreplacement of staff. COMIBOL has 27,662 workers whose dependents number 124,000. The issue of COMIBOL's future was under discussion in Congress.

A plan was prepared by the Government to save COMIBOL. These proposals included the temporary suspension of royalties payable by COMIBOL, the elimination of import duties on raw materials and basic supplies for the mining companies, reduction in refining charges by ENAF from $805 to $655 per ton of tin, the relocation of about 5,000 COMIBOL employees in independent cooperatives, and a reduction of oil and other energy prices and railway freight charges would also contribute to the overall savings of $33.5 million.

During the year, there were serious problems at the Totoral tin mine in Oruro, owned by Compañía Minera Orlandini S.A. The mine was taken over by some of the miners in July 1984. The reason for the takeover was the alleged smuggling of tin concentrates out of Bolivia, reported evasion of taxes, and claims of ill treatment of the workers. After further problems in April 1985, the Ministry of Mining and Metallurgy produced a Ministerial Resolution that authorized the takeover of the mine. Administration of the mine was taken over by COMIBOL. However, court action cleared the company of smuggling tin concentrates, and in December, the Supreme Court annulled the Government's takeover of the Totoral Mine and ordered it returned to its private owners.

Production of tin ore and concentrate was down 19% compared with that of 1984 to 16,136 tons, and metal output dropped to 7,103 tons (from January to June) compared with 7,635 tons during the same period in 1984. COMIBOL produced 62% of the total output; the medium mines, 23%; and the small mines, 15%. Tin exports were estimated to value $186.6 million, down 25% compared with that of 1984.

Tungsten.—Tungsten output declined 13% to 1,643 tons of tungsten trioxide compared with that of 1984. COMIBOL production dropped 39% from that of 1984. The medium mines' production increased 21%, and the small mines output increased 24.6%. The largest producer was the medium-mine sector with 50%, followed by COMIBOL with 28% and the small-mine sector with the balance. Bolivia exported 1,644 tons of WO_3 concentrate valued at $10.3 million, which was 33.5% lower in volume and 45.7% in value below that of 1984.

The Bolivian tungsten deposits are in the central Andean tin-tungsten belt, which extends 1,000 kilometers from southern Peru through western Bolivia and into the northern tip of Argentina. Most of the deposits being mined at present are in the Cordillera Real in the northwestern part of the country. Bolivia has measured reserves of 31.3 million tons of ore containing about 129,000 tons of tungsten.

One of the largest deposits is in the northern part of Bolivia known as La Reconquistada-Enramada-Chojlla Mines. The vein system extends for about 1,400 meters and dips from outcrops to about 500 meters in depth. Mineralization consists of wolframite in association with cassiterite. The tungsten-to-tin ratio is approximately 1:1. The Chojlla Mine is owned by International Mining Co. Total ore reserves are estimated at 1.5 million tons grading an average 0.54% WO_3. Production over the last 5 years has averaged about 446 tons of contained tungsten, although output in 1984 was down to 310 tons. Projected production for 1985 was 409 tons. Southwest of Enramada and Chojlla are the Viloco and Caracoles Mines, both owned by COMIBOL. In the same area is the Chambillaya Mine owned by the Estalsa-Imco Group with ore reserves of 120,000 tons grading 0.6% WO_3. The deposit has considerable potential.

Southeast of this area is the largest known tungsten deposit in all Latin America, Chicote Grande, with ore reserves totaling 21.2 million tons and grading 0.43% WO_3. Production declines in Bolivia may be partially offset with the coming on-stream of the new tungsten mine at Quime, midway between La Paz and Oruro. The mine owner, EMUSA, which is better known for its antimony operations, hopes to commence production of about 2,000 tons per year of 60% tungsten concentrates in late 1986 or early 1987. Bolivia currently has no tungsten processing facilities, and all concentrates produced are exported.

Representatives of about 40 tungsten producing and consuming countries, including Bolivia and Peru, failed again to reach an agreement on how to boost falling tungsten prices during their 5-day meeting in Geneva, Switzerland, which ended on November 15. The consumers opposed a producers' proposal that the United Nations Conference on Trade and Development (UNCTAD) carry out a study of possible stabilizing measures for the tungsten market. They did agree to refer the issue to the 1986 meeting of the UNCTAD tungsten committee. Delegates from several producing countries, including Peru, blamed current low market quotations for tungsten for causing closures, cutbacks, and the deferral of investment projects. Wolframite prices have fallen from an average $140 per ton 4 years ago to $74 to $78 per ton today.

Producers complained about the uncertainty of GSA disposals of tungsten. They also voted their support of efforts made by U.S. producers to persuade GSA not to make awards to the two lowest bidders in June and to cancel altogether its tender at the end of July. All producers were pleased to learn that GSA had stopped sales of surplus commodities.

INDUSTRIAL MINERALS

On February 4, 1985, the Bolivian Congress approved a seven-point law creating an industrial complex of the evaporitic resources of the Salar de Uyuni, Complejo Industrial de los Recursos Evaporíticos del Salar de Uyuni (CIRESU). This company will be the state agency in charge of the exploitation of the brines and salt of the Salar de Uyuni. This large salt lake is considered to be one of the largest salt crusts in the world. The lake covers approximately 9,000 square kilometers and is in the central depression of the Bolivian Altiplano.

The brine samples, which are basically water with saturated chloride solution, indicate that the average chemical composition was sodium, 8.49%; potassium, 6.81%; lithium, 380 parts per million; magnesium, 0.81%; calcium, 0.56%; sulfate, 0.92%; chloride, 15.96%; and boron, 0.025%. Resources calculated on current available data were lithium, 5 to 9 million tons of lithium content; potassium, 110 to 200 million tons of potassium oxide; and boron, 3.2 to 6.0 million tons of boron content. The Salar de Uyuni contains 40% of the lithium in brines in the world. The Bolivian brines are richer than those currently being processed in California and in the Salar de Atacama.

This move follows actions of the Chilean Government, which through its development agency, Corporación de Fomento de la Producción and in conjunction with Foote Mineral Co. of the United States, is currently exploiting a similar deposit—the Salar de Atacama in the northern part of Chile.

MINERAL FUELS

The Bolivian hydrocarbons sector has become the most important sector of the country's economy. Revenues generated by this sector support the balance of payments and have provided the country with self-sufficiency in hydrocarbons products for the last 15 years. During 1985, the domestic market for refined petroleum products was fully satisfied, despite Bolivia's worst economic crisis, worldwide depressed oil prices and a domestic decline in marketing owing to strikes and disruption in transportation. The hydrocarbons sector contributed 55.7% of the total export value, which amounted to $672.8 million in 1985.

Natural Gas.—Output of natural gas decreased 5.2% from that of 1984, primarily owing to the natural decline in gas reserves from gasfields of YPFB, Occidental Boliviana Inc. and Tesoro Bolivia Petroleum Co. Another reason for the production decline was the new reinjection program to maintain the current liquid's condensate production.

YPFB's gasfields in the Santa Cruz division became the most important gas producer in 1985 with 50% of the total yearly output. Argentina continues to be Bolivia's sole foreign customer for natural gas. About 47.7% of the total gas output was exported to that country, amounting to 78.3 billion cubic feet; domestic consumption of natural gas required was 4.3% of the total, and the balance was reinjected into the gasfields to continue liquids condensate production.

The 1983 price agreement was maintained through 1984 at $4.28 per million British thermal units. In September 1985, Bolivia and Argentina agreed to maintain the price at $4.70 per thousand cubic feet. The volume was also maintained at 220 million cubic feet per day. Both Governments also agreed to maintain the existing payment schedule, which binds Argentina to pay 50% of the value of its natural gas imports in cash (approximately $15 million per month). Argentina has paid the remaining 50% of these imports through commodity exports to Bolivia and by deducting it from Bolivia's own $400 million debt to Argentina.

In October, the Government approved a supreme decree, which authorizes YPFB to renegotiate a 1982 exploration contract with Bolivia Andina Petroleum Corp. (BAPCO), Shell Exploradora y Productora de Bolivia BV, and Anschutz Corp. joint venture, which had been canceled by YPFB in 1984. The decree acknowledges that BAPCO was not responsible for the failure to agree to terms for continuing the 1982 contract, which actually was still in effect, notwithstanding the action taken by YPFB. The decree also acknowledges the serious need to discover new hydrocarbons reserves, which were declining rapidly, and the necessity for private risk capital to undertake new exploratory activities. Finally, the decree states that the contract with BAPCO will require the approval of the executive rather than legislative branch of the Government. After 3 years of exploratory works, the Shell-Anschutz Corp. joint exploration effort came to an end, as the 21st operational contract signed with YPFB ended on June 29, 1985. Shell-Anschutz invested approximately $22 million to explore an area of 28,000 square kilometers north of La Paz. This exploration program was concluded in late 1984, and no geological structures worth drilling were found.

Increases of natural gas production in the future will depend on internal demand and on the need for liquids and liquefied petroleum gas. The Río Grande Gasfield (YPFB) will continue to be the main source of Bolivia's natural gas production. Tesoro plans to drill one well in its La Vertiente Gasfield to increase output. Liquefied petroleum gas production has sharply increased from 61,660 cubic meters in 1979 to 297,840 cubic meters in 1985. YPFB has three gas plants—Río Grande, Colpa, and Camiri—where liquefied petroleum gas and natural gasoline is produced.

Natural gas reserves, according to YPFB, as of December 31, 1985, amounted to 4.0 trillion cubic feet, which was adequately quantified and certified by U.S. firms.

Petroleum.—Production of crude oil and condensate declined by 4.9% to 7.2 million barrels compared with 1984 output. This extended the downtrend in production that started in 1974. The decline in production was due to reduction in output in both YPFB and the contractor's oilfields. Some traditional oilfields, such as Camiri and Monteagudo, are almost depleted, and secondary recovery methods were being used to increase their output.

Bolivia has currently 23 crude oil producing fields, all belonging to YPFB, of which 13 fields were declining in output, owing to natural decline in oil reserves. Processed petroleum and refinery production decreased 2.6% compared with those of 1984. YPFB estimates that total Bolivian petroleum reserves (crude oil plus lease condensate) as of December 31, 1985, amounted to 125.1 million barrels, of which 88.5% belonged to YPFB and the remainder to Occidental and Tesoro. Bolivia's liquids reserves at current production and/or consumption levels could last approximately 18 years.

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The Mineral Industry of Botswana

By Thomas O. Glover[1]

The value of minerals produced in Botswana in 1985 exceeded the 1984 value by 7.2% in terms of the pula, the local currency; however, in terms of the U.S. dollar, the value fell by 21.8%. Average rates of exchange for the pula fell from 1.28 to 1.76 pula per dollar from 1984 to 1985.

Botswana's economy was one of the fastest growing economies in Africa. Its gross domestic product per capita level in 1985 was approximately $900[2] per person. Two of three major revenue sources were the sale of copper-nickel pellets and diamonds. Eighty percent of Botswana's population of 1 million people were sustained by subsistence farming, with only 15% employed in the formal job sector. Mining accounted for 22% of those in the formal job sector, with 7% employed in Botswana and 15% in the Republic of South Africa.

Botswana's currency reserves, estimated at $750 million in late 1985, covered approximately 14 months of foreign trade. These large reserves are necessary owing to the country's dependence on imports from other countries; Botswana's main source of foreign currency is the fluctuating diamond export market. The sixth national development plan was announced with its main purpose to increase incentives for job creation. The plan foresaw several years of deficit spending due to the relative decline in the growth rate in earnings from the sale of diamonds.

The Botswana Power Corp. completed work on the new overhead powerlines linking the power stations in north Botswana with the power stations in south Botswana. The new powerlines run from Selebi-Phikwe to Gaborone. The central power station at Morupule was scheduled for completion in 1986. By late 1986 or early 1987, Botswana would become self-sufficient in electricity, whereas in 1985, about one-half of the electricity was supplied by the Republic of South Africa. The new central power station was scheduled to burn coal for power generation from the Morupule Mine situated 1 kilometer away.

On January 1, 1987, Botswana was scheduled to assume ownership of the National Railways of Zimbabwe that runs through its territory. Prior to the takeover, Botswana was scheduled to purchase 20 locomotives, 47 coal cars, 13 tank cars, and 650 other railway cars. The 600-kilometer main and branch lines were to be rebuilt over a 10-year period at a rate of 60 kilometers per year.

PRODUCTION AND TRADE

Production of minerals in Botswana generally decreased during 1985. Coal and nickel production in 1985 increased by 11.3% and 5.2%, respectively, with only a small increase in copper. Diamond production, which had led the country's growth in 1984, decreased slightly in 1985 below that of 1984.

Both the Orapa and Letlhakane diamond mines showed a decrease in production from that of 1984 and 1985. Only the Jwaneng diamond mine showed a slight increase in production during the same period. The Bamangwato Concessions Ltd. (BCL) nickel-copper mines at Selebi-Phikwe continued to produce efficiently; however, low commodity prices kept the operation from making a profit. Coal production increased over 11%, but the price of coal dropped $2.85 per ton.

Botswana encouraged foreign trade and investments and employed liberal foreign investment incentives. The first trade investment mission to the United States took place in 1985. The U.S. General System of Preferences permits duty-free entry for approximately 3,500 Botswana items. Exports from the United States increased by $12 million from those of 1982 through 1984. Botswana was a member of the Southern African Customs Union that permits them duty-free shipments in several southern African countries. Botswana's two major mineral export commodities were diamond and nickel-copper pellets. Total estimated value of the country's 1985 exports was $621 million, and total imports were valued at $515 million. Because the Botswana currency declined against the U.S. dollar and Western European currencies, in which most of the country's exports were valued in 1985, the value of export prices in pulas rose 65% over the 1984 levels.

Table 1.—Botswana: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984[p]	1985[p]
Coal, not further described	379,270	414,778	395,127	392,851	437,053
Cobalt, Co content of nickel-copper (smelter product)[2 3]	254	254	223	259	222
Copper:					
Mine output, metal content[4]	19,954	21,161	24,411	25,868	[e]26,134
Cu content of nickel-copper (smelter product)[3]	17,819	18,375	20,261	21,471	21,692
Diamond:					
Gem[e] thousand carats	744	1,165	4,829	[r]5,778	6,317
Industrial stones[e] do	4,217	6,604	5,902	7,104	6,317
Total do	4,961	7,769	10,731	12,882	12,634
Gem stones, semiprecious, rough, not further described kilograms	--	1,100	NA	36,700	14,310
Nickel:					
Mine output, metal content[4]	21,925	20,669	21,431	21,887	[e]23,018
Ni content of nickel-copper (smelter product)[3]	18,278	17,756	18,216	18,604	[e]19,565
Nickel-copper matte, gross weight	46,565	45,685	48,083	51,845	51,507
Sand and gravel cubic meters	156,921	NA	NA	188,498	102,524
Stone, crushed, not further described do	184,355	NA	NA	436,604	132,966
Talc	70	--	--	--	--

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through June 23, 1986.
[2]Figures approximate recoverable mine output and have been used in world production tables appearing in volume I of the Minerals Yearbook.
[3]Smelter product was all matte in 1981, a combination of matte and pellets in 1982 and 1983, and all pellets in 1984 and 1985.
[4]Analytic content of ore milled.

COMMODITY REVIEW

METALS

After many months of negotiations, Falconbridge Ltd. of Canada concluded a 14-year supply contract in 1985 for nickel-copper-cobalt pellets with BCL in Botswana. BCL pellet production in 1985 was 56,788 tons. Falconbridge was to receive 7,000 tons of pellets in 1985, 23,000 tons in 1986, and 46,000 tons in 1987. The Falconbridge allocation was scheduled to be processed at its Kristiansand, Norway, refinery. All production over the Falconbridge allocation in 1987 was to be processed by Rio Tinto (Zimbabwe) Ltd. (RTZ) at its Eiffel Flats refinery in Zimbabwe. RTZ was preparing to toll refine the BCL pellets for Centametall AG, a Swiss trading company. The AMAX Nickel Inc. Port Nickel refinery in Braithwaite, Louisiana, United States, that had been processing 100% of BCL pellet production was shut down November 30, 1985. AMAX was to be paid several million dollars for releasing BCL from the pellet contract but was still retaining its 29.8% share of Botswana Roan Selection Trust Ltd. (BRST), the parent company of BCL.

Compared with 1984 production, in 1985

the copper content of the BCL smelter product increased slightly to 21,692 tons, nickel content increased slightly to 19,565 tons, and cobalt decreased to 222 tons.

INDUSTRIAL MINERALS

Diamond.—Botswana continued to rank second in total world diamond production for the second consecutive year. The Government of Botswana did not disclose gem and industrial diamond production in 1985; however, estimates would still put Botswana as first in total gem diamond production and as second in total industrial diamond production.

The combined output of the three DeBeers Botswana Mining Co. Ltd. (Pty.) (Debswana) mines—Orapa, Letlhakane, and Jwaneng—totaled 15.1 million tons of ore yielding 12.6 million carats. Debswana was owned equally by the Government of Botswana and the DeBeers Co.

The Orapa Mine treated 7,620,000 tons of ore yielding 4,446,575 carats at a grade of 58.35 carats per 100 tons. Compared with the grade of 60.95 carats per 100 tons in 1984, a loss in grade of 4.27% was realized. Ore mining at the Orapa Mine proceeded over most of the kimberlite pipe area with an additional 739,000 tons of ore mined and stockpiled but not delivered to the plant. Most of this tonnage was low-grade kimberlite.

The Letlhakane Mine treated 2,485,000 tons of ore yielding 579,396 carats at a grade of 23.32 carats per 100 tons. Compared with the grade of 30.63 carats per 100 tons in 1984, a loss in grade of 23.87% was realized. The drop in grade was the result of mining the lower grade satellite pipe from mid-1985 until yearend.

The Jwaneng Mine treated 5,003,000 tons of ore yielding 7,608,957 carats at a grade of 152.09 carats per 100 tons. Compared with the grade of 149.02 carats per 100 tons in 1984, an increase in grade of 2.06% was realized. Mining centered in the larger center lobe of the kimberlite pipe. Stockpiling of low-grade ore continued.

Active prospecting for new diamond deposits continued. Two areas were evaluated in Botswana, but neither was promising.

Soda Ash.—Work by British Petroleum Botswana Ltd. (BP) on the Sua Pan soda ash mining project in the Makgadikgadi salt pans was delayed for undisclosed reasons. The project was to cost $200 million and was scheduled to produce potash, soda ash, and table salt. The project would include a soda ash refinery at Sua Pan, a packaging factory at Francistown, and other support facilities at Sua Pan. The plant would employ 500 people when in full operation and produce up to 300,000 tons per year. The principal market would be the Republic of South Africa. BP was the second group to consider the operation. The first group was BRST in 1974.

MINERAL FUELS

Proven in situ steam coal reserves of over 17 billion tons have been identified in Botswana. Development of these reserves commenced in 1973. A total of 3.69 million tons was mined from 1973 through 1985. The only coal operation in Botswana in 1985 was the Morupule Colliery near Palapye that commenced operation in 1973. The colliery came into production primarily to supply steam coal to BCL's nickel-copper smelter at Selebi-Phikwe and to the adjacent 65-megawatt powerplant near Morupule. Of the 437,053 tons of coal produced in 1985, 60% went to the Morupule power station, 38% went to the Selebi-Phikwe smelter complex, and 2% went for local domestic purposes. Power generated at the Morupule power station was used at the BCL mines, Selebi-Phikwe Township, Francistown, and the Orapa diamond mine.

A new 90-megawatt power station, scheduled for commissioning in 1986, was under construction near the Morupule Colliery. Plans were under way to increase the colliery production to 600,000 tons per year to meet the power station coal requirements. Power from the new facility was to be made a part of the national grid that connected Gaborone-Jwaneng in the south, Francistown in the east, and Orapa in the west.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Botswana pulas (P) to U.S. dollars at the rate of P1= US$0.5682.

The Mineral Industry of Brazil

By H. Robert Ensminger[1]

The mining and mineral industry of Brazil expanded its output in 1985, by approximately 12% over that of 1984. The total mineral production value of $10.3 billion[2] contributed 4.8% to the gross domestic product (GDP). The GDP reached a reported $229.1 billion in 1985, which was an increase of 7.4% over that of 1984. However, the economic growth was tempered by an inflation rate of 233%. Much of the growth was related to increased energy production. Energy and petroleum self-sufficiency reached 86% and 59%, respectively. According to Petróleo Brasileiro S.A. (PETROBRÁS), the state petroleum company, Brazil's expenditure for the purchase of imported petroleum decreased from almost $10 billion in 1981 to approximately $3.6 billion in 1985.

A study completed by the Departamento Nacional da Produção Mineral (DNPM) on the country's mineral prospects suggests that the mineral sector will maintain its high rate of growth at least into 1990 when the rate of expansion may slow somewhat. In November 1985, the Government released its National Development Plan, which was aimed at continuing high rates of industrial growth, bolstered by substantial investment in diversification and new technology.

The Carajás Grande project, undertaken by Cia. Vale do Rio Doce (CVRD), the state mining company, had by yearend cost $2.9 billion exclusive of interest and working capital.

On invitation from the Angola Diamond Co., representatives of Cia. de Pesquisa de Recursos Minerais (CPRM) visited Luanda to begin talks on possible cooperation in research on alluvial diamonds in the region of the Kaunzi River, Angola.

A wolframite (tungsten ore) deposit was discovered in the Serra dos Carajás area, and is being studied by Rio Doce Geologia e Mineração S.A., CVRD's exploration arm. Preliminary estimates put potential ore reserves at 320,000 tons assayed at 1.1% wolframite. The newly discovered deposit could equal the present annual production of wolframite of 94 tons per year.

In 1985, at least 12 multinational mining companies, CVRD, and domestic tin producers were known to be exploring for gold in Brazil.

Government Policies and Programs.—In December, the Government issued a decree specifying the terms and deadlines for the denationalization of 17 Government-operated companies. Among them were seven companies involved in the minerals industry. The companies were PETROBRÁS subsidiaries, Petrobrás Quimica S.A. and Petrobrás Distribuidora S.A.; and the steel companies, Cimetal Siderúrgia S.A. Cia. Ferro e Aco de Vitoria, Cia. Siderúrgica de Mogi das Cruzes, Usina Siderúrgica do Bahia S.A., and Usinas Siderúrgicas de Minas Gerais S.A. (USIMINAS).

The National Economic Development Bank (BNDE) placed 5 billion PETROBRÁS shares on the market. The BNDE is in charge of selling the shares with more than 300 brokers, distributors, and investment and commercial banks directly involved in selling the shares to the public. The Government also declared that the growth of the state-operated companies will be halted. No new state enterprises will be created, and existing state-operated companies will not be allowed to buy private firms. State-run companies will also be forbidden to engage in any new undertakings outside of their own fields.

CPRM, the state mineral resources research company, has been active in Mozambique where, with Organization of Petroleum Exporting Countries financing, the company undertook a research project on coal. A second coal research project was also under way in Mozambique concerning coal reserves. If the findings are satisfactory, Brazil hopes to sign a bilateral mining agreement that would satisfy some of its coal import requirements.

PRODUCTION

The 1985 increase in mineral production was mainly accounted for by iron ore, gold, bauxite, coal, phosphate rock, and tin, in that order. Other important mineral production included nickel, columbium (pyrochlore), manganese, titanium, potash, and diamonds. In addition, rising domestic demand accounted for increased production of aluminum, copper, lead, and zinc. DNPM estimated that illicit sales accounted for more than one-half of Brazil's overall gold production in 1985. Officially controlled production amounted to approximately 1 million troy ounces, while the DNPM estimated uncontrolled output at approximately 1 million troy ounces. Apparently substantial quantities find their way across the Uruguayan, Paraguayan, and Bolivian borders according to a senior DNPM official. Uruguay reportedly sold almost 1 million troy ounces to the United States in 1985, although virtually no gold was mined there. Total gold production rose approximately 13% over that of 1984.

According to the International Tin Council (ITC), Brazil ranked second to Malaysia in tin production. Productivity in 1985 increased approximately 33% over that of 1984. The ITC considered the large increase in Brazilian tin production as one of the paramount factors that led to the collapse of the tin market in October. Phosphate rock achieved record-high production as rated capacity was exceeded. The output forecast for 1986 is expected to be even greater than that for 1985.

At yearend 1985, DNPM was studying a request to revise the minerals tax on bauxite exported by Mineração Rio do Norte S.A. (MRN) in an effort to increase the company's production.

With the exception of diamonds, about 60% of all mineral stones and gems sold on the world market were produced by Brazilian garimpeiros (prospectors), according to DNPM. Brazil led the world in the production of agate, amethyst, aquamarine, emerald, and rose quartz.

Table 1.—Brazil: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984[p]	1985[e]
METALS					
Aluminum:					
Bauxite, dry basis, gross weight	[r]4,662,600	[r]4,186,500	5,238,700	6,433,100	[3]6,433,200
Alumina	496,639	606,177	786,648	891,300	891,000
Metal:					
Primary	256,418	299,054	400,744	454,999	[3]549,800
Secondary	36,040	46,280	43,016	48,946	50,000
Antimony, mine output, metal content	269	--	--	--	--
Beryllium: Beryl concentrate, gross weight	853	[r]1,135	943	1,407	1,500
Cadmium, metal, primary	45	73	189	225	[3]224
Chromium:					
Crude ore	926,413	668,000	468,737	709,000	710,000
Concentrate	152,859	158,500	110,978	128,910	135,000
Marketable product[4]	236,390	275,500	155,022	255,914	275,000
Columbium-tantalum ores and concentrates, gross weight:					
Columbite and tantalite	299	201	264	170	180
Djalmaite concentrate	13	4	7	10	10
Pyrochlore concentrate	29,886	19,593	19,663	16,247	32,000
Copper:					
Mine output, metal content	11,777	24,482	39,082	58,500	70,000
Metal, secondary	45,000	57,000	39,920	36,000	40,000
Gold:[e 5]					
Mine output troy ounces	150,000	260,421	NA	NA	500,000
Garimpeiros (prospectors) do	1,050,000	1,186,361	NA	NA	1,500,000
Total do	1,200,000	1,446,782	1,750,000	[3]1,768,305	2,000,000

See footnotes at end of table.

Table 1.—Brazil: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984[p]	1985[e]
METALS —Continued					
Iron and steel:					
Ore and concentrate, (marketable product):[4]					
Gross weight thousand tons	99,500	[r]93,159	88,716	112,057	120,000
Iron content do.	64,675	61,035	57,980	72,800	81,600
Metal:					
Pig iron[6] do.	10,796	10,827	12,945	17,200	[3]18,970
Ferroalloys, electric-furnace:					
Chromium metal	6	6	7	123	[3]124
Ferroboron	--	--	--	11	[3]29
Ferrocalcium silicon	7,481	9,657	7,400	17,755	[3]22,179
Ferrochromium	118,780	96,646	77,326	125,125	[3]127,288
Ferrochromium-silicon	8,655	2,598	5,526	7,628	[3]8,875
Ferrocolumbium	14,632	11,506	9,665	16,522	[3]17,676
Ferromanganese	107,872	120,743	103,271	106,459	[3]138,835
Ferromolybdenum	797	337	126	437	[3]509
Ferronickel	10,744	10,597	25,991	30,000	[3]9,399
Ferrophosphorus	346	22	1,211	926	[3]1,281
Ferrosilicon	120,662	115,314	156,683	157,873	[3]187,246
Ferrosilicon magnesium	11,002	11,275	10,698	15,429	[3]14,876
Ferrosilicon zirconium	497	503	85	244	[3]421
Ferrotitanium	498	430	166	551	[3]1,372
Ferrotungsten	95	74	228	239	[3]218
Ferrovanadium	296	238	102	456	[3]905
Inoculant	1,428	1,393	1,400	1,992	[3]1,748
Silicomanganese	142,743	172,358	167,333	185,631	[3]180,271
Silicon metal	18,957	17,921	20,602	26,783	29,477
Total	565,491	571,618	587,820	694,184	742,729
Steel, crude, excluding castings thousand tons	[r]11,346	[r]11,642	12,486	16,680	[3]18,557
Semimanufactures, flat and nonflat do.	[r]13,230	[r]12,999	14,660	18,385	[3]20,457
Lead:					
Mine output, metal content	21,650	19,360	18,821	16,692	[3]19,200
Metal:					
Primary	34,567	21,943	20,581	25,982	27,000
Secondary	[r]28,987	[r]26,322	28,939	37,700	40,000
Manganese ore and concentrate, marketable, gross weight[4]	2,042,144	2,340,979	2,091,631	2,693,131	2,400,000
Nickel:					
Mine output, metal content	[r]6,567	[r]14,451	15,561	21,670	24,000
Ferronickel, Ni content	[r]2,335	[r]3,471	8,314	9,187	12,000
Rare-earth metals: Monazite concentrate, gross weight	2,460	1,814	5,256	3,622	6,000
Silver[7] thousand troy ounces	765	760	486	829	850
Tin:					
Mine output, metal content	[r]8,297	[r]8,218	13,275	19,957	[3]26,514
Metal, smelter, primary	[r]7,789	9,298	12,950	18,877	21,000
Titanium concentrates, gross weight:					
Ilmenite	[r]15,856	[r]11,322	30,452	40,945	45,000
Rutile	[r]172	[r]234	463	412	500
Tungsten, mine output, metal content	1,576	[r]1,524	1,026	1,037	[3]1,175
Zinc:					
Concentrate and salable ore	400,631	596,971	662,126	573,260	600,000
Mine output, metal content	71,000	71,000	73,000	72,000	72,000
Metal, smelter:					
Primary	91,944	95,528	99,913	106,927	110,000
Secondary	19,000	14,400	11,045	7,522	10,000
Zirconium: Zircon concentrate, gross weight[8]	6,000	4,966	13,790	6,375	7,000
INDUSTRIAL MINERALS					
Asbestos:					
Crude ore	1,992,766	2,092,087	2,090,472	1,889,326	1,800,000
Fiber	138,417	145,998	158,855	134,788	[3]148,300
Barite:					
Crude	178,895	98,931	69,341	101,301	110,000
Beneficiated	98,804	122,219	100,106	104,920	110,000
Marketable product[4]	116,340	[r]140,243	127,039	143,173	145,000
Calcite	30,912	72,507	48,993	48,915	50,000
Cement, hydraulic thousand tons	26,051	25,644	20,870	25,000	27,000
Clays:					
Bentonite	166,338	164,060	128,691	201,025	200,000
Kaolin:					
Crude	1,063,480	1,243,520	1,241,252	1,569,063	1,500,000
Beneficiated	469,757	493,186	420,120	486,359	500,000
Marketable product[4]	556,753	[r]600,632	501,706	596,688	600,000
Other:					
Crude thousand tons	21,601	22,160	21,784	22,477	23,000
Beneficiated do.	2,229	1,442	1,034	984	1,000

See footnotes at end of table.

Table 1.—Brazil: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984[p]	1985[e]
INDUSTRIAL MINERALS —Continued					
Diamond:[e]					
Gem thousand carats	163	80	[r]80	[r]200	250
Industrial do.	926	450	450	[r]550	350
Total[9] do.	1,089	530	[r]530	[r]750	600
Diatomite:					
Crude	13,202	106,581	22,431	9,069	15,000
Beneficiated	8,858	13,131	8,663	7,641	9,000
Marketable product[4]	8,973	13,146	8,678	7,721	16,000
Feldspar and related materials:					
Feldspar, marketable product[4]	118,407	131,853	111,837	105,491	120,000
Leucite, marketable product[4]	536	209	3,588	3,680	4,000
Sodalite, crude, marketable product	[r]844,046	644	845	1,214	1,200
Total	[r]962,989	[r]132,706	116,270	110,385	125,200
Fluorspar:					
Crude	174,665	201,971	239,522	368,130	375,000
Concentrates, marketable product:					
Acid-grade	36,226	32,000	43,000	74,000	80,000
Metallurgical-grade	17,403	19,000	26,000	30,000	34,000
Total	53,629	51,000	69,000	104,000	114,000
Graphite:					
Crude	464,089	359,991	442,810	290,007	300,000
Marketable product:					
Direct-shipping crude ore	16,318	6,131	11,138	2,633	5,000
Concentrate	17,499	15,413	16,498	30,047	30,000
Total	33,817	21,544	27,636	32,680	35,000
Gypsum and anhydrite, crude	597,461	680,800	555,907	493,732	550,000
Kyanite:					
Crude	2,155	1,076	735	1,587	1,500
Marketable products[4]	1,590	423	526	1,290	1,200
Lime, hydrated and quicklime[e] thousand tons	5,000	5,000	5,000	5,000	--
Lithium mineral concentrates:					
Amblygonite	277	66	113	49	75
Lepidolite	2	74	1	([10])	--
Petalite	2,080	2,293	1,892	477	500
Spodumene	243	341	116	288	300
Total	2,602	2,774	2,122	814	875
Magnesite:					
Crude	618,251	505,385	486,374	724,280	500,000
Beneficiated	285,792	225,533	231,000	321,643	235,000
Mica, all grades[11]	787	878	3,595	3,601	3,500
Nitrogen: N content of ammonia	375,700	503,200	738,100	750,000	750,000
Phosphate rock including apatite:					
Crude:					
Mine product thousand tons	16,441	25,070	19,898	22,704	25,000
Of which, sold directly do.	53	7,395	32	29	30
Concentrate:					
Gross weight do.	2,658	2,767	3,208	3,798	4,214
P_2O_5 content do.	1,083	887	1,069	1,305	1,300
Pigments, mineral: Other, crude	4,153	5,272	3,820	4,254	4,500
Precious and semiprecious stones except diamond, crude and worked:[11]					
Agate kilograms	1,424,381	1,038,287	966,095	1,799,651	1,825,000
Amethyst do.	234,198	195,502	244,269	336,978	350,000
Aquamarine do.	3,807	24,479	4,727	10,294	15,000
Cat's-eye do.	30	NA	2	220	250
Citrine do.	52,094	29,760	30,572	30,511	35,000
Emerald do.	10,538	7,646	9,640	6,259	7,500
Garnet do.	2	16	241	313	500
Opal do.	103	46	48	679	600
Ruby value	--	NA	$17,868	$17,455	$17,000
Sapphire do.	--	NA	$9,814	$14,613	$15,000
Topaz kilograms	4,011	3,631	3,822	682	2,500
Tourmaline do.	4,319	2,669	12,498	5,596	8,000
Turquoise value	NA	--	$1,051	$1,000	$1,000
Other kilograms	249,660	188,674	620,796	544,593	600,000
Quartz crystal, all grades	5,154	7,421	9,681	8,141	9,000
Salt:					
Marine thousand tons	2,766	2,888	3,259	3,578	3,700
Rock do.	839	836	928	950	950
Silica (silex)	4,517	7,978	2,200	1,479	2,000

See footnotes at end of table.

Table 1.—Brazil: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984[p]	1985[e]
INDUSTRIAL MINERALS —Continued					
Sodium compounds:					
Caustic soda	759,000	760,000	875,000	950,000	950,000
Soda ash, manufactured (barilla)	188,000	199,000	210,000	215,000	220,000
Stone, sand and gravel:					
Dimension stone:					
Marble, rough-cut ... cubic meters	66,839	122,114	141,280	174,531	170,000
Slate	19,464	4,411	98,009	60,801	75,000
Crushed and broken stone:					
Basalt ... cubic meters	438,391	329,564	153,733	484,302	450,000
Calcareous shells	1,212,252	1,328,960	1,214,171	994,545	1,000,000
Dolomite ... thousand tons	1,961	1,954	1,714	1,917	1,900
Gneiss ... cubic meters	218,025	249,798	190,563	376,001	350,000
Granite ... thousand cubic meters	49,225	43,720	35,261	38,815	40,000
Limestone ... thousand tons	52,066	49,027	44,918	45,757	45,000
Quartz[12]	144,707	67,527	83,590	109,964	105,000
Quartzite:					
Crude	795,104	636,797	250,352	235,314	300,000
Processed	122,700	102,826	93,246	100,825	100,000
Sand ... thousand cubic meters	35,876	40,088	24,450	24,957	30,000
Sulfur:					
Frasch ... thousand tons	--	--	1	1	2
Pyrites ... do	44	54	55	55	60
Byproduct:					
Metallurgy ... do	17	30	150	150	165
Petroleum ... do	102	100	110	110	120
Total ... do	163	184	316	316	347
Talc and related materials:					
Talc, marketable product[4]	325,191	328,644	326,145	348,915	350,000
Pyrophyllite, marketable product[4]	178,464	76,624	70,318	64,432	75,000
Other: Agalmatolite, marketable product	49,147	63,068	42,967	86,268	90,000
Vermiculite:					
Crude	77,997	43,316	42,337	49,890	50,000
Marketable product[4]	14,307	14,059	9,877	9,157	10,000
MINERAL FUELS AND RELATED MATERIALS					
Coal, bituminous, marketable[4] ... thousand tons	[r]6,086	[r]5,835	6,935	7,752	8,000
Coke, metallurgical, all types ... do	[r]1,188	960	1,247	1,010	1,000
Gas, natural:					
Gross ... million cubic feet	[r]87,403	106,968	141,700	173,119	200,400
Marketed ... do	1,677	989	141,700	173,119	200,400
Natural gas liquids ... thousand 42-gallon barrels	[r]2,555	2,950	4,015	5,475	6,500
Petroleum:					
Crude ... do	77,895	94,738	120,378	168,788	[3]205,500
Refinery products:					
Gasoline ... do	71,100	74,539	64,300	69,999	75,000
Jet fuel ... do	23,360	19,975	17,600	18,000	20,000
Kerosene ... do	NA	4,024	4,500	5,000	5,500
Distillate fuel oil ... do	216,502	122,105	113,900	126,784	140,000
Residual fuel oil ... do	NA	89,397	80,300	90,000	100,000
Lubricants ... do	3,755	4,801	4,800	5,500	6,000
Other ... do	NA	NA	NA	NA	70,000
Refinery fuel and losses ... do	NA	NA	NA	NA	12,000
Total ... do	NA	NA	NA	NA	428,500

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.

[1]Table includes data available through Sept. 1986.

[2]In addition to the commodities listed, bismuth, molybdenite, and uranium oxide are produced, but output is not reported, and available information is inadequate to make reliable estimates of output levels.

[3]Reported figure.

[4]Direct sales and beneficiated.

[5]Officially reported figures are as follows, in troy ounces: major mines: 1981—140,691; 1982—148,408; 1983—199,206; 1984—not available; and 1985—not available. Small mines (garimpos): 1981—414,744; 1982—671,982; 1983—1,526,775; 1984—not available; and 1985—not available.

[6]Includes sponge iron as follows, in thousand metric tons: 1981—226; 1982—226 (estimated); 1983—255 (estimated); 1984—246 (estimated); and 1985—285.

[7]Partially revised officially reported output; of total production, the following quantities are identified as placer silver (the balance being silver content of other ores and concentrates), in thousand troy ounces: 1981—144; 1982—123; 1983—247; 1984—not available; and 1985—not available.

[8]Includes baddeleyite-caldasite.

[9]Figures represent officially reported output plus official Brazilian estimates of output by nonreporting miners; officially reported output was as follows, in thousand carats: 1981—136; 1982—not available; 1983—not available; 1984—not available; and 1985—not available.

[10]Revised to zero.

[11]Exports.

[12]Apparently includes crude quartz used to produce quartz crystal (listed separately in this table) as well as additional quantities of common quartz.

TRADE

Brazil recorded a $12.45 billion overall trade surplus in 1985, which was approximately $350 million less than the figure for 1984. The United States recorded a trade deficit with Brazil of $5 billion for the year, which was below the level reached in 1984. Brazil exported an estimated 6.5 million tons of steel products. Iron ore exports reached 92.3 million tons, a new record high. Tin exports of 20,000 tons also set a record high.

The Government signed a long-term countertrade agreement with Peru that will total $600 million annually. It provides for the export of capital goods, manufactured products, and foodstuffs to Peru in exchange for various minerals including copper, gold, lead, oil, silver, and zinc. Of the $300 million worth of imports to Brazil each year, about 10% will be reexported.

At yearend, China and the Government of Brazil signed a bilateral trade agreement. The total value of the agreement over the next 3 years was expected to be near $1.5 billion. Brazil will export 550,000 tons of rolled steel products, 1 million tons of pig iron, 2.5 million tons of iron ore, and 50,000 tons of aluminum ingots in exchange for petroleum from China. China has set up the China National Metals & Minerals Import and Export Corp. in Rio de Janeiro to aid in negotiations on trade, technology, and cultural exchanges between the two countries.

The Government of Brazil granted Suriname a $20 million line of credit, and agreed to increase purchases of alumina by 50% to 130,000 tons annually. In return, Suriname will use the credit to buy raw materials and consumer goods from Brazil.

CVRD and Tiajpromexport (U.S.S.R.) exchanged letters of intent in November for promotion of the following projects in Brazil: (1) Construction of a pig iron production plant in the Ponta de Madeira port area (1.5-million-ton-per-year capacity), and (2) construction of a ferromanganese plant in the Carajás area (150,000-ton-per-year capacity). The U.S.S.R. was to provide technical and financial assistance in the construction of the above plants.

Table 2.—Brazil: Exports and reexports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS				
Aluminum:				
Ore and concentrate thousand tons	3,989	4,247	881	Canada 1,534; Venezuela 1,421.
Oxides and hydroxides	7,102	43,213	37,085	Argentina 5,307; Paraguay 535.
Metal including alloys:				
Unwrought	116,325	147,923	58,275	Japan 28,564; China 23,268.
Semimanufactures	38,324	47,378	18,623	Saudi Arabia 5,969; Pakistan 4,247.
Antimony:				
Oxides	56	--		
Metal including alloys, all forms	--	5	--	All to Argentina.
Beryllium: Ore and concentrate	943	1,021	1,021	
Cadmium: Metal including alloys, all forms	--	33	--	Netherlands 30; Argentina 3.
Chromium:				
Ore and concentrate	--	2	--	All to Uruguay.
Oxides and hydroxides kilograms	100	101,300	--	Finland 100,000; Uruguay 1,000; Chile 300.
Metal including alloys, all forms	10	--		
Cobalt: Metal including alloys, all forms	34	97	22	Netherlands 75.
Columbium and tantalum: Ore and concentrate	129	255	211	Netherlands 32; Japan 12.
Copper:				
Ore and concentrate	--	20,124	--	Republic of Korea 10,124; Japan 10,000.
Matte and speiss including cement copper	246	981	--	Japan 643; Belgium-Luxembourg 338.
Metal including alloys:				
Unwrought	21	342	342	
Semimanufactures	16,042	34,552	28,628	Canada 2,066; Singapore 946.
Gold: Metal including alloys, unwrought and partly wrought troy ounces	6	--		

See footnotes at end of table.

Table 2.—Brazil: Exports and reexports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued				
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite thousand tons	74,200	187,589	3,086	Japan 120,799; West Germany 17,955; Italy 9,441.
Metal:				
Scrap	40	500	--	All to Spain.
Pig iron, cast iron, related materials	1,803,332	3,069,126	355,384	China 1,444,226; Japan 354,431.
Ferroalloys:				
Ferroaluminum	--	90	60	Argentina 30.
Ferrochromium	38,048	53,880	8,850	Japan 32,868; Belgium-Luxembourg 5,500; Netherlands 5,500.
Ferrocolumbium	9,256	13,771	2,795	Netherlands 4,209; Japan 2,009.
Ferromanganese	49,511	21,302	8,550	Colombia 5,300; Netherlands 4,000.
Ferromolybdenum kilograms	1,000	100	--	All to Uruguay.
Ferronickel	15,494	11,175	350	West Germany 7,148; Finland 2,118; Netherlands 1,393.
Ferrosilicomanganese	123,708	100,388	32,748	Japan 58,518; Netherlands 4,000.
Ferrosilicon	111,846	89,874	15,787	Japan 64,735; Pakistan 3,119.
Ferrotungsten	222	61	37	Argentina 14; Japan 10.
Silicon	14,486	17,268	6,056	Japan 9,014; France 1,470.
Unspecified	7,538	13,401	10,144	Australia 931; Canada 557.
Steel, primary forms	465,467	1,445,316	237,287	Argentina 291,517; Japan 145,795.
Semimanufactures:				
Bars, rods, angles, shapes, sections	1,430,204	2,137,603	459,967	Algeria 718,557; China 286,863.
Universals, plates, sheets	2,955,593	2,720,856	293,134	China 572,676; Japan 418,966.
Hoop and strip	22,001	115,200	107,334	Mexico 1,080; Paraguay 923.
Rails and accessories	240	236	69	Netherlands 154; Iraq 9.
Wire	35,166	54,364	25,018	Nigeria 6,200; Australia 5,554.
Tubes, pipes, fittings	229,479	676,776	528,247	Egypt 33,203; Colombia 32,757.
Castings and forgings, rough	4,614	8,855	6,520	Chile 1,645; Belgium-Luxembourg 224.
Lead:				
Oxides kilograms	105	--		
Metal including alloys, all forms	31	7	(2)	Mainly to Paraguay.
Lithium:				
Ore and concentrate	17	--		
Oxides and hydroxides kilograms	5	--		
Magnesium: Metal including alloys, semimanufactures do	152	4	--	All to Paraguay.
Manganese:				
Ore and concentrate, metallurgical-grade	747,436	878,976	97,163	Czechoslovakia 108,729; U.S.S.R. 100,896; United Kingdom 92,319.
Oxides	1,884	3,991	779	Argentina 1,477; Mexico 817.
Metal including alloys, all forms kilograms	10	--		
Molybdenum: Metal including alloys, all forms do	152	59	--	Turkey 45; Peru 8; Uruguay 4.
Nickel: Metal including alloys:				
Unwrought	45	381	153	Argentina 155; Hungary 51.
Semimanufactures	36	51	(2)	Argentina 45; Colombia 2; Mexico 2.
Platinum-group metals: Metals including alloys, unwrought and partly wrought, platinum troy ounces	6	161	--	All to Spain.
Silver: Metal including alloys, unwrought and partly wrought do	51,763	122,108	--	Republic of South Africa 64,301; Chile 30,318; West Germany 26,235.
Tin: Metal including alloys:				
Unwrought	8,820	14,602	10,781	Bulgaria 820; Argentina 766.
Semimanufactures	1	3	--	United Kingdom 2; Argentina 1.
Titanium:				
Oxides kilograms	350	450	--	All to Uruguay.
Metal including alloys, all forms	--	3	3	
Tungsten:				
Ore and concentrate	1,482	970	296	West Germany 448; Netherlands 161.
Metal including alloys, all forms	1	--		
Zinc:				
Oxides	27	37	--	Chile 33; Bolivia 2; Paraguay 2.
Blue powder	--	3	--	All to Uruguay.
Metal including alloys:				
Unwrought	20	20	--	Argentina 10; Uruguay 7; Paraguay 2.
Semimanufactures	25	14	--	Paraguay 11; Uruguay 3.

See footnotes at end of table.

Table 2.—Brazil: Exports and reexports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued				
Other:				
Ores and concentrates	1,072	3,279	3,234	Netherlands 32; Japan 13.
Ashes and residues	1,979	26,257	63	Switzerland 12,927; Republic of Korea 10,897; Japan 1,129.
Base metals including alloys, all forms	15	11	10	Japan 1.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	2	15	--	Japan 8; Venezuela 7.
Artificial:				
Corundum	18,576	29,362	4,319	Argentina 6,997; Japan 6,251.
Silicon carbide	5,575	5,854	1,450	Japan 2,988; Australia 426.
Grinding and polishing wheels and stones	877	1,094	161	Chile 189; Ecuador 95.
Asbestos, crude	11,750	19,716	--	Mexico 5,166; Argentina 4,686; India 4,365.
Barite and witherite	6,300	12,717	--	Venezuela 12,706; Argentina 11.
Cement	19,553	102,365	1,159	Paraguay 81,764; India 10,200; Congo 4,135.
Chalk	10	235	--	Paraguay 225; Venezuela 10.
Clays, crude:				
Bentonite	1,890	99	--	Peru 40; Paraguay 21; Venezuela 21.
Chamotte earth	--	79	--	Argentina 40; Uruguay 20; Spain 10.
Kaolin	181,555	195,830	--	Belgium-Luxembourg 69,289; Japan 50,204; Italy 48,142.
Unspecified	573	988	--	Uruguay 920; Bolivia 30; Paraguay 30.
Diamond:				
Gem, not set or strung carats	23,305	21,200	9,160	Switzerland 6,775; Belgium-Luxembourg 2,905.
Industrial stones do	--	35	35	
Dust and powder do	--	1,955	--	Argentina 1,800; Uruguay 155.
Diatomite and other infusorial earth	5	18	--	Uruguay 13; Nigeria 5.
Feldspar	4,000	2	--	Mainly to Venezuela.
Fertilizer materials: Manufactured:				
Ammonia	125,191	42,525	--	Mozambique 35,010; Denmark 7,290; Uruguay 160.
Nitrogenous	142,414	16,393	--	Uruguay 12,689; Argentina 1,560; Paraguay 1,476.
Phosphatic	7,624	9,153	--	Paraguay 4,252; Uruguay 3,250; Argentina 1,620.
Potassic	953	865	--	Paraguay 516; Argentina 320; Uruguay 29.
Unspecified and mixed	115,214	27,835	--	Paraguay 21,065; Uruguay 3,217; Bolivia 2,148.
Fluorspar	1	1,012	--	Argentina 1,000; Uruguay 12.
Graphite, natural	5,578	5,082	2,825	Italy 1,032; Republic of South Africa 857.
Gypsum and plaster	54	30	--	All to Paraguay.
Kyanite and related materials: Unspecified	--	18	--	All to Finland.
Lime	3,665	2,149	--	Paraguay 2,135; Bolivia 14.
Magnesium compounds:				
Magnesite	4	--		
Oxides and hydroxides	73,735	97,215	8,450	Poland 52,485; Venezuela 12,919.
Other	67	52	--	Argentina 45; Peru 4; Uruguay 3.
Mica:				
Crude including splittings and waste	3,407	3,265	258	United Kingdom 2,901; Mexico 50.
Worked including agglomerated splittings kilograms	500	500	--	All to Uruguay.
Pigments, mineral:				
Natural, crude	12	--		
Iron oxides and hydroxides, processed	352	500	290	Paraguay 51; Ecuador 44.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$23,905	$57,065	$33,346	Switzerland $9,819; Japan $7,232.
Synthetic do	$23	$373	--	Japan $366; Taiwan $7.
Salt and brine	243,224	348,114	302,430	Uruguay 27,001; Nigeria 9,290.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	7	192	5	Paraguay 73; Republic of South Africa 72; Canada 17.
Sulfate, manufactured kilograms	1,500	30	--	Argentina 20; Paraguay 10.

See footnotes at end of table.

Table 2.—Brazil: Exports and reexports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	101,556	144,990	2,612	Italy 109,774; Japan 18,377; Spain 2,814.
Worked	7,671	10,854	6,567	Japan 2,844; Paraguay 283.
Dolomite, chiefly refractory-grade	646	586	--	Argentina 386; Uruguay 200.
Gravel and crushed rock	2,634	6,901	--	Bolivia 6,840; Chile 61.
Limestone other than dimension	r1,206	3,000	--	Paraguay 2,975; Uruguay 25.
Quartz and quartzite	10,226	5,691	356	Japan 2,417; West Germany 1,031; Italy 888.
Sand other than metal-bearing	5,675	4,177	--	Colombia 2,740; Argentina 1,437.
Sulfur:				
Elemental, all forms	34	319	--	Paraguay 270; Uruguay 34; Costa Rica 15.
Sulfuric acid	292	151	--	Paraguay 74; Bolivia 69; Venezuela 4.
Talc, steatite, soapstone, pyrophyllite	1,295	3,142	168	Venezuela 2,200; Paraguay 516.
Vermiculite	999	1,136	1,000	Australia 126; Chile 10.
Other:				
Crude	199	108	--	Liberia 100; Japan 6; Australia 2.
Slag and dross, not metal-bearing	200	400	--	All to Argentina.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	--	2,047	--	All to Peru.
Carbon black	469	1,503	--	Argentina 618; Uruguay 363; Mozambique 360.
Coal: Anthracite	717	600	--	All to Argentina.
Coke and semicoke	28	54	(2)	Uruguay 44; Paraguay 10.
Petroleum:				
Crude thousand 42-gallon barrels	r357	--		
Refinery products:				
Liquefied petroleum gas do.	493	482	(2)	Paraguay 167; Argentina 162; Suriname 128.
Gasoline do.	r13,038	195,670	104,941	Nigeria 87,168; Colombia 670.
Mineral jelly and wax do.	284	366	213	Mexico 41; Netherlands 29.
Kerosene and jet fuel do.	4,296	18,443	984	Nigeria 11,486; Zaire 1,911; Netherlands Antilles 1,843.
Distillate fuel oil do.	5,022	100,979	87,924	Zaire 4,950; Senegal 2,368.
Lubricants do.	1,068	1,195	120	Mexico 375; Nigeria 293; Netherlands 196.
Nonlubricating oils do.	69	71	--	Netherlands 14; Mexico 7.
Residual fuel oil do.	r11,639	13,064	11,813	Italy 905; Ireland 345.
Bitumen and other residues do.	26	50	--	Paraguay 33; Chile 12; Congo 2.
Bituminous mixtures do.	4	14	--	Paraguay 12; Congo 1.

rRevised.
[1]Table prepared by H. D. Willis.
[2]Less than 1/2 unit.

Table 3.—Brazil: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS				
Alkali and rare-earth metals: Unspecified	40	127	78	West Germany 38; United Kingdom 9.
Aluminum:				
Ore and concentrate	5,020	11,159	1,000	Guyana 10,150; United Kingdom 9.
Oxides and hydroxides	202,824	183,724	236	Netherlands 148,065; Jamaica 33,870; Canada 637.
Metal including alloys:				
Scrap	4,128	210	210	
Unwrought	2,958	4,584	107	Italy 1,656; Argentina 1,509; Netherlands 1,099.
Semimanufactures	1,330	2,465	1,201	France 827; Japan 129.

See footnotes at end of table.

Table 3.—Brazil: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Beryllium: Metal including alloys, all forms ______ value, thousands__	$1	$3	--	All from West Germany.
Chromium:				
Ore and concentrate ___________	5,897	20,674	--	Philippines 13,919; Republic of South Africa 6,755.
Oxides and hydroxides _________	50	62	(2)	United Kingdom 36; West Germany 24; Japan 2.
Cobalt: Oxides and hydroxides _______	21	4	1	West Germany 3.
Columbium and tantalum: Metal including alloys, all forms, tantalum _____ value, thousands__	$83	$22	$20	West Germany $2.
Copper:				
Ore and concentrate ___________	89,159	87,553	--	All from Chile.
Metal including alloys:				
Scrap _________________	441	854	58	Chile 796.
Unwrought______________	56,442	107,136	117	Chile 79,234; Peru 8,776; Bahamas 5,709.
Semimanufactures _________	1,957	1,320	39	United Kingdom 581; Netherlands 163; France 150.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite ____________	14	16	13	Switzerland 3.
Metal:				
Scrap _________________	--	30,506	29,875	Paraguay 631.
Pig iron, cast iron, related materials _____________	4,840	4,578	1,593	Argentina 1,900; Canada 470.
Ferroalloys_____________	520	325	87	Sweden 154; West Germany 30.
Steel, primary forms ________	6,813	111	--	West Germany 56; Japan 29; France 26.
Semimanufactures:				
Bars, rods, angles, shapes, sections ____________	15,175	25,604	569	United Kingdom 16,988; West Germany 5,507; Sweden 1,359.
Universals, plates, sheets __	30,775	29,926	329	France 11,684; West Germany 6,394; Japan 4,854.
Hoop and strip _________	4,430	5,132	795	West Germany 2,531; United Kingdom 867.
Rails and accessories _____	19,688	30,125	33	Japan 29,390; West Germany 414; Belgium-Luxembourg 241.
Wire _______________	1,509	2,780	157	Italy 1,354; Japan 676; West Germany 323.
Tubes, pipes, fittings _____	5,487	7,595	522	France 2,493; West Germany 1,939; Japan 1,416.
Castings and forgings, rough	79	58	2	West Germany 53; Italy 3.
Lead:				
Ore and concentrate ___________	6,591	10,724	--	Ireland 5,260; Belgium-Luxembourg 2,835; Peru 2,629.
Oxides ___________________	488	240	1	Mexico 239.
Metal including alloys:				
Scrap _________________	2,849	6,543	6,543	
Unwrought_____________	649	2,151	18	Canada 1,499; Trinidad and Tobago 425; Mexico 209.
Magnesium: Metal including alloys:				
Scrap ___________________	183	13	--	All from Netherlands.
Unwrought ________________	6,191	4,363	631	Norway 3,732.
Semimanufactures____________	--	2	2	
Manganese:				
Ore and concentrate, metallurgical-grade_________________	19,206	1,006	--	Mexico 1,000; Republic of South Africa 6.
Oxides ___________________	54	14	14	
Mercury ________ 76-pound flasks__	2,669	5,134	638	Mexico 3,655; Spain 406.
Molybdenum: Metal including alloys, all forms ___________________	41	51	24	West Germany 16; Netherlands 6.
Nickel:				
Matte and speiss value, thousands__	$28	$62	$62	
Metal including alloys:				
Unwrought_____________	174	339	40	Norway 150; Canada 117.
Semimanufactures _________	177	151	103	West Germany 33; Switzerland 6.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands__	$2,566	$4,000	$1,252	West Germany $2,500; United Kingdom $113.

See footnotes at end of table.

Table 3.—Brazil: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984	
			United States	Other (principal)
METALS —Continued				
Silver: Metal including alloys, unwrought and partly wrought value, thousands	$38,433	$23,718	$5,692	Peru $16,897; West Germany $872.
Tin: Metal including alloys, semimanufactures	9	5	(2)	Mainly from West Germany.
Titanium: Oxides	1,475	1,010	53	France 503; West Germany 340; Belgium-Luxembourg 100.
Tungsten:				
Ore and concentrate	1,465	2,615	64	Chile 2,540; West Germany 5.
Metal including alloys, all forms	80	47	15	West Germany 14; United Kingdom 9.
Zinc:				
Ore and concentrate	58,695	60,098	--	Peru 39,995; Canada 15,339; Mexico 4,764.
Oxides	288	110	13	Netherlands 70; West Germany 20.
Blue powder	17	21	17	West Germany 4.
Metal including alloys:				
Unwrought	3,599	3,769	--	Mexico 2,137; Canada 1,223; West Germany 284.
Semimanufactures	14	145	36	West Germany 108; Sweden 1.
Other:				
Ores and concentrates	30,009	46,567	665	Sri Lanka 35,729; Bulgaria 4,752; Republic of South Africa 3,605.
Oxides and hydroxides	230	220	2	West Germany 188; Italy 30.
Ashes and residues	3,692	17,951	4,451	Republic of South Africa 13,000; Canada 500.
Base metals including alloys, all forms	2,742	2,026	315	Republic of South Africa 1,059; West Germany 139.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	707	987	446	Italy 498; West Germany 42.
Artificial:				
Corundum	151	318	33	Japan 171; France 54; West Germany 38.
Silicon carbide	133	1,266	6	Argentina 841; Norway 271; West Germany 88.
Dust and powder of precious and semiprecious stones including diamond value, thousands	$3,883	$3,255	$2,490	Ireland $278; West Germany $247.
Grinding and polishing wheels and stones	114	190	34	Canada 80; West Germany 29.
Asbestos, crude	7,772	3,791	109	Canada 2,331; Republic of South Africa 998; Italy 349.
Barite and witherite	44	133	--	Argentina 100; West Germany 30; Switzerland 3.
Boron materials:				
Crude natural borates	5,964	15,088	355	Peru 7,441; Argentina 7,192.
Oxides and acids	2,993	4,180	216	Argentina 2,876; France 820; West Germany 246.
Cement	2,399	1,948	1,081	France 798; Spain 60.
Chalk	49	--		
Clays, crude	12,934	17,151	10,145	Argentina 5,681; France 800.
Cryolite and chiolite kilograms	21,000	141	91	West Germany 50.
Diamond:				
Gem, not set or strung value, thousands	$691	$70	--	All from Switzerland.
Industrial stones do	$509	$250	$229	Ireland $11; West Germany $7.
Diatomite and other infusorial earth	2,217	1,303	284	Mexico 761; West Germany 165.
Feldspar, fluorspar, related materials	5	2	--	All from Switzerland.
Fertilizer materials: Manufactured:				
Ammonia	16,000	34,429	--	U.S.S.R. 17,877; Trinidad and Tobago 16,552.
Nitrogenous	429,342	603,376	297,941	Netherlands 126,203; West Germany 95,633.
Phosphatic	1,325	60,665	52,215	Uruguay 6,250; Portugal 2,200.
Potassic	1,216,753	1,793,981	281,497	East Germany 694,719; Canada 476,179.
Unspecified and mixed	86,500	160,576	97,289	Chile 63,223; West Germany 55.
Graphite, natural	2	41	(2)	Madagascar 36; West Germany 4.
Gypsum and plaster	1	1	1	
Lime	71	20	--	All from Belgium-Luxembourg.
Magnesite	697	1,268	226	Republic of South Africa 700; West Germany 230.

See footnotes at end of table.

Table 3.—Brazil: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Mica:				
Crude including splittings and waste	109	--		
Worked including agglomerated splittings	43	48	9	Belgium-Luxembourg 21; France 14.
Nitrates, crude	9,667	9,707	--	All from Chile.
Phosphates, crude	5	9,449	9,449	
Pigments, mineral: Iron oxides and hydroxides, processed	1,328	776	98	West Germany 653; Japan 16.
Precious and semiprecious stones other than diamond:				
Natural ----- value, thousands	$37	$410	--	All from Switzerland.
Synthetic ---- do	$19	$54	$4	Switzerland $44; West Germany $6.
Pyrite, unroasted	31	60	1	West Germany 59.
Salt and brine	6	37	([2])	Mainly from Italy.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	70,224	1,093	402	West Germany 380; United Kingdom 210.
Sulfate, manufactured	101,803	33,627	810	Chile 18,876; Mexico 9,765.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	--	15	--	Italy 10; France 5.
Worked	6	--		
Dolomite, chiefly refractory-grade	1,419	470	--	Austria 320; Italy 100; West Germany 50.
Gravel and crushed rock	--	100	--	Mainly from France.
Quartz and quartzite	35	1	([2])	Do.
Sand other than metal-bearing	490	7	7	
Sulfur:				
Elemental:				
Crude including native and byproduct	953,789	1,174,132	211,729	Canada 547,494; Poland 401,431.
Colloidal, precipitated, sublimed	537	499	469	France 27; West Germany 3.
Sulfuric acid	54,134	192,029	32,783	Spain 89,030; Canada 46,749.
Talc, steatite, soapstone, pyrophyllite	36	18	18	
Other:				
Crude	10,159	5,321	437	Argentina 4,741; Mexico 78.
Slag and dross, not metal-bearing	27,414	8,423	--	Republic of South Africa 6,825; West Germany 1,598.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	139	139	99	Argentina 40.
Carbon black	3,049	2,550	958	West Germany 363; East Germany 321.
Coal: All grades excluding briquets thousand tons	6,295	8,104	4,272	Poland 1,813; Canada 1,173.
Coke and semicoke	220,531	55,061	--	West Germany 30,050; Poland 14,070; Colombia 8,741.
Petroleum:				
Crude thousand 42-gallon barrels	267,243	236,601	--	Iraq 68,149; Saudi Arabia 46,944; Nigeria 32,298.
Refinery products:				
Liquefied petroleum gas do	5,873	2,939	([2])	Saudi Arabia 1,510; Angola 611; Algeria 271.
Gasoline do	965	758	99	Netherlands Antilles 427; Trinidad and Tobago 84.
Mineral jelly and wax 42-gallon barrels	1,031	504	55	Republic of South Africa 236; Denmark 79; Belgium-Luxembourg 63.
Distillate fuel oil thousand 42-gallon barrels	1,706	([2])	NA	NA.
Lubricants do	159	147	29	Romania 107; Netherlands Antilles 6.
Nonlubricating oils do	81	97	([2])	Mainly from Romania.
Residual fuel oil do	4,128	1,008	--	Argentina 731; Uruguay 229; Paraguay 48.
Petroleum coke do	105	601	326	Netherlands 236; United Kingdom 28.

NA Not available.
[1]Table prepared by H. D. Willis.
[2]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Alumina, Aluminum, and Bauxite.—In 1985, Brazil produced approximately 550,000 tons of aluminum, exceeding the preceding year's total by nearly 21%. The aluminum export total of 177,200 tons almost 20% over the figure for the preceding year.

The Alumínio Brasileiro S.A. aluminum smelter, at Bacarena in the Amazon region of the State of Pará, was inaugurated in October. The plant was brought on-stream at a cost of approximately $1.3 billion. It is a joint venture between CVRD, which holds 51% of the equity, and Nippon Amazon Aluminium Co., which holds 49%. Nippon Amazon is a Japanese Government-headed consortium of 33 companies. Since the inauguration, there has been a conflict of opinion between the two owners. CVRD is anxious to complete the project as soon as possible while Nippon Amazon wants to limit its future investment in the company.

Vale do Sul Alumínio S.A. (VALESUL) toward yearend was studying plans to expand aluminum ingot production, from 90,000 tons per year to 200,000 tons per year. The expansion cost would be approximately $220 million.

Billiton Metais S.A., Royal Dutch/Shell's Brazilian mining arm, planned to invest $50 million on two aluminum operations. The Alumínio do Maranhão S.A. project in São Luiz, Maranhão, in which Billiton Metais is a minority partner (29%) with the Aluminum Co. of America (Alcoa) (71%), will get $33 million. Another $15 million will be split between Royal Dutch/Shell's 4% share of VALESUL, a partnership with CVRD and Reynolds Metals Co. (United States), and two bauxite mines in the State of Pará.

At yearend, Reynolds Metals Co. approved the construction of a $55 million aluminum can plant at Pauso Alegre, Minas Gerais. The company plans to begin construction in 1986 with completion slated for 1987. Capacity will be 200 million two-piece units annually. Can sheet aluminum is to be supplied by the Aluminum Co. of Canada Ltd. its local smelting and rolling facilities.

Aluminum producers in Brazil believe that the sector's primary challenge is the development of a marketing policy that increases per-capita domestic consumption to world levels while continuing aluminum exports. Producers also want low-cost electric energy in order to maintain competitiveness of the Brazilian aluminum industry. With energy price subsidies, the industry expects that within the next 10 years Brazil could be the world's third largest aluminum producer.

Alumina production for 1985 was very close to the figure for the preceding year, which was 891,300 tons. Brazil's bauxite production for 1985 increased the level of production over that of 1984. MRN was by far the largest producer with an output of approximately 75% of the total of 6.43 million tons. All of MRN's production was from the Trombetas Mine in the State of Pará. MRN also was the largest exporter of bauxite with approximately 90% of the total. Brazil exported an estimated 5 million tons of bauxite in 1985, an apparent increase of 8% above that of the preceding year. At the beginning of 1985, DNPM estimated the measured and indicated bauxite reserves to be in excess of 2.2 billion tons, which constituted 10% of the world's total reserve base. Almost 90% of Brazilian bauxite reserves are in the northern State of Pará in the regions of Almeirim, Juriti, Paragominas, Serra dos Carajás, and Trombetas. By far, the largest volume of bauxite produced came from Trombetas. The Carajás bauxite is powdery and has a high iron content; therefore, it will probably be mined after the other, better quality reserves have been exhausted.

Billiton Metais consolidated plans to reactivate two old bauxite mines in the State of Pará, which in conjunction with Alcoa Alumínio do Brazil S.A. were purchased from an entrepreneur. The mines, Crusalta and Monte Branco, have estimated reserves of 210 million tons. Production is programmed to reach 1.25 million tons annually by 1989 providing the price remains at least at the 1985 level.

Columbium.—In 1985, Brazil produced approximately 88% of the world's output of columbium in the form of the mineral pyrochlore. Pyrochlore production reached an estimated 32,000 tons while 17,700 tons of ferrocolumbium and columbium oxide were produced. The pyrochlore mine at Araxa, Minas Gerais, in operation since 1961, is the largest known columbium deposit in the world, and is owned and operated by Cia. Brasileira de Metalurgia e Mineração (CBMM). A second pyrochlore mine, Catalão, has been operating since 1976 and is owned by Mineração Catalão de Goiás S.A. A third pyrochlore deposit, Catalão Quvidor, is owned by Goiás Niobio S.A. and began operation in late 1985. Almost the entire mine production goes into the manufacture of ferrocolumbium. Brazil has recently integrated its operation to include production of high-purity columbium oxides and has discontinued, since 1982, the exporting of pyrochlore concentrate. CBMM announced plans to begin the production of columbium metal on a commercial scale within 2 years at the company's ferrocolumbium plant at Araxa.

Copper.—Brazil produced an estimated 70,000 tons of copper in 1985. This was an apparent increase of nearly 20% above that of 1984. CVRD plans to start up a $6 million pilot plant at Salobo in the Carajás area in early 1986. It will produce approximately 80 tons of concentrate per day yielding 32 tons of fine copper. The full-scale plant, due to come on-stream in early 1988, will produce 300,000 tons of concentrate annually yielding 120,000 tons of fine copper. CVRD has quantified the reserves in the Salobo deposit area and estimates the reserves at 1.2 billion tons of ore assaying 0.83% copper, which translates into approximately 10 million tons of copper. Also of interest are the significantly high amounts of gold, molybdenum, and silver present in the ore; it has been reported that an assayed concentrate contained 10 to 15 grams of gold per ton, 100 to 200 grams of silver per ton, and 2,000 grams of molybdenum per ton.

Copper concentrate from Salobo is much needed by Caraíba Metais S.A. Indústria e Cómercio's 150,000-ton-per-year smelter-refinery at Camaraci, Bahia. Caraíba Metais currently is the only domestic producer of copper metal in Brazil. Limited supplies of ore from the company's mine near Jaguarari, Bahia, 500 kilometers to the northwest have created production problems for the Camaraci plant.

Gold.—The total gold production figure for 1985 was approximately 2 million troy ounces. The officially controlled output was 982,000 troy ounces, while the DNPM estimated uncontrolled output between 1.0 and 1.3 million troy ounces. Substantial quantities of gold mined by garimpeiros illegally found its way across the Uruguayan, Paraguayan, and Bolivian borders in 1985. Uruguay reportedly sold almost 1 million troy ounces to the United States, though virtually no gold was mined there.

Reserves of gold in Brazil at yearend were estimated by DNPM to be in excess of 1 billion troy ounces with 41% being subterranean and 59% alluvial. The actual potential may be considerably greater because of still unexplored tracts in the Amazon region.

Rio Tinto Zinc Corp. Ltd. do Brasil announced plans to begin gold mining operations at its Morro do Ouro Mine near Paracatu, Minas Gerais, by midyear 1986. The Morro do Ouro Mine will be the third largest (mechanized) gold mine in the country. It will only be smaller than the two Mineração Morro Velho S.A. operations near Belo Horizonte, Minas Gerais. The cost of the project is estimated at $60 million with economically workable reserves evaluated at approximately 86 million tons of ore containing 6.6 grams of gold per ton, which translates to 18.25 million troy ounces of gold.

Three mining companies pulled out of the State of Mato Grosso, and others may follow, as a result of invasions by hosts of garimpeiros. One of the three firms had invested $3 million in mining operations in the State, but was forced to halt activities when all its concessions were taken over by garimpeiros. The Government has set apart a number of garimpeiro "reserves" within Mato Grosso, but the system has never worked properly in practice and company mining properties continue to be invaded. The State of Rondônia also was the scene of some concentrated invasions of land by garimpeiros and consequent armed clashes between garimpeiros and the police.

A joint venture between Osborne and Chappell Goldfields Ltd. (Canada) and the newly incorporated Cia. Nacional de Mineração was announced. The deposit is in the Teles Pires River area in the State of Mato Grosso. The deposit has estimated reserves of 30,000 ounces of gold, and is expected to begin operations in mid-1986 with Osborne and Chappell Goldfields, the operator.

Iron Ore.—Iron ore production showed a marked increase to an estimated 120 million tons in 1985. This was an apparent increase of 7% above that of 1984. Brazil was the world leader of iron ore exports having exported approximately 90 million tons. Brazil ranked second in the world in iron ore production behind the U.S.S.R., of which an estimated 76% was for export. CVRD produced approximately 52% of the total and exported an estimated 66% of the export total.

CVRD announced plans to advance iron ore production levels at its Carajás project in 1986. The 15-million-ton-per-year phase will be advanced 6 months to January 1, 1986. The 25-million-ton-per-year phase will begin July 1, 1986, with the 35-million-ton-per-year phase scheduled to begin July 1, 1987. The advancement of the production schedules is expected to reduce the cost of the project by 32% to approximately $3.0 billion.

Brazilian iron ore reserves are primarily in two States, Minas Gerais in the south, and Pará in the north. The southern reserves are found mainly in the "Quadrilatero Ferrifero" (Iron Ore Quadrangle) while those in the north are predominantly found near the municipality of Maraba in the Carajás range. The potential reserves of iron ore grading 66% are approximately 32 billion tons, of this total 18 billion tons are in the State of Pará (Carajás region), and 6 billion tons in the State of Minas Gerais (Iron Ore Quadrangle). When ore grading 45% to 50% is considered, the reserves increase to a figure exceeding 50 billion tons.

In 1985, CVRD produced 50% of the total iron ore output. The production primarily came from the large Caue and Conceicao-Dois Corregos Mines at Itabira, about 100 kilometers northeast of Belo Horizonte, Minas Gerais. CVRD also operated smaller mines in the same area at Periquito, Caraca, Picarro, Timbopeba, and Capanema. The pelletizing complex at the port terminal of Tubarao has a total design capacity of 17 million tons per year, based on six pelletizing plants, four of which are operated as joint ventures with international groups.

In the southeast corner of the Iron Ore Quadrangle, about 145 kilometers southeast of Belo Horizonte, the Germano Mine operated by Samarco Mineração S.A. features what is claimed to be the world's longest (396 kilometers) and largest slurry pipeline. It was designed to carry 12 million tons of dry concentrates per year, but conveyed 7 million tons in 1985.

Steel.—Crude steel production reached approximately 18.6 million tons in 1985, which was an increase of 11% over that of 1984. Of the total steel production, Cia. Siderúrgica Nacional, USIMINAS, Cia. Siderúrgica Tubarao, and Cia. Siderúrgica Paulista combined to produce approximately 60% of it.

The Aco Minas Gerais S.A. steelworks at Ouro Branco, Minas Gerais, was officially opened in February, more than 4 years behind schedule, and at a cost of about $6 billion. In 1985, the Brazilian steel sector was comprised of 42 plants, 10 of which were operated by state-controlled companies and accounted for approximately 67% of the total domestic output.

Brazil was sixth in the world as a producer of pig iron in 1985 with a total of approximately 19 million tons. Of the total produced, 2.5 million tons was exported, most notably to China. CVRD has plans to increase pig iron production by 617,000 tons per year. The new construction will include seven new projects in the eastern Amazon region.

Manganese.—Manganese, principally from the Serra do Navio Mines in Amapá Territory, continued to be second to iron ore among Brazilian mineral exports. Total shipments were 980,000 tons, of which 219,000 tons went to the domestic market. Destinations of the export tonnage were Western Europe, 607,000 tons; the United States, 116,000 tons; Japan, over 25,000 tons; and Argentina, 12,000 tons.

Cia. Auxiliar de Empresas de Mineração agreed to keep prices of 1985 manganese ore deliveries to Japanese ferroalloy makers unchanged from the preceding year's prices. This was the first settlement in the series of discussions between the Japanese and major world producers, all of whom have been holding out for price increases despite Japanese opposition.

Carajás production of electrolytic manganese for batteries was estimated at 11,000 tons, and it is expected to increase to 25,000 tons in 1986. Starting in 1986, annual production of manganese for electrolytic purposes and alloys will be 150,000 tons. Carajás manganese reserves were estimated at 65 million tons with the reserves at the Igarape Azul Mine, Amazonas, the most important. The Igarape Azul reserves were estimated at 11 million tons grading 42% manganese. The ore is near the CVRD iron ore railroad and is transported by the railroad.

Metalman Indústria e Comércio Manganese Electrolitico, a subsidiary of the Metallur Group, announced plans to commence production by 1988 of 10,000 tons of electrolytic manganese metal annually at its plant in Rosario, São Paulo. The company will also produce 10,000 tons of electrolytic manganese dioxide and 1,000 tons potassium permanganate annually. Of the total produced, 8,000 tons of metal and 4,000 tons of electrolytic manganese dioxide will be available for export annually.

Tin.—Brazilian tin production increased from 19,957 tons in 1984 to 26,514 tons in 1985, an increase of 33%. Tin exports were an estimated 20,000 tons. The large production increase was the result of a large increase in production at the Pitinga Mine in the State of Amazonas. The mine is owned and operated by Paranapanema S.A. Mineração Indústria e Construção. Average tin content was over three times the average content of other Brazilian mines, which contributed to the Pitinga Mine having the lowest production cost for tin in the world. Owing to the tin crisis, all producers were reevaluating their future plans. It appears that tin production in 1986 will most likely show a decline. The reserves in the area were placed at 575,000 tons of metal. Paranapanema also has planned for the extraction of other valuable minerals from the ores at Pitinga, namely tantalite, yttrium, and zirconite.

Brascan Recursos Naturais S.A. and Empresas Brumadinhos S.A. were the second and third largest tin producers, with 3,500 tons and 2,000 tons, respectively. Both announced plans to increase production in 1986. Brumadinhos announced investments of $26 million in 1986, of which $14 million will go for production expansion and $12 million to two new mines in the State of Goiás.

Titanium.—The ilmenite deposit near Mataraca, Paraiba, mined by Titanio do Brasil S.A. produced an estimated 30,000 tons of ilmenite in 1985. The sand deposit contains 3% heavy minerals (ilmenite, 70%; zirconite, 20%; others, 10%). At yearend, the reserves were estimated at 2.1 million tons of ilmenite. Plans were considered to increase the mines capacity to 100,000 metric tons per year, but some uncertainty has arisen because the deposit may be declining in grade as mining progresses.

In February 1984, the Government of Brazil authorized CVRD to begin construction of a titanium concentrate plant using anatase deposits at Tapira, Minas Gerais. The plant is to be fully operational in 1988 with annual production capacity of 400,000 tons of titanium concentrate, evenly divided between export and domestic use. CVRD discussed various forms of association with a number of large foreign chemical firms for export of titanium dioxide and/or investment in domestic pigment production.

Zinc.—In 1985, Brazil's zinc reserves were estimated at 25 million tons, of which 96% was in Minas Gerais, and 4% was in Bahia. The principal producers of zinc concentrate were Cia. Mineira de Metais S.A. and Cia. Paraibuna de Metais. Paraibuna announced plans to quadruple capacity to 120,000 tons per year by 1989. In light of the domestic consumption figures for 1985, the ambitious expansion program is justified. Brazil consumed an estimated 150,000 tons of zinc metal, of which 20% was imported.

INDUSTRIAL MINERALS

Gem Stones.—Mineração Tejucana S.A. announced plans for a 10,400-carat expansion of its current annual output of diamonds; in addition, new projects were considered by Cia. Minera Morro Vermelho Ltda. that are destined to increase diamond production, both gem and industrial quality.

Emeralds were mined in the States of Bahia, Goiás, and Minas Gerais. Sales of emeralds represented 20% of total gem exports. Brazil has reserves of tourmaline in Minas Gerais, opal in Piaui, chrysoberyl in Espirito Santo and Minas Gerais, topaz in Minas Gerais, amethyst and citrine in Minas Gerais and Rio Grande do Sul, and small numbers of zircon, morganite, etc. Cut diamonds, topaz, and aquamarine accounted for 31% of total gem exports mainly to Japan, Switzerland, and the United States.

Phosphate Rock.—Phosphate rock concentrate production showed an increase of nearly 11%, from 3.8 million tons to 4.2 million tons. Domestic demand increased only slightly reflecting the effect of low-cost imports from China, Israel, Jordan, and Tunisia. Phosphate rock exports to the United States totaled 27,000 tons.

Three types of phosphate deposits have been found in Brazil at a total of 12 sites. They are igneous—Goiás (1), Minas Gerais (2), Rio Grande do Sul (1), and São Paulo (3); sedimentary—Pernambuco (2), and Minas Gerais (2); and hydrothermal—Ceará (1).

Potash.—Petrobrás Mineração S.A. opened Brazil's first potash mine in the State of Sergipe in March. Production for the year was approximately 100,000 tons with production expected to rise to 600,000 tons by 1987. Brazil imported slightly in excess of 1 million tons in 1985. Brazil was expected to remain, at least in the short term, one of the world's major potash importers, second only to the United States. Of the total of 1.08 million tons of potash imported, the U.S. share was 16.7%.

MINERAL FUELS

Coal.—As of 1985, Brazil had limited coal resources, with the great preponderance consisting of steam coal. Total coal production was approximately 8.0 million tons, of which slightly more than 1 million tons was metallurgical (coking) coal. Because of the extreme shortage of domestic supplies of coking coal, Brazil imported approximately 9.4 million tons of coking coal in 1985. This was an increase of 13% over that of 1984. The United States supplied Brazil with 5.8 million tons of coking coal and 70,000 tons of steam coal.

CVRD and Cia. de Pesquisas e Lavras Minerais (COPELMI) signed a letter of intent at yearend to form a new company to exploit the Santa Terezinha metallurgical coal reserves near Porto Alegre, Rio Grande do Sul. CVRD will own 40% with COPELMI owning the balance. CVRD and COPELMI began laying the groundwork for the exploitation of the Guaiba steam coal deposit in Rio Grande do Sul. Total investment will be approximately $1 billion, with annual production estimated at 2.4 million tons.

Natural Gas.—Natural gas production was estimated at 200 billion cubic feet for 1985, an increase of nearly 16% over the 1984 figure. Brazil was the fourth largest natural gas producer in Latin America after Mexico, Venezuela, and Argentina. PETROBRÁS, the state petroleum company, has been trying to increase gas reserves through intensive exploration. Efforts have focused in the area of the Jurua River (Upper Amazon), São Miguel dos Compos and Pilar in the State of Alagoas, and the Ceará State capital of Fortaleza. A gas discovery in the State of Amazonas could prove to be important because of its proximity (45 kilometers) to the capital city of Manaus.

Despite substantial reserves, 3 trillion cubic feet, Brazil has been a modest producer. The country has begun to use natural gas in the petrochemical industry, and as a substitute for fuel oil in industry and bottled liquefied petroleum gas in homes. The Government has begun to provide industry with incentives to change boilers from fuel oil to gas. It also began extending the gas pipeline network and planning new ones for consuming centers.

Petroleum.—At yearend, PETROBRÁS was producing 609,000 barrels per day (bbl/d) of petroleum, a new PETROBRÁS record. The 600,000-bbl/d plateau was initially reached in October 1985. Average production for the entire year was 563,000 bbl/d, a 22% increase over the figure for 1984. Campos Basin production reached 359,000 bbl/d compared with 289,000 bbl/d in 1984. Offshore production comprised 70.7% of total production. The Campos Basin produced 60% of total production. Production gains in 1986 are expected to come more slowly than in recent years, with a peak of 620,000 to 630,000 bbl/d expected. At yearend 1985, Brazil's estimated proved reserves were 2.07 billion barrels. Brazil reduced its imports of petroleum by 11%, from 727,000 to 647,000 bbl/d.

Uranium.—In September, the Brazilian President appointed a 12-person commission of largely private sector representatives to evaluate the Brazilian nuclear program. The commission was asked to provide recommendations on the role of nuclear energy in Brazil's near and long-term energy needs.

NONMINERAL ENERGY SOURCES

Alcohol.—Brazilian alcohol production capacity has increased greatly in the last several years. The production capacity of the State of São Paulo in 1985 was greater than the entire Brazilian production capacity of alcohol in the 1982-83 crop year. Brazil's total capacity for 1985 was 12.5 billion liters with São Paulo contributing 6.2 billion liters of capacity to the total. In November, the U.S. International Trade Commission launched an investigation into the harmful aspects of alcohol imports from Brazil.

Hydroelectric.—Total generating capacity in Brazil has grown by nearly 50% from 1979 to 1985. In 1985, 85% of electrical capacity was in hydropower; however, of actual power generation, 94% was from hydropower. The hydroelectric generation capacity was 35.5 billion watts. This is expected to be increased to 69.6 billion watts by 1995. Since Brazil is not self sufficient in coal, natural gas, or petroleum and alternative energy sources are not now cost effective, hydropower will remain the most important source of electrical energy for the future.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Brazilian cruzeiros (Cz$) to U.S. dollars at the rate of Cz$6.2=US$1.00 as an average for 1985.

The Mineral Industry of Bulgaria

By Walter G. Steblez[1]

Bulgaria continued to be a significant East European producer of nonferrous metals and industrial minerals as well as a modest producer of lignite. The country's production of nonferrous metals—copper, lead, and zinc—largely met domestic needs, but over one-half of Bulgaria's requirements for iron ore were imported from the U.S.S.R.

Bulgaria's centrally planned economy did not meet most objectives. Industrial production, compared with that of 1984, grew 4% as opposed to the planned 5.2% target set for the year. There were shortfalls in the output of electricity, coal, and mineral fertilizers. The gross output of the metallic mining and processing sectors remained at the level of 1984. The mineral industry's labor force remained at approximately the same level as in the preceding year.

Major projects put into operation included a 72-kilometer section of the U.S.S.R.-Bulgaria pipeline and the "Maritsa-East" 420,000-kilowatt coal-fired electric power station. New facilities for the production of electric steel were put into operation at the Lenin metallurgical complex at Pernik, and reportedly, full operational capacity was attained at the Elatsite copper mining and beneficiation complex; there was also facility expansion in a number of other copper mining and processing areas. Negotiations with Greece continued during the year on terms and conditions of Bulgaria's participation in the U.S.S.R.-Greece alumina project.

Government Policies and Programs.—Centrally planned production targets for 1986 were more modest than those set for 1985. Industrial production was planned to grow 4.5%; the tool manufacturing and energy sectors were to grow 9.2% and 6.9%, respectively, over 1984 production levels. Major investments in the mineral industry in 1986 were to include a new mill at the Burgas steelworks and facility expansion at the Septemvri hot tube-rolling complex. Also, new facilities would be constructed at the Georgi Damyanov copper mining complex in the Srednegorie region, and a thermocalibration shop would be put into operation at the Lenin metallurgical complex. Although detailed tasks for the 1986-90 5-year plan were not published in 1985, preliminary reports indicated that there was to be a 60% increase in the production of high-quality electric steel in 1990 over that of 1985. There would also be greater emphasis placed on secondary recovery of metals during this period. Four recycling centers for both steel and nonferrous metals were planned for completion by 1990. Secondary nonferrous metal processing would be upgraded to increase the recovery of cobalt, silver, and other components.

PRODUCTION

Bulgaria's mineral industry was state-owned and operated. Annual as well as 5-year production goals were centrally planned by the State Planning Commission. Shortfalls in the country's economic performance in 1985 were attributed to severe winter and drought conditions. In the mining area, below freezing weather conditions were responsible for extensive equipment failure and prolonged downtime.

Table 1.—Bulgaria: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984[p]	1985[e]
METALS					
Cadmium metal, smelter[e]	210	200	200	200	200
Copper:[e]					
Mine output, metal content	62,000	70,000	80,000	80,000	80,000
Metal, primary and secondary:					
Smelter	62,000	62,000	60,000	60,000	90,000
Refined	62,000	65,000	62,000	62,000	93,000
Iron and steel:					
Iron ore:					
Gross weight thousand tons	1,754	1,552	1,803	2,063	2,100
Fe content do.	537	474	554	622	625
Iron concentrates do.	797	732	824	913	915
Metal:					
Pig iron do.	1,512	1,558	1,623	1,578	[3]1,702
Ferroalloys, electric furnace, all types[e] do.	[r]54	[r]57	[r]57	[r]49	41
Steel, crude do.	2,483	2,584	2,831	2,878	[3]2,926
Semimanufactures, rolled do.	3,351	3,253	3,235	3,354	3,300
Lead:					
Mine output, metal content	116,000	95,000	95,000	95,000	95,000
Metal, smelter, primary and secondary	119,000	118,000	116,000	116,000	116,000
Manganese ore:					
Gross weight	45,321	45,000	45,000	45,000	45,000
Mn content	13,207	13,207	13,100	13,000	13,000
Molybdenum, mine output, metal content[e]	150	[r]170	[r]190	[r]190	190
Silver, mine output, metal content[e] thousand troy ounces	930	930	930	930	930
Zinc:					
Mine output, metal content	[e]65,000	66,000	68,000	68,000	68,000
Metal, smelter, primary and secondary	90,000	90,000	91,000	91,000	91,000
INDUSTRIAL MINERALS					
Asbestos	400	600	700	600	600
Cement, hydraulic thousand tons	5,433	5,614	5,644	5,717	[3]5,215
Clays: Kaolin	221,422	237,000	242,000	256,000	260,000
Gypsum and anhydrite:					
Crude thousand tons	350	376	386	393	400
Calcined	94	104	116	115	[3]116
Lime: Quicklime thousand tons	1,758	[r]1,634	1,634	1,526	1,600
Nitrogen: N content of ammonia	[r]1,023	[r]1,033	1,124	1,138	1,140
Pyrites, gross weight[e]	680,000	680,000	680,000	680,000	680,000
Salt, all types[e]	87,000	87,000	87,000	[r]89,000	90,000
Sodium carbonate, calcined thousand tons	1,469	1,459	1,271	1,212	1,400
Sulfur:[e]					
S content of pyrites	300,000	300,000	300,000	300,000	300,000
Byproduct, all sources	70,000	70,000	70,000	70,000	70,000
Total	370,000	370,000	370,000	370,000	370,000
MINERAL FUELS AND RELATED MATERIALS					
Coal, marketable:					
Anthracite thousand tons	89	80	83	84	60
Bituminous do.	157	161	160	139	140
Brown do.	5,657	5,537	5,342	5,519	6,000
Lignite do.	23,338	26,437	26,805	26,617	25,200
Total do.	29,241	32,215	32,390	32,359	31,400
Coke do.	1,381	1,274	1,270	1,186	1,200
Gas, natural, marketed million cubic feet	4,840	[e]4,840	[e]4,800	4,800	4,600
Petroleum:					
Crude:					
As reported[e] thousand tons	180	180	180	180	180
Converted[e] thousand 42-gallon barrels	1,314	1,314	1,314	1,314	1,300
Refinery products do.	94,535	NA	NA	NA	NA

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through Aug. 1, 1986.
[2]In addition to the commodities listed, bismuth, chromite, gold, palladium, platinum, tellurium, uranium, barite, fluorspar, magnesite, and a variety of crude construction materials (common clays, crushed stone, dimension stone, and sand and gravel) are produced, but available information is inadequate to make reliable estimates of output levels.
[3]Reported figure.

TRADE

Bulgaria's total exports increased 5.8% over those of 1984, while imports rose 9%. About 76% of the country's trade was conducted with member states of the Council for Mutual Economic Assistance (CMEA), comprised of the U.S.S.R. and other centrally planned economy countries. Over 55% of total trade was conducted with the U.S.S.R.

Trade with the U.S.S.R. provided Bulgaria with significant quantities of raw materials such as coal, natural gas, petroleum and petroleum products, and iron ore and rolled iron. In exchange, Bulgaria provided the U.S.S.R. with machine tools and electronic goods. The 1986 commercial agreement, signed in 1985 with Albania, a non-CMEA country, would increase trade between the two Balkan States by 60%. Albania's mineral exports to Bulgaria would include bitumen, sulfur, refractories, and nonferrous metals goods in exchange for capital goods and chemicals.

Table 2.—Bulgaria: Apparent exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS				
Aluminum:				
Ash and residue containing aluminum	--	3,372	--	All to West Germany.
Metal including alloys:				
Scrap	2,017	2,760	--	West Germany 1,972; Italy 732.
Unwrought	6,067	4,997	--	Japan 3,632; Italy 686; Netherlands 465.
Semimanufactures	33	55	19	Japan 32; West Germany 4.
Bismuth: Metal including alloys, all forms	33	8	--	All to West Germany.
Cadmium: Metal including alloys, all forms	--	54	--	All to Czechoslovakia.
Copper:				
Ore and concentrate	6,000	NA		
Sulfate	1,665	496	--	All to West Germany.
Metal including alloys:				
Scrap	301	290	--	All to Switzerland.
Unwrought	--	1,210	--	Belgium-Luxembourg 505; Yugoslavia 329; Italy 197.
Semimanufactures	839	829	--	Yugoslavia 792; Morocco 35.
Gold:				
Waste and sweepings value, thousands	--	$470	--	All to West Germany.
Metal including alloys, unwrought and partly wrought troy ounces	--	1,768	--	All to Switzerland.
Iron and steel: Metal:				
Scrap	38,000	48,000	--	Yugoslavia 22,968; Italy 10,952; Turkey 2,318.
Pig iron, cast iron, related materials[2]	38,200	263,000	--	NA.
Ferroalloys:				
Ferrochromium	5,040	670	--	Austria 406; West Germany 237.
Ferromanganese	--	1,000	--	NA.
Ferrosilicomanganese	--	165	--	All to France.
Ferrosilicon	2,588	823	--	West Germany 427; Austria 396.
Unspecified	685	12,342	--	NA.
Steel, primary forms	162,000	309,000	--	Japan 170,145.
Semimanufactures:				
Bars, rods, angles, shapes, sections thousand tons	66	88	--	Turkey 33; Italy 5; unspecified 43.
Universals, plates, sheets do.	555	522	--	Turkey 46; Cuba 43; unspecified 266.
Hoop and strip do.	4	14	--	NA.
Rails and accessories do.	5	11	--	NA.
Wire do.	43	54	--	Hungary 3; Yugoslavia 2; unspecified 48.
Tubes, pipes, fittings do.	44	42	--	Cuba 14; Poland 7; Hungary 2.
Castings and forgings, rough do.	1	1	--	NA.
Lead:				
Oxides	728	NA		
Metal including alloys, unwrought	4,121	1,617	--	Turkey 870; Hungary 697; France 50.
Lithium: Oxides and hydroxides	38	573	--	All to Yugoslavia.
Manganese: Ore and concentrate, metallurgical-grade	[e]28,500	[e]24,600	--	All to Czechoslovakia.

See footnotes at end of table.

Table 2.—Bulgaria: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued				
Mercury ________ 76-pound flasks__	--	406	--	All to United Kingdom.
Molybdenum: Ore and concentrate ____	321	48	--	All to West Germany.
Nickel: Metal including alloys:				
Scrap ____________________	4	1	--	All to Switzerland.
Unwrought ________________	110	125	--	Yugoslavia 64; West Germany 44; Austria 10.
Semimanufactures____________	39	20	--	All to Morocco.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands__	--	$115	--	West Germany $59; Switzerland $56.
Silver:				
Waste and sweepings[3] _____do____	$390	$85	--	All to Belgium-Luxembourg.
Metal including alloys, unwrought and partly wrought _____do____	$995	$700	--	West Germany $510; United Kingdom $117; Netherlands $71.
Tin: Metal including alloys, scrap _____	137	NA		
Zinc: Metal including alloys:				
Unwrought ________________	15,362	23,912	--	Czechoslovakia 11,000; Turkey 6,478; France 1,735.
Semimanufactures____________	30	NA		
Other:				
Ores and concentrates__________	23	6	--	All to Austria.
Ashes and residues____________	--	144	--	Austria 78; Italy 61.
Base metals including alloys, all forms	23	24	--	Belgium-Luxembourg 10; United Kingdom 10; France 3.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.: Grinding and polishing wheels and stones ____________	24	NA		
Asbestos, crude ______________	351	NA		
Barite and witherite ____________	--	20	--	All to Tunisia.
Boron materials: Crude natural borates _	1,085	341	--	All to West Germany.
Cement[4] __________________	509,100	342,600	--	Switzerland 53,000; Libya 33,400; U.S.S.R. 24,000.
Clays, crude:				
Chamotte earth______________	--	150	--	All to Hungary.
Fire clay _________________	4,000	NA		
Kaolin ___________________	5,002	6,173	--	Hungary 3,130; Poland 3,043.
Unspecified _______________	4,574	4,051	--	Yugoslavia 3,334; Tunisia 650.
Diamond: Industrial stones value, thousands__	$176	$466	--	All to Belgium-Luxembourg.
Fertilizer materials: Manufactured:				
Nitrogenous[4] ____ thousand tons__	695	1,022	--	India 183; Turkey 62; Morocco 33.
Potassic ______________do____	5	2	--	All to Turkey.
Unspecified and mixed ____do____	44	NA		
Nitrates, crude[4] ______________	6,723	4,736	--	U.S.S.R. 1,950; Czechoslovakia 1,067; Spain 300.
Pigments, mineral: Iron oxides and hydroxides, processed____________	33	96	--	All to Yugoslavia.
Precious and semiprecious stones other than diamond:				
Natural _____ value, thousands__	$168	$4	--	All to France.
Synthetic _____________do____	$291	$372	--	West Germany $357; Japan $12.
Sodium compounds, n.e.s.: Carbonate, manufactured[4] ____ thousand tons__	945	838	--	U.S.S.R. 490; Hungary 126; Czechoslovakia 40.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked _____	7,721	8,309	--	Hungary 5,511; Italy 1,171; Belgium-Luxembourg 741.
Worked _______________	1,275	3,290	NA	West Germany 2,950; Belgium-Luxembourg 237.
Gravel and crushed rock ________	69	NA		
Sand other than metal-bearing ____	12,350	NA		
Sulfur: Sulfuric acid ____________	7,900	5,500	--	NA.
Talc, steatite, soapstone, pyrophyllite __	--	25	--	All to Netherlands.
Other:				
Crude___________________	12,562	14,166	--	All to Hungary.
Slag and dross, not metal-bearing ___	3,687	NA		
MINERAL FUELS AND RELATED MATERIALS				
Carbon black ________________	32	5	--	All to Italy.
Coal: Anthracite and bituminous _____	[2]223,000	[2]287,000	--	Belgium-Luxembourg 35,644; Italy 12,840; unspecified 235,837.
Petroleum refinery products:				
Liquefied petroleum gas thousand 42-gallon barrels__	625	701	--	Yugoslavia 400; Italy 236; Austria 57.
Gasoline _____________do____	503	593	--	Netherlands 237; Italy 208; West Germany 68.

See footnotes at end of table.

Table 2.—Bulgaria: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Destinations, 1984: United States	Destinations, 1984: Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum refinery products —Continued				
Mineral jelly and wax thousand 42-gallon barrels	23	22	--	Italy 13; Belgium-Luxembourg 7.
Kerosene and jet fuel do.	31	112	--	Italy 89; Hungary 23.
Distillate fuel oil do.	1,349	1,789	--	West Germany 465; Turkey 444; Switzerland 326.
Lubricants do.	202	362	--	Austria 191; Yugoslavia 137.
Residual fuel oil do.	2,901	460	--	Sweden 164; France 150; Italy 145.
Unspecified do.	146	213	--	All to Poland.

[p]Preliminary. NA Not available.
[1]Table prepared by Jozef Plachy. Owing to a lack of official trade data published by Bulgaria, this table should not be taken as a complete presentation of this country's mineral trade. Unless otherwise specified, these data have been compiled from United Nations information and data published by the trading partner countries.
[2]Statistical Yearbook of Members of the Council for Mutual Economic Assistance, Moscow, U.S.S.R.
[3]May include other precious metals.
[4]Official Trade Statistics of Bulgaria.

Table 3.—Bulgaria: Apparent imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides	478	105	--	West Germany 53; France 48.
Metal including alloys:				
Scrap	--	2	--	All from Canada.
Unwrought	14,848	17,933	--	Hungary 10,315; Yugoslavia 6,507; Norway 696.
Semimanufactures	6,045	5,908	--	Hungary 2,622; West Germany 1,843; Austria 618.
Antimony: Oxides	--	10	--	All from West Germany.
Chromium: Oxides and hydroxides	110	452	--	U.S.S.R. 350; Poland 100.
Cobalt: Metal including alloys, all forms	6	NA		
Copper:				
Matte and speiss including cement copper	347	672	--	All from Yugoslavia.
Sulfate[2]	3,569	7,727	--	All from U.S.S.R.
Metal including alloys:				
Unwrought	700	1,300	--	Belgium-Luxembourg 1,299.
Semimanufactures	2,088	2,024	--	West Germany 1,527; Belgium-Luxembourg 198; France 111.
Gold: Metal including alloys, unwrought and partly wrought troy ounces	579	38,734	--	Switzerland 37,777; West Germany 957.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite[2] thousand tons	2,313	2,286	--	U.S.S.R. 2,181.
Metal:				
Pig iron, cast iron, related materials[2]	407,482	664,573	47	U.S.S.R. 404,660; Turkey 31,184.
Ferroalloys:				
Ferromanganese	3,000	3,000	--	West Germany 1,473; France 500.
Unspecified	23,000	23,000	--	NA.
Steel, primary forms	571,000	451,000	--	NA.
Semimanufactures:				
Bars, rods, angles, shapes, sections thousand tons	382	376	--	U.S.S.R. 48; East Germany 33; Yugoslavia 25.
Universals, plates, sheets[2] do.	191	161	--	U.S.S.R. 97; Poland 26; West Germany 9.
Hoop and strip[2] do.	6	7	--	U.S.S.R. 5; Poland 1.
Rails and accessories do.	63	75	--	NA.
Wire do.	15	17	--	Austria 5; West Germany 2; Italy 1.
Tubes, pipes, fittings do.	73	68	([5])	West Germany 8; Yugoslavia 4; unspecified 43.
Castings and forgings, rough do.	6	8	--	NA.

See footnotes at end of table.

Table 3.—Bulgaria: Apparent imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Sources, 1984	
			United States	Other (principal)
METALS —Continued				
Lead:				
Ore and concentrate	5,000	4,318	--	Peru 2,461; Yugoslavia 1,857.
Metal including alloys, unwrought	[4]700	166	--	All from West Germany.
Magnesium: Metal including alloys, semimanufactures	22	NA		
Manganese:				
Ore and concentrate, metallurgical-grade	[5]96,800	[5]94,400	--	U.S.S.R. 74,000.
Oxides	35	NA		
Mercury 76-pound flasks	--	189	--	All from West Germany.
Molybdenum: Ore and concentrate	170	NA		
Nickel: Metal including alloys:				
Scrap	--	18	--	All from Canada.
Unwrought	1	NA		
Semimanufactures	140	192	--	West Germany 164; France 10; Austria 8.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$3,557	$3,177	--	France $2,196; West Germany $853.
Silver: Metal including alloys, unwrought and partly wrought do.	$602	$165	--	West Germany $115; Switzerland $45.
Tin:				
Ore and concentrate	--	14,446	--	All from Poland.
Oxides	6	NA		
Metal including alloys, unwrought	5	NA		
Titanium:				
Ore and concentrate	3,700	3,108	--	West Germany 2,608; Netherlands 500.
Oxides	265	689	--	West Germany 644; Yugoslavia 40.
Metal including alloys, all forms	4	5	--	All from West Germany.
Tungsten: Metal including alloys, all forms	18	12	--	Netherlands 8; West Germany 2; Japan 2.
Zinc:				
Ore and concentrate	11,134	25,788	3,028	Peru 13,596; Sweden 5,250; Canada 3,305.
Metal including alloys, semimanufactures	3	5	--	All from Belgium-Luxembourg.
Zirconium: Ore and concentrate	1,779	1,108	--	All from Netherlands.
Other:				
Ores and concentrates	10	20	--	Netherlands 9; Sweden 7; Switzerland 3.
Oxides and hydroxides	58	NA		
Base metals including alloys, all forms	1	165	--	Turkey 125; United Kingdom 35.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	21	NA		
Artificial:				
Corundum	1,730	2,683	--	Yugoslavia 1,209; Italy 1,180; Hungary 294.
Silicon carbide	642	1,163	--	All from Italy.
Dust and powder of precious and semiprecious stones including diamond value, thousands	$57	$196	--	Switzerland $144; Belgium-Luxembourg $52.
Grinding and polishing wheels and stones	1,199	1,270	1	Italy 466; Austria 420; Yugoslavia 356.
Asbestos, crude	1,715	269	--	All from Canada.
Boron materials: Oxides and acids	1	7	--	All from West Germany.
Cement[3]	48,122	64,533	--	U.S.S.R. 49,794; Czechoslovakia 13,795.
Chalk	6	501	--	France 400; United Kingdom 101.
Clays, crude	2,192	149	100	France 25; Netherlands 20.
Diamond: Industrial stones value, thousands	$2,990	$4,053	--	Belgium-Luxembourg $3,758; West Germany $151; Austria $144.
Diatomite and other infusorial earth	580	674	--	Austria 495; Iceland 76; France 63.
Feldspar, fluorspar, related materials	196	822	--	West Germany 758; Yugoslavia 64.
Fertilizer materials: Manufactured:				
Ammonia	5	3	--	West Germany 2.
Nitrogenous	--	11,000	--	All from Turkey.
Phosphatic	[5]600,000	[5]780,000	91,875	U.S.S.R. 205,500; Tunisia 26,000; unspecified 429,054.
Potassic	[5]241,071	[5]209,000	--	U.S.S.R. 144,100; unspecified 64,848.
Unspecified and mixed	814	654	--	West Germany 482; Belgium-Luxembourg 172.

See footnotes at end of table.

Table 3.—Bulgaria: Apparent imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Graphite, natural	409	1,968	--	All from West Germany.
Gypsum and plaster	--	431	--	Austria 312; United Kingdom 119.
Lime	30	49	--	All from West Germany.
Magnesium compounds	8,999	24,398	--	Czechoslovakia 24,000; France 272.
Mica:				
Crude including splittings and waste	5	20	--	West Germany 11; United Kingdom 9.
Worked including agglomerated splittings	24	40	--	Austria 34; West Germany 5.
Phosphates, crude[2] thousand tons	1,658	1,683	--	U.S.S.R. 770; Morocco 136; Tunisia 62.
Pigments, mineral: Iron oxides and hydroxides, processed	349	912	25	West Germany 524; Japan 363.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	--	$20	--	All from Thailand.
Synthetic do.	$88	NA		
Pyrite, unroasted	262,000	249,000	--	All from U.S.S.R.
Salt and brine	1,501	35,760	--	Turkey 35,740.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	--	1	--	All from West Germany.
Sulfate, manufactured	502	42	--	All from Japan.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	40	3,257	--	Turkey 3,219.
Worked	75	459	--	Italy 276; Austria 183.
Dolomite, chiefly refractory-grade	166	NA		
Gravel and crushed rock	713	1,114	--	Yugoslavia 1,070; Japan 44.
Quartz and quartzite	1,104	796	--	Sweden 744; Italy 40.
Sand other than metal-bearing	13	241	--	West Germany 121; Yugoslavia 75; France 30.
Sulfur:				
Elemental:				
Crude including native and byproduct	55,000	68,000	--	All from Poland.
Colloidal, precipitated, sublimed	--	10	--	All from West Germany.
Sulfuric acid	12,351	11,531	--	Yugoslavia 11,471; West Germany 58.
Talc, steatite, soapstone, pyrophyllite	192	158	--	Austria 114; Italy 40.
Other: Crude	654	177	--	All from West Germany.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	3	12	--	Italy 11.
Carbon black[2]	30,280	26,794	--	U.S.S.R. 25,718; Italy 486; East Germany 292.
Coal: Bituminous[2] thousand tons	5,367	5,338	--	U.S.S.R. 5,177; Poland 156.
Coke and semicoke[2] do.	502	544	--	U.S.S.R. 263; Poland 62; Czechoslovakia 20.
Gas, natural: Gaseous million cubic feet	19	NA		
Peat including briquets and litter	--	18	--	All from Sweden.
Petroleum refinery products:				
Liquefied petroleum gas 42-gallon barrels	57	--		
Gasoline do.	19,958	286,415	--	Yugoslavia 277,933; West Germany 4,054.
Mineral jelly and wax do.	1,133	276	--	Austria 173; Netherlands 47.
Kerosene and jet fuel do.	93	395	--	West Germany 248; Yugoslavia 93.
Distillate fuel oil do.	440	790	--	Yugoslavia 298; Austria 186.
Lubricants do.	33,745	32,535	--	West Germany 12,103; Austria 8,435; Belgium-Luxembourg 5,082.
Residual fuel oil do.	343,209	6	--	All from United Kingdom.
Bitumen and other residues do.	31,725	18,774	--	Hungary 17,853; West Germany 794.
Bituminous mixtures do.	170	12	--	All from United Kingdom.
Petroleum coke do.	3,086	3,932	--	All from West Germany.

[p]Preliminary. NA Not available.
[1]Table prepared by Josef Plachy. Owing to a lack of official trade data published by Bulgaria, this table should not be taken as a complete presentation of this country's mineral trade. Unless otherwise specified, these data have been compiled from United Nations information and data published by the trading partner countries.
[2]Official trade Statistics of Bulgaria.
[3]Less than 1/2 unit.
[4]World Metal Statistics, World Bureau of Metal Statistics, London, United Kingdom.
[5]Statistical Yearbook of Members of the Council for Mutual Economic Assistance, Moscow, U.S.S.R.

COMMODITY REVIEW

METALS

Bulgaria's nonferrous mining industry, developed with large-scale assistance from the U.S.S.R., met both domestic and export requirements. The country's steel industry, also developed with Soviet assistance, was supplied largely with raw materials from the Soviet Union. The 1986-90 5-year plan called for increased capacities for the production of ferroalloys, pig iron, and steel as well as for new capacity for large-scale output of higher quality electric steel; by 1990, the country's steel industry was to produce 900,000 tons of special steel compared with 500,000 tons produced in 1985.

Alumina.—Negotiations were conducted at yearend with the Government of Greece concerning Bulgaria's participation in the Greek-Soviet alumina project. The chief issue was Bulgaria's payment terms for annual purchases of 220,000 tons of Greek alumina. Unlike the U.S.S.R., which agreed to purchase alumina on a cash basis based on a basket of U.S. and European prices, Bulgaria insisted on a cash plus barter arrangement. Negotiations were expected to continue into 1986.

Copper.—Full operational capacity was reached during the year at the Elatsite copper mining complex near Sofia. This open pit operation processed approximately 6 million tons of ore per year with a 0.4% copper content. At the Tsar Asen Mine, a heap-leaching installation for tailings and lean ores was put into operation. Similar installations were also planned at the Assarel, Elatsite, and Medet open pit operations. Work continued during the year on the installation of an Outokumpu Oy flash smelter at the Georgi Damyanov metallurgical works. The project was planned for completion by yearend and would produce anode copper from concentrates with a 13.85% metal content. Matte produced in the furnace would have a copper content ranging from 45% to 55%.

Iron and Steel.—The chief event in the country's steel industry was the reconstruction and modernization of the Lenin metallurgical complex to produce 250,000 tons per year of electric steel. Two electric steelmaking shops with electric arc furnaces were in operation at the Lenin complex and at the Brezhnev integrated ironworks and steelworks. Oxygen converter steel was produced in 100-ton converters at the Kremikoutsi iron and steel complex near Sofia. Converter steel production increased its share of the total amount of steel produced from 54.8% in 1984 to 57.0% in 1985.

Lead and Zinc.—Most of the lead and zinc ore mined in Bulgaria came from underground workings at Gorubso in the Rhodopes region. Construction delays were noted at the Ossogovo lead-zinc mining and beneficiation complex, which presumably included the construction of a new concentrator at this facility, which was reported under construction in 1984. One of the main tasks in the lead-zinc sector during the year was to reduce mining losses and ore dilution to bring the quality of ore and concentrate to planned standards.

INDUSTRIAL MINERALS

Bulgaria produced about 4 million tons per year of industrial minerals, which satisfied 95% of the country's industrial needs and included asbestos, bentonite, fluorite, gypsum, kaolin, and perlite.

MINERAL FUELS

Bulgaria produced only 30% of its energy requirements; the balance was met by imports, largely from the Soviet Union. Small quantities of petroleum were imported from Libya. Domestic reserves of coal, from an overall resource base of 6,700 million tons, amounted to 3,200 million tons; reserves of petroleum and natural gas were determined at 15 million barrels and 247 billion cubic feet, respectively. Owing to a poor petroleum and gas resource base, Bulgaria's long-term energy policy was aimed at maximizing the domestic production of lower grade lignites and brown coals and nuclear electrical generating capacity to maintain economic growth at current or lower petroleum consumption rates.

Coal.—Bulgaria reported the finalization of a long-term coal development program that would increase production 4% annually through 1990 and afterwards by 6.6% annually. Priority would be given to open pit mine development. Owing to harsh weather conditions during the year, production in 1985 declined by 3% compared with that of 1984.

Petroleum and Natural Gas.—The chief events in the petroleum and gas sectors were the completion of a 72-kilometer sector of the U.S.S.R.-Bulgaria gas pipeline, and a U.S.S.R.-Bulgarian agreement, early in 1985, on Bulgaria's purchase of 194.2 billion cubic feet of Soviet natural gas in 1985.

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The Mineral Industry of Burma

By Gordon L. Kinney[1]

Burma continued with a mineral development program that was constrained mainly by the country's paucity of capital funds and the policy of not allowing foreign private investment. Mineral development projects under way for many years, in most cases, have been completed and have resulted in increased production of minerals or in lower unit costs because of the renovation and improved technology.

Burma is well endowed with a variety of mineral resources. About 30 different minerals were produced in commercial quantities in 1985. Barite, cement, copper, gem stones, gypsum, lead, silver, steel ingots, tin, tungsten, and zinc were the most important of the nonfuel minerals.

The most critical mineral-related problem in the country has been inadequate crude oil production. A modest amount of development drilling has been under way for years by the Government-owned Myanma Oil Corp. (MOC). The level of exploration drilling, however, has increased considerably in recent years. Crude oil production peaked in 1980 and has generally declined slowly since then, giving the exploration drilling a sense of urgency as MOC tries to find new deposits. Also, since 1980, increased industrialization has forced the demand for petroleum to climb steadily. The Government has a policy of not importing crude oil, which has heightened the energy shortage and hindered economic progress.

To emphasize the importance of petroleum and natural gas, the Government removed the energy function from the Ministry of Industry No. 2 in 1985 and created the Ministry of Energy. The Ministry will contain the Minister's office, planning department, MOC, Petrochemical Industries Corp., Petroleum Products Supply Corp., and the Electric Power Corp.

Economically, Burma remained a country largely reliant on agriculture, with more than 60% of its labor force employed in agriculture and 40% of its foreign exchange earnings coming from rice exports. The economic growth rate, which averaged 6.5% annually between fiscal year (FY) 1977[2] and FY 1982, appears to have tapered off in 1984-85. The trade deficit, which declined slightly in FY 1983 (revised from reported surplus), exceeded $300 million in FY 1984.[3] Burma, notwithstanding the importance it places on self-reliance, has become more and more dependent on foreign assistance to finance imports and economic development. As a result, foreign debt has grown to over $2.6 billion.[4]

The Government was considering the development of offshore natural gas reserves in the Gulf of Martaban to increase export earnings and to ease domestic energy shortages. The final decision awaited assessment of a feasibility study undertaken by Petro-Canada International Assistance Corp. The plan was to use the gas to produce ammonia, methanol, urea,, and electric power. The fertilizer would be exported and the methanol would be converted to gasoline to ease the fuel shortage. Financing, which will be very expensive, had not yet been arranged.

PRODUCTION

In FY 1984, the mining sector produced 92% of the Government's planned output, and the net value of the mining sector product increased an estimated 32%. The executive branch report to the legislature stated that the value of nonfuel mining output at current prices was $127 million in FY 1984. It also revised the FY 1983 figure of $122 million to $104 million.[5] Crude oil and natural gas were the most valuable mineral commodities in 1985 despite the drop in world prices of crude oil. A rough estimate of crude oil value was $200 million. At a nominal value of $3.00 per 1,000 cubic feet of natural gas, gas production was worth an additional $60 million. Several minerals or mineral-based commodities showed gains in production despite a drop in world prices for some. These included cement, copper, fire clay, limestone, natural gas, nitrogen fertilizer, and salt. Those declining included barite, white clay, dolomite, feldspar, pig iron, silver, tin, tungsten, and zinc.

Table 1.—Burma: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984	1985[p]
METALS					
Antimony, mine output:					
Gross weight	250	--	--	--	--
Sb content[e]	100	--	--	--	--
Copper:					
Mine output, metal content	77	101	4,200	12,000	16,700
Matte, gross weight	170	223	173	173	173
Iron and steel: Pig iron	3,753	13,328	15,200	7,764	--
Lead:					
Mine output, metal content	[e]16,100	[e]16,050	23,146	21,937	21,935
Metal:					
Refined	4,068	7,829	7,636	6,996	9,585
Antimonial lead (18% to 20% Sb)	254	279	313	254	[e]300
Nickel:					
Mine output, metal content[e]	20	20	20	20	20
Speiss, gross weight	80	81	80	80	[e]80
Silver, mine output thousand troy ounces	450	526	558	576	568
Tin, mine output, metal content:					
Of tin concentrate	596	804	629	745	622
Of tin-tungsten concentrate	842	877	1,013	1,283	1,129
Total	1,438	1,681	1,642	2,028	1,751
Tungsten, mine output, metal content:					
Of tungsten concentrate	248	243	235	216	171
Of tin-tungsten concentrate	577	601	695	880	774
Total	825	844	930	1,096	945
Zinc, mine output, metal content	3,556	5,382	4,537	5,320	4,353
INDUSTRIAL MINERALS					
Barite[3]	6,933	16,029	9,989	[e]11,000	8,100
Cement, hydraulic	317,434	344,225	334,685	311,179	477,000
Clays:[3]					
Ball clay	793	409	404	110	110
Bentonite	2,317	1,463	710	710	710
Fire clay[4]	1,755	1,633	[e]1,780	1,020	1,370
Industrial white clay	813	813	810	810	610
Feldspar[3]	4,267	2,540	[e]2,700	6,220	2,446
Graphite[3]	1,422	279	200	234	234
Gypsum[3]	31,095	26,079	34,278	39,200	38,594
Nitrogen: N content of ammonia[e]	59,300	51,000	53,900	[r]56,916	125,795
Pigments, mineral, natural: Iron oxide	350	(5)	(5)	(5)	--
Precious and semiprecious stones: Jadeite[3] kilograms	8,891	9,682	29,107	20,694	12,079
Salt[6] thousand tons	270	269	288	280	320
Stone:[3]					
Dolomite	6,381	3,250	4,400	[e]4,000	2,383
Limestone, crushed and broken thousand tons	1,219	1,221	1,247	1,210	1,541
Quartz	37	39	--	--	--
Talc and related materials: Soapstone[3]	128	128	128	128	128

See footnotes at end of table.

Table 1.—Burma: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984	1985[p]
MINERAL FUELS AND RELATED MATERIALS					
Coal, lignite	38,100	38,200	34,500	43,200	43,000
Gas, natural:					
Gross[e] million cubic feet	16,000	19,000	20,000	26,000	34,000
Marketed[3] do	14,878	17,400	18,190	24,796	32,596
Petroleum:					
Crude (gross wellhead) thousand 42-gallon barrels	10,447	9,789	10,168	11,761	11,302
Refinery products[e] do	7,670	7,000	7,000	8,000	8,000

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through June 5, 1986.
[2]In addition to the commodities listed, pottery clay, common sand, glass sand, other varieties of crude construction stone, and other varieties of gem stones are produced, but available information is inadequate to make reliable estimates of output levels.
[3]Data are for fiscal years beginning Apr. 1 of that stated.
[4]Includes fire clay powder.
[5]Revised to zero.
[6]Brine salt production as reported by the Burmese Government was as follows: 1981—83,795; 1982—73,901; 1983—200,944; 1984—81,166; and 1985—44,508.

TRADE

Burma's export earnings from minerals during FY 1984 totaled $46 million, excluding gems, jade, and jewelry, a 12% increase over that of FY 1983. The percentage increase of minerals exported was much greater despite falling world prices. Proceeds from Burma's 21st Annual Gem Emporium in February 1984 were $4.9 million, a large drop from $8.8 million in 1983. However, the sales at the 22d Annual Gem Emporium in February 1985 rose to a record $9.3 million.

The major sources of mineral revenue were tin-tungsten concentrates and tin metal, accounting for more than one-half the total. Silver was next in value, followed by copper matte, refined lead, and zinc concentrate.

Copper concentrate was produced for export, and the first sale was made in late 1984 or early 1985. After trial runs of the copper concentrator at Monywa, Sagaing Division, are completed and full-scale operation is under way, the value of copper exports are expected to equal the tin and tungsten values at current prices.

Overall exports for FY 1984 dropped to about $350 million, a decline from $422 million (revised) reported in FY 1983. Imports increased moderately to $670 million in FY 1984. The main cause of the trade deficit was lower rice earnings. The increased earnings from mineral exports could not offset the earnings loss of the much larger agricultural and industrial sectors.

COMMODITY REVIEW

METALS

Copper.—The Monywa copper mine and flotation plant began exporting sizable amounts of 20% copper concentrate after 5 years of construction. The mill, however, was still operating on a trial basis by Burmese officials. The copper exports will provide a much-needed source of foreign exchange despite the depressed world market for copper. The mine was producing 4,200 tons of ore per day, with production targeted for 8,000 tons per day. The mine and plant were designed and constructed with Yugoslav assistance. No decision has been made on whether to build the long-discussed copper smelter at Monywa. Although there are additional copper reserves at Letpaduang, near the present mine, no plans had been made to develop the mine pending an economic feasibility study by the Department of Geological Survey and Exploration.

Gold.—The Geological Survey carried out gold surveys and preliminary development work during FY 1984 at Namtu and Kawlin. The work was done with technical assistance provided by the Government of Australia. Twenty Burmese trainees were scheduled to go to Australia for a detailed training course on gold mining.[6]

Iron and Steel.—The second unit of the direct-reduction steel plant at Anisakan in Maymyo Township was believed to have been completed. Burmese officials planned to use the second 20,000-ton-per-year Kinglor-Metor unit for feedstock to an electric arc furnace for steel production. The first unit's output would continue to be smelted for pig iron production.

Japanese firms reportedly signed a $14 million contract with the Metal Industries Corp. of Burma to renovate its Ywama steel mill at Insein in the Rangoon suburbs.[7] The goal was to achieve a rerolling capacity of 43,000 tons per year by expanding the capacity of the electric arc furnace, the rolling mill, wire mill, and peripheral facilities. In addition, a continuous billet caster was to be installed. The project was expected to be financed by a loan from the Government of Japan.

According to a Government report,[8] the No. 1 iron and steel plant began construction of a unit to make steel grinding balls for the mining industry. All of Burma's ore concentration and cement plants currently use imported grinding balls. The plant was scheduled for completion in FY 1988 and will save on foreign exchange and furnish additional local employment opportunities.

Lead and Zinc.—Expansion of the lead ore concentrating plant at the Bawdwin Mine in Shan State began in 1981 with a loan from the Federal Republic of Germany. Assembly of the plant began in 1984 with delivery of the ore-dressing equipment, electrical and mechanical equipment, and construction materials. Construction was in progress during 1985. Although most ore presently comes from underground workings, the capacity of the open pit mine was being expanded from 500 to 1,000 tons per day to coincide with the concentrator expansion.[9]

INDUSTRIAL MINERALS

Expansion of the cement industry has been given high priority by the Government. Chronic shortages of cement at major construction sites have delayed building schedules and caused increases in overall construction costs. The Government-owned Cement Mills Industrial Development Corp. completed two 400-ton-per-day wet-mill kilns during the year at the Kyangin cement complex near Mandalay. One kiln went on-line in February; the other was scheduled for commissioning in midyear. Japan's Kawasaki Heavy Industries Ltd. supplied the equipment and expertise.

The Federal Republic of Germany's Dyckerhoff Zementwerke AG reportedly was asked to study the economic feasibility of rehabilitating the three old production lines at the Thayetmyo cement plant in Magwe Division. The mill was running three shifts per day producing only 600 tons of cement from the 980-ton-per-day-capacity plant. The antiquated equipment consisted of three kilns. The oldest kiln was built in 1935 by the United Kingdom. The second was built in 1956 and installed by the German Democratic Republic. The newest kiln was built by Japan in 1964 and has a capacity of 400 tons per day. The old British mill was no longer running, and Burmese officials did not believe that it was worth rehabilitating.

Repairs have been started on the Myaingalay mill near Pa-an in Karen State. The plant was nearly ready to begin production in late 1984 when it was damaged by an anti-Government group. When this plant begins operating, Burma's cement production was forecast to increase to over 500,000 tons.

MINERAL FUELS

An anticipated major increase in domestic crude oil production by the Government has not materialized, forcing its four refineries to run at 50% of their 57,000-barrel-per-day (bbl/d) capacity. Crude output was reported at 27,000 bbl/d in 1985, down from a peak of 30,000 bbl/d in 1980. The reported production, based on well-head readings, was often far less than that in usable oil because of the high water and mud content, reportedly 10% of flow.

The Government continued its policy of not importing crude oil despite the recent substantial decreases in the worldwide price of oil. This policy has therefore resulted in the 4-year shortage in the Burmese market. Two small refineries in central Burma, Chauk (5,000 bbl/d) and Malun (2,000 bbl/d), were closed during the year, as was a 23,000-bbl/d refining unit at the three-unit Syriam refinery near Rangoon. Only the 25,000-bbl/d Mann refinery in central Burma and the remaining two units at Syriam continued operating.

The Government of Burma continued to be committed to a vigorous program of exploration in order to increase oil production. The Government's economic guidelines since 1973 have been that it would consider mutually beneficial economic cooperation with foreign countries or economic interests. Regardless of the stated policy, foreign participation in petroleum exploration remained limited to one offshore contract with the Japanese National Oil Corp.

MOC has been drilling in the Gulf of Martaban for a number of years and reportedly has discovered large deposits of low-sulfur natural gas. An International Bank for Reconstruction and Development study was being conducted during the year to recommend the best way to develop the gas resources and build related downstream industries. Depending on the sources of the estimate, reserves range from 3 to 9 trillion cubic feet. Plans for ammonia, methanol, and urea plants and a thermal powerplant appeared to be progressing well during 1985. A 90-kilometer, 46-centimeter-diameter pipeline was planned to be built to bring the gas onshore. Development of the Martaban Field was expected to be expensive, but the fertilizer produced would be exported and supply much-needed foreign exchange. The electric power and methanol, converted to gasoline, would serve the domestic market.

Three wells drilled in the Gulf of Martaban during 1985 did not strike commercial quantities of natural gas. A fourth was under way at yearend.[10] These disappointing wells were apparently on a different geologic structure than the one discovered in 1982 and considered for development. The recently drilled wells are not expected to affect the development of the first structure.

Exploration continued onshore in the Middle Irrawaddy Basin and in the Prome Valley. Four seismic and four geologic teams were working in these areas during the year. Altogether, 215 new wells were drilled onshore, an increase of 14 over that of 1984. Over one-half of Burma's 45 drilling rigs were working in the Htaukshabin Oilfield at yearend. The new wells resulted in nearly doubling production to 10,000 bbl/d in the first half of 1985. The Mann Oilfield, 12 miles north of Htaukshabin, continued as the most productive field in Burma with 16,000 bbl/d. Water injection was being used in both of these fields to enhance oil flow.

Drilling was continuing at the Payagon Field where a small amount of oil and 12 million cubic feet per day of gas were being produced. The gas supplied a brick factory, a steel rolling mill, and three electric powerplants.

The 1981 discovery at Tantabin in the Irrawaddy Delta was thought to be an important discovery at that time. Three confirmation wells have been drilled since then with disappointing results.

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[1]Physical scientist, Division of International Minerals.

[2]The Burmese fiscal year begins Apr. 1 of the year stated.

[3]Values have been converted from Burmese kyats (K) to U.S. dollars at the rate in FY 1983 of K8.02=US$1.00 (revised); FY 1984, K8.36=US$1.00; and FY 1985, K8.51=US$1.00 (estimated).

[4]U.S. Embassy, Rangoon, Burma. State Dep. Airgram A-11, July 9, 1985, p. 3.

[5]Ministry of Planning and Finance. Report to the Pyithu Hluttaw on the Economic and Social Condition of the Socialist Republic of the Union of Burma for 1985/86. 1985, p. 27.

[6]Mining International. V. 2, No. 9, Sept. 1985, p. 84.

[7]Minerals and Metals Review. V. 10, No. 12, Dec. 1984, p. 41.

[8]Page 258 of work cited in footnote 5.

[9]International Mining. V. 2, No. 11, Nov. 1985, p. 56.

[10]Petroleum News. V. 16, No. 10, Jan. 1986, p. 12.

The Mineral Industry of Canada[1]

By Harold R. Newman[2]

The Canadian mineral industry continued its efforts to increase efficiency and productivity. The industry achieved some growth in 1985 despite continuing low metal prices. Cost reduction continued to be a high priority with all producers. Most capital investments by the industry were directed toward that goal. Investment of $8.3 billion[3] showed a moderate increase over the $7.7 billion in 1984. New mine developments and exploration programs were mainly limited to the precious metal sector.

The mineral industry continued to face an international market situation of decreased demand, growing sources of supply and surplus capacity of mineral products, and marginal world economic growth rates. These factors, outside its control, caused an export-oriented mineral industry to experience some difficulty. If there is moderate improvement in the world economy in 1986 as expected, this would benefit Canadian mineral trade. Low levels of inflation and stabilization of interest rates have allowed some companies to improve their debt-to-equity ratio and achieve a degree of profitability.

Government Policies and Programs.—In 1985, Canada and the United States agreed to hold discussions on the possibility of free trade between the two countries. These discussions will include not only mineral trade but also all other sectors of trade. Negotiations were to take place without any preconditions. Chief trade negotiators have been appointed by both countries, and negotiations were scheduled to commence in 1986. Mineral Development Agreements (MDA) between Canada and Manitoba, New Brunswick, Newfoundland, Nova Scotia, and Saskatchewan were in their second year in 1985, and results were satisfactory. British Columbia, Ontario, and Quebec signed MDA's in mid-1985. Work under these MDA's provide geoscience data, mining and mineral processing technology, and market and economic studies to identify new development opportunities. On the basis of a 5-year period, the Federal commitment was about $90 million, and the Provincial commitments, about $69 million.

In March 1985, the Western Accord was signed between the governments of Canada, Alberta, British Columbia, and Saskatchewan with the objectives of replacing existing price controls on petroleum and moving toward deregulation of oil prices. The Western Accord eliminated many of the discriminatory and interventionist policies of the 5-year-old National Energy Program (NEP) and replaced them with a market-responsive, profit-sensitive regime. A long list of Federal oil and gas taxes was removed or phased out. The Petroleum Incentives Program, which discriminated against foreign investment, was to be phased out. International oil companies operating in Canada will benefit from the shift to free-market oil pricing, because a high percentage of their production had been receiving artificially low "old" oil prices (pre-1974 production) under the previous NEP regulations. The Department of Indian Affairs and Northern Development (DIAND) released a policy paper, "The Northern Mineral Sector: A Framework for Discussion." This was expected to lead to a Northern Mineral Policy in 1986. The Yukon Territorial government budgeted $730,000 in 1985 for a Yukon Mineral Development Program to promote exploration and development.

The Federal Industrial Review Act (FIRA) was dismantled by the Government, and the FIRA review board was replaced by the Investment Council of Canada in an effort to encourage new foreign investment.

PRODUCTION

Canada's mineral and primary metal sector employed about 1.5% of the work force and accounted for about 4% of the gross domestic product (GDP), over 40% of new capital investment, and over 45% of rail freight loadings in 1985. The sector produced about 50 commodities. Mining took place in every Province and Territory, although on Prince Edward Island it was confined to sand and gravel operations.

According to the Canadian Department of Energy, Mines and Resources (EMR), the total value of Canada's mineral production, including fuel and nonfuel minerals, was about $33.0 billion compared with about $32.0 billion in 1984. Mineral fuels accounted for $23 billion. The metals group accounted for $6.4 billion; the industrial minerals group accounted for $1.8 billion, and structural materials accounted for $1.7 billion. The 10 leading minerals, based on value of output, were petroleum, natural gas, natural gas products, coal, iron ore, copper, zinc, nickel, gold, and uranium, which represented 87% of the total value of output of the industry. All except natural gas and its byproducts, zinc, and gold showed an increase in 1985.

The Province of Alberta continued to account for the largest share of the total value of output reaching $19.9 billion or 60.9% of the total, owing to the large oil and gas output. Ontario was second in output value with $3.3 billion or 10% of the total. Saskatchewan was third in output value at $2.8 billion or 8.4% of the total. The Northwest Territories, whose value of output climbed from $777 million in 1984 to $844 million, had the largest increase overall. The value of output increased in 8 of 10 Provinces and decreased in the Yukon Territory. Production values of the Provinces and Territories were as follows, in billion dollars:

Province or Territory	1984	1985[p]
Alberta	19.3	19.9
Ontario	3.3	3.3
Saskatchewan	2.7	2.8
British Columbia	2.4	2.5
Quebec	1.5	1.6
Newfoundland-Labrador	.7	.6
Manitoba	.5	.6
Northwest Territories	.5	.6
New Brunswick	.4	.4
Nova Scotia	.2	.2
Yukon Territory	(1)	(1)
Prince Edward Island	(1)	(1)
Total[2]	32.0	33.0

[p]Preliminary.
[1]Less than 1/2 unit.
[2]Data may not add to totals shown because of independent rounding.

Source: Department of Energy, Mines and Resources, Ottawa, Canada, 1985.

Table 1.—Canada: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984[p]	1985[e]
METALS					
Aluminum:					
Alumina, gross weight thousand tons	1,208	1,127	1,116	1,126	1,019
Metal:					
Primary	1,115,691	1,064,795	1,091,231	1,227,000	1,282,000
Secondary	59,281	62,000	63,000	64,000	65,000
Antimony[e 2]	1,670	--	--	[r]554	1,094
Bismuth[3]	168	189	202	166	222
Cadmium[4]	1,298	854	1,456	1,605	1,683
Calcium kilograms	469,403	W	W	W	W
Cobalt:					
Mine output, metal content[5]	2,080	1,404	1,584	2,123	2,676
Metal[6]	1,277	1,041	1,824	1,628	2,270
Columbium and tantalum:					
Columbium concentrate (pyrochlore):					
Gross weight[e]	4,100	4,758	[r]3,039	4,400	4,944
Cb content	1,916	2,145	[r]1,256	1,987	2,223
Tantalum concentrate:					
Gross weight[e]	289	258	--	--	--
Cb content	9	8	--	--	--
Ta content	94	77	--	--	--
Copper:					
Mine output, recoverable metal content[7]	[r]691,328	612,455	653,040	721,826	730,300
Metal, primary and secondary:					
Blister and anode	479,046	366,625	375,000	452,000	493,300
Refined	476,655	337,780	464,333	504,252	499,600
Gold thousand troy ounces	1,673	2,081	2,363	2,683	2,747

See footnotes at end of table.

Table 1.—Canada: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984[p]	1985[e]
METALS —Continued					
Iron and steel:					
Iron ore:[8]					
Gross weight thousand tons	51,985	35,425	33,495	41,065	39,889
Fe content do.	32,642	22,530	21,300	26,076	25,130
Metal:					
Pig iron do.	9,743	8,000	[r]8,567	9,643	9,658
Ferroalloys do.	282	218	269	216	227
Steel, crude do.	14,811	11,762	12,828	14,715	15,500
Semimanufactures[9] do.	13,186	9,556	NA	NA	NA
Lead:					
Mine output, Pb content	332,045	341,212	251,467	264,301	284,600
Metal, refined:					
Primary	168,450	174,310	178,043	173,000	240,000
Secondary	69,658	67,566	63,914	79,000	66,800
Lithium: Spodumene[10]	--	--	--	82	300
Magnesium metal, primary	8,548	7,900	6,000	8,000	7,000
Molybdenum	12,850	13,961	10,194	11,557	7,569
Nickel:					
Mine output, Ni content[11]	160,247	88,581	128,113	173,725	175,600
Metal, smelter	109,303	58,636	87,200	104,000	110,100
Platinum-group metals troy ounces	382,667	228,426	223,925	333,363	335,164
Selenium, refined[12] kilograms	350,010	222,000	266,000	463,000	305,000
Silver thousand troy ounces	36,311	42,246	35,559	42,655	38,889
Tellurium, refined[12] kilograms	21,297	[e]18,000	[e]16,000	21,000	20,000
Tin, mine output, Sn content	239	135	141	217	113
Titanium:					
Ilmenite, gross weight thousand tons	2,008	1,735	1,700	1,800	2,500
Sorel slag (80% TiO_2)[13]	759,191	669,000	630,000	733,000	850,000
Tungsten, mine output, W content	1,993	2,842	[r]1,220	3,328	3,174
Uranium oxide (U_3O_8)	8,853	7,643	8,483	10,272	12,800
Zinc:					
Mine output, Zn content	1,095,958	1,189,000	[r]1,069,709	1,207,098	1,172,200
Metal, refined	618,650	511,870	617,033	683,156	692,400
INDUSTRIAL MINERALS					
Asbestos thousand tons	1,122	834	858	837	744
Barite	86,117	27,744	[r]45,465	46,884	70,000
Cement, hydraulic[14] thousand tons	10,145	8,426	7,871	8,609	9,559
Clays and clay products[15] value, thousands	$119,116	$95,993	$127,400	$100,200	$105,800
Diatomite[e]	2,600	2,000	2,000	[r]4,000	3,800
Gypsum and anhydrite thousand tons	7,025	5,987	7,507	7,756	8,399
Lime do.	2,555	2,197	2,232	2,266	2,210
Magnesite, dolomite, brucite value, thousands	$11,472	$8,216	$7,825	$5,965	$7,680
Mica, scrap and flake	10,881	9,979	10,433	10,881	11,500
Nepheline syenite	587,565	550,000	528,000	521,000	488,000
Nitrogen: N content of ammonia	2,176,249	2,062,100	2,887,870	3,493,464	3,500,000
Potash, K_2O equivalent thousand tons	6,549	5,309	5,708	7,527	6,604
Pyrite and pyrrhotite, gross weight	10,198	19,268	[e]5,000	5,000	6,000
Salt thousand tons	7,240	7,940	8,602	10,235	10,042
Sand and gravel do.	259,661	207,227	233,408	233,759	223,700
Silica (quartz)	2,238	1,797	2,303	2,624	2,538
Sodium compounds, n.e.s.:					
Sodium carbonate[e]	475,000	475,000	425,000	365,000	350,000
Sodium sulfate	535,214	542,839	454,000	387,000	375,000
Stone[16] thousand tons	85,041	61,929	74,466	81,754	77,930
Sulfur:					
Elemental byproduct:					
Of smelter gases do.	783	627	678	875	773
Of sour natural gas do.	5,599	5,226	5,390	5,260	5,296
Of refineries[e] do.	160	160	170	165	150
Of tar sands do.	247	259	330	296	392
S content of pyrite and pyrrhotite[e] do.	10	[r]8	[r]9	[r]10	10
Talc, soapstone, pyrophyllite	82,715	72,182	97,000	126,000	132,000
MINERAL FUELS AND RELATED MATERIALS					
Carbon black[e]	130,000	130,000	135,000	176,500	175,000
Coal:					
Bituminous and subbituminous	33,290,000	35,317,000	[r]37,146,000	47,510,000	60,480,000
Lignite	6,798,000	7,494,000	7,760,000	9,918,000	9,672,000
Coke, high-temperature	4,659,000	4,000,000	4,120,000	4,900,000	4,750,000
Gas, natural:					
Gross million cubic feet	3,019,191	3,076,002	3,372,670	3,173,708	3,250,000
Marketed do.	2,399,415	2,682,747	2,465,100	2,505,818	2,831,200

See footnotes at end of table.

Table 1.—Canada: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984[p]	1985[e]
MINERAL FUELS AND RELATED MATERIALS —Continued					
Natural gas liquids:					
Gross:					
Butane thousand 42-gallon barrels	20,443	20,375	19,793	30,492	21,305
Propane do	33,016	33,547	30,211	37,322	33,870
Pentanes plus do	36,420	35,366	33,371	34,513	37,280
Ethane do	29,541	26,698	29,577	35,765	30,400
Condensate do	1,881	936	880	1,057	895
Total do	121,301	116,922	113,832	139,149	123,750
Peat	461,993	487,000	544,000	541,000	586,000
Petroleum:					
Crude[17] thousand 42-gallon barrels	467,701	464,122	494,617	526,350	530,300
Refinery products:					
Gasoline:					
Aviation do	1,480	1,066	1,081	1,297	1,300
Other do	239,707	212,126	r204,685	203,797	204,000
Jet fuel do	28,841	25,153	r26,442	26,434	28,000
Kerosene do	18,575	16,256	r13,809	13,831	14,000
Distillate fuel oil, diesel and light do	171,907	146,938	r137,693	145,497	150,000
Residual fuel oil, heavy do	100,707	74,472	r58,857	54,723	55,000
Lubricants do	5,898	4,860	4,940	5,808	6,000
Liquefied petroleum gas, propane and butane do	16,337	16,101	r20,453	21,041	22,000
Petrochemical feedstocks do	32,366	28,900	r26,973	27,527	28,000
Asphalt do	19,139	16,065	r16,666	16,108	18,000
Petroleum coke do Unspecified do	20,327	10,623	r27,128	30,922	32,000
Refinery losses do	40,360	36,186	r10,753	12,823	14,000
Total do	695,644	588,746	549,480	559,808	572,300

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available. W Withheld to avoid disclosing company proprietary data.

[1]Table includes data available through May 31, 1985.

[2]Sb content of antimonial lead alloys, flue dust, and doré slag estimated on the basis of reported gross production.

[3]Refined metal and bullion from domestic ores plus recoverable Bi content of exported concentrates.

[4]Refined metal from domestic ores plus recoverable Cd content of exported ores and concentrates.

[5]Actual output not reported. Data represent the Co content of all products derived from ores of Canadian origin, including nickel oxide sinter shipped to the United Kingdom and nickel-copper-cobalt matte shipped to Norway for further processing.

[6]Actual output not reported. Data represent the output within Canada of metallic cobalt from ores of both Canadian and non-Canadian origin.

[7]Blister copper from domestic ores plus recoverable Cu content of exported matte and concentrates.

[8]Series represent gross weight and metal content of usable iron ore (including byproduct ore) actually produced.

[9]Includes shipment of ingots from primary plants for rolling elsewhere.

[10]Based on U.S. imports.

[11]Refined nickel from domestic ores plus Ni content of oxide produced and recoverable Ni content of exported matte.

[12]From all sources, including imports and secondary sources.

[13]Refined sorel slag contained 72% TiO_2 in 1981-82; 74% TiO_2 in 1983; and 80% TiO_2 in 1984-85.

[14]Cement shipped and/or used by producers.

[15]Includes bentonite products from common clay, stoneware clay, fire clay, and other clays.

[16]Crushed, building, ornamental, paving, and similar stone.

[17]Including synthetic crude (from oil shale and/or tar sands).

Table 2.—Canada: Mineral production in 1985, by commodity

(Percent)

Commodity	Share of total[P]
Petroleum, crude	42.2
Natural gas	17.6
Natural gas products	6.1
Coal	4.2
Iron ore	3.4
Copper	3.2
Nickel	2.8
Gold	2.7
Uranium	2.1
Cement	1.7
Potash	1.4
Other	12.6
Total	100.0

[P]Preliminary.

Sources: Department of Energy, Mines and Resources, Ottawa, Canada, and Statistics Canada, 1985.

Production at several major mines was suspended idefinitely. Prices for their products remained at or below that reached at the bottom of the recession in 1982. Despite problems of some individual producers, the industry as a whole responded to the economic conditions by improving its competitiveness, becoming more efficient through improved mining techniques, new technology, and cost cutting. Mining activities were conducted in every region of the country.

The values of principal mineral production were as follows, in million dollars:

Commodity	1984	1985[P]
METALS		
Iron ore	1,082	1,128
Copper	997	1,055
Zinc	1,091	961
Nickel	848	902
Gold	914	874
Uranium (U)	658	699
Silver	337	246
Lead	143	111
Molybdenum	77	55
Total	6,147	6,031
INDUSTRIAL MINERALS		
Cement	524	569
Potash, K_2O	633	469
Asbestos	278	257
Salt	153	165
Clay products	100	105
Lime	115	100
Gypsum	45	59
Total	1,848	1,724
MINERAL FUELS		
Petroleum	13,004	13,825
Natural gas	5,797	5,771
Coal	1,310	1,375
Total	20,111	20,971

[P]Preliminary.

Source: Department of Energy, Mines and Resources, Ottawa, Canada, 1985.

TRADE

The Canadian mineral sector's share of international markets has declined over the past 15 years. Although the value of mineral exports has almost tripled in the last 10 years, the share of total exports has declined from 34% to 26% in 1985.

There was an increase in exports in 1985 because of an improved market. Exports of crude minerals and fabricated material were valued at almost $23 billion. The major market was the United States, which accounted for 72.3% of the total exports. The leading commodities exported were petroleum, natural gas, precious metals, aluminum, and coal. The value of mineral industry imports totaled $11.2 billion. The United States supplied 54% of the total value. The value of the mineral trade surplus with the United States was $10.4 billion.

As a result of Canada's and the United States decision in late 1985 to seek freer trade between the two countries, negotiators were preparing to begin discussions that would aim at producing a comprehensive agreement to reduce trade barriers between the world's two largest trading partners. A freer trade agreement was expected to boost sales and improve the competitiveness of both nations' manufacturing sectors. The United States remained the largest foreign investor in Canada with about $45 billion in direct investment. At slightly over $11 billion, Canada has become the third largest foreign investor in the United States, after the United Kingdom and the Netherlands.

Table 3.—Canada: Exports and reexports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983[r]	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS				
Aluminum:				
Ore and concentrate	46,001	51,360	47,224	United Kingdom 898; West Germany 801.
Metal including alloys:				
Scrap	81,425	106,574	99,207	Japan 5,613; Italy 655.
Unwrought	925,449	834,371	612,664	NA.
Semimanufactures[2]	66,332	101,904	89,401	Pakistan 2,979; Ivory Coast 1,956.
Cadmium: Metal including alloys, all forms	1,365	1,388	843	United Kingdom 511; Netherlands 28.
Cobalt:				
Oxides and hydroxides	192	373	17	United Kingdom 320; Belgium-Luxembourg 36.
Metal including alloys, all forms	887	1,487	1,150	United Kingdom 179; Belgium-Luxembourg 137.
Copper:				
Ore and concentrate including matte, Cu content	313,796	339,061	15,107	Japan 222,299; Republic of Korea 37,473; China 27,768.
Ash and residue containing copper	1,708	2,754	2,754	
Metal including alloys:				
Scrap	53,469	52,676	43,824	Republic of Korea 1,350; Taiwan 1,146.
Unwrought	298,555	346,017	185,660	United Kingdom 39,840; China 38,528.
Semimanufactures	39,357	63,577	47,745	Saudi Arabia 3,114; Venezuela 2,793.
Gold:				
Ore and concentrate, Au content troy ounces	197,598	193,676	33,212	Japan 129,310; China 17,940.
Metal including alloys, unwrought and partly wrought thousand troy ounces	2,533	4,000	3,545	Japan 299; West Germany 83.
Iron and steel:				
Iron ore and concentrate thousand tons	25,528	30,737	12,078	Netherlands 4,018; United Kingdom 3,797.
Metal:				
Scrap	866,932	795,060	551,600	Republic of Korea 70,226; Italy 59,487.
Pig iron, cast iron, related materials	385,252	439,608	202,104	Netherlands 113,344; Japan 32,305.
Ferroalloys:				
Ferromanganese	4,160	9,202	9,197	Brazil 5.
Ferrosilicon	45,728	35,299	15,673	Japan 18,314; United Kingdom 617.
Unspecified	5,188	5,202	2,795	United Kingdom 2,296; Libya 104.
Steel, primary forms	579,096	249,086	248,840	Greenland 82; Singapore 49.
Semimanufactures:				
Bars, rods, angles, shapes, sections	807,983	890,758	861,791	Mexico 7,460; France 4,742.
Universals, plates, sheets	873,346	1,291,368	1,065,230	Thailand 45,104; Italy 41,200.
Rails and accessories	38,322	108,343	60,551	Indonesia 19,440; Italy 11,049.
Wire	129,573	167,359	164,775	Republic of South Africa 441; New Zealand 322.
Tubes, pipes, fittings	251,908	421,256	405,415	Barbados 2,986; Syria 2,231.
Castings and forgings, rough	113,274	139,494	139,006	Australia 82; Mexico 76.
Lead:				
Ore and concentrate, Pb content	85,548	72,937	8,859	Belgium-Luxembourg 38,499; West Germany 15,469.
Metal including alloys:				
Scrap	8,535	5,960	4,132	Taiwan 678; West Germany 466.
Unwrought	147,281	124,528	79,406	United Kingdom 27,095; Belgium-Luxembourg 6,155.
Semimanufactures	11,411	18,489	17,459	U.S.S.R. 500; Japan 198.
Magnesium: Metal including alloys, all forms	2,577	4,059	1,241	United Kingdom 1,185; Japan 833.
Molybdenum: Ore and concentrate including scrap, Mo content	11,349	8,896	406	Japan 2,280; Belgium-Luxembourg 1,859; West Germany 1,429.
Nickel:				
Ore and concentrate including matte, Ni content	40,087	59,410	119	Norway 31,049; United Kingdom 27,421; Japan 821.
Oxides and hydroxides, Ni content	11,186	20,082	8,876	NA.
Metal including alloys:				
Scrap	2,988	9,606	3,999	Netherlands 3,435; Japan 922.
Unwrought	67,386	80,508	45,807	NA.
Semimanufactures	10,451	10,867	8,910	Belgium-Luxembourg 509; United Kingdom 335.

See footnotes at end of table.

Table 3.—Canada: Exports and reexports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983[r]	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued				
Platinum-group metals:				
Ore and concentrate, metal content troy ounces	185,092	272,156	5,241	United Kingdom 266,915.
Metal including alloys:				
Waste and scrap do	39,192	164,290	60,347	United Kingdom 90,440; West Germany 13,503.
Unwrought and partly wrought do	101,307	136,962	131,111	United Kingdom 5,755.
Selenium, elemental	$258	418	121	United Kingdom 117; Netherlands 92.
Silver:				
Ore and concentrate, Ag content thousand troy ounces	14,144	13,654	3,316	Japan 6,500; Belgium-Luxembourg 579.
Metal including alloys, unwrought and partly wrought do	33,804	35,146	35,073	Sweden 32; United Kingdom 12.
Tin: Ore and concentrate including scrap, Sn content	381	317	31	United Kingdom 286.
Uranium and/or thorium: Ore and concentrate value, thousands	$50,775	$257,664	$228,311	United Kingdom $21,765; West Germany $4,748.
Zinc:				
Ore and concentrate, Zn content	626,178	539,633	28,373	Belgium-Luxembourg 306,285; Japan 63,432; Netherlands 39,400.
Blue powder	4,415	3,532	3,258	West Germany 92; Venezuela 62.
Metal including alloys:				
Scrap	17,996	19,552	8,786	West Germany 7,027; United Kingdom 1,322.
Unwrought	500,609	529,728	331,189	China 44,785; United Kingdom 39,466.
Semimanufactures	1,997	1,160	1,005	Cuba 56; Taiwan 49.
Other:				
Ores and concentrates	100,174	96,329	28,386	West Germany 30,927; Spain 15,002.
Ashes and residues	24,868	16,071	7,208	Taiwan 4,786; Japan 3,409.
Precious metals, unspecified:				
Waste and sweepings value, thousands	$75,072	$53,256	$18,531	United Kingdom $21,456; West Germany $10,845.
Metal, unwrought and partly wrought do	$21	$107	$103	United Kingdom $4.
Base metals including alloys, all forms	2,548	1,657	1,418	United Kingdom 150; Australia 37.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	795	350	350	
Artificial:				
Corundum	110,226	135,903	123,556	United Kingdom 12,310; Austria 37.
Silicon carbide	68,476	67,700	67,700	
Grinding and polishing wheels and stones value, thousands	$4,146	$6,528	$5,407	Finland $279; Brazil $189.
Asbestos, milled including crude	753,911	795,853	185,362	Japan 100,983; India 36,786.
Barite and witherite	795	1,247	1,247	
Cement thousand tons	1,513	2,113	2,104	Cameroon 4; Dominican Republic 2.
Diamond:				
Gem, not set or strung carats	36,894	56,798	30,129	Belgium-Luxembourg 12,966; Israel 8,553.
Industrial stones do	299,340	102,636	41,855	Ireland 57,581; Belgium-Luxembourg 3,200.
Dust and powder do	77,850	271,131	271,063	U.S.S.R. 68.
Feldspar, fluorspar, related materials:				
Nepheline syenite	398,390	387,069	334,354	Netherlands 21,830; Italy 10,482.
Fertilizer materials: Manufactured:				
Ammonia thousand tons	675	832	832	
Nitrogenous do	1,551	1,922	1,543	India 129; China 128.
Potassic do	9,412	11,215	7,029	Japan 685; India 636.
Unspecified and mixed do	116	115	104	Ghana 8.
Gypsum and plaster do	5,187	6,229	6,200	Malaysia 28.
Lime	215,946	186,748	186,139	Bermuda 183; Algeria 179.
Magnesium compounds: Magnesite, crude	243,837	580,072	579,961	West Germany 74; France 37.
Pigments, mineral: Iron oxides and hydroxides, natural and processed	13,768	17,039	16,702	Venezuela 306.

See footnotes at end of table.

Table 3.—Canada: Exports and reexports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983[r]	1984	Destinations, 1984 United States	Destinations, 1984 Other (principal)
INDUSTRIAL MINERALS —Continued				
Precious and semiprecious stones other than diamond —— value, thousands	$8,336	$9,281	$5,878	Taiwan $551; United Kingdom $528.
Salt and brine —— thousand tons	1,916	2,531	2,525	Guyana 1; Leeward and Windward Islands 1.
Sodium compounds, n.e.s.: Sulfate, manufactured	265,895	239,003	238,961	Trinidad and Tobago 42.
Stone, sand and gravel:				
Dimension stone: Crude and partly worked	58,781	220,691	218,375	Italy 1,322; Japan 801.
Limestone other than dimension	1,390,822	1,216,727	1,216,681	Trinidad and Tobago 46.
Quartz and quartzite	103,960	116,283	116,265	Leeward and Windward Islands 18.
Sand and gravel	95,652	109,852	108,968	France 591; Algeria 146.
Sulfur:				
Elemental, all forms thousand tons	5,671	7,327	1,782	Republic of South Africa 533; Brazil 517.
Sulfuric acid	273,307	553,781	471,737	Brazil 25,802; Chile 22,594.
Other: Crude —— value, thousands	$87,362	$111,554	$35,053	France $30,503; West Germany $19,124.
MINERAL FUELS AND RELATED MATERIALS				
Coal, all grades including briquets thousand tons	16,975	24,355	172	Japan 15,880; Republic of Korea 3,252; Brazil 1,206.
Coke and semicoke	45,777	116,710	95,358	Belgium-Luxembourg 11,083.
Gas, natural —— million cubic feet	681,462	743,768	743,768	
Peat, agricultural	397,736	460,760	437,827	Japan 20,717; Saudi Arabia 912.
Petroleum:				
Crude thousand 42-gallon barrels	105,529	131,024	130,573	Japan 451.
Refinery products:				
Liquefied petroleum gas do	41,176	45,043	43,111	Japan 1,807; Mexico 124.
Gasoline do	7,800	9,996	9,817	New Zealand 166; St. Pierre and Miquelon 11.
Distillate fuel oil do	10,457	13,994	12,663	St. Pierre and Miquelon 259; Republic of Korea 252.
Lubricants do	178	438	411	Bahamas 5; St. Pierre and Miquelon 3.
Residual fuel oil do	13,614	13,939	13,355	United Kingdom 330; Bahamas 254.
Asphalt do	1,316	1,816	1,806	St. Pierre and Miquelon 5; United Kingdom 3.
Petroleum coke do	333	305	305	

[r]Revised. NA Not available.
[1]Table prepared by H. D. Willis.
[2]May include relatively minor quantities of certain shapes not normally included among semimanufactures.
[3]Corrected 1983 data by destination: United Kingdom—111; United States—87; Netherlands—33; Spain—14; Belgium-Luxembourg—4; and other countries—9.

Table 4.—Canada: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983[r]	1984	Sources, 1984 United States	Sources, 1984 Other (principal)
METALS				
Aluminum:				
Ore and concentrate thousand tons	2,330	2,452	40	Brazil 1,511; Guyana 587; Guinea 154.
Oxides and hydroxides do	1,063	1,349	56	Jamaica 549; Australia 308; Japan 277.
Metal including alloys:				
Scrap	54,666	61,782	59,249	U.S.S.R. 2,016; Poland 155.
Unwrought	33,390	47,279	30,032	United Kingdom 4,600; Republic of South Africa 3,692.
Semimanufactures	119,207	184,350	132,374	West Germany 26,820; France 10,206.
Antimony: Oxides	1,001	1,144	345	United Kingdom 676; Belgium-Luxembourg 93.

See footnotes at end of table.

Table 4.—Canada: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983[r]	1984	Sources, 1984 United States	Sources, 1984 Other (principal)
METALS —Continued				
Chromium:				
Ore and concentrate, Cr content	8,605	12,888	5,607	Republic of South Africa 5,183; Cuba 1,254.
Oxides and hydroxides	1,718	2,098	1,424	United Kingdom 353; West Germany 233.
Cobalt:				
Ore and concentrate, Co content	45	13	NA	NA.
Oxides and hydroxides	30	17	NA	NA.
Copper:				
Ore and concentrate, Cu content	24,231	36,173	3,122	Chile 16,835; India 10,050; Poland 3,763.
Oxides and hydroxides	201	234	163	Norway 36; West Germany 35.
Sulfate	873	2,644	216	Belgium-Luxembourg 1,057; U.S.S.R. 536; United Kingdom 508.
Metal including alloys:				
Scrap	71,542	76,338	75,797	Haiti 286; United Arab Emirates 129.
Unwrought	24,559	25,563	4,520	Chile 12,735; Zaire 7,003.
Semimanufactures	38,551	44,107	29,771	Japan 3,236; West Germany 2,588.
Gold:				
Ore and concentrate, Au content troy ounces	30,575	18,969	8,841	Peru 4,983; Chile 3,601.
Metal including alloys, unwrought and partly wrought thousand troy ounces	2,105	2,182	1,936	Nicaragua 104; Peru 79.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite thousand tons	4,013	4,947	4,776	Brazil 171.
Metal:				
Scrap do	666	1,131	1,131	
Pig iron, cast iron, related materials	11,470	13,420	9,344	Brazil 3,945; West Germany 54.
Ferroalloys:				
Ferrochromium	32,565	33,091	7,980	Republic of South Africa 22,561; Yugoslavia 1,999.
Ferromanganese	18,263	29,805	10,824	West Germany 10,699; Republic of South Africa 3,676.
Ferrosilicomanganese	416	6,830	651	Republic of South Africa 6,077; Norway 100.
Ferrosilicon	13,090	24,777	24,409	West Germany 286; France 72.
Unspecified	7,231	12,060	7,128	Dominican Republic 1,821; Brazil 1,426.
Steel, primary forms	91,913	276,706	96,411	Brazil 48,154; West Germany 47,997.
Semimanufactures:				
Bars, rods, angles, shapes, sections	440,366	641,829	147,136	Belgium-Luxembourg 94,083; Spain 75,532.
Universals, plates, sheets	497,311	662,332	219,492	United Kingdom 68,943; Japan 65,564.
Hoop and strip	37,001	37,091	29,623	Japan 2,657; West Germany 1,506.
Rails and accessories	20,058	33,832	7,250	Japan 12,963; Belgium-Luxembourg 4,875.
Wire	64,162	78,234	17,805	United Kingdom 11,363; Belgium-Luxembourg 7,900.
Tubes, pipes, fittings	291,139	343,695	175,272	Japan 67,069; West Germany 20,798.
Castings and forgings, rough	37,781	43,365	36,772	Italy 1,326; Republic of Korea 1,264.
Lead:				
Ore and concentrate, Pb content	18,548	21,565	5,460	Peru 6,044; Republic of South Africa 5,072.
Oxides	1,409	1,224	948	Mexico 104; Republic of South Africa 83.
Metal including alloys:				
Scrap	58,072	48,137	48,098	Mexico 37.
Unwrought	2,551	6,314	4,084	Netherlands 1,226; Mexico 550.
Semimanufactures	1,298	653	636	Belgium-Luxembourg 9; United Kingdom 4.
Magnesium: Metal including alloys, all forms	4,787	6,249	6,033	United Kingdom 198; Italy 18.
Manganese:				
Ore and concentrate, metallurgical-grade, Mn content	42,260	77,545	3,169	Gabon 45,392; Republic of South Africa 20,227; France 8,757.
Oxides	4,852	5,279	3,336	Japan 1,256; Greece 673.
Metal including alloys, all forms	2,652	3,011	237	Republic of South Africa 2,757.
Mercury 76-pound flasks	2,147	2,176	1,596	Spain 580.

See footnotes at end of table.

Table 4.—Canada: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983[r]	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Molybdenum: Oxides and hydroxides	141	238	227	West Germany 11.
Nickel:				
Ore and concentrate including matte, Ni content	4,886	3,430	610	Australia 2,741; United Kingdom 79.
Metal including alloys:				
Scrap	24,386	21,305	9,367	United Kingdom 6,224; Belgium-Luxembourg 2,486.
Unwrought	2,357	3,479	972	Norway 2,422; United Kingdom 39.
Semimanufactures	3,174	2,825	1,706	West Germany 620; Sweden 376.
Platinum-group metals: Metals including alloys, unwrought and partly wrought troy ounces	18,294	22,441	14,114	United Kingdom 8,327.
Silver:				
Ore and concentrate including waste, metal content[2]	4,889	5,323	5,195	Peru 78; Chile 15.
Metal including alloys, unwrought and partly wrought thousand troy ounces	10,913	6,917	6,319	Mexico 287; Chile 257.
Tin:				
Ore and concentrate, Sn content	29	43	43	
Metal including alloys:				
Unwrought	3,769	4,106	1,502	Brazil 912; Netherlands 521.
Semimanufactures	349	298	267	United Kingdom 18; Hong Kong 8.
Titanium:				
Oxides	12,968	16,188	7,980	West Germany 2,660; Spain 990.
Metal including alloys, all forms	275	356	267	Japan 52; United Kingdom 17.
Tungsten: Ore and concentrate, W content	12	7	7	
Uranium and/or thorium: Ore and concentrate value, thousands	$90,784	$76,952	$218	Australia $36,094; Republic of South Africa $28,840; Argentina $11,796.
Zinc:				
Ore and concentrate, Zn content	78,027	41,087	23,831	Peru 9,403; Chile 5,651.
Oxides	1,257	1,350	1,266	Mexico 78; France 3.
Blue powder	445	845	741	Belgium-Luxembourg 86; West Germany 18.
Metal including alloys:				
Scrap	298	780	780	
Unwrought	9,964	6,757	409	Peru 2,850; West Germany 2,584.
Semimanufactures	1,492	1,089	886	West Germany 129; Belgium-Luxembourg 52.
Zirconium: Metal including alloys, all forms	191	227	197	France 30.
Other:				
Ores and concentrates, metal content	87,815	75,987	51,797	Australia 13,006; Republic of South Africa 9,844.
Ashes and residues	10,979	25,147	15,086	India 10,050; France 11.
Base metals including alloys, all forms	1,392	1,670	1,188	Republic of South Africa 191; United Kingdom 110.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	29,493	26,748	24,824	Iceland 1,718; Italy 190.
Grinding and polishing wheels and stones value, thousands	$14,529	$17,716	$11,882	Italy $1,838; Austria $1,079.
Asbestos, crude	454	326	273	Republic of South Africa 53.
Barite and witherite	29,952	17,686	6,483	Morocco 10,593; Netherlands 610.
Boron materials: Oxides and acids	4,773	6,689	6,243	Italy 248; France 127.
Cement	238,269	236,233	233,056	Belgium-Luxembourg 1,402.
Clays, crude:				
Bentonite	187,228	337,054	243,746	Greece 93,194; West Germany 91.
Chamotte earth	4,655	5,089	5,073	Netherlands 16.
Fire clay	30,066	43,744	43,333	United Kingdom 411.
Fuller's earth	536	4,152	4,152	
Kaolin	249,834	253,080	249,600	United Kingdom 3,480.
Unspecified	89,099	106,661	105,921	Switzerland 600; United Kingdom 93.
Cryolite and chiolite	568	537	117	Denmark 268; Netherlands 152.
Diamond:				
Gem, not set or strung thousand carats	276	263	54	Belgium-Luxembourg 135; Israel 41.
Industrial stones do	1,168	1,383	984	Ireland 318; United Kingdom 27.
Dust and powder do	1,578	2,378	657	U.S.S.R. 1,694; Ireland 25.
Diatomite and other infusorial earth	23,298	23,892	23,892	

See footnotes at end of table.

Table 4.—Canada: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983[r]	1984	Sources, 1984	
			United States	Other (principal)
INDUSTRIAL MINERALS —Continued				
Fertilizer materials:				
Crude, n.e.s	41,059	23,825	23,570	West Germany 127; Netherlands 55.
Manufactured:				
Ammonia	41,193	19,947	19,947	
Nitrogenous	224,799	308,231	168,103	Netherlands 70,935; Norway 23,346.
Phosphatic	360,304	340,177	324,731	Israel 14,225; Belgium-Luxembourg 1,105.
Potassic	65,055	80,095	80,091	United Kingdom 4.
Unspecified and mixed	39,822	33,063	32,751	Japan 103; United Kingdom 100.
Fluorspar	141,928	166,709	8,916	Mexico 93,221; Morocco 33,610; Spain 30,895.
Gypsum and plaster	100,939	131,809	4,357	Spain 83,914; Mexico 43,449.
Iodine	193	275	39	Japan 172; Chile 63.
Lime	22,844	24,848	23,323	Belgium-Luxembourg 1,473; France 52.
Magnesium compounds:				
Magnesite, crude	7,149	9,115	8,836	Hong Kong 272; West Germany 6.
Oxides and hydroxides	42,054	49,943	37,442	Italy 3,301; Netherlands 2,638.
Mica:				
Crude including splittings and waste	2,791	2,395	2,371	India 24.
Worked including agglomerated splittings ... value, thousands	$2,170	$2,409	$1,796	France $444; United Kingdom $134.
Nitrates, crude	1,934	9,190	457	Chile 8,715; United Kingdom 18.
Phosphates, crude ... thousand tons	2,625	3,170	3,170	
Pigments, mineral: Iron oxides and hydroxides, natural and processed	6,436	7,762	5,683	West Germany 643; Spain 545.
Precious and semiprecious stones other than diamond ... value, thousands	$26,258	$23,359	$9,187	France $2,848; Japan $2,239.
Salt and brine ... thousand tons	777	1,053	700	Mexico 291; Chile 25.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	126,047	131,882	131,757	United Kingdom 117; West Germany 8.
Sulfate, manufactured	22,479	20,584	524	United Kingdom 19,997; West Germany 27.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	44,258	54,418	29,898	Republic of South Africa 13,436; Italy 7,003.
Worked ... value, thousands	$14,133	$17,381	$7,494	Italy $8,728; Portugal $225.
Dolomite, chiefly refractory-grade	2,418	3,196	3,196	
Gravel and crushed rock	43,986	44,413	44,108	Italy 230; United Kingdom 75.
Limestone other than dimension ... thousand tons	1,800	1,944	1,944	
Quartz and quartzite	271	494	437	Belgium-Luxembourg 36; Japan 19.
Silica sand ... thousand tons	983	1,076	1,076	
Sand and gravel ... do	879	1,267	1,266	West Germany 1.
Sulfur:				
Elemental, all forms	2,365	3,019	3,014	West Germany 5.
Sulfuric acid	126,573	28,330	28,317	United Kingdom 10; West Germany 3.
Talc, steatite, soapstone, pyrophyllite	35,390	38,816	38,620	United Kingdom 75; France 73.
Vermiculite	20,907	24,188	21,003	Republic of South Africa 3,185.
Other:				
Crude ... value, thousands	$6,556	$6,777	$6,183	West Germany $260; Mexico $90.
Slag and dross, not metal-bearing	141,461	84,159	84,108	United Kingdom 51.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	1,949	2,448	2,205	France 171; Trinidad and Tobago 54.
Carbon: Carbon black	8,183	11,035	10,793	Mexico 163; France 35.
Coal: All grades including briquets ... thousand tons	14,731	19,064	19,064	
Coke and semicoke	585,862	660,257	619,506	West Germany 40,751.
Gas, natural: Gaseous ... million cubic feet	37	32	32	
Petroleum:				
Crude ... thousand 42-gallon barrels	91,853	93,402	14,659	Venezuela 24,660; Mexico 16,320.
Refinery products:				
Liquefied petroleum gas ... do	8,232	6,723	6,722	West Germany 1.
Gasoline, motor including aviation ... do	2,751	3,934	1,878	Netherlands 724; Venezuela 510.
Mineral jelly and wax ... do	54	59	54	Brazil 2; United Kingdom 1.
Kerosene and jet fuel ... do	899	3,663	1,397	Italy 552; Bahamas 501.
Distillate fuel oil ... do	1,326	5,463	2,933	Venezuela 1,582; Netherlands Antilles 245.

See footnotes at end of table.

Table 4.—Canada: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983[r]	1984	Sources, 1984 United States	Sources, 1984 Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum —Continued				
Refinery products —Continued				
Lubricants thousand 42-gallon barrels	519	738	667	Netherlands 59; United Kingdom 6.
Naphtha do	26	443	43	Belgium-Luxembourg 200; Netherlands 200.
Nonlubricating oils do	313	336	333	West Germany 2; France 1.
Residual fuel oil do	9,097	15,091	5,122	Venezuela 6,057; Bahamas 1,403.
Asphalt do	204	443	310	Spain 114; Cuba 17.
Petroleum coke do	4,229	4,877	4,633	NA.
Unspecified do	1,023	556	354	Netherlands 104; Venezuela 79.

[r]Revised. NA Not available.
[1]Table prepared by H. D. Willis.
[2]May include other precious metals.

COMMODITY REVIEW

METALS

Aluminum.—All Canadian smelters were reported operating at capacity except for Aluminum Co. of Canada Ltd.'s (ALCAN) Arvida smelter at Jonquiére, Quebec. The smelter utilized 87% of its installed capacity. ALCAN was undertaking several measures to improve productivity and reduce costs. These included a major reorganization of its North American operations and reducing the labor force. The company also announced it was postponing construction on its new 248,000-ton-per-year aluminum smelter at Laterriere, Quebec. Aluminiere de Bécancour Inc. (ABI) was continuing with construction and preparations for startup of smelter operations at its 230,000-ton-per-year smelter at Bécancour, Quebec. The plant was expected to reach full production in March 1987. With its twin 115,000-ton-per-year potlines, ABI would bring a sizable increase in aluminum smelting capacity to North America. Initially, ABI will be receiving its alumina requirements from Australia through Alcoa of Australia Ltd. and Queensland Alumina Ltd. The company has a long-term power contract with Hydro-Quebec for the supply of 400 megawatts of electricity with an option for an additional 200 megawatts at a later date.

It was announced that Swiss Aluminium Ltd. (Alusuisse) had reached an agreement with the government of Quebec to study the feasibility of constructing a 200,000- to 250,000-ton-per-year aluminum smelter in the Province. Alusuisse will examine three potential sites, Bécancour, Lauzon, and Sept Iles. The study was expected to be completed by yearend 1986. After completion of a feasibility study, Kaiser Aluminum & Chemical Corp. decided to postpone its Quebec aluminum smelter proposal. With the completion, in 1985, of the 113,000-ton-per-year expansion of the Canadian Reynolds Metals Co. Ltd. smelter at Baie Comeau, Quebec, primary aluminum smelting capacity in Canada was 1,347,000 tons per year.

Copper.—Copper producers continued in their efforts to increase efficiency and reduce production costs. Some new mines were being developed. Cominco Ltd. and Lornex Mining Corp. Ltd. prepared a plan to merge their respective Highland Valley operations in British Columbia. The proposal involved setting up a new entity to operate the properties. Cominco's mine capacity would be raised to 120,000 tons per day to supply both mills. Annual output of the combined operations was expected to produce 180,000 tons of copper contained in concentrate and significant quantities of gold and silver. Both ore bodies contain molybdenum that may be recovered depending on the selling price. The combined effect of the higher grade ore at Cominco's mine and increased ore resources makes the combined operation a low-cost and highly competitive facility. Approval of the transaction by the boards of directors of both companies will be required. Government approvals may also be necessary. Because of overcapacity in the world copper smelting market, there were no plans to build a smelter for the combined operation. Copper concentrates were expected to be sold in the Far East market.

Westmin Resources Ltd. officially opened its new mine and mill complex at Myra Falls, Vancouver Island, British Columbia, in October. Westmin's H-W ore body is a polymetallic massive sulfide deposit of copper, lead, and zinc with significant quantities of gold and silver. Ore production, initially at 28,000 tons per month, will rise to about 55,000 tons per month by 1987. Proven reserves were estimated at 13.5 million tons grading 2.2% copper, 0.33% lead, 5.3% zinc, 2.3 grams of gold, and 34 grams of silver per ton. Initial cut-and-fill mining will eventually be replaced by blasthole mining. The lead and zinc concentrate will be shipped to Cominco's smelter at Trail, British Columbia, and the copper concentrate will be shipped to Japan. Mine development costs were estimated at $185 million with an additional $15 million spent on environmental and engineering studies owing to the location of the mine and mill within a Provincial park.

Corporation Falconbridge Copper was continuing development on its Ansil Mine near Noranda, Quebec. At yearend 1985, about 820 meters of the planned 1,615-meter shaft had been completed. The average grade of the estimated 2.1-million-ton ore body was 7% copper with gold and silver values. The mine was scheduled to be in production by mid-1988.

Noranda Inc.'s Brenda Mine and Bell Mine in British Columbia reopened in September 1985. Brenda Mine had been closed since December 1984, and the Bell Mine had been closed since late 1982. These mines were expected to close again in 1988 after exhausting economic reserves. The company has two other copper mines in British Columbia, the Granisle Mine, which closed in 1982, and the Goldstream Mine, which closed in early 1984.

Gibraltar Mines Ltd. installed a leach-electrowinning plant at its mine at McLeese Lake, British Columbia. This plant was expected to produce 5,000 tons per year of copper starting in late 1986. Gibraltar produces about 40,000 tons per year of copper in concentrates by conventional method.

Falconbridge Ltd. acquired the Kidd Creek Mine at Timmins, Ontario, from Canada Development Corp. in 1985 for about $102 million plus 10.5 million shares of Falconbridge's common stock and about $198 million worth of Falconbridge's 8.5% convertible debentures, and assumption of $470 million of Kidd Creek Mines Ltd. (KCML) debt. This acquisition will make Falconbridge a major copper producer as well as a significant producer of zinc, silver, gold, and several minor metals. KCML was continuing with the expansion of the copper smelter and refinery capacity. Falconbridge intended to sell its 56.7% holdings in Kiena Gold Mines Ltd. to Campbell Red Lake Mines Ltd. for $63 million, principally to raise cash for the purchase of KCML.

Environmental regulations regarding sulfur dioxide (SO_2) emissions were announced by the governments of Ontario and Quebec in 1985. These regulations would affect Inco Ltd. and Falconbridge nickel-copper facilities at Sudbury, Ontario, and Noranda's copper smelters at Gaspé and Horne, Quebec.

Gold.—Canada is the second largest gold producer of the market economy countries after the Republic of South Africa. Three new mines came into production in the Hemlo, Ontario, area in 1985. The mines are operated by Noranda, Teck-Corona Operating Co., and Lac Minerals Ltd. This gold camp has become one of the most important gold producing areas in Canada. The Hemlo ore body was estimated to contain almost 18 million troy ounces of gold. By 1990, the area was expected to be producing 30% of Canada's total output of gold. Noranda poured its first bar of gold at the Golden Giant Mine in April 1985. The mine's reserves were estimated at 20 million tons grading 10.1 grams per ton. Teck-Corona poured its first bar of gold in May. The mine's reserves were estimated at 7.6 million tons grading 12.1 grams per ton. Lac Minerals poured its first gold bar from the Page-William Mine in December. The reserves were estimated at 50 million tons grading 5.3 grams per ton. Production costs at the mines were expected to be relatively low and should average about $125 per ounce of gold.

Litigation between Lac Minerals and International Corona Resources Ltd. over the Page-William Mine has been going on for 2 years. Corona was suing Lac Minerals for breach of trust alleging that Lac Minerals, in obtaining the Williams patented claims, acted on confidential information obtained during meetings between company geologists. Corona was seeking either ownership of the mine or $3 billion in damages. The case, before the Ontario Supreme Court, was still under way at yearend.

Most producers mine and process ore at costs ranging from $185 to $280 per ounce. Costs of one of the lower cost producers, Campbell Red Lake, have averaged $102 per ounce while those of one of the higher cost producers, the Detour Lake Mine of Dome Mines Ltd., have averaged $345 per ounce. However, this high cost was mainly the result of unexpected low-grade ore and operational problems. Dome Mines was planning to shut down the open pit mine in late 1986 and do underground development work. If gold prices warrant and ore grades are high enough, the mine would be reopened as an underground operation.

BP Resources Canada Inc., a subsidiary of British Petroleum Ltd., continued to evaluate its Chetwynd gold deposit on the southwest coast of Newfoundland. The company estimated reserves at 11.2 million tons grading 4.5 grams per ton. No gold was mined in Newfoundland in 1985, and the company's discovery set off a flurry of exploration activity in the area.

KCML announced it would put its Hoyle Pond Mine, near Timmins, into commercial production in 1985. Reserves were estimated at 405,000 tons grading 0.45 ounce per ton. When the mine is in full production in 1986, 90,000 tons per year of ore will be processed. In conjunction, the company also stated it would spend $5 million to build a gold mill, upgrade the crushing plant, and add a 300-ton-per-day gold recovery circuit at its metallurgical facilities at Timmins. These are major parts of the company's decision to expand its gold production.

Iron Ore.—Canadian iron ore shipments in 1985 were valued at $1.1 billion compared with $1.0 billion in 1984. The industry operated at an average 78% capacity. Iron Ore Co. of Canada (IOC), Wabush Mines, and Quebec Cartier Mining Co. operated throughout the year without any temporary closures. Dofasco Inc.'s Adams and Sherman Mines operated at capacity except for a 5-week closure in midsummer. The Algoma Steel Corp. Ltd. operated its Wawa Mine and sinter plant at 67% capacity. The increased level of trade and consumption benefited the iron ore industry. The improved productivity, cost cutting measures, and restructuring or closure of some operations has enabled the industry to remain competitive in the international market. Iron ore producers will continue to compete in a supply surplus environment owing to the decreasing demand for steel and increasing supply from new mines. The Ontario government's new SO_2 emission target will have an effect on Algoma's operation. The company's sintering plant at Wawa will be required to reduce SO_2 emissions by 56% by 1994.

Iron and Steel.—The average utilization rate of production capacity was a reported 67% in 1985. Canadian steel producers were concerned about continued access to U.S. markets, dangers of unfair foreign competition, and changing patterns of steel production and trade. The industry continued with rebuilding and modernization projects. Capital investment in the steel industry in 1985 was estimated to be $500 million. Canada continued as a net exporter of steel with the majority of the exports shipped to the United States.

Lead and Zinc.—Production in 1985 was little changed from that of 1984. Oversupply and overcapacity continued to impact the industry. Price levels were depressed so that few producers were able to make a profit. As a result, some producers instituted production cutbacks in the latter part of 1985. Cominco proposed constructing a new lead smelter at its Trail, British Columbia, facility to replace its existing lead smelter, which is outdated, inefficient, and does not meet current environmental standards. When completed, the facility would have a production capacity of 158,400 tons of refined lead increasing current production by 41,400 tons per year. Corporation Falconbridge Copper was intending to bring its Winston Lake zinc property near Schreiber, Ontario, into producton in 1986. Reserves were estimated at over 2 million tons of ore grading 16% zinc, 1% copper, and 0.8 troy ounce of silver per ton. Production was scheduled for late 1986 with full production in early 1987. Curragh Resources Corp. purchased Cyprus Anvil Mining Corp. in 1985 from Dome Petroleum Ltd. for an undisclosed sum. The Cyprus Anvil Mine in the Yukon Territory had been closed since June 1982. Curragh expected to start production in 1986 producing 180,000 to 200,000 tons of concentrate, running about two-thirds zinc concentrate averaging 52% to 55% metal, and one-third lead concentrate averaging 62% to 64% metal. Byproduct production would include 20,000 ounces of gold per year. Sherritt Gordon Mines Ltd. permanently closed its Fox Mine at Lynn Lake, Manitoba, owing to exhaustion of ore reserves. The Vendome Mine of Abcourt Mines Inc. near Barraute, Quebec, went into production in 1985. Annual capacity is 12,000 tons of zinc in concentrate. Brunswick Mining and Smelting Corp. Ltd., KCML, Cominco, and Noranda announced significant zinc mine production cutbacks for 1986.

Nickel.—Cost reduction and efficiency continued as priority considerations for Canadian nickel producers. World overcapacity and low prices continued to plague the industry. At Sudbury, Inco and Falconbridge continued to make productivity gains in their respective mines and smelters. In late 1985, Inco announced that in response to growing oversupply, it would reduce production in 1986. Hudson Bay Mining and Smelting Co. Ltd. announced it had located a high-grade nickel-copper deposit at Namew Lake, Manitoba. Preliminary drilling had indicated over 2 million tons of 2.8% nickel and 0.7% copper. Inco started production at its Thompson open pit. The Thompson pit will replace the Pipe open pit, which was mined out in 1984. The ore is high grade, averaging 2.7% nickel. In late 1985, the Provincial government of Ontario announced new SO_2 emission controls. The limit of SO_2 emissions for Inco will be 265,000 tons per year in 1994 compared with 728,000 tons per year in 1985. The limit for Falconbridge in 1994 will be 100,000 tons per year compared with 154,000 tons per year in 1985.

Silver.—Production declined in 1985 primarily owing to a decline in byproduct silver production from base metal mining. Equity Silver Mines Ltd. in British Columbia continued as Canada's major primary silver producer. The company started an expansion of its concentrator. Capacity would be increased from 5,300 to 7,680 tons per day. The project was scheduled to be completed in mid-1986 at a cost of $9 million. Terra Mines Ltd. closed its Camsell River Mine in the Northwest Territories stating low metal prices made the operation uneconomical.

Other Metals.—Durham Resources Inc. resumed production of antimony at its Lake George Mine in New Brunswick in mid-1985. The mine had been closed since May 1981. Development work was continuing on the new ore deposit that underlies the original zone. The shaft was at its final depth of 381 meters. The company was expecting to mill about 91,000 tons per year of ore averaging 4.2% antimony. Cobalt was recovered as a byproduct of nickel-copper production at Sudbury, Ontario. The increase in nickel production caused a corresponding increase in cobalt production. Geddes Resources Ltd. continued with the development of the Windy Craggy copper-cobalt property in northeastern British Columbia. An airstrip was completed in 1985 and an 850-meter adit was planned for 1986. Rio Algom Ltd.'s primary tin mine-mill complex at East Kemptville, Nova Scotia, shipped its first consignment of 18 tons of tin in concentrate to Capper Pass and Son Ltd., Melton, United Kingdom, for smelting in December 1985. The complex was expected to reach full production in mid-1986 at a milling rate of 9,000 tons per day to produce 4,400 tons per year of tin in concentrate. Projected mine life is over 17 years. Copper and zinc will be recovered as byproducts. Billiton Metals Canada Inc. and Lac Minerals reached a joint venture agreement in 1985 to explore the North Zone tin prospect on Billiton's Mount Pleasant tin-tungsten mine, which was closed in July 1985 for economic reasons. Previous drilling by Billiton had indicated 6 million tons of reserves grading 0.8% tin. Canada Tungsten Mining Corp. Ltd. (Cantung) reduced its production to 65% of capacity in 1985 because of depressed prices. QIT-Fer et Titane Inc. is the only company that mines ilmenite, a titanium-iron ore. The ore is mined at Havre St. Pierre, Quebec, and shipped to Tracy, Quebec, for beneficiation and smelted to produce a high-quality pig iron and titania slag (sorel slag). The plant operated at full capacity in 1985, and most of the sorel slag produced was exported to the United States and Western Europe. IOC discontinued work on its Strange Lake deposit. Studies indicated there was a limited market for the rare earths, columbium, tantalum, yttrium, and zirconium contained in the deposit.

INDUSTRIAL MINERALS

Asbestos.—Asbestos production continued to decline in 1985. Companies were operating at about 50% capacity. Mine production in Canada was expected to continue at the present depressed level or decrease to about 700,000 tons per year.

Potash.—Canada is the second largest producer of potash after the U.S.S.R. Installed capacity at yearend 1985 was 9,275,000 tons in Saskatchewan and approximately 500,000 tons in New Brunswick. Both production and shipments were lower in 1985 than in 1984. Exports to the United States were down 25% because of farmers cutting back on fertilizer to try to minimize their losses. The government of Manitoba acquired a 49% interest in Canamax Resources Inc.'s potash deposit in southwestern Manitoba for $5 million. The Manitoba government was intending to bring the 2-

million-ton-per-day mine into production by early 1990. The Manitoba government held discussions with China, India, Japan, and the Republic of Korea in efforts to secure long-term contracts and foreign equity. Denison-Potacan Potash Co. brought its Clover Leaf Mine at Salt Springs, New Brunswick, into production in July 1985. The company expected the mine would reach full capacity capability in 1987. Kalium Chemicals, a division of P.P.G. Canada Inc., continued work on the expansion of the Belle Plaine Mine near Regina, Saskatchewan. The capacity will be increased from 1.06 to 1.3 million tons per year at a cost of about $75 million.

Other Industrial Minerals.—Increased activity in construction resulted in increased demand for cement in 1985, although plant closures for extended periods continued. Canadian cement production capability remained at 16.5 million tons per year. Exports of crude gypsum almost reached record-high levels owing to demand for gypsum wallboard by the construction industry. Graphite was produced by one company, Graphite Asbury Quebec Inc., at Notre-Dame-du-Laus, Quebec. Production increased slightly. The majority of the flake graphite produced is exported to the United States. Canada produces salt from four salt mines and two potash mines. Rock salt is the major product. Brine is also produced in 11 plants for manufacture of evaporated salt and associated products. Sulfur recovery from sour natural gas was the major source of sulfur production. The increased demands for natural gas resulted in increased sulfur production in 1985. Production of talc and pyrophyllite continued to increase. Bakertalc Inc., Canada Talc Inc., and Steetley Talc Ltd. had expansion programs under way to increase production capacity. Talc producers operated at nearly full capacity.

MINERAL FUELS

Coal.—The coal industry in Canada, like the coal industries in some other industrialized countries, has been cyclic in nature. Since the energy crisis of the 1970's, renewed emphasis on the coal industry has provided new growth and expansion. Production has increased from 25.3 million tons in 1975 to a record high 60 million in 1985, with exports exceeding 27 million tons in 1985. The three Western Provinces, Alberta, British Columbia, and Saskatchewan, produce about 95% of the total with the remainder produced by Nova Scotia and New Brunswick. Alberta's production is mostly subbituminous coal consumed nearby or at neighbor Provinces' utilities. British Columbia produces mainly metallurgical coal destined for export to Pacific rim countries. Saskatchewan mines produce lignite for local powerplants. Nova Scotia produces both thermal and metallurgical coal, which is both consumed domestically and exported. New Brunswick's bituminous production is consumed by local utilities. Canada exported coal to over 20 countries in 1985 with Japan being the largest customer, receiving 65% of Canada's exports. Canada is a major coal supplier to Japan, second after Australia. The building of a new port, major expansion of another port, and several new mines that have come on-stream have positioned Canada as a strong competitor in world coal trade.

Gulf Canada Resources Inc. was proceeding with the development of its Mount Klappan anthracite deposit in northwestern British Columbia in 1985. The company was conducting economic studies as well as sending trial shipments to potential customers. Production of 1.5 million tons per year was expected to start by 1987.

The performance of Denison Mines Ltd.'s Quintette Mine in British Columbia appeared to be greatly improved in 1985. Output was more than triple that of 1984. The project had a series of problems since operations began in late 1983 including higher than expected ash content of the coal, process plant adjustment, and mechanical failures. Productivity also suffered because of inadequate operator training. These problems appeared to be resolved; however, the company's debt burden remained heavy.

The Cape Breton Development Corp. (Devco) continued research on a coal-water process known as Carbogel, which could be used in place of bunker C oil. With a sufficient cost advantage, Devco believes power utilities and industrial customers could be convinced to convert their oil-fired burners to accommodate Carbogel.

Natural Gas.—According to EMR, the potential natural gas reserves in Canada ranged from 4,300 billion cubic meters to 18,000 billion cubic meters with a 50% probability of 9,500 billion cubic meters. Also, the volume remaining to be discovered could be 1.5 trillion cubic meters.

The National Energy Board announced in May 1985 it has adopted a new approach to determine the surplus of natural gas available for export. The new procedures replaced the old 25A1 surplus rule, which had provided the framework for natural gas export regulation over the past 26 years. The new four-step procedure will be based on a calculation of a 15-year ratio between estimated resources and total annual production in Canada. It incorporates estimates of annual additions to reserves, forecasts of Canadian demand and authorized exports, and an assessment of future annual productive capacity. The most significant change is the reduction in the forecast horizon from 25 years to 15 years. In terms of export potential, the new procedure theoretically would permit the export of 1.5 trillion cubic feet in 1986 and a cumulative total of 9.5 trillion cubic feet through the year 2005.

Petroleum.—The Canadian Government and the Provincial governments of Alberta, British Columbia, and Saskatchewan signed the Western Accord agreement in March 1985 with the objective of replacing existing price controls and moving toward deregulation of oil prices. To be phased out or terminated immediately were the Natural Gas and Gas Liquids Tax, the Incremental Oil Revenue Tax, the Canadian Ownership Special Charge, the Crude Oil Export Charge, and the Petroleum Compensation Charge. On January 1, 1986, the Petroleum and Gas Revenue Tax would be reduced each year until terminated at yearend 1988. These changes were introduced to encourage the petroleum industry to invest in new oil and gas exploration and return the sector to market sensitive pricing. Because of this agreement and recent drilling successes, the record-high level of activity achieved during 1985 was expected to continue through 1986. The number of well completions in 1985 was expected to reach a record high of 10,600, almost 9% above the 9,763 well completions in 1984. At the beginning of 1985, the estimated established resources of crude oil and equivalent were slighty over 1,000 million cubic meters.

Uranium.—The Uranium Resource Appraisal Group has estimated the amount of measured, indicated, and inferred uranium resources in Canada, recoverable from minable ore at a price up to $220 per kilogram, to be 551,000 tons. Potential reserves were estimated at 1.0 million tons. Of the total recoverable reserves, 49% were in Saskatchewan and 45% in Ontario.

In 1985, Canada had five primary uranium producers, Denison Mines and Rio Algom in Ontario, and Eldorado Resources Ltd., Cluff Mining, and Key Lake Mining Corp. in Saskatchewan. Eldorado Resources Ltd. operates Canada's only uranium refining-conversion facilities. Production of an estimated 12,800 tons of uranium trioxide (U_2O_3) was equivalent to 30% of the total Western World production.

Over 80% of Canada's total uranium exploration expenditure and drilling activity in 1985 took place in Saskatchewan and the Northwest Territories. This trend was expected to continue because the potential for discovering high-grade deposits such as Key Lake and Cigar Lake is greater here than elsewhere in Canada.

In early 1985, COGEM Canada Ltd. reported that the results of its drilling programs indicated the Agar Lake ore body contained an estimated 110,000 tons of uranium ore grading 12% U.

The Federal Government's policy on foreign ownership of uranium mines was under review at yearend 1985. A simpler and more liberal policy was expected to be forthcoming. The Investment Canada Act passed in June 1985 replaced FIRA and was expected to enhance the uranium export opportunities and encourage foreign investment in new production projects.

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[1]For more detailed information on the mineral industry, see the Canadian Mineral Surveys for 1983 and 1984, both of which were prepared by the Mineral Policy Sector and the Energy Sector, Department of Energy, Mines and Resources, Ottawa, Canada. The U.S. Department of the Interior, Bureau of Mines, has arranged to have these Canadian publications placed in libraries in each of the 50 states and Puerto Rico as follows: University of Alabama, Tuscaloosa; E. E. Rasmuson Library, University of Alaska, Fairbanks; University of Arizona, Tucson; University of Arkansas, Fayetteville; California State Library, Sacramento; A. Lake Library, Colorado School of Mines, Golden; Wilbur Cross Library, University of Connecticut, Storrs; H. M. Morris Library, University of Delaware, Newark; Strozier Library, Florida State Library, Tallahassee; P. Gilbert Memorial Library, Georgia Institute of Technology, Atlanta; University of Hawaii, Hilo; University of Idaho, Moscow; Morris Library, Southern Illinois University, Carbondale; Indiana University, Bloomington; Iowa State University of Science and Technology, Ames; Watson Library, University of Kansas, Lawrence; M. L. King Library, University of Kentucky, Lexington; University of Southwestern Louisiana, Lafayette; R. H. Folger Library, University of Maine, Orono; Eisenhower Library, John Hopkins University, Baltimore, MD; Massachusetts Institute of Technology Library, Cambridge; Michigan Technical Library, Houghton; Wilson Library, University of Minnesota, Minneapolis; University of Southern Mississippi, Hattiesburg; Rolla Library, University of Missouri, Rolla; Montana College of Mineral Science and Technology, Butte; D. L. Love Library, Nebraska Geological Survey at University of Nebraska, Lincoln; University of Nevada, Reno; University of New Hampshire, Durham; J. C. Dana Library, Rutgers University, Newark, NJ; New Mexico Institute of Mining and Technology, Socorro; Columbia University, New York, NY; D. H. Hill Library, North Carolina State University, Raleigh; Frity Library, University of North Dakota, Grand Forks; Ohio State University, Columbus; University of Oklahoma, Norman; Multnomah County Library, Portland, OR; Pennsylvania State University, University Park; University of Rhode Island, Kingston; University of South Carolina Undergraduate Li-

brary, the Horseshoe, Columbia; South Dakota School of Mines and Technology, Rapid City; Tennessee State Library and Archives, Nashville; Main Library, University of Texas, Austin; Marriott Library, University of Utah, Salt Lake City; Bailey Library, University of Vermont, Burlington; Virginia Polytechnic Institute, Blacksburg; University of Washington, Seattle; West Virginia University, Morgantown; Memorial Library, University of Wisconsin, Madison; University of Wyoming, Laramie; and University of Puerto Rico, Mayagüez.

[2]Physical scientist, Division of International Minerals.

[3]Where necessary, values have been converted from Canadian dollars (CAN$) to U.S. dollars at the rate of CAN$1.3655=US$1.00, the average exchange rate for 1985.

The Mineral Industry of Chile

By Pablo Velasco[1]

Chile continued to be the world's largest producer and exporter of copper, as it has been since 1982. In 1985, Chile ranked 2d in the world as a molybdenum and iodine producer, 3d in lithium, 8th in silver, and 11th in gold production. Chile also continued to rank as the world's largest producer and exporter of sodium nitrate and rhenium, and the country also has 37% of the world's total reserves of rhenium.

Chile's production of copper reached nearly 1.36 million tons, an increase of 5% over that of 1984. Preliminary data by the Central Bank of Chile indicated the gross domestic product (GDP) grew by 2.3% in real terms to just above $1.6 billion.[2] This was less than the 1984 growth rate, but it nevertheless continued the modest growth that has occurred since the 1981-83 recession. Mining contributed a modest 1.8% to the GDP in 1985 compared with 4.4% in 1984.

The value of Chile's mineral production increased about 3% in 1985 over that of 1984 because of slightly increasing prices during the year. Copper prices averaged 64.3 cents per pound in 1985, compared with 62.4 cents per pound in 1984. The total value of mineral exports in 1985 was $2.32 billion, representing about 61% of Chile's total exports. Copper alone accounted for $1.76 billion, or about 46% of export earnings. About 77,000 workers were directly employed in the mining sector. Copper production and export is the most important economic activity in the country, despite the fact that it only employs roughly 39,000 workers, or less than 1% of the nation's total labor force.

The price of copper has tremendous importance to the overall Chilean economy, as a change of 1 cent per pound in the price of copper alters Chile's export income by about $30 million per year.

Corporación Nacional del Cobre de Chile (CODELCO-Chile) produced about 79% of the total Chilean copper output in 1985, or about 16% of the Western World's copper production.

Despite the slight increase in price and increase in output of copper, the value of copper shipments increased only 12% over that of 1984 to $1.76 billion. CODELCO-Chile maintained profitability during the year by cutting operating costs by about 2 cents per pound; this was due to completion of investment projects, relatively high copper grades, and the effect of devaluation of the Chilean peso.

Chile's favorable investment climate, well-developed mining infrastructure, and highly skilled work force have attracted a number of large foreign investment projects. These include a major lithium project operated by the Sociedad Chilena de Litio Ltda. (SCL), a $53 million joint venture between Foote Mineral Co. of the United States and the Chilean State Corporación de Fomento de la Producción (CORFO) that currently produces about 25% of the world's total output of lithium. Also of note are the $170 million Salar de Atacama mixed salts projects of AMAX Chemicals Inc. and the Chilean consortium, Molibdenos y Metales S.A. (Molymet) and CORFO. Exxon Minerals Chile Inc. is investing $71 million to expand the El Soldado copper mine. St. Joe Minerals Corp. will spend $24 million to increase production at its El Indio gold mine. The La Escondida copper-molybdenum project investment is expected to reach $1.2 billion (more detail under "Commodity Review—Copper"). The large international mining companies such as Cía. Minera Sierra Morena (a subsidiary of Consolidated Gold Fields PLC), Cía. Minera Mantos Blancos (a subsidiary of Anglo American Corp.), Phelps Dodge Corp. of Chile (a subsidiary of

Phelps Dodge Corp.), Chevron Minera de Chile (a subsidiary of Chevron Minerals Corp.), and Freeport Chile Exploration Co. (a subsidiary of Freeport Minerals Co.) have active exploration programs in Chile for precious metals and copper and are considering several promising investment projects. However, depressed metal prices during the year have delayed and temporarily shut down some projects in mining such as the El Toqui lead and silver mine and the Cerro Colorado copper project.

Government Policies and Programs.—Important amendments to the Chilean foreign investment statutes were made by Law 18474 (Decree Law 600), published November 30, 1985. Highlights of these amendments were—

1. Investments of $50 million or more will have special provisions. If the investments are in industrial or nonmining extractive projects, the foreign investor may be allowed up to 8 years in which to bring in the foreign capital. (The former period was 3 years; for mining investments it is now 8 years, extendable to 12.) If the investments are in industrial or extractive (including mining) projects, the following special rights may be granted to the foreign investor: (a) The period during which the foreign investor is entitled to a fixed income tax rate of 49.5% may be extended from the normal 10 year period to one "compatible with the estimated duration of the project," with a maximum of 20 years; (b) special tax treatment is offered during the total investment period; (c) if the new project involves export of the products, favorable export rights are granted for the life of the project. Retention of foreign currency earned by these exports is also favorably modified; however, approval is required by the Central Bank of Chile and a Foreign Investment Committee.

2. A modification in calculating the income tax rate had been offered the previous year to foreign investors in Law 18293 (January 31, 1984, Official Gazette).

3. The new law clarifies the foreign investor's rights involving removal of capital from Chile when there is sale or liquidation of the property.

4. Special provisions were made regarding the tax treatment of Chilean investors who invest in foreign corporations that set up Chilean branches. Important modifications of the 1975 hydrocarbons law (Decree Law 1089 of July 3, 1975) will permit the Chilean state petroleum company, Empresa Nacional del Petróleo (ENAP), to enter into joint ventures with the foreign companies for exploring for and producing hydrocarbons. These modifications have already been approved and should be implemented in 1986. Certain areas of the Magallanes region, previously controlled by ENAP, will be opened up for private exploration and development. The new regulations are very similar to the Colombian "Association Contract," which is highly regarded by oil companies as a model to attract foreign investment. Foreign oil companies have reacted favorably to the new regulations, which follow recent liberalization of the Foreign Investment Law.

The Government of Chile, through Empresa Nacional de Minería (ENAMI), established the National Gold Mining Plan in 1984 to employ jobless people in the exploitation of gold placer deposits throughout the country. ENAMI provides equipment and training to the miners and pays a basic salary of about $15 a month. The gold produced becomes the miner's property and may be sold either to ENAMI or to any other buyer. The yearly cost of this plan was $2 million in 1984 and $4.3 million in 1985, while net revenues were $0.7 million in 1984 and $3.4 million in 1985. Employment in the program has grown from 5,000 workers in 1984 to more than 10,000 in 1985. ENAMI forecast that more than 20,000 workers will be enrolled in the program by 1987.

PRODUCTION

Depressed world prices for most mineral products improved slightly in 1985, limiting the increase in value of Chile's mining output to 2.2% despite substantial increases in copper, gold, manganese, molybdenum, silver, and zinc output. Chile's economy remains highly dependent upon the production and export of copper and its byproducts. The largest copper producer in Chile and in the world is CODELCO-Chile, which comprises four divisions: Chuquicamata, El Teniente, Andina, and El Salvador. In 1985, CODELCO-Chile's output totaled 1.08 million tons of fine copper. The Chuquicamata Div. accounted for 51% of the total production, followed by El Teniente with 30%, Andina with 10%, and El Salvador with 9%.

CODELCO-Chile's molybdenum production reached 18,390 tons of fine metal content in 1985, an increase of 9.1% compared with that of 1984. Of this total, 5,936 tons was processed in the Chuquicamata roasting plant into molybdenum trioxide and 6,033 tons was shipped to the Molymet roasting plant to be converted into molybdenum trioxide and ferromolybdenum.

Total export value amounted to $144.6 million, an increase of 4% compared with that of 1984.

Gold production reached 554,000 troy ounces, slightly above that of 1984, and a slight increase in export value over that of 1984 to $151 million. Silver output increased 5% over that of 1984 to 16.6 million troy ounces, and the export value dropped 12% below that of 1984 to $77 million. Iron ore production fell 8.5% below that of 1984 to 6.5 million tons, and the export value declined 17% below that of 1984 to $92 million.

Sodium nitrate production increased 13% over that of 1984 to 674,000 tons, and combined nitrate and iodine export values were $85 million, a 14% increase over those of 1984.

Coal production in Chile remained stable at nearly 1.4 million tons, but substantial increases were projected by Government officials for the near future.

Chile has 37% of the world's rhenium reserves and is the largest producer. Molymet is Chile's sole producer, recovering ammonium perrhenate from the molybdenum stack gases by solvent extraction.

Chile's selenium production in 1985 nearly doubled to 50,037 kilograms. The principal producers were ENAMI, from anode slimes produced at Las Ventanas copper refinery, and Química y Metalúrgia Ltda., from copper slags purchased from Chuquicamata. Cía. de Aceros del Pacífico S.A. de Inversiones (CAP), the Chilean state-owned steel company, which also operates the iron ore mines, the pelletizing plant, and the manganese mines through its subsidiaries Cía. Minera del Pacífico S.A. (CMP) and Manganesos de Atacama S.A. CAP reported profits of $9.3 million in 1985, a 43% increase compared with 1984 profits, owing to 14% and 29% reductions in operating and administrative costs, respectively.

Cía. de Carbones de Chile Ltda. (COCAR), the newly formed Chilean coal company that will develop the $70 million Pecket coal deposit in the Magallanes area, Region XII south of Chile, was awarded a 6.7-million-ton coal supply contract by CODELCO-Chile for 8 years with the possibility of expansion to 2 more years for its Chuquicamata-Tocopilla power station.

Negotiations for the installation of the $300 million methanol plant in the south were completed between ENAP and the newly formed Cape Horn Methanol Co. Ltd. in December 1985. Plant construction was expected to start in March 1986.

The second petrochemical plant negotiation to produce ammonia and urea (fertilizer plant) in Punta Porpesse, Cabo Negro, was initiated between Cargill Inc., Combustion Engineering Inc., and ENAP to produce 350 tons of ammonia and 1,750 tons of urea per day. The project was estimated to cost about $440 million.

A severe earthquake rocked Chile's central zone in March 1985, but no significant damage was done to mine facilities, and production did not suffer.

Table 1.—Chile: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984[p]	1985[e]
METALS					
Arsenic trioxide	--	--	--	[e]3,500	4,000
Copper:					
Mine output, metal content[3]	1,081,100	1,242,200	1,257,500	1,290,700	1,356,400
Metal:					
Smelter, primary[4]	953,800	1,046,800	1,058,900	1,098,300	1,088,500
Refined:[5]					
Fire, primary refined	[r]140,159	[r]180,914	164,086	185,697	175,977
Electrolytic	[r]635,441	[r]671,586	670,114	694,003	708,323
Total	775,600	852,500	834,200	879,700	884,300
Gold, mine output, metal content troy ounces	[r]400,478	[r]543,569	570,971	541,051	554,281

See footnotes at end of table.

Table 1.—Chile: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984[p]	1985[e]
METALS —Continued					
Iron and steel:					
Iron ore and concentrate:					
Gross weight thousand tons	8,514	6,470	5,974	7,116	6,510
Iron content[e] do	5,190	3,874	[r]3,602	[r]4,250	3,944
Metal:					
Pig iron do	582	[r]453	540	594	580
Ferroalloys:					
Ferromanganese	5,254	2,982	5,209	4,890	6,330
Ferrrosilicomanganese	104	--	--	--	755
Ferrosilicon	2,477	1,413	4,885	6,365	--
Ferromolybdenum	656	1,456	1,712	2,211	448
Total	8,491	5,851	11,806	13,466	7,533
Steel, crude[6] thousand tons	644	492	618	692	681
Semimanufactures (hot-rolled) do	495	233	371	473	519
Lead, mine output, metal content	223	1,552	1,679	4,284	2,473
Manganese ore and concentrate:					
Gross weight	25,557	16,111	26,050	26,172	35,635
Metal content	8,596	5,207	8,584	8,475	11,785
Molybdenum, mine output, metal content	15,360	20,048	15,264	16,861	18,389
Rhenium, mine output, metal content pounds	10,300	17,921	12,516	14,198	12,266
Selenium kilograms	33,665	23,011	43,869	25,450	50,037
Silver thousand troy ounces	[r]11,610	[r]12,288	15,058	15,766	16,633
Vanadium, mine output, metal content[e 7]	127	--	--	--	--
Zinc, mine output, metal content	1,516	5,656	5,993	19,168	22,288
INDUSTRIAL MINERALS					
Barite	259,349	292,402	114,595	21,722	54,494
Borates, crude, natural (ulexite)	3,277	291	1,301	3,985	4,773
Cement, hydraulic thousand tons	1,863	1,132	1,255	1,390	1,425
Clays:					
Kaolin	56,778	21,086	40,812	48,608	48,537
Other (unspecified)	177,397	34,072	31,876	36,543	9,177
Diatomite	358	387	741	1,712	2,317
Feldspar	2,506	469	2,356	3,026	2,565
Gypsum:					
Crude	237,853	89,636	66,337	167,477	195,911
Calcined	103,344	41,304	53,425	44,818	57,222
Iodine, elemental	2,688	2,596	2,793	2,661	3,040
Lapis lazuli kilograms	--	--	--	9,000	8,500
Lime, hydraulic[e] thousand tons	648	645	723	[r]778	800
Lithium carbonate	--	--	--	2,110	4,508
Nitrogen: Natural crude nitrates:					
Sodium	[r]471,200	[r]420,800	470,500	595,400	674,000
Potassium	[r]153,200	156,000	152,000	132,100	150,000
Phosphates:					
Guano	1,100	50	129	NA	3,150
Rock	--	1,377	935	4,606	7,110
Total	1,100	1,427	1,064	4,606	10,260
Pigments, mineral, natural: Iron oxide	4,890	2,445	6,751	16,113	8,224
Potash, K_2O equivalent	21,400	21,800	21,280	18,494	21,000
Pumice (includes pozzolan)	277,359	172,382	173,789	172,150	206,333
Quartz, common	165,393	185,556	221,757	293,465	267,510
Salt, all types	290,279	674,002	714,598	625,760	753,427
Sodium compounds, n.e.s.:					
Carbonate[e]	10,000	NA	NA	NA	NA
Sulfate[8]	58,677	48,146	51,943	57,696	48,700
Stone:					
Limestone thousand tons	[r]2,923	[r]1,667	2,142	2,326	2,470
Marble	1,879	963	--	1,440	1,300
Sulfur:					
Native, other than Frasch:					
Refined	4,659	6,615	15,688	13,685	14,755
Caliche	109,965	98,372	83,060	40,279	63,992
Byproduct (from industrial gases)	28,000	31,828	32,364	32,135	30,073
Total	142,624	136,815	131,112	86,099	108,820
Talc	665	283	637	422	1,299
MINERAL FUELS AND RELATED MATERIALS					
Coal, bituminous and lignite thousand tons	1,169	997	1,095	1,323	1,384
Coke: Coke oven do	300	242	279	278	291
Gas, natural:					
Gross million cubic feet	179,367	178,851	169,609	172,971	163,790
Marketed do	130,000	124,661	52,760	53,431	50,535

See footnotes at end of table.

Table 1.—Chile: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984[p]	1985[e]
MINERAL FUELS AND RELATED MATERIALS —Continued					
Natural gas liquids:					
Natural gasoline thousand 42-gallon barrels	931	969	937	962	943
Liquefied petroleum gas do	2,849	2,893	2,855	2,969	2,805
Total do	3,780	3,862	3,792	3,931	3,748
Petroleum:					
Crude do	15,104	15,626	14,365	14,069	13,048
Refinery products:					
Gasoline:					
Aviation do	44	101	94	56	25
Motor do	8,806	7,146	8,032	8,139	8,152
Jet fuel do	1,510	1,145	1,126	1,138	1,063
Kerosene do	1,662	633	1,164	855	755
Distillate fuel oil do	7,874	6,122	7,334	7,850	8,529
Residual fuel oil do	9,158	6,321	6,390	5,982	5,566
Liquefied petroleum gas do	2,641	2,051	2,208	2,157	1,912
Unspecified do	1,902	2,866	1,252	1,453	1,553
Refinery fuel and losses do	1,857	1,280	(9)	335	447
Total do	35,454	27,665	27,600	27,965	28,002

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through Aug. 1986.
[2]In addition to the commodities listed, pyrite is also produced, but available information is inadequate to make reliable estimates of output levels.
[3]Figures are the nonduplicate copper content of ore, concentrates, cemented copper, slags and minerals, copper as a byproduct of gold and silver precipitate, and other copper-bearing products measured at the last stage of processing as reported in available sources.
[4]Figures are total blister, fire-refined, electrolytic, and equivalent copper output including that blister subsequently refined in Chile and copper produced by electrowinning. Detailed statistics on electrowinning are not available; although based on current plant capacities, electrowon copper production is estimated to be approximately 55 metric tons per year.
[5]Figures are total refined copper distributed into two classes according to method of refining, fire-refined and electrolytic, which includes electrowon copper refined in Chile.
[6]Excludes castings.
[7]Estimated on the basis of reported vanadium content of vanadiferous slags imported by the United States from Chile.
[8]Includes natural sodium sulfate and anhydrous sodium sulfate, coproducts of the nitrate industry.
[9]Revised to zero.

TRADE

The four largest exporters of minerals in Chile are state-owned mineral producers: CODELCO-Chile, which accounts for 41% of Chile's total exports followed by ENAMI, CAP, and Sociedad Química y Minera de Chile (SOQUIMICH). The four state-owned mineral producers represent 54% of the total Chilean exports. The total value of mineral exports was $2.32 billion in 1985, an increase of 7.5% over that of 1984. The total value of mineral exports represents 61% of the total export shipments, of which copper alone accounted for $1.76 billion, or about 46% of the total export earnings. Copper is Chile's main export commodity to the United States, representing 40% of the total exports of $877.3 million, and 22% is made up of 12 other commodities.

The total mineral exports to the United States, and those of copper, respectively, declined 15% and 19% below those of 1984. Chile is one of the largest trading partners of the United States, purchasing manufactured mining equipment and chemicals for the mining industry. In 1985, Chile imported about $140 million worth of mining equipment from the United States. About $56 million of Chile's exports to the United States came in duty free under the Generalized System of Preference (GSP) program, such as molybdenum, silver, and ammonium perrhenate. However, unwrought copper (concentrate, blister, and refined) imports from Chile are ineligible for GSP treatment, owing to competitive need limits.

Among other Chilean copper trading partners in 1985 were Japan, 8%; the Federal Republic of Germany, 8%; Brazil, 7%; the United Kingdom, 5%; and Venezuela, 4%. Chile continues to seek new markets for its products abroad and is looking to expand sales of established trade items, as well as nontraditional exports. Trade with

China increased to over $120 million per year. Copper, fish meal, and nitrate are the main exports to China. Recently, Chile's ENAP agreed to purchase 800,000 barrels of crude oil from the Chinese National Chemical Import-Export Corp. (SINOCHEM). F.o.b. trade surplus increased sharply to $759 million in 1985, compared with $293 million in 1984. Despite the improvement in 1985, larger trade surpluses are needed to service the country's external debt burden without new private bank borrowings. Export values increased by 2% in 1985, and imports declined by 11.7%, both relative to 1984.

Table 2.—Chile: Exports of copper and molybdenum ore, by destination[1]

Destination	Copper (thousand metric tons)			Molybdenum (metric tons)
	Ore and concentrate, Cu content	Blister	Refined	Ore and concentrate, Mo content
1984:				
Argentina	--	--	38.2	--
Belgium-Luxembourg	0.1	9.7	7.5	--
Brazil	28.3	11.4	70.6	--
Canada	15.1	--	1.4	1,710
China	--	19.1	30.0	--
Finland	7.4	--	--	--
France	--	--	98.9	--
German Democratic Republic	--	3.0	8.5	--
Germany, Federal Republic of	.3	24.4	84.8	452
Greece	--	--	11.6	--
Italy	--	8.9	94.1	--
Japan	87.8	8.9	105.1	6
Korea, Republic of	21.3	--	20.4	--
Netherlands	.1	.8	--	2,318
Portugal	--	2.0	6.6	--
Romania	--	5.9	--	--
Spain	.2	20.4	9.9	--
Sweden	--	--	12.5	232
Taiwan	3.5	--	33.7	--
Turkey	5.4	13.7	--	--
United Kingdom	(2)	25.2	29.6	--
United States	.3	45.0	155.2	--
Yugoslavia	--	11.9	--	--
Other	.2	.3	11.6	--
Total	170.0	210.6	830.2	[3]4,717
1985:				
Argentina	--	--	28.9	--
Belgium-Luxembourg	.1	16.9	6.6	--
Brazil	48.6	19.2	51.7	1
Canada	30.2	--	2.0	2,802
China	15.9	13.8	53.9	--
France	(2)	1.1	97.8	--
German Democratic Republic	--	3.5	6.2	40
Germany, Federal Republic of	25.5	17.4	113.9	351
Greece	--	1.0	15.5	--
India	.1	--	7.0	--
Italy	(2)	9.4	102.1	--
Japan	102.7	1.0	55.1	--
Korea, Republic of	29.2	--	27.8	--
Mexico	--	6.9	14.2	--
Netherlands	.1	--	19.8	1,780
Portugal	--	1.6	5.5	--
Romania	--	6.0	--	--
Saudi Arabia	--	--	8.0	--
Spain	.3	13.9	14.7	--
Sweden	--	--	13.7	404
Taiwan	1.6	--	9.8	--
Turkey	10.8	21.1	--	--
United Kingdom	--	21.4	46.1	--
United States	(2)	22.6	178.3	146
Yugoslavia	--	9.9	3.4	--
Other	.4	3.3	9.9	--
Total	265.5	190.0	891.9	[3]5,523

[1]Table prepared by H. D. Willis.
[2]Less than 50 tons.
[3]Data do not add to total shown because of independent rounding.

Source: Estadisticas del Cobre, 1985 and 1986 monthly editions, Comisión Chilena del Cobre.

COMMODITY REVIEW

METALS

Arsenic.—Cía. Minera San José Ltda.'s El Indio arsenic trioxide plant operated at full capacity in 1985, producing about 4,000 tons of arsenic trioxide. Output was exported to Sweden, Argentina, and the United States. El Indio's arsenic trioxide is relatively crude (94% to 97% AS_2O_3) and contains some iron impurities, making it unsuitable for glass production.

Another potential producer of arsenic is Refimet, which operates a toll concentrate roasting plant 50 kilometers north of Santiago. Refimet processes roughly 35% of El Indio's concentrate production, removing arsenic, which is put into storage ponds. The concentrate is then shipped to ENAMI's Las Ventanas smelter.

Copper.—Chile continued as the world's largest producer and exporter of copper in 1985 with an increase of 5.1%, compared with 1984 output. In 1985, production of copper and copper byproducts remained profitable despite the world's depressed prices. Of the total copper produced in Chile, 65% was refined copper, 15% blister copper, and 20% cement copper, concentrate, slags and minerals, and copper derived from the gold and silver processes.

CODELCO-Chile continued as the country's dominant copper producer; its output was 79.4% of domestic total output and was 2.6% greater than in 1984. The medium and small mining sector contributed 20.6% to the total output with an increase of 16.7%, compared with that of 1984. ENAMI was the second largest copper producer in Chile; output increased 8%, compared with that of 1984.

In 1985, CODELCO-Chile's total copper production reached 1.08 million tons of fine copper. The Chuquicamata Div. of CODELCO-Chile accounted for 51% of the total production, El Teniente Div. for 30%, Andina Div. for 10%, and El Salvador Div. for the remaining 9%. In 1985, CODELCO-Chile contributed $411.3 million to the Chilean Treasury Department by way of taxes and advances against earnings. The 1985 contribution made by CODELCO-Chile was 26% less than in 1984. CODELCO-Chile's development plan envisions investment of $2 billion over the next 5 years and contemplates several expansion projects in its four divisions in order to improve its level of competitiveness in the international market. The projects focus on increasing the tonnages of ore extraction and processing to compensate for lower ore grades to be mined in the four divisions. CODELCO-Chile invested $369.5 million in plants and equipment in 1985.

Among Chile's private sector copper projects, the La Escondida copper-molybdenum deposit is the most interesting and promising project. La Escondida is considered to be one of the largest copper deposits in the world with estimated reserves of 675 million tons of ore grading 2.16% copper and 0.01% molybdenum. La Escondida is about 100 miles southeast of Antofagasta and is owned jointly by Utah International Inc., a subsidiary of Australia's Broken Hill Pty. Ltd., 60%; The Rio Tinto Zinc Corp. PLC of London (United Kingdom), 30%; and Mitsubishi Corp. of Japan, 10%. Investment in La Escondida is expected to reach between $1 and $1.4 billion. Earnings are estimated at $420 to $500 million per year, while operating costs are projected at $150 to $220 million. The construction stage could begin in 1987 and will employ about 3,500 workers; when completed La Escondida will have a concentrator to process 35,000 tons per day and a 100-mile slurry pipeline to carry the concentrate to a port facility. La Escondida is expected to yield 300,000 tons per year of high-grade copper concentrate. Final financing arrangements are expected to be completed by yearend 1986.

The Cerro Colorado copper deposit, with proven reserves of 70 million tons of ore grading 1.4% copper, is 75 miles east of Iquique. The project is a joint venture between Rio Algom Ltd. of Canada, 75%, and Outokumpu Oy of Finland, 25%; development is expected to require $220 to $240 million. The open pit mine is expected to yield copper, gold, and molybdenum, the sale of which will earn an estimated $90 million per year. Annual output is estimated between 55,000 and 60,000 tons of high-grade copper concentrate and will employ about 600 workers during the construction stage.

Chevron, Mobil Oil Corp., and Billiton-Shell (Billiton International Metals BV and Shell Hydrocarbons BV) are jointly conducting intensive studies on the Collahuasi porphyry copper deposit located 67 miles east of Iquique. The consortium Cía. Minera

Exploradora Doña Inés will spend about $6 million during the next 2 years in exploration, including the drilling of a 350-meter exploration shaft. Preliminary estimates indicate at least 20 million tons of secondary enriched ore grading 2% copper with some silver values.

Gold and Silver.—Chile's gold and silver production increased 2% and 6% over that of 1984, respectively. The value of metallic gold exports increased 7% over that of 1984 to $91 million. However, the value of Chile's silver metal exports declined 16% below that of 1984 to $73.6 million. Gold-silver concentrate shipments fell 15% below those of 1984 to $55 million.

ENAMI's precious metals refinery at Las Ventanas recovers gold and silver from anode slimes, a byproduct of the electrorefining of copper. ENAMI also purchases gold contained in ores from the small and medium mining sector and processes concentrates from CODELCO-Chile on a toll basis. ENAMI produced 208,000 troy ounces of gold bars in 1985, up 2% over 1984 output and worth about $71 million.

ENAMI initiated the National Gold Mining Plan in 1983 as an attempt to increase placer gold mining in Chile and provide employment to ease Chile's severe unemployment problem. The program employed 10,630 workers during 1985 and produced 34,755 troy ounces of gold, worth about $10 million. (More details are provided under the "Government Policies and Programs" section.) CODELCO-Chile began exporting metallic gold in 1985, primarily to Europe. CODELCO-Chile's gold production is expected to increase rapidly when the Salvador Div. begins exploitation of its auriferous silica mine ore body.

In the private sector, Cía. Minera San José, a subsidiary of St. Joe Minerals of the United States, continued as the leading producer of gold in the country since 1980 from the rich El Indio Mine located 200 kilometers east of La Serena. The mine has proven and probable reserves of 4.4 million tons of ore containing an average of 8.8 grams of gold per ton, 120 grams of silver per ton, and 5.3% copper. Gold production at El Indio increased slightly in 1985 over that of 1984 to 376,500 troy ounces, while silver production increased 4% over that of 1984 to 1.12 million troy ounces. Copper contained in the concentrate increased slightly to 19,000 tons. Current production of ore at El Indio is 1,850 tons per day, and the company has plans to invest $24 million for expansion of the mine by mid-1988 to increase production to 2,400 tons per day. Gold production is expected to decline to 180,000 troy ounces per year, despite the expansion, due to exhaustion of the direct-shipping-ore zone and declining gold grade. However, silver production will increase to 1.32 million troy ounces, and copper output will reach 30,000 tons per year.

Other investment projects include a 50% expansion of the mill and development of a tailings filter system. St. Joe Minerals is also considering expansion of its arsenic roasting plant and the investment of an additional $14 million to develop the El Tambo ore body located 12 kilometers south of El Indio. The El Tambo Mine will produce 64,000 troy ounces of gold per year by heap leaching. Reserves at El Tambo are estimated at 1 million tons of ore grading 7 to 8 grams of gold per ton. Exploration for precious metals in Chile continued in 1985 despite the decline in gold and silver prices.

Freeport Chile Exploration Co. ended exploration at Coipita and began intensive studies of the Sierra Gorda gold-silver ore body near Calama. Preliminary findings indicated several million tons of ore with veins grading 8 to 10 grams of gold per ton.

Chevron began intensive geological studies of the Andacollo area near La Serena. Preliminary estimates by Chevron indicate reserves of 10 million tons of ore with 2 grams of gold per ton, with some veins containing 4 to 6 grams of gold per ton. Cost of a 3,000-ton-per-day heap-leaching operation was estimated at $20 million.

Development of the La Coipa deposit by Consolidated Gold Fields was held up by legal disputes over mining claim rights. Ore reserves at La Coipa are estimated at 10 million tons of ore with 6 to 8 grams of gold per ton. Minera Sierra Morena, the Consolidated Gold Fields subsidiary, has already invested $20 million in the project.

CODELCO-Chile is the largest silver producer in Chile. In 1985, they produced 6.4 million troy ounces of silver, or about 39% of the nation's total. CODELCO-Chile recovers silver from anode slimes at the Chuquicamata and El Salvador refineries. CODELCO-Chile and ENAMI are the largest exporters of silver in Chile with more than 80% of the nation's total. ENAMI produced 4.9 million troy ounces of silver at its Las Ventanas precious metals refinery from concentrates purchased from the small- and medium-size silver mines. These mines increased production almost 30% in

1985 over that of 1984.

The most important silver mines in Chile are the Choquelimpe Mine owned by Cía. Procesadora de Metales, the Caracoles Mine owned by Cía. Minera Flomax, the Cachinal de la Sierra Mine owned by Cía. Minera Brass, the El Bronce Mine owned by Cía. Minera El Bronce de Petorca, and the Vaquillas Mine owned by Cía. Minera Vaquillas. Some of these mines extract silver from old waste dumps using a cyanide heap-leaching process.

Billiton-Shell purchased an option on the Choquelimpe silver deposit and is currently conducting geological studies on-site. Anglo American continued exploration of the Esperanza District near Copiapó, and has identified the Chimberos ore body, with reserves of about 4 million tons of ore with high silver grade. Anglo American is evaluating the feasibility of producing 1,000 tons per day of ore from an open pit mine and the construction of a concentrator on-site.

Iron Ore.—Production of iron concentrate in 1985 declined nearly 9% below that of 1984 to 6.51 million tons, of which 4.5 million tons was shipped to the pelletizing plant at Huasco to be converted into iron ore pellets. The production of pellets in 1985 increased by 7% over that of 1984 to 3.6 million tons, grading 66.3% iron. Shipments of iron ore concentrate and pellets to domestic and foreign markets reached 2.1 million tons and 2.7 million tons, respectively, for a total f.o.b. value of $90.8 million.

About 82% of the iron ore and pellets produced in Chile was exported to Japanese markets, and the remainder was consumed domestically.

The continued drop in iron ore prices during 1985 forced CAP to rationalize production at its three principal mines operated by its subsidiary CMP. CMP lost $5.6 million in 1985, compared with losses of $15.5 million in 1984. CMP has 450 million tons of ore reserves in the currently producing mines of El Romeral, Los Colorodos, EL Algarrobo, and El Laco. It also has 350 million tons of ore reserves in the Cerro Negro, Cristales, Pleito, and Alcaparra Mines, which are being developed. CMP mining operations are carried out in two production centers: El Romeral, near La Serena, and the El Algarrobo Mine and pellet plant in the Huasco region.

Iron and Steel.—Ferroalloys, pig iron, and crude steel production declined 44.1%, 2.4%, and 1.6%, respectively, below that of 1984; semimanufactured (hot-rolled) products increased nearly 10% over those of 1984.

Cía. Siderúrgica de Huachipato S.A. (CSH), another subsidiary of CAP, earned a pretax profit of $20.6 million in 1985, an increase of 28% over 1984 earnings; net earnings were $13.6 million. The increase in earnings, according to CAP officials, was the result of well planned and implemented operational and administrative policies. Production costs and administrative expenses were lowered 14% and 29%, respectively, below those of 1984. CSH was one of the few steel producers in Latin America that produced a profit in 1985, as was confirmed by figures published by the Latin American Iron and Steel Institute. CAP plans investments of $317 million over the next 5 years, including a $110 million 350,000-ton-per-year coke plant, a $15 million lamination plant, and a $36 million continuous casting line.

Lead and Zinc.—Chile's lead and zinc production declined 42% and increased 16%, respectively, compared with those of 1984. Sociedad Contractual Minera El Toqui Ltda., with its El Toqui Mine in Aysén Province, southern Chile, was the largest producer of lead and zinc in 1985. However, falling lead and zinc prices and heavy debt servicing costs forced the mine to shut down in November 1985. The company was facing bankruptcy and may be sold. The El Toqui project has four deposits, the San Antonio (grading 9% to 11% zinc), the Zuniga (polymetallic, grading 4% lead, 14% zinc, and 1% copper), and the Estatuas and Katerfeld 2 (both under exploration). Other small lead and zinc producers in Chile include Empresa Minera de Aysén Ltda. and Cía. Minera Catemu Ltda. Shipments of lead and zinc concentrates during 1985 were 2,266 tons of lead and 36,765 tons of zinc for a total value of $6.7 million.

Manganese.—Manganesos de Atacama (98.4% owned by CAP) operates three manganese mines in the Ovalle area and produces ferromanganese alloys and ferrosilicomanganese at its Guayacán plant near Coquímbo. Roughly 85% of its production is consumed by CAP at the CSH smelter. The remainder is sold to small steel producers in Chile or exported to Peru and Ecuador. CAP also purchased the entire output of medium-grade manganese ore. Production and profits for this CAP affiliate went up 36% and 48%, respectively, in 1985 over those of 1984.

Molybdenum.—Chile is the world's second largest producer of molybdenum, after the United States, and holds about 25% of the world molybdenum reserves. CODELCO-Chile, the only Chilean producer of molybdenum, which recovers it as a byproduct of copper, increased production 9% compared with that of 1984 to 18,389 tons. Of this total output, 68% was in the form of concentrate and 32% was processed in the Chuquicamata Div. as molybdenum trioxide. Income from the sale of copper byproducts was the lowest in the last 5 years, falling to $165.3 million. Of this total, sales of molybdenum amounted to $124.4 million with shipments totaling 17,034 tons of fine molybdenum content, decreases of 17% in value and 5% in volume, respectively, below those of 1984.

In 1985, the Molymet plant near Santiago received 6,033 tons of molybdenum concentrate from CODELCO-Chile on a toll basis for conversion into molybdenum trioxide.

Molymet also imported 2,450 tons of molybdenum concentrate from the United States, Canada, and Peru for conversion and export in the form of ferromolybdenum and molybdenum oxides. Profits were approximately $3.4 million, up 47% over those of 1984.

INDUSTRIAL MINERALS

Lithium and Potassium.—SCL, a subsidiary of Foote Mineral (55%) of the United States and CORFO (45%) of Chile, more than doubled its lithium carbonate production to 4,508 tons compared with that of 1984. The entire output, valued at about $18 million, was exported. Production capacity of lithium carbonate at SCL's facility at La Negra, near the port city of Antofagasta, is about 7,480 tons per year. SCL is studying the feasibility of expanding the capacity to 9,000 tons per year. SCL is also evaluating the feasibility of recovering magnesium from the brines of the Salar de Atacama Basin, which grade about 1,500 parts per million of lithium. The Salar de Atacama's reserves represent about 40% of the world's economically available lithium supply.

The University of Chile was conducting research and development of a process to produce lithium metal in Chile using the abundant reserves of lithium carbonate that currently exist in the Salar de Atacama brines. University officials indicate that it is possible to produce lithium metal in the country with evident economic advantages. In the world market, a pound of lithium carbonate now sells for about $1.48, while a pound of lithium metal sells for about $24. Currently, metal markets account for 5% of the total lithium demand, but new applications in extremely light structural alloys, lightweight batteries, and organometallic compounds and its use as a coolant and heat-transfer fluid in nuclear reactors are expected to dramatically increase the demand for the metal within a few years.

AMAX of the United States signed an agreement with CORFO in 1985 for the development of the Salar de Atacama mixed salts project, a $170 million investment to produce potassium sulfate (250,000 tons per year), boric acid (30,000 tons per year), lithium carbonate (15,000 tons per year), and potassium chloride (500,000 tons per year). AMAX will hold 63.75% of the shares. Molymet will participate with 11.25%, while CORFO will retain 25%. Construction of the plant facilities and infrastructure is projected to begin in 1987, with production starting in 1992.

Nitrates and Iodine.—SOQUIMICH, CORFO's nitrate and iodine producing subsidiary, operates two mines, Maria Elena and Pedro de Valdivia, both located 150 kilometers northeast of Antofagasta, and produces sodium nitrate, potassium nitrate, iodine, and anhydrous sodium sulfate. CORFO owns 93% of SOQUIMICH but plans to sell 49% of the company's shares back to private investors. SOQUIMICH is the fifth largest exporter in Chile with sales of $89 million in 1985. Primary markets for nitrates are the United States (37%), Western Europe (28%), and Brazil (17%). The domestic market accounts for 39% of SOQUIMICH's revenue. Production included was 824,000 tons of nitrate (727,500 tons in 1984), 48,700 tons of sodium sulfate (57,696 tons in 1984), and 3,040 tons of iodine (2,661 tons in 1984). SOQUIMICH recently completed construction of a new iodine plant. The unit, situated at Maria Elena in northern Chile, will have a production capacity of 250 tons during the first year. Separately, SOQUIMICH announced plans to produce pure potassium nitrate during the second quarter of 1986. The company plans to sell 20,000 tons of potassium nitrate to customers in the United States, Europe, and South America. An agreement between SOQUIMICH and SINOCHEM of China was about to be signed for the sale of 60,000 tons of sodium nitrate valued at more than $7 million, which will represent an annual sale of between 30,000 and 35,000 tons.

Phosphates.—Phosphate rock (apatite) production increased 54% over that of 1984 to 7,110 tons grading 26.37% P_2O_5. CORFO offered two phosphate projects for national and international tender in 1985, following several years of intensive geologic studies. The first project offered was the Fosinige deposit at Mejillones, near Antofagasta. This phosphorite deposit has estimated ore reserves of 42 million tons grading 6% P_2O_5. CORFO accepted the bid of the Chilean firm Sigdo-Koppers to conduct a feasibility study of the Mejillones deposit. CORFO plans a project capable of producing 30,000 tons per year of concentrate, which would require an investment of about $10 to $12 million. The Bahia Inglesa phosphate deposit is located 45 kilometers west of Copiapó on the coastline of Chile. This zone is presently being evaluated for phosphorite potential. Proven reserves were estimated at 5.2 million tons of phosphate rock grading 17% P_2O_5 content with some uranium content (about 70 parts per million U_3O_8). CORFO is considering a 20,000-ton-per-year mine and processing plant, which could recover uranium as a byproduct.

Market demand for phosphate fertilizer in Chile is about 140,000 tons per year, mainly as triple-superphosphate. Currently, nearly all of Chile's consumption of this type of fertilizer is imported. According to CORFO, the project will require a total investment of $13 million, the reserves will support 15 to 20 years of production, and the project will have a 20% domestic market share with annual sales of $7.5 million.

Sulfur.—Chile's native sulfur output derived from caliche increased nearly 59% over that of 1984, and refined native sulfur increased about 8% over that of 1984. Chile's total production of sulfur increased almost 46% to 78,747 tons over that of 1984 and comes from Region II near Antofagasta and Calama Provinces. Chile imports about 50% of its sulfur consumption, but has extensive reserves of volcanic sulfur (100 million tons at 50% cutoff grade), which could be further exploited. Most of the sulfur imported comes from Canada and was mainly used in the production of sulfuric acid. Sulfuric acid plants are planned for ENAMI's Las Ventanas smelter (237,000 tons per year) and CODELCO-Chile's Chuquicamata smelter (985,000 tons per year) to increase Chile's production and reduce the need for sulfur imports. Several investment projects for sulfur production are under study. Empresa Azufrera Chile Ltda., a $25 million joint venture formed with Real International Marketing (Canada), Devco Overseas (United States), and Saudi Sulfur Co. (Saudi Arabia), is considering a $20 million project to produce up to 500,000 tons per year of pelletized sulfur for export from the Tacora Volcano ore body on the Peruvian border near the town of Parinacota, Region I, Iquique Province. Reserves are adequate at this level of production for over 50 years. Another sulfur investment under consideration is the $15 million Sillajuaya project planned by a Canadian company, the R.M.S. Group. The investment contemplates production of about 850,000 tons per year of sulfur from the Sillajuaya Volcano located 150 kilometers east of Iquique.

MINERAL FUELS

Coal.—Coal output increased nearly 5% over that of 1984 to almost 1.4 million tons. Region VIII (Concepción and Arauco Provinces) continued to be the most important coal producer in the country with 90% of the total; the remainder came from Region X (Puerto Montt Province). Sales of coal in 1985 reached 1.6 million tons, an increase of 9% over that of 1984.

Chile will be turning increasingly to coal as an alternative, cheaper source of energy in a bid to replace expensive oil imports. Coal currently supplies 10% of the country's energy needs with an annual production of more than 1 million tons. Hydroelectric power provides 36% and oil 54%. There are four coal producers in Chile: Empresa Nacional del Carbón S.A. (ENACAR), which is responsible for over 90% of the total production, Cía. Carbonífera Schwager Ltda., Sociedad Carbón Valparaíso Ltda., and Carbonífera San Pedro de Catamutun.

Apart from reserves currently under exploitation in Concepción and Arauco, Chile has large reserves of subbituminous coal in Magallanes and Valdivia. To exploit these deposits, the newly formed COCAR will go into operation in 1986. COCAR is now owned 81% by Cía. de Petróleos de Chile S.A. and other Chilean investors; 10% by the International Bank for Reconstruction and Development affiliate, International Finance Corp. (IFC); and 9% by Northern Strip Mining Ltd. of the United Kingdom. COCAR plans to invest $70 million to develop the Pecket deposit on Pecket Island in the Magallanes region of southern Chile. The deposit has estimated reserves of 115 million tons of subbituminous coal. CODELCO-Chile has awarded a supply contract for 6.7 million tons of coal to COCAR. The contract, signed for 8 years with a possible 2-year extension, provides a market for the output from COCAR's subbituminous coal deposit. The Pecket project includes mine development and the construction of a plant and port facilities.

ENACAR and Carbonífera Schwager have also been contracted to provide CODELCO-Chile with 761,000 tons and 411,000 tons of coal, respectively. The coal will be burned at the 79-megawatt unit 12, 79-megawatt unit 13, and 125-megawatt unit 14 of CODELCO-Chile's Tocopilla power station, which feeds the Chuquicamata copper complex. As soon as the new coal port comes into operation, COCAR is to commence shipping 536,000 tons of coal over a period of 12 months, mainly to the Tocopilla power station in northern Chile.

The Pecket coal project at Tocopilla is expected to save Chile about $40 million in energy production costs and a further $100 million in oil imports. The coal will both generate electricity for CODELCO-Chile and supply the general electricity needs of northern Chile. The Comisión Nacional de Energía estimates total coal consumption will rise to 1.91 million tons in 1986, drop slightly to 1.85 million tons in 1988, and then rise to 3 million tons by 1990.

Petroleum and Natural Gas.—ENAP reported that production of crude oil in Chile was about 13 million barrels, 7% below that of 1984, continuing the decline that began after 1982, when output peaked at 15.6 million barrels. Offshore production, with 25 platforms in operation, represented 61% of the total annual production.

The subsidiary refining companies, Refinería de Petróleo Concón S.A. and Petrox S.A., processed 28.0 million barrels of crude, of which 12.6 million barrels was Chilean crude oil and 15.4 million barrels was imported crude oil.

ENAP and its subsidiaries provided 92% of the domestic market. The balance consisted of products imported by the distributing companies. During the year, 15.1 million barrels of crude oil was imported, primarily from Venezuela and secondly from Egypt, Niger, Ecuador, Gabon, and China, with a c.i.f. value of $427.8 million. Imported crude increased nearly 5% in volume and 2% in value respectively, compared with those of 1984.

As a result of negotiations between ENAP and SINOCHEM of China, a shipment of 538,000 barrels of crude oil was received in August at Quintero. This shipment of crude oil was on an experimental basis and was part of a contract for 800,000 barrels of crude oil with a total value of $20 million.

A new contract was signed in June with a French firm, BEICIP, to conduct technical and economic feasibility studies on the application of secondary recovery methods of crude oil. These techniques are being tested at the main oilfields of the Springhill District. As a result of these investigations, an investment project was defined consisting of applying secondary recovery methods by means of water injection in the Catalina Oilfield on Tierra del Fuego Island. This project is scheduled to start in early 1986.

ENAP officials said that seismic studies conducted in the Salar de Atacama indicated favorable sedimentary structures at least 8,000 meters thick, which could prove to contain hydrocarbons. ENAP has invested $6.8 million in exploration in the Salar de Atacama over the past 2 years. To further explore other areas of interest near the Salar de Atacama, an additional investment of $5 million will be needed during the next few years.

Output of natural gas decreased 5% below that of 1984 to almost 163.8 billion cubic feet, of which 113.3 billion cubic feet was reinjected; of the remainder, 24% was marketed and 7% was flared.

Negotiations and preliminary contracts to finance a 700,000-ton-per- year methanol plant were completed in December 1985. Purchase orders for the primary equipment were immediately issued. The total investment needed will be almost $300 million.

A new company called Cape Horn Methanol Ltd. was formed. The Henley Group, an affiliate of Allied-Signal Corp. of the United States, holds 80% of the shares; the other partners are Chile's Paper and Cardboard Manufacturing Co. (CMPC), holding a 10% interest, IFC with 8%, and the Methanol Investment Co. Ltd., a group of domestic investors, with 2%. Seventy-five percent of the project will be financed by a syndicate of U.S. and European banks led by Citibank NA, supplying a $35 million loan; Japan's Marubeni Corp., in consortium with Kawasaki Heavy Industries Ltd. and Nissho-Iwai Corp., extending a $152 million syndicated loan; and IFC, providing $50 million. Plant construction was scheduled to start in March 1986 with 900 workers, and production was to start about yearend 1988.

The second petrochemical development

project negotiation was initiated, following the submission of international bids, for the construction of an ammonia-urea plant (fertilizer plant) in Punta Porpesse, Cabo Negro, 17 miles north of Punta Arenas. The joint venture, between Cargill and Combustion Engineering, expects to invest $440 million in the project. A purchase agreement was signed with ENAP for sufficient natural gas feedstock to support a daily production level of 350 tons of ammonia and 1,750 tons of urea. Project financing negotiations were expected to be completed in 1986, and construction of the plant should take 3 years.

More than one-third of all ammonia produced is directly applied as a fertilizer, and most of the balance goes into preparation of other fertilizers, such as urea and various ammonium salts. Although most urea also is used directly as a fertilizer, ENAP will have to build installations valued at $100 million over the next 20 years to ensure an adequate gas supply to the new petrochemical plants. One of these will be a 110-mile, 18-inch gas pipeline to feed the plants scheduled to start construction next year. This new pipeline will be financed in part by the International Development Bank.

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[1] Physical scientist, Division of International Minerals.

[2] Where necessary, values have been converted from Chilean pesos (Ch$) to U.S. dollars at the average rate of Ch$160.9=US$1.00, as of Dec. 31, 1985.

The Mineral Industry of China

By E. Chin[1]

China's output of minerals, metals, and fuels is diverse and large by world standards. Under the seventh 5-year plan (1986-90), emphasis was to be placed on increasing the production of nonferrous metals, particularly aluminum; industrial minerals primarily for export; and coal and petroleum primarily for domestic consumption. Although China has a large and wide array of mineral resources, it is conspicuously lacking in chromium, cobalt, platinum-group metals, and potash. Moreover, its resources of iron and manganese ores are low grade.

Under the sixth 5-year plan (1981-85), the key to China's modernization and development was economic reform. During this period, the national economy grew steadily at a fairly high rate; output by the major sectors were realigned and balanced; industrial performance and efficiency were enhanced; advancements in education, science, and technology were promoted; living standards were markedly improved; and investments for technical transformation of industrial enterprises gained higher levels. Unified state control of revenues and expenditures was being changed into a system whereby remuneration was according to the work performed and responsibility, rights, and interests were to be integrated. Direct control of the economy was being transformed to reflect allowances of market forces. Government ownership was gradually being changed to private ownership to allow the development of diverse economic enterprises and management methods. The pricing system was being reformed to reflect allowances for commodity supply and demand.

The annual growth rate of China's economy during 1981-85 averaged about 10%. The period was characterized by a steady upward growth of the economy without experiencing the major disruptions and upheavals of society during 1953-80. Between 1981 and 1985, China's total industrial output rose at an average of 11% per year. Output in 1985 was 62% higher than that of 1980. Compared with that of 1980, output by major sectors in 1985 showed an increase of 56% in the country's heavy industry; 76% in light industry; 31% in energy; and 43% in transport capacity. The total value of external trade was 72% more than that of 1980. The growth in trade averaged 11% per year during the sixth 5-year plan. China rose from being the world's 28th largest exporter in 1980 to 16th in 1985. The output ratio between heavy and light industry was 57 to 43 in 1978, each accounting for about one-third of the country's total output value of $424 billion.[2] In 1985, the output ratio of these two industries was 53 to 47. The total output value of light industry was $131 billion, an 18% increase over that of 1984. The heavy industrial output value was $149 billion, up 18%.

Output of 82 of the 100 major industrial products met or exceeded state targets. The output of phosphate fertilizers, sulfuric acid, and pyrites was among the commodities that did not meet state plans. Primary energy output in 1985 was equivalent to 839 million tons of standard coal, an increase of 8%. However, insufficient power capacity continued to strain the growth of the manufacturing sector. During the year, energy conservation totaled more than 30 million tons of standard coal.

Overall productivity of state-owned enterprises increased 9%. By yearend 1985, 81% of these enterprises was under the new system of tax payments to the Government.

Profit and tax payments to the state were $38 billion.

The volume of passenger transport was 425 billion persons per kilometer. The volume of cargo handling was 1.7 trillion tons per kilometer. Rail cargo handling accounted for 812 billion tons per kilometer, up 12%; trucking, 36 billion tons per kilometer, up slightly; waterway transport, 757 billion tons per kilometer, up 20%; and air transport, 415 million tons per kilometer, up 33%. The volume of cargo handled by China's major seaports was 311 million tons, up 13%. However, foreign trade ships were docked at seaports an average of 11 days compared with a 9-day average in 1984. The volume of oil and gas carried by pipeline was 61 billion tons per kilometer, up 7%.

State expenditure for capital construction totaled $79 billion. First-phase construction of the iron and steel complex at Baoshan, outside Shanghai, was completed as well as the Guixi copper smelter in Jiangxi. Construction of the Yanzhou-Shijiusuo Railway, electrification of the Jingqin Railway, Shijiu Harbor in Shandong, and the installation of the Beijing-Hankou-Guangzhou coaxial communications cable were also completed during the year. Completion of energy projects added 6 million kilowatts to the national power generating capacity, 15 million tons of coal, and 17 million tons of crude oil. The increase in oil output was largely from Daqing, Dagang, Liaohe, Jilin, Shengli, and Zhongyuan. The major powerplants placed on-stream were the Yuanbaoshan plant in Nei Monggol, the Mudanziang plant in Heilongjiang, and the Dahua hydroelectric plant in Guangxi. During the year, 359 kilometers of new railway were put into operation; 231 kilometers of double-track railway; 1,103 kilometers of electrified railway; 54 million tons of port cargo handling capacity; and more than 1 million tons of cement. The Ningguo and Huaihai Works were the large, 1-million-ton-per-year cement plants placed in operation. In addition, the Zhenhai fertilizer plant in Zhejiang was completed with a designed annual capacity of 300,000 tons of ammonia and 520,000 tons of urea.

During the year, geologic reconnaissance verified new reserves of 15 major minerals listed in the state plan. These included 34 billion tons of coal and 580 million tons of iron ore. Assessments were made of new oil and gas fields and more than 200 metal and industrial mineral ore deposits. The footage for tunneling completed was 10 million meters.

Commodity price reforms, including minerals (especially coal), largely lifting subsidies, were initiated by the state. The average retail price index rose 12% in the cities and 7% in rural areas, while the overall cost-of-living index rose an average of 12%. The sales volume for coal increased 5%; steel, 23%; and cement, 14%.[3]

China's seventh 5-year plan was to focus on the development of the weak links in its economy, especially energy and transportation. A series of thermal power stations was planned for construction near coal mines, railway lines, and in harbor areas. Hydropower stations were to be constructed on the upper reaches of the Huang He, Chang Jiang, and Hongshui. Collectively, thermal and hydropower output was to increase 5 to 6 million kilowatts annually within 5 years. Nuclear power generation was also being considered on the east coast. Coal production was to increase 30 to 40 million tons annually. Onshore and offshore oil exploration and development was to be intensified. Although railway construction was to be stressed, development of highways, ports, inland river shipping, and aviation were not to be neglected. There was to be some growth in the production of steel, nonferrous metals, chemicals, building materials, and other raw materials.

Modernization of existing enterprises and factories was to supersede new construction. Existing enterprises were to rearrange their transformation and reconstruction to increase the variety of their products, upgrade quality, and economize energy and raw material consumption. Selected key enterprises were to undergo overall technical change to be models of technology in their fields. Although new industries were to be developed, traditional industries were expected to remain the principal input of the national economy. However, commerce and service trade, which occupy a low proportion of the overall economy, are planned to have a high rate of growth.

The development of higher education, especially in science and technology, was to be accelerated by expanding enrollment in universities and colleges. Furthermore, secondary vocational training and on-the-job training were to be intensified.[4]

In a study sponsored by the State Council, the scenario for China in the year 2000 was as follows:

(1) Population was to be maintained at 1.25 billion.

(2) The people's living standard would be comfortably well-off at all levels of society.

(3) China would be fifth or sixth in world economic output.

(4) Industry and agriculture would be significantly developed.

(5) The gap between China and advanced nations would be markedly narrowed.

(6) A vigorous open-style economy with Chinese characteristics would have been basically formed.

(7) There was to be a relatively large change in traditional concepts.

China's natural resources were also evaluated in the report as follows:

(1) Water resources were distributed unevenly with 80% mainly in the Chang Jiang Basin and areas to the south.

(2) Deposits of iron ore and phosphate are mainly in the south while coal was mainly in the north.

(3) China ranks first in the world for hydroelectric power potential and third in mineral resources. However, for per-capita production or consumption, it is well below the world average.

(4) China's natural mineral resources are generally not of high quality.

(5) The potential to develop resources are high, particularly for offshore oil production.

The prospects for natural resources in 2000 were characterized as follows:

(1) Water distribution will remain problematic. There will be deficient supplies along the Liao He, lower reaches of the Huang He, eastern Shandong, and in arid areas of the northwest.

(2) Mine development would be sufficient for the production of iron and steel; 10 nonferrous metals; nitrogenous, phosphatic, and potassic fertilizers; and cement. However, small amounts of rich iron and copper ores will have to be imported.

(3) Reserves of a few minerals such as iron ore will not be able to meet the national demand.

(4) There were optimistic prospects for developing offshore oil deposits.[5]

The State Economic Commission set up an office in September 1979 to draft a mineral resources law. The office consisted of representatives from seven ministries and was largely headed by the Ministry of Geology. A draft of the law was submitted to the State Council in 1981, and after examination by various government levels, was to be revised. A subsequent draft was submitted to the State Council in October 1984, and in 1985, returned for further revisions. A separate law was to be enacted for mineral development by foreign investment or Sino-foreign cooperation.[6]

To obtain more complete statistics and information, the State Council differentiated the country's economic sector into three industries. The first industry includes agriculture, forestry, animal husbandry, and fisheries. The second industry ranges from mining and manufacturing to construction. The third industry consists of two major components: (1) communications and transport and (2) services. Geological surveys, technical services, and scientific research fell within the third industry. The disparity between China's total value of industrial and agricultural output and the gross national product (GNP) used by other countries is the omission of the output of the third industry. As such, the State Council instructed the State Statistical Bureau to begin the compilation and addition of these output statistics to GNP.

Public ownership of company stock was allowed by a regulation promulgated in 1984 permitting such sales. Although stocks cannot be traded, they can be transferred through banks at a fixed price. Under the new economic reform policy, Yanzhong Industrial Co. of Shanghai was the first company in China since 1949 to issue dividend checks to its stockholders.

State-owned enterprises account for 80% of China's gross industrial output and for over 70% of the total volume of retail commodity sales. The question of whether state-owned enterprises should become autonomous and privately owned was raised. Individual autonomy in decisionmaking would facilitate negotiating contracts with foreign concerns. However, the transfer to self-ownership, division of equity, and the compensation to the state remained unresolved.

China's only industrial survey was conducted in 1950. Preparatory work was completed during 1984-85 to conduct a comprehensive, 3-year industrial survey beginning in 1986. The survey will include capacity, utilization rate, service life, and energy consumption of industrial equipment. It will also investigate consumption of raw materials, production costs, and economic return of fixed assets.

During 1981-85, 14 coastal cities, 4 special economic zones (Shantou, Shenzhen, Xiamen, and Zhuhai), and Hainan Dao were opened to foreign investment for inducing capital and advanced technology. The State Council proposed further to open gradually a triangular zone composed of the Chang Jiang, Zhujiang, and Xiamen-Zhangzhou-Quangzhou Deltas.[7] By developing the delta areas, the development of central and west China would be facilitated and act as a focal point for exchanges between east and west China. The potential hydropower of the deltas collectively amounts to 340 million kilowatts, over one-half of the total hydropower resources of the country. Coal reserves are 335 billion tons, 43% of the national total. Confirmed reserves of aluminum, copper, iron, lead, molybdenum, nickel, phosphate, soda ash, tin, titanium, vanadium, and zinc ranges from 50% to 90% of the national total. Domestic cooperation and exchanges of goods and the infusion of foreign assistance would enhance raw material production, mutually beneficial to central and east China. The Luipanshui coal basin in Guizhou has reserves of over 15 billion tons, 90% of which are coking grade. Shenfu in Shaanxi has reserves of over 100 billion tons. Reserves in Henan are over 20 billion tons. The output of iron and steel could be increased in Chongqing, Guizhou, Hebei, and Sichuan; aluminum in Guizhou and Henan; asbestos, copper, lead, mirabilite, nickel, and zinc in Hubei and Sichuan; antimony, molybdenum, tin, and tungsten, in Guangxi, Hunan, Shaanxi, and Yunnan; phosphate in Guizhou, Hubei, and Yunnan; and soda ash in Henan; iron ore in Guangdong and Hainan Dao; and salt from seawater evaporites in various regions along the coast. A surfeit in production in one economic zone could be transported to meet the needs in another region.

In addition, the Government was considering opening the Liaodong and Jiaodong Peninsulas to foreign cooperation for economic and technological exchanges.

Shanghai, Qinhuangdao, and Dalian are China's largest ports in that order. Shanghai has an annual cargo handling capacity of 100 million tons. In 1985, Qinhuangdao handled 44 million tons, overtaking Dalian, which handled just over 33 million tons. Qinhuangdao is used mainly for transporting coal from Hebei, Nei Monggol, Ningxia, Shaanxi, and Shanxi and oil from Heilongjiang. Construction was continuing on five deepwater coal and oil berths, which have a collective handling capacity of 66 million tons, and on dockage of 8 million tons for sundry goods, which includes seven general purpose berths. Presently, Qinhuangdao has 15 operational berths and 700,000 square meters of warehouse space. When the electrified railway from Datong Coalfield is completed in 1992, Qinhuangdao's cargo handling capacity will be 100 million tons annually.[8]

The amount of foreign investment in China has increased markedly. The total investment in 1984 was equivalent to the sum of the previous 4 years, while investment in 1985 equaled that of the past 5 years. In addition to opening special economic zones and a number of coastal cities, China adopted more flexible measures and legislative procedures to improve the investment climate. Most of the foreign loans and investments were used to shore up the weaker sectors of the economy, especially for energy, railways, harbors, and for facilities to process raw and semimanufactured materials.[9] Foreign funding induced for domestic investments for 1985 and the past 7 years were as follows, in $100 million:

	1985	1979-85
Foreign loans:		
Received	35.3	203.0
Used	24.3	156.0
Contract values of foreign investment:		
Received	58.5	162.0
Used	15.7	46.0
Commercial credits:		
Received	3.6	17.0
Used	3.0	13.0

China was encouraging more foreign investment in key industrial projects to expedite development and to advance the overall technological level of the country. Foreign business ventures in China totaled 6,155 and were categorized as follows:

	Ventures opened in 1985	Total of such ventures
Joint ventures	1,300	2,300
Cooperative ventures	1,500	3,700
Solely foreign-owned ventures	46	120
Cooperative offshore oil exploration projects	4	35

About 80% of the participants are Hong Kong companies, and the remainder are investors from Western Europe, Japan, and the United States. These firms have invested heavily in key projects such as coal mining, automotive production, and offshore oil exploration and development.

Because of the increase in activity for modernization, there was competition for building materials throughout the country. Although allotments to key projects were given priority, residential construction continued to be brisk. Construction in 1985 and projections for the seventh plan period (1986-90) were as follows, in million square meters:

	1985	1986-90
Urban:		
Residential	128	656
Public infrastructure	52	264
Industrial	34	183
Rural	770	3,850

In the urban areas, most of the investment is channeled from state funds as opposed to investment by individuals and collectives in the rural areas.[10]

In 1985, geologic prospecting for energy resources continued to be emphasized. Oil and gas surveying was focused on the northern part of Xinjiang's Tarim Basin and in the offshore areas of the East China Sea, and for natural gas alone in Nei Monggol, other areas of north China, and in Sichuan. Although coal exploration was stressed in east China, uranium exploration was conducted primarily in northern Guangdong and northern Sichuan. Surveying for metal ores and industrial minerals continued to strengthen China's reserve base for aluminum, boron, copper, diamond, gold, phosphate, sulfur, tin, and zinc.[11]

China's regulations governing the discharge of waste and other pollutants in its inland waters, territorial seas, and Continental Shelf went into force on April 1, 1985. The regulations, encompassed in 24 articles and 2 appendices, cover definitions, areas of jurisdiction, prohibited materials, permits for discharge, fines for violation, and conditions for cleanup. These regulations were expected to safeguard the marine flora and fauna resources in the coastal areas.[12]

Government reorganizations and shuffling of officials, which began in 1983, was essentially completed by the last quarter of 1985. Energy resources remained divided among the Ministry of Coal Industry, Ministry of Petroleum Industry, China Petrochemical Corp., Ministry of Water Resources and Electric Power, and the Ministry of Nuclear Industry. Organs dealing with the metals were the Ministry of Metallurgical Industry (MMI) and China National Nonferrous Metals Industry Corp. (CNNMIC). The former retained jurisdiction of iron and steel and its captive dolomite and iron ore mines. In addition, MMI retained control of the country's larger gold mining operations and, in collaboration with the People's Liberation Army, formed China National Gold Mining Co. CNNMIC inherited jurisdiction over all the nonferrous metals, which included steel alloying ingredients as well as byproduct precious metals. In turn, CNNMIC established the Gem Mineral Corp., which markets raw and polished gem stones as well as intricately carved articles and jewelry pieces.

Jurisdiction of industrial minerals was divided between the Ministry of Chemical Industry, State Bureau of Materials and Equipment, Ministry of Urban and Rural Construction and Environmental Protection, and the State Administration of Building Materials. The latter formed a subsidiary, China Nonmetal Mining Industry Corp. (CNMIC) and its marketing arm, China National Building Materials and Equipment Import and Export Corp. CNMIC administers 80 industrial minerals produced in China.

Although vertical integration was to be achieved, there remained horizontal overlapping and conflict. In addition to the geologic departments of each ministry and corporation, there is an overlap with the National Committee on Mineral Reserves and the Ministry of Geology and Minerals. Moreover, the Ministry of Foreign Economic Relations and Trade exerts substantial influence in joint venture agreements and trade policy. All of these Government organs report to the State Council, albeit through the State Planning Commission and the State Economic Commission.

China's rail system is overstrained and operated at capacity limits. Rail is the unchallenged leader of freight transport as well as passenger transport. In 1985, the rail system transported close to 1.3 billion tons, accounting for 90% of coal shipments traveling over 100 kilometers, over 25% of all fertilizers, over 50% of all oil, and almost all of China's iron, steel, and timber shipments. However, the overall rail system is inadequate for the size of the area it services and the volume it transports. China's mainline system has 53,000 kilometers of working track. The locomotive fleet is 12,500: 67% steam, 27% diesel, and the remainder electric. The rolling stock is composed of 310,000 cars, of which 290,000 are in the National and Provincial systems.

During 1981-85, loans provided by the Japanese and the International Bank for Reconstruction and Development (World Bank) were used for major rail projects to be completed early in the seventh 5-year period. These projects will subsequently increase the annual rail transport capacity. Loans from the World Bank during 1986-90 will be used for four projects, which should increase capacity further to 34 million tons by 1992. Other infrastructure vital to the mineral and other industries was also being improved and expanded including the highway and inland river transport systems.[13] Inland water transport of cement, coal, oil, ore, and other construction materials would alleviate congestion on the railroads and highways.

The State Science and Technology Commission selected 10 developments as being the most notable in 1985. These included the construction of the Gezhouba hydroelectric dam; water injection at Daqing to increase oil production; natural resources study for the development of the North China Plain bounded by the Huang He, Huai He, and Hai He; equipment design for a surface mine to produce 10 million tons of iron ore per year; development of China's largest, experimental controlled nuclear fusion device; new laboratory technology to separate uranium isotopes by atomic laser; the launch and recovery of a scientific exploration satellite; rapid production equipment for polyester fiber; and a computer program for Chinese characters and laser photocomposition system for Chinese characters.[14]

PRODUCTION

China is a significant world producer of antimony, barite, coal, fluorspar, graphite, magnesite, petroleum, rare earths, tin, tungsten, and uranium. It is also an important world producer of gold, molybdenum, tantalum, and vanadium. To encourage exploration for precious metals, the Government awarded bonuses for deposits that can be developed. One of the most active minerals reconnaissance programs resulting from this policy was for gold.

China's economy continued to expand, and the total value of agricultural and industrial production increased 16% over that of 1984. Heavy industrial output increased 18%. The output value of state-owned industry increased 13% over that of 1984; collectively owned, 31%; individually owned, 150%; and other, 40%. The overall productivity of state-owned industrial enterprises increased 9%. The major problems of the economy were the growth in domestic demand exceeding production (a condition exacerbated by the increase in individual purchasing power), the increased trade deficit; higher commodity prices; and a deterioration of product quality.

Electric power generation was 407 billion kilowatt hours (kW•h), of which 22% was generated by hydropower. During the year, equipment to generate power equivalent to 5.6 million kilowatts was produced.

Table 1.—China: Estimated production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984	1985
METALS					
Aluminum:					
Bauxite, gross weight	1,500,000	1,600,000	1,600,000	1,600,000	1,650,000
Alumina, gross weight	750,000	800,000	800,000	800,000	825,000
Metal, refined, primary	[r]350,000	380,000	[r]400,000	400,000	410,000
Antimony, mine output, metal content	10,000	12,000	15,000	15,000	15,000
Bismuth, mine output, metal content	260	260	260	260	260
Cadmium, smelter	270	300	300	300	300
Copper:					
Mine output, metal content	170,000	175,000	175,000	180,000	185,000
Metal:					
Smelter, primary and secondary	190,000	205,000	195,000	210,000	225,000
Refined, primary and secondary	300,000	300,000	310,000	310,000	400,000
Gold, mine output, metal content thousand troy ounces	1,700	1,800	1,850	1,900	1,900
Iron and steel:					
Iron ore, gross weight[3] thousand tons	75,000	75,000	75,000	75,000	66,000
Pig iron do.	34,170	35,535	37,380	39,980	43,600
Ferroalloys do.	940	880	900	900	900

See footnotes at end of table.

Table 1.—China: Estimated production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984	1985
METALS —Continued					
Iron and steel —Continued					
Steel, crude ---- thousand tons	35,600	37,160	40,020	43,370	46,700
Steel, rolled ---- do	26,700	29,008	30,720	33,710	36,900
Lead:					
Mine output, metal content	160,000	160,000	160,000	160,000	160,000
Metal, refined, primary and secondary	175,000	175,000	195,000	195,000	195,000
Magnesium metal, primary	7,000	7,000	7,000	7,000	7,000
Manganese ore, gross weight ---- thousand tons	1,600	1,600	1,600	1,600	1,600
Mercury, mine output, metal content 76-pound flasks	20,000	20,000	20,000	20,000	20,000
Molybdenum, mine output, metal content	2,000	2,000	2,000	2,000	2,000
Nickel:					
Mine	11,000	12,000	13,000	15,000	15,000
Smelter	11,000	12,000	13,000	14,000	15,000
Silver, mine output, metal content thousand troy ounces	2,500	2,500	2,500	2,500	2,500
Tin:					
Mine output, metal content	15,000	15,000	15,000	15,000	15,000
Metal, smelter	15,000	15,000	15,000	15,000	15,000
Tungsten, mine output, metal content	13,500	12,500	12,500	13,500	15,000
Zinc:					
Mine output, metal content	160,000	160,000	160,000	160,000	190,000
Refined, primary and secondary	160,000	160,000	175,000	185,000	190,000
INDUSTRIAL MINERALS					
Asbestos	106,000	110,000	160,000	160,000	160,000
Barite ---- thousand tons	800	900	1,000	1,000	1,000
Cement, hydraulic ---- do	84,000	94,072	108,250	121,080	142,500
Fluorspar	480,000	550,000	650,000	650,000	650,000
Graphite	184,000	185,000	185,000	185,000	185,000
Gypsum ---- thousand tons	3,400	3,500	4,300	4,800	5,000
Kyanite and related materials	2,500	2,500	2,500	2,500	2,500
Lithium minerals, all types	14,000	14,000	15,000	15,000	15,000
Magnesite ---- thousand tons	2,000	2,000	2,000	2,000	2,000
Nitrogen: N content of ammonia ---- do	12,193	12,711	13,766	14,000	15,000
Phosphate rock and apatite, P_2O_5 equivalent ---- do	2,530	2,580	r3,750	4,260	3,600
Potash, marketable, K_2O equivalent ---- do	20	26	29	40	40
Salt ---- do	18,320	16,384	16,130	16,000	14,450
Sodium compounds: Sodium carbonate, natural and synthetic ---- do	1,652	1,734	1,793	1,880	2,000
Sulfur:					
Native ---- do	200	200	200	200	200
Content of pyrite ---- do	1,800	1,800	2,300	2,300	2,300
Byproduct, all sources ---- do	300	300	350	350	350
Total ---- do	2,300	2,300	2,850	2,850	2,850
Talc and related materials	900,000	950,000	950,000	950,000	950,000
MINERAL FUELS AND RELATED MATERIALS					
Coal:					
Anthracite ---- thousand tons	124,000	130,000	143,000	154,000	155,000
Bituminous and lignite ---- do	497,000	521,000	572,000	618,000	695,400
Total ---- do	621,000	651,000	715,000	772,000	850,400
Coke, all types ---- do	31,720	33,245	34,510	35,000	39,000
Gas, natural:					
Gross ---- billion cubic feet	495	455	480	490	510
Marketed ---- do	450	414	431	438	455
Petroleum:					
Crude (including crude from oil shale) thousand 42-gallon barrels	738,906	744,994	774,311	836,069	873,500
Refinery products ---- do	450,000	475,000	500,000	550,000	655,000

[r]Revised.

[1]Table includes data available through Sept. 4, 1986.

[2]In addition to the commodities listed for which quantitative estimates of output have been made, China is known or believed to have produced other commodities for which no estimates have been prepared.

[3]In terms of 50% Fe ore.

TRADE

China's trade reached $66 billion, an increase of 25% over that of 1984. Exports were valued at $26 billion, and imports, $40 billion. China's major trading partners were Japan, $20.2 billion; Xianggang (Hong Kong) and Aomen (Macao), $11.9 billion; the European Economic Community, $7.3 billion; the United States, $7.2 billion; countries of the Association of Southeast Asian Nations, $3.8 billion; Brazil, $1.4 billion; Canada, $1.4 billion; and Australia, $1.3 billion. These trading partners accounted for 87% of China's trade.

According to the Ministry of Foreign Economic Relations and Trade, China's top importing companies were China National Metals & Minerals Import and Export Corp., $6.5 billion, and China National Chemical Import-Export Corp., $3.6 billion.

During 1982-85, China attended the annual meetings of the General Agreement on Tariffs and Trade (GATT) as an observer. In November 1984, China was granted observer status to attend the GATT council meeting and the meeting of its associated organizations. At the 41st GATT meeting in November 1985, China indicated it would formally file an application for restoration to the multilateral trade negotiations.[15]

Table 2.—China: Apparent exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984^p	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS				
Alkali and alkaline-earth metals	116	215	--	Japan 199.
Aluminum:				
Ore and concentrate	274,764	528,190	111,538	West Germany 126,193; France 60,731; Canada 56,531.
Oxides and hydroxides	13,946	11,279	211	Thailand 3,754; Singapore 1,805; Philippines 1,550.
Metal including alloys:				
Scrap	172	177	--	Hong Kong 172.
Unwrought	14,358	642	--	Japan 482; France 101; Hong Kong 56.
Semimanufactures	8,780	5,550	349	Hong Kong 4,098; Indonesia 492.
Antimony:				
Ore and concentrate	2,106	7,062	--	France 2,957; Japan 2,641; West Germany 964.
Oxides	1,472	1,163	--	Japan 1,075; France 58.
Metal including alloys, all forms	4,644	5,510	--	Japan 5,118; France 289.
Arsenic:				
Ore and concentrate	5	2	--	All to Thailand.
Oxides and acids	135	327	--	Hong Kong 242; Thailand 40; Japan 18.
Beryllium: Oxides and hydroxides	30	20	--	Japan 15; Belgium-Luxembourg 5.
Cadmium: Metal including alloys, all forms	177	--		
Chromium:				
Ore and concentrate	3,632	30	--	France 24; Singapore 6.
Oxides and hydroxides	1,390	1,460	16	France 711; West Germany 565.
Metal including alloys, all forms	180	253	--	West Germany 196; Belgium-Luxembourg 38.
Cobalt: Oxides and hydroxides	84	17	--	Hong Kong 11.
Copper:				
Oxides	3	--		
Sulfate	306	201	--	Japan 180.
Metal including alloys:				
Scrap	304	729	188	Hong Kong 505.
Unwrought	51	1,125	--	United Kingdom 986; Hong Kong 85.
Semimanufactures	10,768	8,297	(2)	Hong Kong 7,952; Pakistan 131.
Germanium: Metal including alloys, all forms	1	1	--	Mainly to Japan.
Gold: Metal including alloys, unwrought and partly wrought troy ounces	2,636	4,608	--	All to Hong Kong.
Indium: Metal including alloys, all forms kilograms	305	--		
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite	85	101	--	All to Thailand.
Pyrite, roasted	--	4,000	--	All to Italy.

See footnotes at end of table.

Table 2.—China: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal:				
Scrap	36,562	13,184	--	Hong Kong 9,244; Indonesia 3,872.
Pig iron, cast iron, related materials	56,036	3,375	--	Thailand 3,058; Hong Kong 240.
Ferroalloys:				
Ferrochromium	NA	3,470	--	All to Japan.
Ferromanganese	2,042	1,926	--	Pakistan 911; Indonesia 585; Singapore 400.
Ferrosilicon	4,729	2,550	--	All to Japan.
Silicon metal	17,883	14,318	--	Do.
Unspecified	3,413	1,948	10	Japan 1,320; Turkey 304; Sweden 239.
Steel, primary forms	11,955	392	--	Sri Lanka 299; Pakistan 65.
Semimanufactures	496,561	307,008	5,034	Hong Kong 228,031; Singapore 26,300; Malaysia 19,172.
Lead:				
Ore and concentrate	407	--		
Oxides	846	525	--	Japan 322; Pakistan 127; Hong Kong 45.
Metal including alloys:				
Scrap	--	6	--	All to Hong Kong.
Unwrought	3,078	1,212	--	Thailand 1,000; Hong Kong 212.
Semimanufactures	247	79	--	Indonesia 50; Hong Kong 25.
Lithium:				
Oxides and hydroxides	342	389	--	West Germany 192; Japan 111; France 86.
Metal including alloys, all forms kilograms	256	251	--	All to Japan.
Magnesium: Metal including alloys, all forms	559	243	([3])	Japan 139; West Germany 78.
Manganese:				
Ore and concentrate	22,713	12,983	--	Japan 12,443.
Oxides	4,903	2,017	--	Hong Kong 1,436; Singapore 250; Malaysia 153.
Metal including alloys, all forms	856	325	--	Indonesia 145; West Germany 140.
Mercury 76-pound flasks	6,338	2,700	348	Pakistan 725; Japan 520; Hong Kong 441.
Molybdenum:				
Ore and concentrate	60	41	--	All to West Germany.
Oxides and hydroxides	6	20	--	All to Sweden.
Nickel:				
Oxides	55	20	--	All to Hong Kong.
Metal including alloys, all forms	24	4	--	Hong Kong 3.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$4,186	$1,128	$668	United Kingdom $297; Hong Kong $113.
Rare-earth metals	126	141	107	Indonesia 30.
Silicon, elemental	120	--		
Silver:				
Ore and concentrate	--	10	--	All to Singapore.
Waste and sweepings[4] value, thousands	$1,302	$39	--	All to France.
Metal including alloys, unwrought and partly wrought do	$5,931	$9,342	$35	France $8,821; Hong Kong $485.
Tin:				
Ore and concentrate	--	37	--	Pakistan 25; Singapore 12.
Oxides	--	231	--	All to United Kingdom.
Metal including alloys:				
Scrap	1	--		
Unwrought	2,846	3,924	1,659	Hong Kong 1,162; Japan 998.
Semimanufactures	1,282	471	--	Hong Kong 461.
Titanium:				
Oxides	1,810	2,045	42	Hong Kong 824; Japan 650; France 164.
Slag	10	--		
Metal including alloys, all forms	--	133	--	All to West Germany.
Tungsten:				
Ore and concentrate	3,836	4,632	125	West Germany 3,431; Sweden 327; France 209.
Oxides and hydroxides	15	55	--	Sweden 50.
Metal including alloys, all forms	216	103	46	Singapore 45.
Uranium and thorium:				
Ore and concentrate	760	300	--	All to France.
Metal including alloys, all forms	10	[5]15	--	All to Indonesia.
Vanadium: Oxides and hydroxides	3,860	2,048	--	Belgium-Luxembourg 1,470; Japan 327.

See footnotes at end of table.

Table 2.—China: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued				
Zinc:				
Oxides	2,824	2,599	174	Japan 733; Hong Kong 313; West Germany 270.
Blue powder	17	10	--	All to Hong Kong.
Metal including alloys	3,312	1,677	--	Hong Kong 722; Japan 656; Pakistan 136.
Other:				
Ores and concentrates	14,981	10,024	501	Thailand 4,070; Indonesia 1,500; Italy 1,000.
Oxides and hydroxides	1,691	1,041	846	United Kingdom 100.
Ashes and residues	7,974	6,707	1	Hong Kong 6,676.
Base metals including alloys, all forms:				
Quantity, reported	1,608	3,265	--	Hong Kong 2,970; Algeria 100.
Value only, reported thousands	$4,010	$11,536	$11,513	New Zealand $23.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	2,638	513,106	--	Japan 509,993; Hong Kong 2,726.
Artificial:				
Corundum	10,275	16,428	101	Japan 9,242; Hong Kong 6,283.
Silicon carbide	650	3,043	--	Hong Kong 1,511; West Germany 1,094.
Dust and powder of precious and semiprecious stones value, thousands	$48	$90	$18	Singapore $60.
Grinding and polishing wheels and stones	2,789	5,716	(6)	Hong Kong 2,034; Indonesia 1,875; Malaysia 705.
Asbestos, crude	3,050	2,808	--	Malaysia 1,125; Japan 749; Singapore 351.
Barite and witherite	781,830	920,112	849,614	Japan 40,902; West Germany 20,555.
Boron materials:				
Crude natural borates	62	[7]15	1	Malaysia 14.
Oxides and acids	2,349	1,567	--	Japan 687; Pakistan 220; Malaysia 202.
Cement	290,554	115,812	--	Hong Kong 115,571.
Chalk	--	750	648	Jordan 94.
Clays, crude	213,873	220,407	--	Japan 139,009; Hong Kong 60,390; West Germany 6,525.
Cryolite and chiolite	83	22	17	Malaysia 5.
Diamond:				
Gem, not set or strung value, thousands	$8,012	$6,056	$202	Thailand $2,717; Hong Kong $1,547; Belgium-Luxembourg $776.
Industrial stones do	$1,698	$2,587	$11	Belgium-Luxembourg $2,230; Thailand $279.
Diatomite and other infusorial earth	2	103	--	Singapore 60; Thailand 30.
Feldspar, fluorspar, related materials	367,474	415,167	56,760	Japan 299,994; Hong Kong 21,542; West Germany 19,555.
Fertilizer materials:				
Crude, n.e.s	2,725	2,382	2	Hong Kong 2,374.
Manufactured:				
Ammonia	1,671	1,682	--	Hong Kong 1,670.
Nitrogenous	1,417	1,269	--	Hong Kong 1,094; Singapore 160.
Phosphatic	15,796	192	--	Norway 100; Japan 89.
Potassic	111	21	--	All to Hong Kong.
Unspecified and mixed	2,725	7,785	4	Thailand 6,000; Japan 1,713.
Graphite, natural	46,291	77,241	13,818	Japan 39,254; West Germany 9,562; United Kingdom 5,138.
Gypsum and plaster	6,310	3,581	1	Hong Kong 2,160; Indonesia 657; Malaysia 228.
Iodine including bromine and fluorine	5	3	--	All to Italy.
Kyanite and related materials	50	25	--	All to Jordan.
Lime	37,473	51,083	--	Hong Kong 48,782; Singapore 1,980.
Magnesium compounds	304,460	320,168	29,148	Japan 151,926; West Germany 51,479; Hong Kong 22,494.
Mica:				
Crude including splittings and waste	14,029	15,741	5	United Kingdom 10,316; Japan 3,406.
Worked including agglomerated splittings	243	94	--	Spain 37; Indonesia 23; Hong Kong 17.
Nitrates, crude	--	32	--	Malaysia 30.
Phosphates, crude	5	656	5	Singapore 450; Malaysia 201.
Phosphorus, elemental	NA	1,682	--	Japan 1,677.
Pigments, mineral:				
Natural, crude	1,852	1,446	--	Japan 660; Hong Kong 476; Indonesia 250.
Iron oxides and hydroxides, processed	4,162	5,163	14	Pakistan 1,750; Indonesia 1,167; Hong Kong 809.

See footnotes at end of table.

Table 2.—China: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Destinations, 1984: United States	Destinations, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Precious and semiprecious stones other than diamond:				
Natural ----- value, thousands--	$3,142	$3,589	$356	Hong Kong $2,841; Japan $206.
Synthetic ------------do----	$111	$124	$5	Hong Kong $106.
Salt and brine------------------	737,929	776,620	--	Japan 665,747; Hong Kong 84,879; Malaysia 21,125.
Sodium compounds, n.e.s.:				
Carbonate, natural and manufactured	6,049	3,034	--	Hong Kong 2,777; Sri Lanka 122.
Sulfate, natural and manufactured--	58,814	62,323	--	Japan 44,411; Hong Kong 13,566.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked -----	85,880	95,453	61	Japan 82,812; Hong Kong 8,156.
Worked ----------------	15,646	20,520	([8])	Japan 10,583; Singapore 4,379; Hong Kong 3,051.
Gravel and crushed rock --------	1,414,351	2,195,181	--	Hong Kong 2,191,915.
Limestone other than dimension ---	28,625	23,745	--	All to Hong Kong.
Quartz and quartzite------------	13,580	18,236	6	Japan 16,719; Hong Kong 1,394.
Sand other than metal-bearing ----	987,318	1,157,603	--	Hong Kong 1,148,192; Japan 9,394.
Sulfur:				
Elemental:				
Crude including native and by-product--------------	43	1	1	
Colloidal, precipitated, sublimed-	4	76	--	Thailand 56; Pakistan 20.
Sulfuric acid---------------	3,914	3,546	--	Hong Kong 3,536.
Talc, steatite, soapstone, pyrophyllite --	528,429	534,573	162	Japan 439,042; Pakistan 46,331.
Other:				
Crude--------------------	54,230	17,257	818	United Kingdom 6,181; France 2,979; Hong Kong 2,455.
Slag and dross, not metal-bearing ---	5,619	9,811	--	Japan 8,410; United Kingdom 918.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural -------	13,698	9,868	--	Pakistan 7,178; Malaysia 2,430.
Carbon black ------------------	2,352	3,249	--	Thailand 1,553; Hong Kong 440 Pakistan 379.
Coal:				
Anthracite and bituminous thousand tons--	4,411	4,850	2	Japan 3,952; Hong Kong 696.
Lignite including briquets -------	933	1,305	--	Japan 1,226; West Germany 79.
Coke and semicoke---------------	28,340	15,270	370	Thailand 11,306; Hong Kong 1,569.
Petroleum:				
Crude- thousand 42-gallon barrels--	92,694	119,988	8,221	Japan 81,065; Singapore 22,525.
Partly refined-----------do----	--	90	--	All to Japan.
Refinery products:				
Liquefied petroleum gas -do----	39	78	--	Japan 43; Thailand 30.
Gasoline ----------do----	23,341	24,558	11,692	Japan 12,132.
Mineral jelly and wax --do----	756	601	--	Singapore 275; Hong Kong 96; Thailand 59.
Kerosene and jet fuel---do----	4,130	3,308	48	Hong Kong 1,858; Japan 1,301.
Distillate fuel oil -----do----	8,844	13,467	--	Hong Kong 4,522; Singapore 3,703; Thailand 3,149.
Lubricants ---------do----	417	423	64	Hong Kong 162; Thailand 88; Singapore 66.
Residual fuel oil------do----	2,615	2,708	--	Japan 1,455; Hong Kong 1,083.
Bitumen and other residues do----	82	57	--	Mainly to Hong Kong.
Petroleum coke ------do----	758	985	--	Japan 984.

[p]Preliminary. NA Not available.
[1]Table prepared by Audrey D. Wilkes. Owing to a lack of official trade data published by China, this table should not be taken as a complete presentation of this country's mineral exports. These data have been compiled from United Nations information and data published by the partner trade countries.
[2]Unreported quantity valued at $25,000.
[3]Less than 1/2 unit.
[4]May include platinum-group metals.
[5]Excludes unreported quantity exported to Pakistan and Hong Kong valued at $16,000 and $3,000, respectively.
[6]Unreported quantity valued at $75,000.
[7]Excludes unreported quantity exported to Pakistan valued at $9,000.
[8]Unreported quantity valued at $1,422.

Table 3.—China: Apparent imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS				
Alkali and alkaline-earth metals	1	1	--	All from Japan.
Aluminum:				
Oxides and hydroxides	73,580	70,012	--	Japan 69,963.
Metal including alloys:				
Scrap	170	84	--	All from Hong Kong.
Unwrought	63,207	70,966	21,366	Australia 34,401; New Zealand 11,024.
Semimanufactures	14,499	17,071	45	Japan 9,073; Hong Kong 4,918; Austria 1,577.
Antimony: Oxides	--	10	--	All from West Germany.
Chromium:				
Ore and concentrate	131,356	20,407	--	Philippines 17,907; Pakistan 2,500.
Oxides and hydroxides	636	1,636	1,558	United Kingdom 53.
Cobalt:				
Oxides and hydroxides	3	16	--	All from United Kingdom.
Metal including alloys, all forms	--	14	--	Netherlands 9; Belgium-Luxembourg 5.
Copper:				
Ore and concentrate	43,861	74,481	--	Canada 27,768; Philippines 20,888; Mexico 15,696.
Oxides	49	90	--	All from Hong Kong.
Sulfate	1	9	--	Do.
Metal including alloys:				
Scrap	85,858	3,620	--	Hong Kong 2,807; Singapore 435.
Unwrought	96,289	59,545	50	Canada 38,528; Belgium-Luxembourg 9,782.
Semimanufactures	3,117	31,474	10	Japan 26,885; Hong Kong 2,381.
Gold:				
Ore and concentrate value, thousands	NA	$7,026	--	Canada $4,980; Philippines $2,046.
Metal including alloys, unwrought and partly wrought troy ounces	20,869	8,248	--	Japan 4,761; Hong Kong 3,487.
Iron and steel:				
Iron ore and concentrate	3,068,854	4,420,440	--	Australia 4,420,386.
Metal:				
Scrap	1,382	67,361	--	Netherlands 30,617; Japan 14,844; Hong Kong 12,591.
Pig iron, cast iron, related materials	797,250	246,130	(2)	Japan 166,296; Pakistan 77,793.
Ferroalloys:				
Ferrochromium	NA	4,155	--	All from West Germany.
Ferromanganese	500	8,900	--	Japan 4,000; Spain 3,200.
Unspecified	20,790	6,217	100	Belgium-Luxembourg 5,531; France 542.
Steel, primary forms	601,097	1,310,060	--	Japan 793,599; Australia 234,094; Sweden 48,826.
Semimanufactures thousand tons	8,259	9,978	4	Japan 7,597; West Germany 562; Hong Kong 529.
Lead:				
Oxides	--	19	--	All from West Germany.
Metal including alloys:				
Scrap	2	218	--	Hong Kong 199.
Unwrought	1,327	6,323	8	Japan 5,582; Hong Kong 569.
Semimanufactures	30	531	--	Japan 519.
Magnesium: Metal including alloys, all forms	1,002	1,307	1,261	Japan 46.
Manganese: Oxides	1,030	35	--	Hong Kong 21; United Kingdom 14.
Mercury 76-pound flasks	NA	206	--	All from West Germany.
Molybdenum: Metal including alloys, all forms	(2)	2	1	Japan 1.
Nickel:				
Ore and concentrate	38,322	NA		
Metal including alloys, all forms	853	146	NA	Hong Kong 79; United Kingdom 39.
Platinum-group metals: Metals including alloys, unwrought and partly wrought troy ounces	295	1,805	(3)	Japan 1,518; Hong Kong 287.
Rare-earth metals kilograms	1,500	--		
Selenium, elemental	8	20	--	All from Canada.
Silver:				
Ore and concentrate	1	6	--	Do.
Metal including alloys, unwrought and partly wrought thousand troy ounces	1,440	13,030	--	United Kingdom 12,732; Japan 276.
Tin:				
Oxides	26	32	--	Mainly from Italy.
Metal including alloys, all forms	76	93	3	Hong Kong 70; Japan 18.

See footnotes at end of table.

Table 3.—China: Apparent imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984p	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Titanium: Oxides	5,260	4,350	718	Japan 2,972; Hong Kong 335; France 225.
Tungsten: Metal including alloys, all forms	4	9	1	Japan 6.
Uranium and/or thorium: Ore and concentrate value, thousands	$1	--		
Zinc:				
Ore and concentrate	15,843	15,775	--	All from Australia.
Oxides	256	1,821	--	France 1,305; Singapore 315.
Metal including alloys, all forms	86,134	195,921	6	Canada 44,785; Spain 38,638; Australia 31,442.
Zirconium: Ore and concentrate	--	60	--	All from West Germany.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	143	581	(4)	Hong Kong 571.
Artificial: Corundum	69	58	--	Hong Kong 45; Japan 8.
Dust and powder of precious and semiprecious stones, excluding diamond value, thousands	$30	$69	$11	Hong Kong $53.
Grinding and polishing wheels and stones	137	272	(5)	Hong Kong 148; Japan 64; Italy 39.
Asbestos, crude	834	600	--	Greece 320; Canada 245.
Barite and witherite	NA	157	--	Singapore 123; Pakistan 34.
Boron materials: Oxides and acids	20	14	--	All from Hong Kong.
Cement	1,328,842	819,059	2	Hong Kong 484,388; Japan 320,347.
Chalk	--	80	--	All from Singapore.
Clays, crude	2,096	3,094	1,125	Hong Kong 827; Japan 751; Singapore 389.
Diamond:				
Gem, not set or strung value, thousands	$2,869	$6,569	$664	United Kingdom $3,554; Hong Kong $1,139; Belgium-Luxembourg $1,016.
Industrial stones	$5,696	$8,996	$591	Belgium-Luxembourg $8,394.
Diatomite and other infusorial earth	99	90	76	Hong Kong 7; West Germany 4.
Feldspar, fluorspar, related materials	300	9	--	All from Hong Kong.
Fertilizer materials: Manufactured:				
Ammonia	8	45	1	Hong Kong 44.
Nitrogenous thousand tons	982	1,158	261	Pakistan 152; Hong Kong 137; Canada 128.
Phosphatic do	616	233	--	Turkey 81; Morocco 78; Tunisia 74.
Potassic do	651	767	--	Canada 577; West Germany 87.
Unspecified and mixed do	834	1,656	1,229	Italy 169; Spain 63; Netherlands 45.
Graphite, natural	78	35	--	All from Japan.
Gypsum and plaster	5,578	99	--	Hong Kong 76; Japan 23.
Iodine including bromine and fluorine	31	51	--	All from Japan.
Lime	26	64	--	All from Hong Kong.
Magnesium compounds	19	110	--	All from Japan.
Mica:				
Crude including splittings and waste	18	NA		
Worked including agglomerated splittings	13	19	--	Mainly from Hong Kong.
Phosphates, crude	49,738	235,740	--	Morocco 205,740.
Pigments, mineral: Iron oxides and hydroxides, processed	713	598	(2)	Hong Kong 564.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$3,994	$4,686	$154	Hong Kong $4,021; West Germany $484.
Synthetic do	$14	$45	$16	Hong Kong $20.
Salt and brine	247	587	--	Hong Kong 554; Japan 33.
Sodium compounds, n.e.s.:				
Carbonate, natural and manufactured	225,360	207,840	46,480	Hong Kong 106,189; France 31,251.
Sulfate, natural and manufactured	8	104	--	Hong Kong 96.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	1,058	553	--	Italy 183; Mexico 153; Portugal 95.
Worked	1,219	4,580	(2)	Hong Kong 4,044; Italy 531.
Limestone other than dimension	243	806	--	All from Hong Kong.
Sand other than metal-bearing	255	4,083	5	Hong Kong 4,068.
Sulfur:				
Elemental, crude including native and byproduct	301,556	248,669	--	Canada 248,666.
Sulfuric acid	243,666	98,956	5	Japan 78,931; Philippines 19,974.
Talc, steatite, soapstone, pyrophyllite	230	496	--	Hong Kong 481.

See footnotes at end of table.

Table 3.—China: Apparent imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Sources, 1984 United States	Sources, 1984 Other (principal)
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	30	23	--	Hong Kong 22.
Carbon black	947	7,520	236	Hong Kong 2,161; West Germany 2,152; Australia 2,147.
Coal:				
Anthracite and bituminous	19,108	184,641	--	All from Australia.
Lignite including briquets	--	20	--	All from Singapore.
Coke and semicoke	3,806	1,506	--	Japan 1,500.
Petroleum refinery products:				
Liquefied petroleum gas[6] 42-gallon barrels	16,588	26,506	--	Hong Kong 26,460.
Gasoline do	10,758	20,855	--	Hong Kong 16,499; Belgium-Luxembourg 3,417.
Mineral jelly and wax do	2,175	3,730	527	West Germany 1,385; Hong Kong 1,173.
Kerosene and jet fuel do	18,625	21,397	--	Yugoslavia 17,344; Hong Kong 4,053.
Distillate fuel oil do	146,164	248,713	--	Hong Kong 209,783; Singapore 34,972.
Lubricants do	47,361	113,211	(7)	Japan 47,318; Hong Kong 42,175; Singapore 15,253.
Residual fuel oil do	521,109	458,500	--	Hong Kong 438,201; Spain 16,743.
Bitumen and other residues do	1,600	5,606	--	Hong Kong 4,394; Singapore 1,212.
Bituminous mixtures do	618	273	--	Japan 267.
Unspecified do	189	--		

[p]Preliminary. NA Not available.
[1]Table prepared by Audrey D. Wilkes. Owing to a lack of official trade data published by China, this table should not be taken as a complete presentation of this country's mineral imports. These data have been compiled from United Nations information and data published by the partner trade countries.
[2]Less than 1/2 unit.
[3]Unreported quantity valued at $895,000.
[4]Unreported quantity valued at $3,000.
[5]Unreported quantity valued at $70,000.
[6]Excludes unreported quantity valued at $7,438 in 1983 and $7,637 in 1984.
[7]Unreported quantity valued at $687,000.

COMMODITY REVIEW

METALS

Aluminum.—China's bauxite resources were estimated at 1.2 billion tons, of which 400 million tons was considered industrial reserves. Bauxite reserves in Shanxi Province accounted for 30% of the total with the bulk of the remainder in Guangxi, Guizhou, Henan, Liaoning, and Shandong. About one-third of the deposits can be strip-mined. In the long term, however, development of underground bauxite mines will be essential. China's bauxite is mostly monohydrate, the diaspore type with an aluminum-to-silica ratio of 4 to 7. The alumina content ranges from 55% to 70%. The bauxite is hard, difficult to abrade, and poorly soluble. The high silica content makes the ore recalcitrant to caustic leaching by the Bayer process or to oxidation by sintering. The energy consumption in China to produce alumina from bauxite is twofold higher than in countries where aluminum trihydrate or friable aluminum monohydrate is used as the raw material in the Bayer process. Furthermore, energy consumption is high in the electrolytic process, and for each ton of metal produced, the consumption is 1,000 to 2,000 kW•h higher than in countries with advanced technology.

China's four aluminum bases are in Guizhou, Henan, Shandong, and Shanxi. There were nine surface mines; underground industrial production mining was still being tested. China had four plants producing aluminum oxide. There were 30 electrolytic smelters having a capacity of 470,000 tons of aluminum metal. Annual consumption of aluminum metal was 525,000 tons.

China's large aluminum smelters are in Fushun, Liaoning (100,000 tons per year), and Guiyang, Guizhou (80,000 tons per year). The Guiyang plant and the plants at Qingdao, Shandong (16,000 tons per year), and Qingtongxia, Ningxia (31,000 tons per year), were undergoing expansion. The bulk of the remaining metal producing capacity included Wuhan, Hubei (35,000 tons per year); Sanmenxia, Henan (30,000 tons per year); Lanzhou, Gansu (25,000 tons per year); Taiyüan, Shanxi (18,000 tons per year); Hefei, Anhui (16,000 tons per year); Changchun, Jilin (16,000 tons per year); Jiaozuo, Henan (16,000 tons per year); Changsha, Hunan (15,000 tons per year); and Kunming, Yunnan (15,000 tons per year).

During the seventh 5-year plan, construction of three smelters was to be completed: Baiyun, Gansu (capacity not available); Pingguo, Guangxi (300,000-ton-per-year alumina capacity and 100,000-ton-per-year metal capacity); and Datong, Qinghai (100,000-ton-per-year metal capacity). A 50,000-ton-per-year smelter was also being considered at Diandong, Yunnan. China was looking to purchase surplus foreign plant capacity for installations at Baiyin and Qingtongxia. Furthermore, construction of the alumina plant (660,000 tons per year) at Hejin Xian, Shanxi, was to be completed in 1987. In addition, China's largest alumina facility at Zhengzhou, Henan, was to be expanded from 200,000 to 500,000 tons per year.

Aluminium Pechiney S.A., a subsidiary of Pechiney of France, was to provide a bauxite digestion unit for the alumina plant in Hejin Xian. The digestion package would include two units to process diasporic bauxite. Aluminium Pechiney was to supply engineering, research assistance, a portion of the equipment, construction, and startup supervision. In addition, Aluminium Pechiney has been negotiating with China to provide technology for the Pingguo project and for a proposed integrated bauxite-alumina-aluminum complex near Nanning, Guangxi. During 1984-85, Aluminium Pechiney provided China with five coilers for aluminum sheet, two continuous casters for aluminum sheet, and a facility to produce high-purity aluminum foil.

Conditions were considered favorable to the development of China's aluminum industry. It has abundant bauxite and water resources with potential hydropower of 370 million kilowatts. However, installed hydropower capacity was only 5% of the potential hydropower resources. The prospects for greatly expanding production in Shanxi was particularly promising because of the hydropower resources of the Huang He and its rich coal and bauxite reserves.

China signed a letter of intent to purchase a 10% interest in the 150,000-ton-per-year aluminum smelter under construction at Portland, Victoria, Australia. The smelter was jointly owned by the Victoria State government and Alcoa Australia Ltd., a subsidiary of the Aluminum Co. of America.

Copper.—China's reserves of copper ore were estimated to exceed 50 million tons of metal. Most of the deposits were low grade with 56% of the reserves containing less than 1% copper. For example, in the Daheishan Mine in Jilin, the ore graded 0.03% while that in the Jinduicheng Mine in Shaanxi, only 0.028%. Ores that grade over 1% copper were considered rich deposits in China. Deposits grading 1% to less than 2% copper constituted 37% of the reserves in China. Those with a grade of 2% accounted for 6% of the reserves while those over 3% accounted for less than 1%.

Most of the copper resources were not developed and were situated in remote areas where transportation facilities were inadequate. Other conditions such as low-grade ore were deterrents to investment and development. Under the Seventh Economic Plan, copper development was not given high priority. The emphasis was placed on expanding aluminum production followed by lead and zinc production. Therefore, China was expected to continue to be a net importer of copper ore, concentrates, and metal.

The copper sulfide deposits in northeastern Jiangxi around Dexing constituted one-fifth of China's verified reserves. Other major mining areas centered around Tongling, Anhui; Baiyin, Gansu; Daye, Hubei; Zhongtiao Shan, Shanxi; and Dongchuan, Yunnan.

Annual metal output recently has been 450,000 tons while 250,000 tons of metal has been imported annually to meet demand. The capacity of China's copper refinery-smelter facilities was 465,000 tons.

Development of the Yongping Mine, part of the Dexing copper mining district in Jiangxi, was completed in 1985. The Yongping Mine was developed to be one of the nation's largest copper producing facilities with eventual concentrate output of 200,000 tons per year. Production of copper metal began in late 1985 at the Guixi smelter. The Guixi smelter processed Dexing concentrate to produce 90,000 tons of metal per year.

Gold and Silver.—According to the Ministry of Geology and Mineral Resources, China's gold reserves total 13 million troy ounces ranking fourth in the world after the Republic of South Africa, the U.S.S.R., and the United States. Its annual gold output stands sixth in the world following the Republic of South Africa, the U.S.S.R., the United States, Canada, and Australia. At the National Gold Mine Work Conference, convened at Beidaihe outside of Beijing in October, it was announced that China was to double its gold production in 1990 over the present output. Production in 1985 was estimated by analysts from market economy countries at about 2 million troy ounces.

With the exception of Shanghai, all Provinces, Autonomous Regions, and Municipalities have recorded gold deposits. Alluvial gold was prevalent in most of the rivers in northeast and northwest China, Shandong Province, and Nei Monggol. Zhaoyuan County in Shandong was the largest producing county with an annual output of 129,000 ounces. Other counties, each producing 16,000 ounces annually, were Huangxian, Muxi, and Rushan in Shandong; Kuangcheng, Qianxi, and Qinglong in Hebei; Lingbao and Songxian in Henan; Harqin and Qahar in Nei Monggol; Beipiao in Liaoning; and Mojiang Hani in Yunnan. The largest nugget found to date was in Ganze, Sichuan. It weighed 4.2 kilograms and measured 235 millimeters long, 135 millimeters wide, and 35 millimeters thick.

Gold production in Shandong accounted for 25% of the national output in 1985, or 58% of all the gold output controlled by the state. The Jiaojiashi deposit in Shandong was estimated to constitute one-third of the nation's gold reserves. Jiaojiashi is situated at Shibian near Shanshan Dao in the Jiaodong area of Yexian County. Development of the Jiaojiashi Mine was to be completed in 1987 and was expected to produce 1,500 tons of ore per day. The surface mine covers over 5 hectares and the disseminated gold occurrence is 2 meters below the surface.

China's largest project for recovering gold and silver from sulfuric acid waste solution was completed in early 1985 in Rushan County, Shandong. This plant processes 12,000 tons of sulfuric acid per day, and the annual recovery of gold and silver was expected to be 59,000 ounces each.

Gold in Heilongjiang ranks second to Shandong in production and reserves. Provincial officials were seeking foreign assistance to expand output from Fukeshan, Laogow, and another mine by 107,000 ounces per year.

Gold production from all sources was estimated to reach 1.9 million ounces in 1985. About one-half of the total was by small licensed operations or individuals.

To encourage new finds, the Government was offering a monetary award in yuan and U.S. currency for deposits containing 1 ton of gold. To discourage smuggling, the state was imposing stiff fines and penalties. In addition, the state increased the purchase price of gold by 30%.

Development of the Shuitai gold mine in Shangling County and the Zhanggongling gold-silver mine in Hexian County, both in Guangxi, are state projects. When completed, the Zhanggongling Mine will have a daily output of 150 tons of ore.

The Shilipu silver mine, in Zhaoyuan County, Shandong, went into operation on May 1, 1985. Reserves of this mine are 20,000 tons. The daily ore treating capacity is 100 tons with silver recovery of 91%.

In 1986, China plans to use 120,000 ounces of gold to mint commemorative and anniversary gold coins compared with 85,000 ounces in 1984 and 100,000 ounces in 1985. China began minting Panda coins in 1982. The largest coin was issued in 1984 and weighed 1 troy pound. On May 20, 1985, the People's Bank of China issued a set of five gold coins commemorating the giant panda with a gold purity of 99.9%. The obverse of the coin depicts the Hall of Prayer for Good Harvests of Beijing's Temple of Heaven. The gold content of these coins range from 0.05 to 1 ounce. Beginning in 1986, a new Panda coin will be added annually.

Iron and Steel.—China is a major producer of iron and steel, ranking fourth after the U.S.S.R., Japan, and the United States in order of tonnage. Expansion of capacity, however, is limited because of old, outdated facilities and lack of high-grade iron ore. Although China has verified iron resources of 47 billion tons, it is mostly low-grade ore. Only 2.4% of the resources are direct-shipping ore. Deposits containing 35% to 50% iron constitute 5% of the resource base. The balance contained an average of less than 34% iron.

The output of low-grade iron ore increased from 110 million tons in 1980 to over 130 million tons in 1985. Aggregate capacity of China's mines reached 135 million tons per year as a result of mine expansion and development, which added 22 million tons during the sixth 5-year plan.

The targeted output for steel in the year 2000 was 95 million tons necessitating ore output of 255 million tons. The shortfall in iron ore would have to come from mine development and expansion or be imported.

A large portion of China's iron resources are where hydrologic conditions are complex and in areas with inadequate transportation. The reserves of existing mines in these areas total 6 billion tons. A capacity of 50 million tons per year could be added by completing new mine development currently under construction and by expanding existing mines and upgrading equipment. Six billion tons of ore are in areas where there are no mines. Development of these deposits could yield 60 million tons annually. By maintaining current capacity of 135 million tons and establishing a new capacity of 110 million tons from expansions and new mines, China could fill the gap between supply and demand through imports to meet the steel output target in the year 2000.

Based on steel imports of 8 million tons per year, the state has used more than $3 million in foreign currency annually. Since the end of 1981, state stockpiles of steel remained at 21 million tons. If China were to reduce annual imports by one-third in the next 5 years and draw an equivalent amount from the state stockpile, $5 billion would be available to develop new mine capacity of 110 million tons as well as the necessary infrastructure.

During 1949-80, state investment for mine development accounted for 20% of the budget in the iron and steel sector. This amount was inadequate for the development and expansion of iron ore mining. For instance, state funding for the captive mines of the steel complex at Anshan, Liaoning, was insufficient yielding a shortfall in supply for Anshan of 4 million tons of ore annually. State investment in mines for the Shoudu complex in Beijing was 32% of the budget, which only maintained ore output. However, the annual expenditures of 40% of the budget for the mines of the steel complex at Panzhihua, Sichuan, was sufficient.

The large iron and steel complexes have captive mines that usually have higher grade ore. However, consideration was being given to separating mining from steelmaking. It was believed that this would stimulate mine productivity through competition. Moreover, mines would service local ironmaking facilities rather than a distant single enterprise.

Construction of an underground mine was completed in late 1985 in central Shandong Province, near Jinan. Annual capacity of this mine was 2.5 million tons of iron ore.

With the exception of Xizang, all Provinces, Autonomous Regions, and Municipalities in China had production facilities for iron and steel. The large complexes, which produced over 1 million tons of steel per year, were situated at Anshan, Baotou, Beijing, Benxi, Ma'anshan, Panzhihua, Shanghai (three mills), Taiyüan, Tangshan, Tianjin, and Wuhan. In addition, there were 10 independent mills producing specialty steel. There were over 800 local operations, which collectively produced 20% of the steel.

China's largest steel complex was in Anshan, Liaoning. Installation of a top-blown converter at the third steel mill boosted Anshan's annual steel capacity to 7 million tons and its steel products output to 5 million tons. The 3.1-million-ton-per-year steel complex at Wuhan, Hubei, was China's second largest. The complex was undergoing renovation to increase annual capacity to 4 million tons of steel. A blast furnace, open-hearth furnace, and coking oven were being rebuilt. A used sintering plant with a rated capacity of 200,000 tons per month, purchased from France, was to be installed at Wuhan.

In an experiment to streamline industrial integration, the central Government reassigned the management of Wuhan from the Ministry of Metallurgical Industry to local authority. In addition, 11 small neighboring plants, which manufacture rolled steel, sheets, strip, tubes, wire, coke, and other materials, were merged with Wuhan.

The Panzhihua steel complex at Dukou, Sichuan, was being expanded by the addition of a blast furnace, a rolling mill, and other facilities. When completed in 1989, annual steel capacity will increase from 1.7 to 2.4 million tons. The steel mill at Taiyüan, Shanxi, was also undergoing modernization. When completed in 1990, annual production of pig iron will be 1.1 million tons and that of steel, 1.5 million tons.

A feasibility study was being conducted for construction of a steel complex near Beilun Harbor in Ningbo, Zhejiang, in 1985. Plans were for a 3-million-ton-per-year mill to be completed by 1990. Plans for expansion to 6 million tons were also included in the study.

A feasibility study was completed on establishing a small steel enterprise in Hainan Dao, Guangdong. The study included developing an iron ore deposit and a 300,000-ton-per-year steel mill with rolling facilities.

Other investments in the steel sector included renovation of the mills at Lingyuang, Liaoning, and Xingfu, Shandong.

Firing of the 4,063-cubic-meter-inner-volume blast furnace in September marked the completion of the first-phase construction of the Baoshan steel complex outside Shanghai. Initial production of steel from Baoshan during 1985 was projected at 300,000 tons. The blast furnace with a daily output of 10,000 tons of iron was imported from Japan. The complex's first-phase annual production capacity was expected to reach 3,000,000 tons of iron, 3,800,000 tons of steel, 500,000 tons of seamless steel tube, and 2,100,000 tons of steel billets. Second-phase construction, to be designed and undertaken by Chinese technicians, will include blast furnaces and sintering and coking facilities. Imported equipment will include two continuous rolling mills to produce 3 million tons of steel plates and billets per year, a 4-million-ton-per-year hot-rolling mill, and a 2-million-ton-per-year cold-rolling mill for steel plates and billets. After completion of second-phase construction, Baoshan was expected to produce 6.5 million tons of iron, 6.7 million tons of steel, 4.2 million tons of steel products, and 1.2 million tons of steel billets annually. Baoshan was slated to be China's second largest steel center after Anshan in northeast China.

Startup of a converter in December marked the opening of the small Jiuquan steelworks in Jiayuguan, Gansu Province. Annual capacity of the steelworks in Jiayuguan, including Jiuquan, was 500,000 tons per year. Jiuquan was negotiating the purchase of a 200,000-ton-per-year wire rod mill for installation and commissioning in 1986.

Lead and Zinc.—China's resources of lead and zinc are large and widespread. Reserves of zinc were considered particularly rich. However, present output of lead was only 180,000 tons per year and that of zinc, 250,000 tons per year. Domestic production did not meet annual demand. Since 1950, annual imports of lead averaged 41,000 tons and that of zinc, 160,000 tons. During the seventh 5-year plan, lead-zinc was given second priority to aluminum for development in the nonferrous sector.

Development of China's largest lead-zinc mine was under way at Changba, Gansu. Reserves at this surface mine were estimated at 45 million tons of high zinc-bearing material. Construction of a 150,000-ton-per-year zinc smelter was planned in Beiying, 70 miles northwest of Lanzhou to process the output from Changba. A preliminary agreement was signed with the Federal Republic of Germany's Lurgi Gesellschaften for a 50,000-ton-per-year lead smelter.

A small mine was being developed at Jishuimen, Guangdong. Annual ore production capacity was expected to be 200,000 tons to produce 1,200 tons of lead, 110 tons of zinc, and 220 tons of tin per year.

Expansion of China's largest electrolytic zinc smelter was under way. China was to import technology and equipment to be installed at Zhuzhou, Hunan, to increase annual zinc production from 100,000 to 135,000 tons.

A letter of intent was ratified with Mitsui Mining & Smelting Co. Ltd. of Japan to install a new 60,000-ton-per-year vertical retort zinc smelter at Huludao, Liaoning. The new smelter will replace the existing vertical retort, which dates back to 1950. Completion of this project was expected in 1987.

A large lead-zinc complex was to be constructed at Lanping, Yunnan. The complex will include mining, ore beneficiation, and smelting facilities. Initial plans called for an annual smelting capacity of 60,000 tons of combined lead and zinc, which would be expanded to 200,000 to 300,000 tons. This was a joint venture between the Yunnan Provincial government and CNNMIC. Despite expansions in mine and smelter capacity, China was expected to continue as a net importer of lead and zinc during 1986-90.

Molybdenum.—China has large resources of molybdenum distributed mainly in the north. Extraction of molybdenum from porphyry copper at Jinduicheng, Shaanxi, was being doubled from 4 to 8 million pounds of contained molybdenum. Over 1,500 tons of molybdenum disulfide was produced from concentrates from the Yangjiachangzu Mine in Jinxi, Liaoning. Molybdenum disulfide was also produced from concentrates from the Wangdaofeng Mine in Heilongjiang. In addition, molybdenum concentrate was produced from a mine at Xiaosigu, Hebei. There are also rich occurrences of molybdenum in the copper deposits of Dexing, Jiangxi; the tungsten deposits at Shinzhuyuan, Hunan, and in the Provinces of Jiangxi and Yunnan; and the molybdenum deposits in Henan and Liaoning. Although China could be a new major exporter, it most likely will not because of the currently depressed world market.

Nickel.—The nickel occurrence at Jinchuan, Gansu, is the second largest nickel sulfide deposit in the world after a Canadian deposit. The Jinchuan deposit accounts for more than 60% of China's nickel reserves. The electrolytic plant at Jinchuan produced cobalt, nickel, and platinum-group metals. The mine output and recovery, after dressing and smelting of nickel, was about 20,000 tons in 1985.

Under a licensing agreement, a nickel flash furnace was purchased from Outokumpu Oy of Finland for installation at Jinchuan, Gansu. The furnace had a capacity of 350,000 tons of nickel concentrate per year.

A large nickel deposit was reported at Huangshan, Hani, along the Ertix River in Xinjiang. Other metals in the deposit include cobalt, copper, gold, platinum-group, and silver. There also are rich nickel occurrences in the Changbai Mountains in Jilin Province.

Rare-Earth Minerals.—China's reserves of rare-earth minerals are the largest in the world. After the United States, China was the second largest producer. Calculated in terms of rare-earth oxide (REO), China's reserves were estimated at 37 million tons, five times that of the rest of the world. Although rare earths occur in 18 Provinces and Autonomous Regions, it is concentrated mainly in Nei Monggol, Jiangxi, Hunan, and Guangdong. China's largest mine was the mixed bastnaesite-monazite-magnetite deposit at Bayan Obo, Nei Monggol. Mine output was transported by rail to Baotou for processing. Installation of a third REO separation plant at Baotou was completed in June 1985. Production from the new plant began in early July, increasing the annual output for neodymium oxide alone from 0.5 to 20 tons. China's REO production in 1985 was 9,000 tons.

Reserves of REO in Jiangxi was estimated at 8 million tons. Jiangxi's 30 mines produced 600 tons of REO in 1985 compared with 200 tons in 1984.

There were 10 operations producing rare-earth products with the major ones being the Yuilong chemical plant in Shanghai, Baotou Rare Earth Corp., Gansu Rare Earth Corp., Jiangxi Rare Earth Corp., and Guangdong Zhu Jiang smelter. The aggregate REO production of this operation capacity exceeded 12,000 tons per year. Because of increased demand for neodymium for permanent magnets, China was expanding neodymium production capacity from 10 to 100 tons per year.

Although China was a major producer and exporter of rare earths, domestic consumption was small. Chinese consumption for metallurgical uses was one-seventh that of the United States. The amount used in glass and ceramics was one-twentieth that of Japan. The amount used in phosphors as yttrium oxide, a compound associated with rare earths, was one-twenty-fifth that of Japan. China replaced Malaysia and Thailand as the major supplier of yttrium to Japan. In 1984, Japan imported 263 tons of yttrium, of which 183 tons was from China.

Tin.—China has rich tin resources and its tin reserves accounted for 15% of world reserves. China also was a major tin producing country. Since 1949, annual production averaged 20,000 tons with peak production of 30,000 tons occurring in the late 1950's. Since 1949, China's annual exports of tin averaged 13,000 tons. Exports have dropped from a high of 30,000 tons in 1980 to 2,600 tons in 1984.

China's tin resources are mostly situated in the south in the Provinces of Guangdong (includes Hainan Dao), Guangxi, Hunan, Jiangxi, and Yunnan. Production from Gejiu in Yunnan and Dachang in Guangxi was believed to have accounted for 80% of the national output. Both Gejiu and Dachang are multimetal paragenetic deposits. In addition to tin, there are inclusions of antimony, arsenic, bismuth, cadmium, copper, gallium, lead, silver, sulfur, tungsten, and zinc. One of the tasks for the tin industry was to raise the recovery of associated metals.

China's tin industry was plagued with a lack of water, electricity, tailings storage facilities, and poor ore dressing technology. The tin recovery rate in ore dressing was low. At Gejiu, the ore dressing plants are out of production 4 to 5 months per year, reducing output by about 2,000 tons each year. In addition, the Gejiu Mines have serious radon and dust pollution hazards. The first-stage development of the Dachang Mine has been completed. However, an electricity shortage prevented full operation, reducing annual output by 4,000 tons.

China plans to construct a 6,000-ton-per-year smelter at Liepin, Guangxi, raising the nation's annual smelter capacity to over 20,000 tons. However, it was also proposed that one modern smelter for China's medium-grade concentrate would be more efficient.

Titanium.—China has rich titanium resources and its verified reserves were more than 20% of the world total. The titanium resources are mainly concentrated in the titaniferous magnetite in Panxi, Sichuan, followed by the heavy mineral sands in Guangdong and Guangxi, and the titaniferous magnetite in Hebei.

China began producing titanium sponge in 1958 with a production capacity of 60 tons per year. The capacity at yearend 1985 was 2,500 tons per year. Sponge was produced at Zunyi, Guizhou; Fushun, Liaoning; and Shanghai. The capacity of each plant was small, with the largest being only 800 tons per year. During 1986-90, plans were to renovate and expand the existing metal producing facilities to double output.

Annual production for titanium dioxide was 25,000 tons. However, the output was too small to meet demand, necessitating imports of large amounts. The largest titania producing plant was only 5,000 tons per year. Plans were being made to begin utilizing the 9 billion tons of ilmenite reserves at Panzhihua, Sichuan. A plant to produce synthetic rutile from ilmenite was proposed for Zigong, Sichuan. Initial output of titanium dioxide would be for pigment production exclusively and later, a small portion for metal production.

Tungsten.—China has rich tungsten resources, and its reserves accounted for more than 50% of the world total. Furthermore, China ranked first in world production of concentrate and in exports, which accounted for about 40% of world trade. However, the industry lacked competitive power base ranging from processing to finished products. The mining sector used backward technology and obsolete equipment, resulting in a recovery rate of only 20% to 40% after extraction and dressing. The metal processing sector lacked analytical technology and quality control. Exports continued to be mainly concentrates and not value-added manufactures. Moreover, the value of exports have declined because of the uneven quality of tungsten concentrate.

In late 1985, the China Tungsten Industry Association was formed in Nanchang, Jiangxi. Jiangxi was the largest producing Province, followed by Hunan, and was considered the tungsten capital of China. The association was to assist the development of high-quality products, promote trade, and disseminate marketing information to tungsten producers and manufacturers in China.

China was to adopt strong measures for an overall reorganization and technical transformation of the industry, increase scientific research, raise the quality and competitive position of tungsten products, and increase the proportion of semifinished and manufactured products.

The major producers of tungsten products in China were the Ganzhou smelter, Jiangxi; Jindong Chemical Works, Sichuan; Zigong Carbide Plant, Sichuan; Lanshun Refractory Alloy Factory, Liaoning; Zhuzhou tungsten and molybdenum smelter, Hunan; Nanchang Carbide Plant, Jiangxi; Benxi Tungsten and Molybdenum Factory, Liaoning; and the Tungsten and Molybdenum Materials Plant, Jiangxi.

Vanadium.—China was a major producer and exporter of vanadiferous materials. Vanadiferous slag production was 70,000 tons. Panzhihua, Sichuan, accounted for 80% of the slag output containing 14% vanadium pentoxide; Chengde, Hebei, produced 15% slag with 13% pentoxide; and Maanshan, Anhui, provided the balance with 17.5% pentoxide. One-half of the slag was processed at Jinzhou, Liaoning, into refined pentoxide, and the remainder was processed at plants in Shanghai; Nanjing, Jiangsu; and Emei, Sichuan.

Other Metals.—More than 80% of China's chromite resources are in remote Provinces of Gansu, Nei Monggol, Xinjiang, and Xizang where mining conditions and transportation facilities were poor. Most of China's chromite deposits are podiform and in lens composed of hard spinels, which are not easily dissolved. Although the grade was not low, the per-unit power consumption to produce metal from domestic ore was 1.4 times that of imported ore.

The metallurgical complex at Jinchuan, Gansu, produced cobalt as a byproduct of nickel refining. Cobalt production at Jinchuan was estimated at 2,100 kilograms. Seventy percent of China's cobalt reserves (elemental content) are in Hainan Dao, Guangdong. There are two cobalt occurrences in Hainan, one associated with copper and the other simply described as the largest single deposit occurring at a shallow depth with the highest cobalt content. Development of a surface mine and ore dressing facility for the latter deposit was completed in mid-1985. The Hainan plant produced high-grade powder concentrate.

Research during the past 4 years by the Shanghai Institute of Silicate Research resulted in developing high-quality, large crystals of bismuth germanate. Because of large purchases by Europe, China was becoming the world's leading producer of bismuth germanate.

Other activities included the construction of a beryl mine and plant in Xinjiang having a capacity of 100 tons of beryllium oxide, building a thermic plant at Minghe, Qinghai, to produce magnesium metal, and importing technology for the Zhujiang smelter in Guangzhou, Guangdong, to produce 1.5 tons of yttrium phosphors.

INDUSTRIAL MINERALS

Asbestos.—China's largest asbestos producing area was Shimian County in Sichuan Province. The Shimian facility produced 40,000 tons of asbestos, 25% of the country's output. The largest reserves of asbestos in China are in northern Qinghai, which were estimated at 20 million tons. Construction of an asbestos dressing plant with an annual capacity of 12,000 tons was completed and placed in operation at Mangnai in northwestern Qinghai. A second plant having a 5,000- to 10,000-ton-per-year capacity was planned for Babao in the Qilian Mountains.

Barite.—China was the world's largest producer of barite having an output of 1 million tons per year with Guangxi accounting for two-thirds of the total. One-half of the output in Guangxi was produced by local farmers as a sideline industry. Local farmers produced 360,000 tons of barite in Xiangzhou County.

A massive barite deposit was found that borders the Provinces of Guangxi, Guizhou, and Hunan. The deposit, believed to be the largest in the world, has reserves of 400 million tons. The deposit is near the surface and suitable for surface mining. China's reserves of barite exceeded 540 million tons.

Bentonite.—China has large bentonite resources scattered throughout 17 Provinces. Reserves were estimated at 1 billion tons, composed equally of sodium and calcium bentonite. High-grade deposits are situated in Anhui, Henan, Liaoning, Jiangsu, Jiangxi, and Zhejiang. China's largest mines were Heishen in Liaoning and Linan in Zhejiang. Heishen was the largest open pit mine in China and had a capacity of 200,000 tons of ore per year and 50,000 tons of bentonite powder per year. Linan was the largest bentonite underground mine in China and had an annual capacity of 209,000 tons. This output capacity included 27,000 tons each of sodium and calcium bentonite, 5,000 tons of activated calcium bentonite, 117,000 tons of sodium bentonite powder, and 3,000 tons of concentrated bentonite.

China's largest bentonite deposit with reserves of 63 million tons was discovered near Changchun, the capital of Jilin Province. The 100-meter-thick deposit covers an area of more than 3 square kilometers and is beneath a coal seam in the Shibeiling coal mine. At the 1985 rate of coal mining at Shibeiling, 200 tons per day of bentonite could be recovered.

Cement.—Because of the accelerated national program to expand China's economy, the construction sector was under duress. There were over 5,000 cement producing facilities employing over 700,000 workers. There were 57 large facilities with 100,000 workers, and the remainder employed the balance. The annual production capacity of the plants owned by the large enterprises was 35 million tons and by the small facilities, 90 million tons. The average annual plant capacity of the larger enterprises was only 520,000 tons with the largest being the Luilihe and Handan cement works of Beijing, each producing over 1 million tons. Of the small operations, which accounted for 46% of the national output, 1,925 had shaft kilns and 85 had rotary kilns. Out of those enterprises with shaft kilns, 131 averaged 88,000 tons annually; 223 averaged between 44,000 and 88,000 tons; 1,020 between 10,000 and 14,000 tons; and 550 with less than 10,000 tons. The operations with rotary kilns accounted for less than 9% of the country's cement production.

China produced a wide variety of cement. In addition to ordinary silicate and slag cement, other principal types included specialty silicate and slag cement for dam construction, stress-hardened cement for oil wells, expandable and self-stressed cement for specialty civil engineering applications, fast-setting and fast-hardening cement for sand molding and other uses, alumina cement for concrete, refractory calcium-alumina cement, white cement, and tinted cement.

Cement output by type of product by the large producers was as follows, in percent: silicate, 19; ordinary, 46; slag, 28; pozzolanic, 2; and specialty, 5.

There were large cement producing facilities throughout China with the exception of the Provinces of Ningxia and Xizang. About 15% of the national output was in the northeast, 27% in eastern China, 25% in the south-central region, 11% in the southwest, 7% in the northwest, and the remainder by small plants distributed throughout China. There also has been remarkable reduction in transport distance. The average rail distance in 1956 was 854 kilometers compared with less than 350 kilometers in the 1980's.

There was a drastic change in consumption pattern from 1950 to the 1980's as a result of China's modernization program. In the 1980's, cement used for capital construction constituted 42% compared with 66% in the early 1950's, maintenance 23% compared with 6%, and rural demand 35% compared with 4%.

China's cement industry was plagued with many problems. First, air pollution was a serious problem. The dust discharged from large kilns amounted to more than 1 million tons each year, and these particulates along with those from driers, grinders, and packaging facilities was 10% of cement output. Discharges by small plants, while much lower in comparison, amounted to 5% of cement output. Second, there was high energy consumption. During 1981-85, annual energy consumption was equivalent to 16 million tons of standard coal or 32% of that consumed in the building industry in China. Moreover, the energy consumption per unit of production was high. In the larger enterprises, energy consumption was 1,446 kilocalories for each kilogram of clinker produced, and the energy consumption in wet-process kilns was 1,500 to 1,800 kilocalories per kilogram. On the other hand, average energy consumption by small producers was 1,127 kilocalories per kilogram of clinker. In addition, labor productivity was low. The output per person averaged 270 tons in large cement works compared with 80 tons in small operations.

China's first modern cement facility was purchased from Japan. This 1.5-million-ton-per-year Yidong plant in Tianjin began full production in 1984. It was fully automated with dust collectors throughout the system. Other large plants installed during the sixth 5-year plan, each with over a 1-million-ton capacity, included the Huaichai plant in Jiangsu and the Ningguo plant in Anhui. Two other large plants under construction in Anhui, each with a 1-million-ton capacity, were the Taoshan and Digang plants.

Completion of the 1.2-million-ton-per-year Zhu Jiang plant in Guangdong was scheduled for 1988. The plant, imported from Denmark, was sited on the bank of the Ba Jiang at Tanu Maoergang in Huaxian County. The Zhu Jiang plant will use high-grade limestone from Chili, Huaxian. The Chili deposit has more than 230 million tons of limestone reserves.

A silicate cement plant with an annual capacity of 600,000 tons was under construction at Nancha in Heilongjiang. Completion of this plant was expected in late 1988.

Fertilizer Materials.—China has made significant strides in its agricultural output, which is necessitated by the indigenous population. However, there was a serious imbalance in the ratio of nutrient ingredients of the fertilizers applied to farmlands. In developed countries, the nitrogen-to-phosphate-to-potash ratio in fertilizer was 1.00 to 0.55 to 0.40. In China, the ratio was 1.00 to 0.71 to 0.002 in 1969 and 1.00 to 0.20 to 0.002 in 1979 because of a lack of domestic phosphate. In 1985, the ratio was 1.00 to 0.26 to 0.06 as a result of expansion of domestic phosphate and potash production and, most importantly, an increase in imports of these ingredients. During the early 1980's, China imported substantial quantities of phosphate. In mid-1985, domestic production of phosphate was cut back as a result of overstocked imports. The major cause of the high inventory was inadequate transportation.

To ensure domestic needs and to preserve foreign currency, five major chemical fertilizer projects were under construction: A phosphatic complex at Tongling, Guangxi; a nitrogenous plant at Yichuan, Ningxia; a nitrogenous-sulfuric-phosphatic plant at Wiezizhan, Shanxi; and a nitrogenous plant each in southern Yunnan and Zhenhai, Zhejiang. The construction of these plants illustrated China's efforts to diversify its domestic fertilizer production. The largest plant at Wiezizhan was being built by a Japanese firm using Norwegian technology. The prime contractor for the Tongling plant was from Romania.

In addition, there were four major chemical fertilizer projects in the planning stage. These included a Sino-Kuwaiti-Tunisian joint venture at Qinhuangdao, Hebei; Sino ventures at Nanjing, Jiangxi, and Dalian, Liaoning, to be built by a British contractor; and a Sino-U.S. venture on Hainan Dao.

In mid-1985, a 1.1-million-ton-per-year nitrogenous fertilizer complex was placed in operation in Urumqi, Xinjiang. The ammonia unit was imported from Japan, and the urea unit was codesigned by engineers from

China and the Netherlands. In December, initial production commenced at the Qixiashan nitrogenous fertilizer plant in Nanjing, Jiangxi. The 300,000-ton-per-year ammonia unit was imported from France.

Yunnan Province was China's largest producer of phosphate and had reserves of 5.3 billion tons (other estimates are as high as 20 billion tons). Yunnan had 25 phosphate mines with an annual output of 3.5 million tons, accounting for 25% of China's rock output. In addition, there were 26 phosphate fertilizer plants producing calcium superphosphate, calcium magnesium phosphate, yellow phosphorus, and refined phosphate rock. Plans were under way to mine and beneficiate 12 million tons of phosphate annually by the year 2000.

A low-magnesium (0.2% to 0.5%) phosphate deposit was discovered at Dianchi, Yunnan. This was the first verified large deposit of low-magnesium phosphate in Yunnan. The deposit was estimated to have reserves of 270 million tons. The deposit is amenable to open pit mining, and the high ore grade eliminates the need for flotation dressing.

Annual phosphate mine output at Zingping, Sichuan, was being expanded to 1.5 million tons. Output of another large mine at Jinhe was also to be increased. Because of the availability of local coal and pyrite, Deyang, Sichuan, was to become a major base for phosphorus chemicals.

Construction of a 40,000-ton-per-year potassium chloride facility was completed at Qaidam, Qinghai. Preparations were under way to expand the plant to 1 million tons per year. When completed, the new capacity would substantially reduce China's imports of potassic fertilizers.

Magnesite.—Perhaps the largest magnesite deposit in the world is southeast of Anshan in Liaoning. The deposit was discovered in 1913 and mining began in 1922. Delineation drilling completed to date at three sites in Chin Shanhuai, Hua Zhiyui, and Xia Fangshen indicated reserves of magnesite well in excess of 2 billion tons.

In 1980, the mines at Da Shichiao and Hai Chen in the above deposit were separated from the Ministry of Metallurgical Industry and merged into the Liaoning Magnesite Co. This company produces annually 700,000 tons of dead-burned magnesite and 80,000 tons of caustic-calcined magnesite. A West German-Australian consortium was to supply Liaoning Magnesite a 50,000-ton-per-year sintering plant. The contract also provided for electrical equipment including a process control system; laboratory-quality control testing facilities; dust collectors for the calcinator, briquetting presses, and bag fillers; and a wet scrubber desulfurizing unit. Installation was to be completed in 1988.

A 40-meter-thick magnesite deposit was discovered 30 kilometers from Fushun, Liaoning. The deposit contains 200 million tons of magnesite and is amenable to surface mining.

Sodium Compounds.—China's shortage of soda ash was not expected to ease unless output was substantially increased. Because of the large growth in plate glass, detergent, and glass container output, China continued to be a net importer of soda ash, averaging 300,000 tons per year during the sixth 5-year period. Three soda ash plants were planned for construction at Nantong, Jiangsu; Shouguang, Shandong; and Tianjin, which is a replacement plant for one lost during an earthquake. Each will have a designed annual capacity of 600,000 tons. Projected demand for soda ash in 2000 was 9 million tons, representing a per capita equivalent of 7.3 kilograms, which is one-quarter that in developed countries. China was expected to remain a net importer of soda ash during the seventh 5-year plan.

Sulfur.—Development of China's largest troilite deposit near Yunfu, Guangdong, was completed by yearend. Reserves at Yunfu were estimated at over 200 million tons, averaging 31% sulfur with the richest concentration 47%. A 33-kilometer railway links the mine to Yunfu City. Designed mine output is 3 million tons per year, which increased China's production of sulfuric acid by 2.4 million tons annually.

Reserves of troilite at Ba-meng Urad in Langshan, Nei Monggol, totals more than 72 million tons. This deposit has associated values of copper and zinc. Operation of the 450,000-ton-per-year Tanyaokow troilite mine at Langshan began in early 1985. Ore dressing capacity at the site was 400,000 tons per year.

Other Industrial Minerals.—The chemical plant at Erinhot, Nei Monggol, expanded anhydrous mirabilite production from 5,000 to 10,000 tons per year. Second-stage expansion was under way to increase output to 50,000 tons per year.

A perlite deposit was discovered at Dantu, Jiangsu, with reserves of 9 million tons. The deposit is amenable to strip mining.

A large deposit of wollastonite was being developed in Lishu, Jilin. Reserves at Lishu were estimated at 10 million tons. When developed, Jilin Province will be China's largest producer of wollastonite.

MINERAL FUELS

China was the world's second largest coal producer and the sixth largest in production of oil and electric power. Total energy output grew 10% in 1985. The increase in energy output was credited to development of small coal mines and hydropower projects, increased investment in powerplants, adjustment in energy pricing, and energy conservation. On the other hand, China was a large energy consumer, and demand continued to outstrip supply. The annual growth in energy production was offset by the growth in the mix of industrial and commercial industries and the country's overall energy inefficiency.

The State Council promulgated new energy conservation regulations, which will take affect on April 1, 1986. The State Planning Commission and the State Economic Commission were designated the primary energy conservation agencies. The State Bureau of Standards was responsible for grassroot implementation in cooperation with regional authorities. The regulations applied to all sectors of the economy and were designed to tighten state control over energy use and waste, and foster the adoption of energy efficient technology.

China began an intensive energy conservation program in 1981. Since then, average annual energy savings had been about 5%. In 1985, conservation resulted in energy savings equivalent to 30 million tons of standard coal. Planned price increases were expected to help curb energy waste, and stiff surcharges were to be levied on excessive use. Industries upgrading energy management and using efficient equipment were to be eligible for investment and depreciation credits.

China lacked coordination and planning between the energy producers and consumers. Transportation was inadequate and poorly integrated, which complicated the movement of unevenly distributed energy resources. Most of the coal produced was in the north and northeast. The major users were in the northeast and east. The overburdened rail system left large tonnages of coal piled at rail depots and mineheads. Electric power grids and transmission systems were inefficient and insufficient for peak demand loads. About 16% of the electric power was lost in transmission.

During 1986-90, more than $17 billion was to be allocated to energy development and conservation. Stronger production incentives were to be instituted; project preparations streamlined; and coordination between the producers, transport sector, and consumers improved.

China's energy capability was the most important key for strengthening the national economy and raising living standards through developing the country's industrial base. Because of its grand objective of quadrupling national gross output by 2000, China's modernization program will be successful only by careful planning and effective development of its energy resources. China's primary energy production in 2000 was projected as follows, in million tons:

Sector	Quantity	Standard coal equivalent
Coal (undressed)	1,200	857
Crude oil	165- 200	236-286
Hydropower	[1]250	80
Natural gas	[2]10- 15	14- 20
Nuclear power	[1]50	16

[1]Billion kilowatt hours.
[2]Billion cubic meters.

To ensure an annual output for coal in 2000 of 1.2 billion tons, mining capacity was to reach 1.3 billion tons. Existing mines were to be streamlined and expanded from 320 to 400 million tons by the turn of the century. Secondly, 400 million tons of annual capacity was to be added through new surface mines and small- and medium-size underground mines. The output of local mines can be raised from 300 to 500 million tons through expansion and development.

For petroleum, output was to increase slightly onshore through 1990. After 1990, the increased output would be offshore and from oilfields developed in the west.

The annual growth rate in power generation was to be 6% to 7% through 1990 and increasing thereafter 9% to 10% to the year 2000. The installed capacity for hydropower in 2000 was to reach 80 to 90 million kilowatts for a generating capacity of 250 billion kW•h. The installed capacity of nuclear power in 2000 was expected to be 10 million kilowatts with an output of 50 billion kW•h.

China had 85 million kilowatts of installed capacity, generating 407 billion kW•h. Two-thirds of the capacity was thermal, of which 74% was produced from coal;

21%; from oil; and the remainder, from gas. China's largest thermal plant had a capacity of 1.2 million kilowatts. Most of the thermal plants serving large urban and industrialized areas ranged from 0.7 to 1.1 million kilowatts. There were 23 thermal powerplants ranging from 300 to 600 megawatts under construction and scheduled for completion by 1990. Plans also called for conversion of some older oil-fired plants to coal.

Hydropower's share of electric power generation declined slightly to 22% in 1985. Installed capacity was estimated at 25,000 megawatts. There were 34 hydropower plants under construction. Twenty-three were small, each with 400-megawatt capacity. Eleven were major hydropower projects with a collective total of 17,000 megawatts. The Huang He, Chang Jiang, Sanghua, Hongshui, and Langoan were the primary rivers for hydropower development.

Coal.—Organization and management of China's coal industry was complex. Under guidance from the State Planning Commission, the Ministry of Coal Industry (MCI) assigned operating budgets and production and supply quotas to the 84 regional mining administrations and coal companies. These regional groups reported their production to Provincial coal boards. In turn, the Provincial coal boards reported to MCI. The Ministry of Railroads and MCI jointly decide coal transport requirements.

China had 500 centrally administered mines, 2,500 provincially administered mines, and 57,000 locally administered mines. MCI directly controlled the central mines, which produced over one-half the nation's coal output. The focus of these mines was to fulfill national needs. About 35% of the central mine output was shipped out of the producing Provinces. Provincial mines reported to Provincial coal boards and their output remained within the Provinces. County or township authorities ran the local mines but also reported to Provincial coal boards.

During the sixth 5-year period, 271 new surface mines with an annual capacity of 118 million tons were put into operation. There were also 200 underground mines, newly developed or expanded, adding 80 million tons. Output of the following 14 major mines was expanded: Kailuan, Katong, Yangquan, Gujiao, Pingshuo, Huolinhe, Tiefa, Shuangyashan, Datun, South Huaihe, North Huaihe, Yanzhou, Zaoteng, and Pingdingshan. Henan's Pingdingshan No. 8 Mine, Shanxi's Gujiao and Xiqu Mines, and the South Huolinhe surface mine were new large mines placed in operation, each with an annual capacity of 3 million tons. Other large mines under construction included Shanxi's Pingshuo Antaibao surface mine and the Luan Changchun Mine.

Initial production began from the Dongshan Shenmu Coalfield on the Shaanxi-Nei Monggol border. The coal has low sulfur and phosphorus levels with an ash content of 2% to 5%. Annual mine capacity was 1.2 million tons and was to be expanded to 5 million tons by 1990. Reserves of the coalfield were estimated at 100 billion tons.

Mining at the 1.2-million-ton-per-year Linnancang Mine, Hebei, began in early 1985. Reserves of this mine were estimated at 8.7 billion tons.

The State Planning Commission approved the development of the Yinlian Coalfield in Sichuan, which has reserves of 2.7 billion tons. Plans were being made for an 8-million-ton-per-year operation.

Development of a high-quality brown coal deposit at Borxil, Nei Monggol, was completed. The new mine had an annual capacity of 450,000 tons. Reserves were estimated at 10 million tons.

Production began from the new 1.2-million-ton-per-year Tucheng Mine in Guizhou. Opening of this mine raised the annual output of the Liypanshui Coalfield to over 10 million tons.

Production from the 1.2-million-ton-per-year Xiaoqing Mine in Sichuan began in early 1985. Xiaoqing became the fourth operating mine in the Tiefa Coalfield, which has reserves of 2.2 billion tons. When development of three additional mines at Tiefa is completed, annual output will reach 15 million tons.

The 1.8-million-ton-per-year Linhuan surface mine in Anhui began operation in early 1985 increasing annual output from the South Huaihe Field to 3.6 million tons. Reserves of the Linhuan pit were estimated at 432 million tons. Coal from South Huaibei was used at the Baoshan steel complex.

Occidental Petroleum Co. of the United States and China National Coal Development Corp. were jointly developing the Antaibao coal mine in the Pingshuo mining district in Pinglu and Shuoxing Counties, Shanxi. Island Creek Coal Co., a subsidiary of Occidental Petroleum, was technical manager of the project. Proven reserves of the district total 13 billion tons of coal with

Antaibao alone having 500 million tons. There are 11 coal seams in the mine with a cumulative thickness of 33 meters. The important seams are the No. 4, which is 7 meters thick; No. 9, 15 meters thick; and No. 11, 4 meters thick. The stripping ratio was estimated to average 5 cubic meters of overburden per ton of coal. The coal has a high ash content of 24%, 40% volatile matter, and a heating value of 13,000 to 13,800 British thermal units per pound. The mine will be a conventional shovel-truck pit using both rope and hydraulic shovels. Morgan Equipment Co. of the United States designed and was supervising the construction of the heavy mining equipment maintenance and rebuilding the plant, which will be the largest in the world. McNally Pittsburgh Inc. of the United States was contracted for engineering design, equipment specifications, and construction supervision of the preparation plant, which will be similar to Island Creek's plant at Providence, Kentucky, United States. However, Antaibao's plant will be the world's largest built as a single unit having four 750-ton-per-hour parallel circuits capable of operating independently. The Antaibao surface mine was the first Sino-foreign joint venture coal project and will be one of the largest coal mine and preparation operations in the world having an annual capacity of 15 million tons. Eight million tons per year will be consumed domestically for electric power generation, and the remainder will be exported primarily to Japan.

At yearend, China's coal reserves were estimated at 785 billion tons. Fourteen percent of the reserves were lignite; 17%, anthracite; and 69%, bituminous.

Petroleum.—Oil was China's second largest energy sector and accounted for 21% of its energy production and 17% of its energy consumption. Oil exports accounted for 16% of China's foreign exchange earnings. China increased its oil production 9% annually during 1983-85. Most of this increase was exported.

Estimates of China's oil reserves were highly speculative. Chinese estimates of recoverable onshore reserves ranged from 8 to 10 billion tons, while foreign estimates were 2 to 6 billion tons. Chinese estimates of offshore reserves were 3 to 10 billion tons, while foreign sources were reluctant to estimate these reserves.

China hoped to raise oil production from 125 million tons in 1985 to over 150 million tons by 1990. Most of the increase was expected to come from four oilfields situated in the northeast: Dagang, Liaohe, Shengli, and Zhongyuan. If these oilfields meet their targets and the Daqing Oilfield maintains its production, they will account for 95% of China's oil production by 1990.

Crude oil production by China's major onshore oilfields during the sixth 5-year plan and the target output in 1990 were as follows, in million tons:

Oilfields	1981	1982	1983	1984	1985	1990
Dagang	3	3	3	3	4	6
Daqing	52	52	52	54	55	55
Huabei	12	11	10	10	10	10
Liaohe	5	5	6	8	9	13
Shengli	16	16	18	23	27	50
Xinjiang	4	4	4	4	5	NA
Zhongyuan	NA	2	3	4	6	10
Other	9	8	8	8	9	6
Total	101	101	104	114	125	150

NA Not available.

The largest increase in production was to come from the Shengli, Liaohe, and Zhongyuan Oilfields. Shengli was to increase annual production by 5 million tons in each of the next 5 years reaching 50 million tons by 1990. This would increase Shengli's share of national output from 22% in 1985 to 33% in 1990. Output from Liaohe increased 18% in 1985 despite serious flooding in August and September. Liaohe had oil reserves of 900 million tons. If Liaohe reaches its target output of 13 million tons by 1990, it will become China's third largest producer, supplanting Huabei. Zhongyuan was to double output to 10 million tons by 1990. Zhongyuan would be about the same production level as Huabei, China's current number three producer.

In April, China opened 10 southern onshore areas to foreign exploration. China

National Oil Development Corp. had the responsibility for all Sino-foreign joint ventures in the newly opened areas where regional subsidiaries were to be established. The 10 areas were situated in Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hunan, Jiangsu, Jiangxi, Yunnan, and Zhejiang. In addition, China planned to open Xinjiang to foreign exploration.

Contracts for offshore drilling were administered by China National Offshore Oil Corp. The first phase of the second-round bidding for a 13,300-square-kilometer tract in the South China Sea opened in December 1984 and the bids were due by September 1985. The second phase of the second-round bidding, opened in late January, covered 12 blocks in the Pearl River Basin and 6 blocks in the South Yellow Sea. Three contracts covering tracts in the Pearl River Basin were awarded in 1985, one each to a Japanese consortium and Amoco and Esso/Shell of the United States. By 1990, China was expected to have two offshore operations producing oil. Output from the fields in Beibu Wan and Bohai were expected to reach 2.4 million tons.

China's largest oil refinery was Dongfanghong in Beijing. Another large refinery was at Shijianzhuang in Hebei. Other large refineries were situated in Tianjin and Shandong Province. There were 34 medium- to large-sized refineries, each with an annual crude oil capacity of more than 500,000 tons. The geographic distribution of China's crude oil processing capacity and production was as follows, in million tons, for 1982:

Location	Capacity	Production
East	25.4	17.7
North	11.7	8.7
Northeast	36.2	27.2
Northwest	8.0	5.4
South-central	17.8	12.9
Southwest	.1	.1
Total	99.2	72.0

Because of exports and burning of crude, only 73% of the crude oil was processed. China was expected to expand the refineries to produce a variety of products for export.

[1]Physical scientist, Division of International Minerals.
[2]Where necessary, values have been converted from Chinese renminbi (RMB) to U.S. dollars at the rate of RMB3.125=US$1.00 for 1985.
[3]Xinhua (Beijing). Communique of the State Statistical Bureau Concerning Fulfillment of the 1985 Economic and Social Development Plan. Feb. 2, 1986, pp. 3-13.
[4]Liu Hong and Wei Liqun. On Correctly Handling Several Important Relationships in the Seventh 5-Year Plan. Jingji Yanjiu (Beijing), No. 10, Oct. 20, 1985, pp. 3-9.
[5]Chen Qi. China's Natural Resources in the Year 2000. Jingji Ribao (Beijing), Nov. 13, 1985, p. 3.
[6]Xinhua (Beijing). Mineral Resources Law Viewed. Mar. 11, 1986, pp. 3-5.
[7]Zhu Ling. Five Newcomers to the Star Rank. Zhongguo Ribao (Beijing), Jan. 20, 1986, p. 1.
[8]Xinhua (Beijing). Qinhuangdao Becomes Second Largest Port. Jan. 23, 1986, pp. 1-2.
[9]Beijing Review (Beijing). Key Projects Encourages Investment. V. 29, No. 6, Feb. 10, 1986, p. 28.
[10]Jianzhu Jingji (Beijing). Forecast for China's Building Construction, 1985 to 2000. No. 10, Oct. 18, 1985, p. 19.
[11]Wen Jiabao. Geological Work Tasks for 1985 Outlined. Zhongguo Dizhi (Beijing), No. 2, Feb. 13, 1985, pp. 1-4.
[12]Zhongguo Huanjing Bao (Beijing). China's Marine Environmental Protection Law. Mar. 23, 1985, p. 3.
[13]Zhongguo Jiaotong Bao (Beijing). Progress Report on Highway and Bridge Construction. July 27, 1985, p. 1.
[14]Beijing Review (Beijing). Ten Major Scientific Achievements. V. 29, No. 9, Mar. 3, 1986, pp. 26-27.
[15]Zhang Zeyu. China Positions Itself To Rejoin GATT. Beijing Rev., v. 29, No. 10, Mar. 10, 1986, pp. 4-5.

The Mineral Industry of Colombia

By Orlando Martino[1]

As a result of large foreign and domestic investments in mineral fuels, Colombia in 1985 became, for the first time, the leading producer and exporter of steam coal in the Latin American region. In addition, one of the largest oil discoveries to date in the Llanos Basin by state-owned Empresa Colombiana de Petróleos (ECOPETROL), in an association contract with a U.S. oil company, offered the prospect that Colombia would soon gain self-sufficiency in crude oil production and resume its historic role as a crude oil exporter.

As in 1983 and 1984, the mining and energy sector was the most dynamic sector of the Colombian economy. Although other sectors of the economy grew between 2% and 4%, mineral output—including coal but excluding petroleum—increased sharply by 26% and accounted for 2.2% of the gross domestic product (GDP). The GDP grew 3% to an estimated \$36.6 billion[2] at current prices. This growth in Colombia's mineral industry was led by steam coal, crude oil, and three precious metals, gold, platinum, and silver. The projects sustaining this growth were the virtual completion of the Cerrejón North Zone coal mine project and the near completion of the 700-kilometer oil pipeline from the Caño Limón Oilfield in the Llanos Basin to the Caribbean Port of Coveñas. The success of these projects provided great impetus to Colombia's revived mineral sector.

Colombia's economy was stimulated by an 8% increase in total exports that included increased quantities of fuel oil, steam coal, and cement. After 3 years of increasing trend, exports of ferronickel decreased for the first time. Increased demand for mineral-related commodities such as steel, cement, and sulfur resulted from expansion in the manufacturing, chemical, and construction industries. The notable increase in barite responded to expanded oil exploration.

By the end of this decade, Colombia was expected to play a significant role in world markets as an exporter of steam coal. Other than steam coal, Colombia has not achieved world rank in any particular commodity except emerald. However, within the Latin American region, Colombia is notable as the leading producer of kaolin and coal, of which it has the most abundant known reserves. It is also a significant producer of asbestos, cement, ferronickel, gold, salt, and sodium carbonate.

Government Policies and Programs.—Considering the new importance of increased gold output in Colombia's foreign exchange position, Decree 384 of February 1985 was issued to regulate the mining of precious metals, and included provisions to control environmental damage on rivers subject to placer operations. By Decree 185 of January 1985, the Government declared the promising gold deposits of Guainía, Vaupés, and Guaviare near the Brazilian border to be a "special reserve" subject to special control by the Government. Mining concessions are available only to state companies or mixed capital companies where the Government has 51% equity interest. In March 1984, the Government stimulated the revival of gold mining by offering a 30% premium over world gold prices.

To expand the development of the entire mining sector, the Government was formulating a national mining development plan scheduled for issuance in late 1985. Because of coal's strategic role as an energy resource, the coal mining code was reformed by Decree 1155 of 1980 and modified and expanded by Decree 2832 of November 1984 designed to facilitate procedural actions with the Government. The Ministerio de Minas y Energía together with Carbones de Colombia S.A. (CARBOCOL) was implementing a program of assistance to small and medium coal producers.

On February 8, the Government issued Decree 385 under its policy to encourage the production and use of steam coal. The decree was designed to define an underground coal mine and the country's structure of coal mining made up of large mining, medium mining, small mining, and micromining. A large underground coal mining operation, for example, is defined as one producing more than 60,000 tons of coal per year and employing 200 workers. The definitions are important in order to determine which mining operators would be eligible for certain Government-financed mine development programs.

In addition to ECOPETROL, the Government's direct participation in the mineral sector was represented by CARBOCOL, set up to exploit the country's large coal resources, and the Empresa Colombiana de Minas (ECOMINAS), set up in 1979 to exploit nonfuel minerals. ECOMINAS was involved in a variety of projects covering bauxite, copper-molybdenum, gold, and phosphate rock. ECOMINAS was also given responsibility for the production control and marketing of emerald. ECOPETROL, CARBOCOL, and ECOMINAS all operated under the policy direction of the Ministerio de Minas y Energía.

The Instituto Nacional de Investigaciones Geológico-Mineras (INGEOMINAS) continued its program of exploration and mineral resource evaluation. During 1985, INGEOMINAS published two important basic studies on Colombia's coal potential and Colombia's promising areas for gold and silver discoveries.

Colombia became a member of the Organismo Latinoamericano de Minería (OLAMI), established in 1985 with a representative of ECOMINAS serving as executive secretary, a Colombia representative as vice president, and a member of Chile's National Mining Society as president. OLAMI is essentially a Latin American organization of mining enterprises, both public and private, with the purpose of promoting regional cooperation in the mineral sector through (1) improvement and exchange of mineral statistics, (2) identification of mineral resources in Latin America, (3) collection of information on national mining legislation in Latin America, and (4) framing of recommendations for Latin American mining integration, including proposals for more efficient use of existing smelting and refining plants. To date, 14 countries in Latin America have agreed to participate in OLAMI.

PRODUCTION

Colombia benefited from another successful expansion of production of crude oil, natural gas, and steam coal. Output of crude oil increased 5% relative to that of 1984 and continued the rebound since the depressed level of 1979. Especially notable was the 41% increase in steam coal production to almost 10 million tons as the mining operations at the new El Cerrejón deposit approached design capacity.

Output of the precious metals group that included gold, platinum, and silver all increased relative to 1984 levels. Gold production in particular increased 43% over that of 1984 in further response to Government price incentives. Record highs were obtained in output of crude steel and cement as these benefited from increased efficiency and increased capacity. In the case of cement, increased foreign demand was also a factor. Output of ferronickel dropped sharply by 31% as the new plant suffered from equipment operation problems. Startup of a new mine explains the sudden increase of mined zinc ore after a 3-year period of no output.

As for industrial minerals, production increases were notable in asbestos and barite, while talc reached a historic high. Salt output was lower, particularly that of marine salt.

Table 1.—Colombia: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984	1985[p]
METALS					
Aluminum, bauxite	50	560	560	560	--
Copper, mine output, metal content	113	113	162	234	--
Gold ---troy ounces	529,214	472,674	438,579	799,889	1,142,830
Iron and steel:					
Iron ore and concentrate ---thousand tons	433	470	456	441	447
Pig iron ---do.	233	246	241	271	246
Ferroalloys: Ferrosilicon[e]	1,200	1,200	1,200	1,200	1,200
Steel, crude ---thousand tons	402	423	482	499	570
Semimanufactures, hot-rolled ---do.	314	333	374	412	468
Lead:					
Mine output, metal content	[r]128	[r]196	154	51	82
Refined (secondary)[e]	3,000	3,000	3,000	3,000	3,000
Manganese ore, gross weight	20,300	([2])	([2])	--	--
Nickel:					
Mine output, metal content	--	NA	17,457	21,885	15,434
Ferronickel, Ni content	--	1,320	13,060	17,064	11,800
Platinum-group metals ---troy ounces	14,804	11,886	10,303	10,108	11,650
Silver	142,740	136,043	98,945	130,022	153,301
Zinc, mine output, metal content	152	--	--	--	[e]1,000
INDUSTRIAL MINERALS					
Asbestos[e] [3]	5,400	5,400	5,400	9,982	12,435
Barite	3,160	3,500	3,839	3,340	5,050
Cement, hydraulic ---thousand tons	4,459	5,031	4,721	5,276	5,710
Clays: Kaolin	810,000	855,684	1,010,543	938,307	1,041,151
Feldspar	27,500	30,091	31,400	32,800	34,308
Fluorspar	--	57	--	--	--
Gypsum ---thousand tons	[r]270	281	238	260	250
Lime, hydrated and quicklime[e] ---do.	1,300	1,300	1,300	1,300	1,300
Mica	52	78	NA	NA	NA
Nitrogen: N content of ammonia	91,500	97,800	101,900	93,700	[e]95,000
Phosphate rock	17,329	20,393	16,944	11,480	24,249
Precious and semiprecious stones: Emerald[4] ---carats	299,006	395,960	1,011,345	394,181	337,950
Salt:					
Rock ---thousand tons	316	301	266	273	234
Marine ---do.	399	202	291	469	335
Total ---do.	715	503	557	742	569
Sodium compounds, n.e.s.: Sodium carbonate	106,220	110,800	118,290	129,440	113,209
Stone and sand:					
Calcite	8,740	8,700	6,454	4,575	3,107
Dolomite ---thousand tons	16	20	12	15	15
Limestone ---do.	10,053	10,620	10,685	11,565	11,756
Marble	16,660	16,843	15,500	15,171	16,993
Sand excluding metal-bearing	502,300	497,118	507,000	521,578	511,587
Sulfur:					
Native (from ore)	26,300	32,601	31,476	36,245	41,374
Byproduct, from petroleum	2,200	[e]3,000	5,530	10,430	9,790
Total	28,500	[e]35,601	37,006	46,675	51,164
Talc, soapstone, pyrophyllite	6,050	6,240	6,639	6,785	8,611
MINERAL FUELS AND RELATED MATERIALS					
Carbon black[5]	18,791	18,415	[e]18,000	[e]18,000	[e]18,000
Coal, all grades ---thousand tons	3,990	4,422	5,053	6,862	9,706
Coke, all types[e] ---do.	500	550	550	550	550
Gas, natural:					
Gross ---million cubic feet	174,800	174,540	184,950	189,000	189,378
Marketed ---do.	120,000	120,560	132,640	135,600	135,891
Natural gas liquids:					
Propane[e] ---thousand 42-gallon barrels	2,800	2,800	2,800	2,840	2,840
Butane[e] ---do.	600	600	600	600	600
Natural gasoline[e] ---do.	800	800	800	800	800
Total ---do.	4,200	4,200	4,200	4,240	4,240

See footnotes at end of table.

Table 1.—Colombia: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984	1985[p]
MINERAL FUELS AND RELATED MATERIALS —Continued					
Petroleum:					
Crude ______ thousand 42-gallon barrels__	48,852	[r]51,765	55,531	61,154	64,409
Refinery products:					
Gasoline:					
Aviation ______________do____	378	404	423	374	341
Motor _______________do____	20,945	21,062	21,259	23,881	23,247
Jet fuel_________________do____	3,896	4,185	4,201	3,483	3,617
Kerosene________________do____	2,613	2,258	2,279	2,040	2,220
Distillate fuel oil ____________do____	9,665	9,653	10,337	10,384	11,035
Residual fuel oil ____________do____	16,300	17,815	19,487	19,278	19,964
Lubricants[e] ______________do____	550	550	[r]657	[r]657	730
Liquefied petroleum gas (propane) do____	1,844	1,847	2,730	2,840	2,311
Asphalt and bitumen _________do____	1,133	1,114	898	964	833
Refinery fuel and losses and unspecified products________________do____	5,019	4,403	6,213	5,913	5,336
Total ________________do____	62,343	63,291	68,484	69,814	69,634

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through Aug. 8, 1986.
[2]Revised to zero.
[3]Startup of open pit asbestos mine was in 1981.
[4]Based on registered exports by the Banco de la República (Bogotá).
[5]Reports obtained in 1985 give 20,619 tons for 1978 and 19,331 tons for 1979; no data were available for 1980.

TRADE

The recent exportation of ferronickel and steam coal has increased the relative importance of mineral commodities in Colombia's export sector. Of 16 significant export commodities traded by Colombia, 5 are mineral related, with fuel oil in second place after coffee. Although some diversification has been achieved, coffee remained Colombia's most valuable export item, accounting for 50% of all exports. As shown in the following table, in million dollars, the five mineral-related commodities represented 18% of all exports in 1985.

Commodity	1982	1983	1984	1985
Fuel oil ________	284	378	444	407
Coal __________	17	29	59	151
Ferronickel _____	6	56	81	53
Cement ________	55	34	38	46
Emeralds _______	41	33	31	25
Total _______	403	530	653	682
Total exports___	3,283	3,176	[r]3,469	3,763

[r]Revised.

Although exports of fuel oil achieved a recent record high, foreign exchange earnings actually decreased because of lower world prices.

The most dramatic change in 1985 occurred in exports of steam coal, which more than doubled in value. In fact, since 1982 when coal exports first became a significant item in Colombia's export sector, ranking 13th in importance, the value of coal exports has increased ninefold. In 1985, coal moved to fourth rank after coffee, fuel oil, and bananas. After Colombia resumes exports of crude oil in 1986, the four most valuable export commodities will be coffee, crude oil, fuel oil, and coal, giving minerals a conspicuous and important role in Colombia's international trade. Colombia has indicated that it would not join the Organization of Petroleum Exporting Countries.

Colombia's first exports of steam coal from the Cerrejón North Zone operated by CARBOCOL and an Exxon Corp. subsidiary took place in February 1985, destined for Denmark. Because of competitive cost and good quality (low ash and sulfur content), Colombia was able to establish itself in European and Asian steam coal markets despite the oversupply position of world coal that followed the reentry of coal exports from Poland after the Polish crisis of 1980-81. By October, Exxon had signed 10 contracts involving 39 million tons with varying delivery schedules. Practically all of the buyers were West Europeans; this region has historically been the most important steam coal market. The only U.S. buyer was the Florida Power Corp.

Colombia's trade deficit persisted and increased in 1985. Relative to the 1984 total, imports increased 18% to $4.7 billion. The most important mineral-related import items were crude oil and gasoline, and iron and steel products, amounting respectively to $465 million and $422 million. Together they represented 19% of total imports.

Table 2.—Colombia: Exports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides	4	--		
Metal including alloys:				
Scrap	80	64	14	Japan 50.
Semimanufactures	27	49	([2])	Nicaragua 37; Panama 8; Ecuador 4.
Copper:				
Ore and concentrate	615	894	--	All to Japan.
Metal including alloys, semimanufactures	6	6	--	Venezuela 4; Costa Rica 1; Panama 1.
Iron and steel: Metal:				
Ferroalloys	28,064	33,938	6,074	Netherlands 20,968; France 3,788.
Semimanufactures	425	1,901	180	Peru 751; Panama 437; Venezuela 290.
Lead:				
Ore and concentrate	--	620	--	All to Mexico.
Metal including alloys, semimanufactures	2	2	--	All to Ecuador.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$911	$8,930	$8,930	
Silver:				
Ore and concentrate[3] do	$522	$341	--	Sweden $314; Spain $27.
Metal including alloys, unwrought and partly wrought do	$695	$488	$218	Peru $270.
Tin: Metal including alloys, scrap	--	2	--	All to Costa Rica.
Zinc: Oxides	235	105	--	Guatemala 55; Ecuador 30; Costa Rica 15.
Other: Ashes and residues	61	--		
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	2	6	--	All to Venezuela.
Grinding and polishing wheels and stones	1	5	--	Mainly to Nicaragua.
Cement	485,561	645,250	354,166	Trinidad and Tobago 115,540; Suriname 76,846.
Chalk	1,152	504	--	Ecuador 260; Trinidad and Tobago 144; Dominican Republic 100.
Clays, crude	645	84	--	Mainly to Venezuela.
Fertilizer materials: Manufactured:				
Ammonia	25,055	12,970	1,416	Spain 3,775; Morocco 3,572; Portugal 2,100.
Nitrogenous	3,000	--		
Phosphatic	([2])	--		
Unspecified and mixed	14,704	36	--	All to Ecuador.
Gypsum and plaster	200	76	--	Do.
Magnesium compounds	--	21	--	All to Venezuela.
Phosphates, crude	804	--		
Precious and semiprecious stones other than diamond: Natural value, thousands	$35,196	$24,783	$1,368	Japan $22,943; Spain $142.
Salt and brine	25,250	--		
Sodium compounds, n.e.s.:				
Carbonate, manufactured	970	50	--	All to Ecuador.
Sulfate, manufactured	40	547	--	Ecuador 411; Guatemala 136.
Stone, sand and gravel:				
Gravel and crushed rock	162	--		
Sand other than metal-bearing	36	125	--	Ecuador 108; Panama 17.
Sulfur:				
Elemental, crude including native and byproduct	1,869	3,418	--	Ecuador 3,255; Guatemala 60; Peru 48.
Sulfuric acid	--	1,050	--	All to Venezuela.
Talc, steatite, soapstone, pyrophyllite	10	240	--	Do.
Other: Crude	1,160	765	--	Ecuador 720; Venezuela 45.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	68	63	--	All to Ecuador.

See footnotes at end of table.

Table 2.—Colombia: Exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Carbon black	4,790	3,887	--	Ecuador 2,174; Chile 854; Costa Rica 559.
Coal: All grades excluding briquets	277,526	721,242	382,855	Mexico 103,075; Israel 59,203.
Coke and semicoke	16,675	55,068	--	Spain 23,338; Venezuela 21,714; Brazil 8,506.
Petroleum refinery products:				
Gasoline, motor 42-gallon barrels	6,273	2,159	NA	NA.
Mineral jelly and wax do.	6,304	--		
Kerosene and jet fuel thousand 42-gallon barrels	1,173	756	NA	NA.
Distillate fuel oil do.	25	38	NA	NA.
Residual fuel oil do.	14,510	16,515	4,877	Netherlands Antilles 3,752; Italy 2,781.
Lubricants 42-gallon barrels	189	602	--	Venezuela 385; Ecuador 210; Peru 7.
Bituminous mixtures do.	430	30	--	Panama 18; Ecuador 6; Venezuela 6.

NA Not available.
[1]Table prepared by H. D. Willis.
[2]Less than 1/2 unit.
[3]May include platinum-group metals.

Table 3.—Colombia: Imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS				
Aluminum:				
Ore and concentrate	5,794	4,067	3,909	West Germany 92; Brazil 44.
Oxides and hydroxides	2,202	4,426	1,858	West Germany 2,490; United Kingdom 76.
Metal including alloys:				
Scrap	105	--		
Unwrought	17,967	17,977	117	Venezuela 10,589; Canada 2,693; Yugoslavia 2,193.
Semimanufactures	8,394	6,639	505	Venezuela 4,667; Brazil 399.
Chromium: Oxides and hydroxides	51	72	56	East Germany 5; Netherlands 5.
Cobalt: Oxides and hydroxides	4	5	5	
Copper: Metal including alloys:				
Unwrought	3,271	2,643	18	Belgium-Luxembourg 1,665; Peru 946.
Semimanufactures	12,404	13,628	318	Chile 6,959; Peru 1,876; Belgium-Luxembourg 1,078.
Iron and steel:				
Iron ore and concentrate	251	121	21	France 100.
Metal:				
Scrap	46,199	43,587	14,633	Netherlands Antilles 25,225; Panama 2,224.
Pig iron, cast iron, related materials	1,339	12,206	452	Brazil 5,752; Mexico 4,003; Chile 1,533.
Ferroalloys:				
Ferromanganese	2,332	8,009	101	Brazil 4,073; Mexico 3,779.
Unspecified	3,102	3,703	246	Brazil 1,594; Chile 1,533.
Steel, primary forms	29,114	27,457	1	Venezuela 18,883; Japan 2,771; United Kingdom 2,742.
Semimanufactures:				
Bars, rods, angles, shapes, sections	56,497	62,736	2,786	Japan 14,878; Venezuela 10,773; United Kingdom 9,930.
Universals, plates, sheets	257,555	304,985	5,575	Japan 173,405; Venezuela 33,832; West Germany 27,971.
Hoop and strip	6,009	6,559	1,272	United Kingdom 2,998; Japan 1,749.
Rails and accessories	33,936	3,312	92	Japan 2,744; Belgium-Luxembourg 187; France 129.
Wire	4,591	3,583	96	Brazil 1,428; Venezuela 587; Belgium-Luxembourg 532.
Tubes, pipes, fittings	79,573	126,670	9,126	Japan 55,913; Brazil 19,722; Argentina 11,869.
Castings and forgings, rough	401	752	4	Spain 426; Peru 150; Japan 54.

See footnotes at end of table.

Table 3.—Colombia: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Lead:				
Oxides	844	1,564	--	Peru 1,548; Ecuador 8; Mexico 5.
Metal including alloys:				
Unwrought	1,328	618	--	Peru 568; Mexico 50.
Semimanufactures	46	17	4	West Germany 12; United Kingdom 1.
Magnesium: Metal including alloys:				
Unwrought	37	34	20	Norway 14.
Semimanufactures	155	32	25	Canada 7.
Manganese:				
Ore and concentrate, metallurgical-grade	1,477	3,397	--	All from Mexico.
Oxides	731	763	90	Brazil 478; Belgium-Luxembourg 130.
Mercury 76-pound flasks	1,595	928	319	West Germany 174; Mexico 174.
Molybdenum: Metal including alloys, all forms	1	1	1	
Nickel:				
Ore and concentrate	20	14	--	All from West Germany.
Metal including alloys:				
Scrap	165	10	--	All from United Kingdom.
Unwrought	231	309	79	Canada 204; United Kingdom 18.
Semimanufactures	177	148	87	Canada 47; France 8.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$81	$37	$8	West Germany $29.
Silver: Metal including alloys, unwrought and partly wrought do	$73	$27	$2	Panama $17; West Germany $7.
Tin: Metal including alloys:				
Scrap	(2)	--		
Unwrought	242	299	2	Bolivia 297.
Semimanufactures	19	64	--	Bolivia 52; Venezuela 10; United Kingdom 1.
Titanium: Oxides	375	344	44	West Germany 138; United Kingdom 75; Spain 50.
Tungsten: Metal including alloys, all forms	--	1	1	
Zinc:				
Oxides	300	50	4	West Germany 41; Peru 5.
Metal including alloys:				
Unwrought	13,113	15,698	--	Peru 14,943; Mexico 474; Canada 232.
Semimanufactures	204	168	115	Costa Rica 20; Panama 6.
Other:				
Ores and concentrates	343	450	49	United Kingdom 216; Australia 120; Netherlands 65.
Oxides and hydroxides	365	130	103	West Germany 22; Switzerland 4.
Base metals including alloys, all forms	71	66	30	Italy 10; United Kingdom 10.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	201	198	82	Ecuador 79; Brazil 16.
Artificial:				
Corundum	608	984	20	Brazil 865; West Germany 70.
Silicon carbide	227	395	8	Brazil 130; Norway 128; West Germany 52.
Grinding and polishing wheels and stones	60	20	8	Italy 6; West Germany 3.
Asbestos, crude	13,170	11,970	786	Canada 10,440; Italy 456.
Barite and witherite	7,903	47	12	Peru 35.
Boron materials:				
Crude natural borates	954	1,472	56	Peru 1,415; West Germany 1.
Oxides and acids	357	424	284	Peru 110; Argentina 15.
Cement	8,423	4,851	1,226	Venezuela 1,227; Cuba 800.
Chalk	70	195	5	Switzerland 115; United Kingdom 75.
Clays, crude	8,619	16,032	15,488	Peru 390; Japan 50.
Diamond:				
Gem, not set or strung value, thousands	$9	$6	$6	
Industrial stones do	--	$2	--	West Germany $1; Switzerland $1.
Diatomite and other infusorial earth	630	561	411	Mexico 150.
Feldspar, fluorspar, related materials	453	374	330	Netherlands 29; West Germany 15.

See footnotes at end of table.

Table 3.—Colombia: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Fertilizer materials: Manufactured:				
Ammonia	12,406	10,588	4	Venezuela 10,577; West Germany 5.
Nitrogenous	209,864	212,591	40,091	Venezuela 141,533; Romania 9,922.
Phosphatic	7,538	12,112	12,112	
Potassic	132,636	164,963	65,346	East Germany 93,437; Spain 6,140.
Unspecified and mixed	120,818	125,350	125,039	France 98; Belgium-Luxembourg 80.
Graphite, natural	54	36	31	Brazil 5.
Gypsum and plaster	40,522	26,544	145	Jamaica 14,493; Dominican Republic 9,598; Venezuela 2,285.
Lime	256	--		
Magnesium compounds	326	736	122	Austria 250; France 155.
Mica:				
Crude including splittings and waste	105	150	136	France 13; Belgium-Luxembourg 1.
Worked including agglomerated splittings	16	41	35	Spain 6.
Phosphates, crude	51,444	37,425	37,425	
Pigments, mineral: Iron oxides and hydroxides, processed	1,202	1,467	81	West Germany 1,297; Spain 43.
Precious and semiprecious stones other than diamond -- value, thousands	$16	$5	$5	
Salt and brine	1,666	73	32	West Germany 41.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	10	12	9	West Germany 2; Belgium-Luxembourg 1.
Sulfate, manufactured	17,409	12,289	1,550	Mexico 8,383; Finland 1,500.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	3,203	3,213	34	Peru 2,675; Guatemala 319; Switzerland 68.
Worked	788	149	3	Peru 112; West Germany 34.
Dolomite, chiefly refractory-grade	6,167	8,360	1,893	Belgium-Luxembourg 5,803; Spain 349.
Gravel and crushed rock	5,093	1,968	--	Brazil 1,015; Peru 870; United Kingdom 66.
Sand other than metal-bearing	4,467	1,775	433	Brazil 1,322; Sweden 10.
Sulfur:				
Elemental:				
Crude including native and byproduct	26,378	38,002	38,002	
Colloidal, precipitated, sublimed	85	186	186	
Sulfuric acid	43	22	2	West Germany 20.
Talc, steatite, soapstone, pyrophyllite	2,193	1,618	1,033	Italy 469; West Germany 37.
Other: Crude	8,143	10,557	8,112	Mexico 1,297; United Kingdom 681.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	496	83	45	Venezuela 38.
Carbon black	796	835	419	West Germany 380; Japan 30.
Coal:				
Anthracite	--	7	7	
Lignite including briquets	17	60	60	
Coke and semicoke	--	2	2	
Petroleum:				
Crude thousand 42-gallon barrels	15,091	10,464	36	Venezuela 9,867; Ecuador 351; Mexico 210.
Refinery products:				
Liquefied petroleum gas 42-gallon barrels	70	139	--	All from France.
Gasoline thousand 42-gallon barrels	7,317	5,647	135	Netherlands Antilles 2,633; Mexico 1,312; Brazil 905.
Mineral jelly and wax do	85	151	111	Japan 17; China 16.
Kerosene and jet fuel do	(2)	(2)	(2)	
Distillate fuel oil do	856	--		
Lubricants do	155	164	67	Netherlands Antilles 53; Venezuela 37.
Bitumen and other residues 42-gallon barrels	12,211	5,018	12	Venezuela 5,006.
Bituminous mixtures do	467	491	479	United Kingdom 12.
Petroleum coke do	847	1,254	1,254	

[1]Table prepared by H. D. Willis.
[2]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Aluminum and Bauxite.—The joint venture plan of Colombia and Jamaica to build Colombia's first aluminum smelter on the north coast of Colombia with a capacity of 140,000 tons per year was shelved indefinitely.

Copper.—A joint venture was formed between Minas el Lobre Ltda. of Colombia and the Nittetsu Mining Co. of Japan to exploit the El Lobre copper mine located 80 kilometers southwest of Medellín. This small mine has estimated reserves of about 1 million tons with an average grade of 4% copper and 3 grams of gold per ton. When mine development and transportation facilities are completed in 1988, copper output will be 4,000 tons per year. It will still be necessary for Colombia to import copper to meet its industrial needs.

Gold.—Another record high in gold output of over 1 million troy ounces was achieved, firmly establishing Colombia's second place as a gold producer in the Latin American region after Brazil. The revival in gold mining has been encouraged by a 30% premium over world prices offered by the Central Bank of Colombia since March 1984. Speculation persisted that at least 10% of output may be attributed to gold smuggling from Panama and border countries like Brazil, which has had a surge in gold output, to take advantage of premium prices.

The placer gold districts in the Departments of Antioquia and Chocó continued as the main producing areas. Output by small producers in 1984 accounted for 91% of the total compared with the 85% share in 1983. Despite the decline in the average world price of gold in 1985 to $317 per troy ounce, the relative importance of precious metals in Colombia's mineral recovery continued to increase. The value of output of precious metals, mostly gold with platinum and silver, represented over 65% of the value of nonfuel mineral output (including coal but excluding oil and gas) in 1985 compared with 44% in 1983.[3]

In October, INGEOMINAS published a special report[4] outlining the most promising areas for discovery of gold and silver deposits, covering disseminated, vein-type, and placer occurrences. Potential placer gold areas included the Guainía Zone in eastern Colombia near the Brazilian border. The Guainía Zone with an extension of 30,000 square kilometers is drained by the Inírida, Guainía, and Cuiari Rivers. The President of Colombia issued Decree 185 in January designating the gold deposits in the Comisarías of Guainía, Vaupés, and Guavaire as "special reserves." Concessions to exploit gold deposits in these areas may be granted to state agencies or to Colombian companies with mixed public and private capital in which the Government's equity participation is a minimum of 51%.

Greenstone Resources Ltd. of Vancouver, Canada, reported a high-grade gold-silver discovery at its Cascada property in Manizales, west of Bogotá. Underground sampling indicates ore grades of 0.77 ounce of gold and 22.5 ounces of silver per ton. Crosscut tunneling and drilling were scheduled to delineate the reserves of ore.

Iron and Steel.—Despite increases in output of crude steel and semimanufactures to historic levels, Colombia's imports of iron and steel valued at $422 million increased 88% in 1985 compared with those of 1984, to meet the demands created by major coal and oil projects. Available data for 1983 show that the major part of imports of iron and steel products came from Japan, followed by Venezuela, the United Kingdom, and Brazil. These imports were dominated by thin and thick sheets with lesser amounts of wire, rails, and seamless tubes. Colombia's output of rolled steel products was concentrated on merchant products such as bars, structural profiles and shapes, wire rod, wires, and rails; the output of flat products was limited to hot-rolled plates.

Crude steel was produced by one fully integrated producer using the Bessemer process and five semi-integrated producers using electric furnaces based on domestic and imported scrap. All six plants are privately owned. The semi-integrated plants have grown at a faster pace, improving their share of the output of crude steel from 23% in 1970 to 43% in 1984. Colombia produced less than 40% of its crude steel consumption, estimated at 1.2 million tons in 1985. Steel consumption was 41 kilograms per person, below the average of 76 kilograms per person for all of Latin America.

Colombia's iron and steel industry has embarked on programs to improve its efficiency and productivity. In April 1985, the country's only fully integrated steel mill, Acerías Paz del Río S.A. (APR), situated north of Bogotá in Belencito, Boyacá Department, completed its expansion work that nearly doubled the capacity of its blast furnace from 500 to 900 tons per day or 330,000 tons per year.

APR's output of ingot steel in 1985 decreased 4% from the record high of 285,700 tons in 1984 to 274,100 tons, because of a shutdown of 67 days to make repairs and improvements in the oxygen plant, sinter plant, and hot-rolling mill. APR's hot-rolling mill has a capacity of 400,000 tons per year. Output of finished steel products registered a record high of 233,600 tons in 1985. APR still plans to install a complementary cold-rolling facility whose construction has been delayed because of financial problems.

The five semi-integrated steel plants also improved their productivity. As of yearend 1985, four of the five plants have installed modern continuous casting equipment, contributing in large part to the significant expansion in output achievement by these plants since 1980. In 1970, the five semi-integrated plants had 29% of Colombia's market for iron and steel products; in 1984 this share was 47%.

Preliminary studies have been made to construct a sponge-iron plant with a capacity of 300,000 tons per year that would utilize about 50 million cubic feet of natural gas per day from the Guajira Gasfields on Colombia's Caribbean coast. The high-grade iron ore required for the process would have to be imported. Plans for the new plant were postponed when Colombia's semi-integrated steel companies opted instead to cover short-term scrap needs with a ship-scrapping operation.

Nickel.—In June, Cerro Matoso S.A. completed 3 years of operation. Cerro Matoso, founded in 1979, is located 20 kilometers southwest of Montelíbano in the Department of Córdoba between Medellín and Cartagena. After steadily rising since 1982, export earnings dropped from $81 million in 1984 to $53 million in 1985. Lower earnings reflected decreased output and lower world prices that dropped from $2.27 per pound to $1.93 per pound during 1985.[5]

Shortly after rebuilding its ferronickel smelter furnace over a 2-month span, Cerro Matoso closed its smelter following another furnace failure in August. The company did not produce ferronickel again until October. Although earlier in the year the smelter was operating close to its effective capacity of 50 million pounds per year of nickel in ferronickel in ingot and granular form, the 5-month shutdown significantly curtailed its ferronickel production. At yearend, the plant was producing at 80% capacity. Cerro Matoso lost $67 million, bringing its accumulated losses since startup to $165 million. The company was able to reschedule its debt with international banks in order to defer a portion of that debt until 1987.

The Government was considering a shutdown of the Cerro Matoso plant and was reportedly planning to break the contract with The Hanna Mining Co. for managing the Cerro Matoso ferronickel project. Hanna, with 6% of equity, was considered responsible for the operating problems that had arisen since startup in 1982. The plant has been plagued by repeated breakdowns in the main furnace. Cerro Matoso's major stockholder, state-owned Instituto de Fomento Industrial, is burdened with other operations in difficulty and therefore may decide to close Cerro Matoso until world prices improve. The possible shutdown of Cerro Matoso would undermine Colombia's program for diversifying its export sector, which is heavily dependent on coffee.

Zinc.—Colombian Mineral Resources S.A., a 100% foreign-owned company, reportedly started up its new zinc-lead Equis project during the year. Possible full production in 1986 was expected to yield 10,000 tons of zinc and 2,000 tons of lead. The $8.5 million project is in Totudendo, Quibdó, Chocó Department. Proven reserves of 122,200 tons also contain gold and silver values.

INDUSTRIAL MINERALS

Barite.—Colombia has been a small-scale producer of barite, used chiefly by the oil companies in their drilling programs. Local demand was mostly met through imports. One of two producers, Atlantic Minerals & Products Corp., a subsidiary of NL Industries Inc. is associated with Minal S.A. in the Bogotá area. The other producer, Milchem Inc., a U.S. firm, operated a grinding mill at Neiva, Huila Department, near active oil exploration activity in the south. Milchem also operated a grinding plant at Santa Marta on the Caribbean coast to serve the offshore market. Output of barite was first registered in 1944 at a level of 1,500 tons from Ataco and Coyaima in Tolima Department and Carnicerías in Huila Department. Output then peaked in 1958 at 13,000 tons. Colombia does not have data on its reserves of barite.

Cement.—Although the national economy grew by almost 3% in 1985, urban construction in the 11 largest cities grew by less than 1%. Because of restraint in Government programs, cement consumption was 4.8 million tons, similar to the level of 1984. The Instituto Colombiano de Cemento reported that cement production increased to 5.7 million tons, a record high, giving a considerable surplus available for export. Exports of clinker and gray cement reached 928,000 tons. Almost all exports were by the Cementos de Caribe Group in Barranquilla. The Caribe Group expected to market 1.2 million tons of clinker and low-alkali gray cement in 1986. Cement exports were valued at $46 million in 1985 and ranked as one of the important mineral-related export commodities after fuel oil, coal, and ferronickel.

APR, the steel producer, reported further progress in marketing its cement made from the high slag yield of its blast furnace operations. APR's cement sales increased 14% to 470,000 tons or 80% of its capacity.

Clays.—*Kaolin.*—Colombia was the leading producer of kaolin in the Latin American region and one of the major world producers. The availability of quality kaolin has supported well-established ceramics and paper industries in Colombia. There are abundant deposits of kaolin in the country, principally in the central and eastern cordilleras, derived from decomposition of igneous rocks.

Emerald.—The Government was engaged in a project to make a systematic exploration of the special emerald reserve in the Department of Boyacá. Bidding on the proposed exploration would be open to national and foreign companies in a joint venture with Colombian entities. As of mid-July, the bidding specifications were not available.

By means of Decree 2477 of October 3, 1984, ECOMINAS was given the responsibility of controlling the marketing and exports of emerald. ECOMINAS operates the emerald mines of Muzo, Coscuez, and Peñas Blancas in Boyacá Department.

Phosphate Rock.—Although output of phosphate rock increased to a historic high in 1985, it was well below consumption of 84,400 tons. Imports of fertilizers and fertilizer raw materials (nitrogen, phosphates, and potash) were valued at $603 million.

ECOMINAS refinanced Fosfatos de Boyacá S.A., a state-owned company to permit the leasing by the private sector of areas in the Pesca deposit. Private production will start in 1986 with a final production level by 1990 of 90,000 tons of phosphate rock for direct soil use. Under the Colombian-Soviet Union cooperation agreement, ECOMINAS sent the U.S.S.R. samples from the Pesca deposit for analysis and evaluation.

Fosfatos del Huila S.A. finished the feasibility study of the Media Luna phosphate rock deposits in Huila. Reserves of 5.5 million tons with a grade of 18% phosphorus pentoxide were confirmed. The industrial development of the project will be reviewed in the near future. In 1985, the company produced 2,525 tons of phosphate rock.

Sulfur.—Production of refined sulfur reached a record high and has almost doubled since 1973, when only 28,000 tons was produced. Most of the sulfur was from mining operations by an established private company, Industrias Puracé S.A.; the balance was a byproduct of state-owned ECOPETROL oil refining operations. A very small amount was also produced by indigenous groups at the Cumbal Volcano near the Ecuadorian border in Nariño Department. ECOMINAS has estimated Cumbal reserves at 2 million tons grading 22% sulfur. Studies were under way to determine the feasibility of their exploitation.

Industrias Puracé initiated its native sulfur operations in 1944 at its El Vinagre Mine situated at the edges of the Puracé Volcano southeast of Popayan in Cauca Department. Underground and open pit methods are used to extract the ore, which grades about 30% sulfur. The company operates a mill and treatment plant to produce sulfur with a purity of 99.8%. Mining operations at El Vinagre have been hampered by transport problems. Dried and sacked sulfur is trucked to sulfuric acid plants in Cali, Medellín, Bogotá, and Barranquilla; and to sugar and rubber industries. Proven ore reserves at the Puracé area are estimated at 3 million tons of sulfur grading 30% sulfur.

Under contract with ECOMINAS, Industrias Puracé was exploring for sulfur in an area distant from the present mine in order to increase reserves and subsequently production. The company's concession reverted back to the Nation in 1983.

ECOPETROL operated sulfur recovery units at its large oil refinery at Barrancabermeja along the Magdalena River and at the Orito refinery in Putumayo. During 1985, both recovery units operated below rated capacity.

MINERAL FUELS

Coal.—The major event of the year was the virtual completion of the Cerrejón North Zone steam coal project by the joint venture of CARBOCOL and International Colombia Resources Corp. (INTERCOR), a subsidiary of Exxon. Eight years were required to bring the project on-stream since 1977 when INTERCOR initiated a $53 million exploration and feasibility study of the bituminous coal deposit in the Guajira Peninsula. In 1980, INTERCOR and CARBOCOL declared the Cerrejón deposit to be commercially feasible. The fully integrated $3.5 billion coal production and shipping project is comprised of a surface mine, coal storage silos, a 150-kilometer railroad, dockside storage and handling equipment, and an export terminal at Port Bolívar in Portete Bay. The surface mine is a multiseam truck and shovel operation based on large reserves of high-quality coal estimated at 3 billion tons. Operations were under way in the west pit that will be developed to a depth of 850 feet. Design of the railroad had to account for flash floods caused by infrequent but very heavy rains in the Guajira Peninsula, a normally arid region. Coal will be transported by two unit trains composed of 100 cars, each of 90-ton capacity. An average of five trains per day will give a shipping capacity to the port of 45,000 tons per day. The export capacity of the terminal at Port Bolívar will be 15 million tons per year. The bay has been dredged to serve ships up to 150,000 deadweight tons, but the port is capable of being modified to handle 250,000-deadweight-ton vessels and expanded to two berths. The entire port coal handling system will be fully operational in 1986.[6]

Although coal mining had begun at Cerrejón North Zone in 1984 at the level of 777,000 tons, the first train delivery of coal to the port took place on January 10, 1985. Temporary facilities at the mine and an "early coal" facility at the port made it possible to export coal from the North Zone 1 year ahead of schedule. North Zone coal exports from Port Bolivar commenced February 19, with a 33,000-ton shipment to a consortium of power companies in Denmark. North Zone exports amounted to 2.2 million tons with shipments projected to 6 million tons in 1986, 9 million tons in 1987, and 15 million tons by 1989.

Coal exports from Cerrejón's Central Zone, mined independently by CARBOCOL, increased to 541,000 tons in 1985 from 349,000 tons in 1984. During 1985, operations at Cerrejón Central Zone were suspended because of the drop in the world price of coal, high transport costs to the coast, and high production costs.

Exploration and development projects were under way in other promising coal basins of Colombia. The feasibility study on the Loma-Boquerón coal project in César Department was completed by Siminera de Colombia S.A. and the Greenly Energy Corp. Production capacity will be 6 million tons of steam coal per year, primarily for export. The joint venture obtained a concession from the Government to exploit the deposit for 23 years. Coal reserves are estimated at 250 million tons. The concession contract requires that royalties be paid to the Government as follows: 6% on output up to 3 million tons, and 8% on output between 3 and 6 million tons. Also, the concessionaire will pay an additional 4% when the sale price is above $30 per ton.

CARBOCOL, through Carbones de Occidente Ltda. in Cali, initiated studies in the areas of Río Junquito-El Tambo, Río Pance, and Jordán in the Cauca Valley coal region. The study defined three projects: (1) the Honda project with an initial output of 25,000 tons, minable to 120,000 tons per year; (2) the Sequenque project with a capacity of 400,000 tons per year; and (3) the Estrella project with an annual output of 100,000 tons.

Carbones del Caribe S.A. in Barranquilla was expected to begin production during 1986 on the north coast in Puerto Libertador, Córdoba Department. Production will be at 400,000 tons per year initially and should reach 1 million tons in 1989. Total reserves were estimated at 16 million tons. The project was developed to supply steam coal to various cement plants in north Colombia; any surplus would be exported.

The Guajira Department became the leading coal-producing area for the first time in 1985, replacing Boyacá and Cundinamarca, the traditional sources.

In late 1985, INGEOMINAS published a detailed report with maps on the coal potential of Colombia. The report describes seven coal regions with reserves amounting to 90% of the country's total that are feasible for exploitation within the next 20 years. Total reserves for the seven regions covering steam and metallurgical coals are estimated at 17 billion tons, of which 3.9 billion are measured reserves.[7]

Natural Gas.—According to ECOPETROL's operation report for 1985, the North Coast Zone, which includes the Guajira offshore gasfields (the leading gas producer), Difícil, Cicuco, Jobo-Tablón, and Sucre, accounted for 67% of total gas output. The Barrancabermeja Zone, which comprises Lisama, Payoa, and Provincia, accounted for 31% of Colombia's output; the small balance came from Río de Oro and Tello.

Most of the gas produced was consumed on the north coast of Colombia, where a number of cement plants are located. Output in 1984 represented about 64,000 barrels per day of crude oil. Reserves at yearend 1984 were 3.8 trillion cubic feet, equivalent to 640 million barrels of oil, or about one-half of the country's crude oil reserves.

To provide an incentive for natural gas production, the Government has regularly adjusted the domestic purchase price of natural gas, which in 1985 increased to $1.00 per million British thermal units.

Petroleum.—Output of crude oil increased 5% in 1985, continuing the upward trend that started in 1980. Part of the increase is attributed to the oil production from the new Caño Limón Field in the Llanos Basin, the largest oil discovery in Colombia since the Cira-Infantas find of the 1920's. The production rate increased to 176,400 barrels per day in 1985, compared with 167,100 barrels per day in 1984. With expanded output from Caño Limón and ECOPETROL's secondary recovery project in the Casabe Field in the Middle Magdalena area, the rate in 1986 was expected to exceed 350,000 barrels per day, easily surpassing the historic high of 218,000 barrels per day set in 1970.

In June, Occidental de Colombia Inc., as operator for the Caño Limón Field under the association contract with ECOPETROL to exploit the Cravo Norte block in the Llanos Basin, sold 50% of its interest to Compañía Shell de Colombia S.A., giving each a 25% interest overall while ECOPETROL retained its 50% interest.

Production under the association contract system with oil companies, rather than continuation of the older concession system, played an important role in increasing production levels. At yearend, ECOPETROL had signed 68 association contracts, of which 53 were with foreign oil companies and 15 with domestic companies. As a result of increased investment in exploration, petroleum reserves increased by yearend to 1.29 billion barrels. In April, the largest foreign oil producer in Colombia, Tenneco Oil Co., announced a new oil discovery in the Upper Magdalena Valley in Neiva Department under the Palermo association contract with ECOPETROL. Tenneco produced over 40,000 barrels per day of crude oil and had proven reserves of 100 million barrels. The discovery wells, San Francisco No. 1 and San Francisco No. 2, are located 15 kilometers northwest of the city of Neiva.

Pending completion of the new oil pipeline from the Port of Coveñas to the Caño Limón Oilfields, expected in early 1986, Colombia found it necessary to import crude oil for its refinery operations, although at a lower level. An increase in imports of petroleum products was made necessary by a 7% increase in gasoline consumption over that of 1984.

Colombia was expected to become self-sufficient in crude oil in 1986 and resume its role as an exporter of crude oil at the projected level of 150,000 barrels per day in 1986. Colombia was not expected to encounter problems in marketing the light crude from Caño Limón. Because of the sharp drop in international oil prices, the Government was considering limiting crude oil exports only to the volume needed to cover its most urgent debt commitments.

Colombia's increased exports of fuel oil were offset by lower prices, which averaged $21.55 per barrel in 1985 compared with $22.38 per barrel in 1984. Fuel oil exports continued as Colombia's second most valuable export commodity after coffee.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Colombian pesos (Col$) to U.S. dollars at the average rate for 1985 of Col$142.3=US$1.00. On Dec. 31, 1985, the rate was Col$172.2=US$1.00.

[3]Ministerio de Minas y Energía. Memoria al Congreso 1985. Bogotá, 1985, p. 113.

[4]Lozano Quiroga, H. Oro y Plata en Colombia—Areas Promisorias (Gold and Silver in Colombia—Promising Areas). Instituto Nacional de Investigaciones Geológico-Mineras. Ibagué, Oct. 1985, 56 pp.

[5]Robertson, R. R., and I. Patiño Vargas. Colombia's Cerro Matoso. Eng. and Min. J., v. 186, No. 5, 1985, pp. 18-22.

[6]Evert, B. M., and G. D. Savage. Cerrejón North Block Project Is Making Colombia a Major Coal Exporter. Min. Eng., v. 38, No. 6, 1986, pp. 409-412.

[7]Rodriguez, D., R. A. Arboleda Otalora, and C. A. Arboleda Otalora. Potencial Carbonífero de Colombia (Colombia Coal Potential, summary in English). Instituto Nacional de Investigaciones Geológico-Mineras, Bogotá, 1985, 33 pp.

Table 4.— Colombia: Production and trade in crude petroleum and refinery products

(Thousand 42-gallon barrels)

	1978	1979	1980	1981	1982	1983	1984	1985
Petroleum, crude:								
Production	47,742	45,298	45,944	48,852	r51,765	r55,531	r61,154	64,409
Imports	8,834	8,995	7,339	7,714	7,327	r13,834	r9,801	6,748
Refinery products:								
Production	57,452	56,246	59,282	62,343	63,291	68,484	r69,814	69,634
Exports[1]	11,153	9,037	9,485	10,432	r12,019	r15,732	r16,862	18,975
Imports	7,784	10,341	12,997	11,025	11,033	r3,435	5,749	9,414

rRevised.
[1]Principally residual fuel oil. Also includes petrochemicals.

Source: Revista del Banco de la República (Bogotá). Apr. 1986, p. 147.

The Mineral Industry of Cyprus

By Thomas O. Glover[1]

Exploitable mineral deposits, known to exist in Cyprus, were being depleted at a fairly consistent rate in 1985; however, mining continued to decline in importance to the economy. Employment in the mining sector decreased by almost one-half from that of 1984, while all sectors of employment showed an unemployment rate of 3.4%, up slightly from 3.3% in 1984.

The Cypriot gross national product (GNP) in 1985 was $2.4 billion,[2] thus showing a strong positive growth rate compared with that of 1984. Annual per capita income was $4,400, up 1.1% from that of 1984. The inflation rate was 5.0%, a slight decrease from that of 1984. The national debt was 37.7% of the GNP, up 4.7% since 1984. Cyprus' trade balance with the United States in 1985 showed a $30 million deficit, compared with a $63 million deficit in 1984.

Cyprus remained geopolitically divided for the 12th consecutive year, and no settlement to the division of the island was in sight by yearend. The Greek Cypriots still control the southern three-fifths of the island, while the Turkish Cypriots control the northern two-fifths. Only the southern sector was considered in this chapter because there is little, if any, mineral production in the northern sector.

PRODUCTION AND TRADE

According to the Cyprus Mines Service, mining in the southern three-fifths of the island declined for the 15th consecutive year. New exploration for copper pyrites in the Troodos Mountains brought new hope to the copper mining industry, which had ceased active mining operations in 1979. Cement copper was extracted from mine drainage waters and waste dump leach solutions at the abandoned copper minesites.

Chromite mining, abandoned in 1982, was nonoperational for the third consecutive year. Mining of asbestos rock in 1985 decreased 33% owing to excessive stocks produced in 1984 when the asbestos fiber market was falling. The market rose in 1985, causing an increase in fiber production of approximately 120%. Excess rock mined in 1984 was used to produce the additional fiber required in 1985. Production of sulfur-bearing pyrites almost tripled in 1985. Production of cement copper was slightly less in 1985. Most industrial minerals showed decreases in production, except bentonite, hydrated lime, salt, and sand and aggregate. Celestite flotation concentrates were produced for the first time; 1985 output was 1,400 tons.

Cyprus' balance-of-trade deficit with the United States was 52.4% lower in 1985 than in 1984. The current-account deficit was $150 million, $29 million less than that of 1984.

Mineral export values either remained the same or dropped, except for bentonite and sand and gravel, which rose in value only modestly, chiefly owing to the sluggish world economy. Asbestos fiber, cement, copper, and salt showed the sharpest drop in value.

Table 1.—Cyprus: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984[p]	1985[p]
METALS					
Chromium ore and concentrate, marketable	10,381	2,878	--	--	--
Copper: Cement copper	470	1,530	2,088	2,290	2,130
INDUSTRIAL MINERALS					
Asbestos, fiber produced	25,568	18,952	17,288	7,429	16,360
Cement, hydraulic thousand tons	1,035	1,068	943	853	659
Clays, crude:					
Bentonite	47,000	13,000	32,000	32,400	52,000
Other:					
For brick and tile manufacture thousand tons	165	187	230	220	212
For cement manufacture do.	253	250	250	e250	e250
Total do.	418	437	480	e470	e462
Gypsum:					
Crude	40,000	30,000	32,000	22,100	16,000
Calcined	23,000	25,000	10,000	11,900	8,500
Lime, hydrated	12,920	11,900	8,500	7,380	7,730
Mineral pigments:					
Umber	20,000	20,000	16,000	13,100	12,200
Yellow ocher	250	--	--	--	--
Total	20,250	20,000	16,000	13,100	12,200
Pyrites	15,866	55,525	46,665	23,322	69,600
Salt, marine	9,299	9,857	--	7,399	10,013
Stone, sand and gravel:					
Dimension stone: Marble	56,000	75,000	90,000	87,500	80,000
Crushed and broken stone:					
Havara (crushed limestone) thousand tons	4,350	3,475	4,500	3,560	2,800
Limestone:					
For cement production do.	1,039	1,000	NA	NA	NA
Other	11,320	10,000	NA	NA	NA
Marl, for cement production	565,387	550,000	533,970	NA	NA
Unspecified building stone	760,000	980,000	500,000	450,000	343,000
Sand and aggregate thousand tons	3,857	3,975	4,100	4,075	4,450
Sulfide concentrates containing precious metals	514	116	--	--	--
Sulfur, S content of marketable pyrites	9,478	e25,500	21,430	10,495	30,972
MINERAL FUELS AND RELATED MATERIALS					
Petroleum refinery products:					
Liquefied petroleum gas thousand 42-gallon barrels	215	193	227	218	172
Gasoline do.	813	805	890	856	789
Kerosene and jet fuel do.	434	377	468	463	248
Distillate fuel oil do.	1,036	1,019	1,147	1,160	990
Residual fuel oil do.	988	1,068	1,101	1,148	924
Asphalt do.	148	136	165	174	145
Unspecified do.	4	--	--	--	--
Refinery fuel and losses do.	220	229	207	201	145
Total do.	3,858	3,827	4,205	4,220	3,413

eEstimated. pPreliminary. NA Not available.
[1]Table includes data available through June 12, 1986.
[2]In addition to the commodities listed, a variety of other crude construction materials are produced, but available information is inadequate to make reliable estimates of output levels.

Table 2.—Cyprus: Exports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS				
Aluminum: Metal including alloys:				
Scrap	528	557	--	Sweden 175; Netherlands 142; West Germany 118.
Unwrought	--	849	--	All to Greece.
Semimanufactures	80	85	--	Libya 30; Saudi Arabia 26; Israel 19.
Chromium: Ore and concentrate	10,896	--		

See footnotes at end of table.

Table 2.—Cyprus: Exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984 United States	Destinations, 1984 Other (principal)
METALS —Continued				
Copper:				
Matte and speiss including cement copper	1	3,059	--	Spain 1,529; U.S.S.R. 1,022; West Germany 508.
Metal including alloys:				
Scrap	449	344	--	Belgium-Luxembourg 115; United Kingdom 52; Sweden 50.
Semimanufactures	7	3	--	Bahrain 1; Iraq 1; Saudi Arabia 1.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite	10,857	--		
Metal:				
Scrap	8,568	13,223	--	Greece 8,450; Italy 4,708.
Semimanufactures:				
Bars, rods, angles, shapes, sections	10	2	--	Mainly to Saudi Arabia.
Universals, plates, sheets	36	658	--	Lebanon 574; Syria 76.
Wire	5	36	--	Saudi Arabia 24; Egypt 9.
Tubes, pipes, fittings	60	134	--	Syria 129.
Lead:				
Oxides	18	3	--	All to Greece.
Metal including alloys, scrap	31	200	--	All to Italy.
Nickel:				
Ore and concentrate	--	2	--	All to Greece.
Metal including alloys, scrap	--	11	4	Sweden 7.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	--	$5	--	All to West Germany.
Silver: Waste and sweepings do.	$4	$5	--	Do.
Titanium: Oxides	2	1	--	All to Saudi Arabia.
Zinc: Metal including alloys:				
Scrap	131	68	--	Portugal 20; Netherlands 19; West Germany 15.
Semimanufactures	--	23	--	Italy 14; Netherlands 8.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc value, thousands	$1	$1	--	All to Oman.
Grinding and polishing wheels and stones do.	$11	$11	--	Do.
Asbestos, crude	13,416	8,216	--	Thailand 1,744; Egypt 1,500; Greece 1,124.
Cement	395,499	401,850	--	Lebanon 238,814; Syria 141,681.
Chalk	--	2	--	All to Syria.
Clays, crude	23	9,942	--	All to United Kingdom.
Diamond: Gem, not set or strung value, thousands	$39	$292	--	Lebanon $148; Switzerland $89.
Diatomite and other infusorial earth	10	--		
Fertilizer materials: Manufactured, unspecified and mixed	8,660	241	--	All to Greece.
Gypsum and plaster	4,854	6,928	--	Saudi Arabia 3,105; Lebanon 1,938; Kuwait 954.
Lime	170	--		
Precious and semiprecious stones other than diamond: Natural value, thousands	--	$1	--	All to United Kingdom.
Pyrite, unroasted	10,857	31,044	--	Italy 30,841.
Salt and brine	--	161	--	United Arab Emirates 86; Oman 34; Qatar 19.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	134	611	--	Israel 352; Saudi Arabia 259.
Worked value, thousands	$256	$62	--	All to Saudi Arabia.
Gravel and crushed rock	359	3,549	--	Saudi Arabia 3,501.
Sand other than metal-bearing	10	--		
Sulfur: Sulfuric acid	11,300	3,852	--	All to Italy.
Talc, steatite, soapstone, pyrophyllite	--	10	--	All to Sudan.
Other: Crude	11	7,609	4,966	United Kingdom 987; Egypt 590.
MINERAL FUELS AND RELATED MATERIALS				
Petroleum refinery products:				
Liquefied petroleum gas 42-gallon barrels	81	--		
Gasoline, motor do.	28,195	23,976	NA	NA.
Mineral jelly and wax do.	--	1	--	All to Kuwait.
Kerosene and jet fuel do.	563,861	567,905	NA	NA.
Distillate fuel oil do.	143,135	91,974	NA	NA.
Lubricants do.	3,521	4,067	NA	NA.
Residual fuel oil do.	145,508	165,961	NA	NA.

NA Not available.

[1]Table prepared by Virginia A. Woodson.

Table 3.—Cyprus: Imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS				
Alkali and alkaline-earth metals	--	1	--	Mainly from Italy.
Aluminum:				
Oxides and hydroxides	1	1	--	All from United Kingdom.
Metal including alloys:				
Scrap	--	151	--	Sweden 122; Denmark 29.
Unwrought	1	10	--	All from United Kingdom.
Semimanufactures	4,179	4,114	5	Greece 2,332; United Kingdom 375; Italy 262.
Chromium: Oxides and hydroxides	1	2	--	All from United Kingdom.
Columbium and tantalum: Metal including alloys, all forms, tantalum	--	1	--	All from Japan.
Copper: Metal including alloys:				
Unwrought	23	22	--	United Kingdom 16; Spain 6.
Semimanufactures	773	859	44	West Germany 171; United Kingdom 157; Italy 112.
Gold: Metal including alloys, unwrought and partly wrought troy ounces	27,112	--		
Iron and steel: Metal:				
Scrap	27	41	--	All from Sweden.
Pig iron, cast iron, related materials	1,404	363	--	Bulgaria 356.
Ferroalloys, ferromanganese	20	20	--	All from France.
Steel, primary forms	8	3	--	Greece 2.
Semimanufactures:				
Bars, rods, angles, shapes, sections	74,949	84,642	--	Spain 27,816; Netherlands 7,915; Greece 7,128.
Universals, plates, sheets	19,389	20,082	--	West Germany 6,037; Greece 4,173; Belgium-Luxembourg 2,231.
Hoop and strip	7,329	7,465	1	Greece 6,240; Czechoslovakia 495.
Rails and accessories	2	1	--	All from West Germany.
Wire	2,949	2,912	2	Hungary 969; Belgium-Luxembourg 748; United Kingdom 627.
Tubes, pipes, fittings	13,849	19,912	2	West Germany 6,636; Greece 5,040; United Kingdom 1,398.
Castings and forgings, rough	34	12	--	Belgium-Luxembourg 4; Spain 4.
Lead:				
Oxides	120	181	--	United Kingdom 180.
Metal including alloys:				
Scrap	6	19	--	All from Denmark.
Unwrought	198	196	--	United Kingdom 77; Netherlands 50; Italy 42.
Semimanufactures	617	857	100	United Kingdom 523; Netherlands 125.
Manganese: Oxides	14	25	--	Belgium-Luxembourg 19; West Germany 6.
Mercury 76-pound flasks	NA	29	--	Mainly from West Germany.
Nickel:				
Matte and speiss	--	1	--	All from Spain.
Metal including alloys, all forms	11	10	--	West Germany 5; Israel 2; United Kingdom 2.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$222	$141	$33	West Germany $82; Austria $15.
Silver: Metal including alloys, unwrought and partly wrought do	$1,434	$1,421	$70	United Kingdom $1,038; West Germany $202.
Tin: Metal including alloys:				
Unwrought do	$1	$1	--	All from United Kingdom.
Semimanufactures	5	6	--	United Kingdom 5; Denmark 1.
Titanium: Oxides	444	531	--	United Kingdom 290; West Germany 121.
Zinc:				
Oxides	19	31	--	West Germany 26.
Metal including alloys:				
Unwrought	4	206	--	Zaire 149; West Germany 25; Netherlands 24.
Semimanufactures value, thousands	$266	$149	--	Netherlands $50; Poland $46.
Other:				
Ores and concentrates	10	92	--	Australia 91.
Oxides and hydroxides	1	7	--	West Germany 6.
Base metals including alloys, all forms	(2)	8	--	All from United Kingdom.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc value, thousands	$21	$67	--	Greece $34; West Germany $20.

See footnotes at end of table.

Table 3.—Cyprus: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Abrasives, n.e.s. —Continued				
Artificial: Corundum	--	1	--	All from United Kingdom.
Dust and powder of precious and semiprecious stones including diamond value, thousands	$1	$2	--	Israel $1; United Kingdom $1.
Grinding and polishing wheels and stones do.	$199	$248	$1	Italy $104; West Germany $48.
Asbestos, crude	369	297	--	Zimbabwe 161; Republic of South Africa 136.
Barite and witherite	6	2	--	All from West Germany.
Boron materials: Oxides and acids value, thousands	$1	$1	--	NA.
Cement	13,207	([3])	--	Mainly from Greece.
Chalk	1,562	308	--	United Kingdom 276; France 26.
Clays, crude	1,197	2,237	5	Greece 2,095.
Diamond:				
Gem, not set or strung value, thousands	$1,019	$1,459	$7	Belgium-Luxembourg $415; Israel $340; United Kingdom $328.
Industrial stones do.	$1	$2	--	All from United Kingdom.
Diatomite and other infusorial earth	120	176	133	Switzerland 20.
Feldspar, fluorspar, related materials	20	--		
Fertilizer materials:				
Crude, n.e.s	--	36	--	All from West Germany.
Manufactured:				
Ammonia	5,110	37	--	Netherlands 27; United Kingdom 6.
Nitrogenous	19,411	27,965	1	Italy 10,508; Greece 6,001; Hungary 3,992.
Phosphatic	1,470	2,850	--	Israel 2,500.
Potassic	272	1,164	--	Israel 961; West Germany 201.
Unspecified and mixed	799	36,208	250	Romania 24,403; Greece 7,776; France 3,020.
Graphite, natural	--	1	--	All from United Kingdom.
Gypsum and plaster	40	37	17	West Germany 12; United Kingdom 7.
Lime	--	5	--	All from Israel.
Magnesite, crude	126	131	--	Netherlands 123; China 5.
Mica:				
Crude including splittings and waste	29	14	--	United Kingdom 11; Norway 2.
Worked including agglomerated splittings value, thousands	$2	$1	--	All from Austria.
Phosphates, crude	4,223	NA		
Pigments, mineral: Iron oxides and hydroxides, processed	21	25	--	United Kingdom 13; West Germany 5.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$474	$445	--	West Germany $198; Thailand $106; United Kingdom $53.
Synthetic do.	$131	$74	--	Switzerland $46; France $13.
Salt and brine	772	1,030	--	United Kingdom 578; Netherlands 333.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	NA	927	--	Romania 280; Bulgaria 220; United Kingdom 213.
Sulfate, manufactured	541	693	--	United Kingdom 283; West Germany 235.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	3,338	5,115	--	Italy 3,812; Greece 1,243.
Worked value, thousands	$624	$481	--	Italy $253; Greece $190.
Dolomite, chiefly refractory-grade	41	40	--	Norway 33; Denmark 5.
Gravel and crushed rock	661	868	--	Italy 742; Greece 90.
Quartz and quartzite	37	86	--	Netherlands 61; West Germany 20.
Sand other than metal-bearing	364	572	--	United Kingdom 334; West Germany 166.
Sulfur:				
Elemental, crude including native and byproduct	3,090	2,513	--	Lebanon 1,639; Greece 805.
Sulfuric acid	274	252	--	Greece 232.
Talc, steatite, soapstone, pyrophyllite	412	429	--	Greece 240; Norway 95; Netherlands 20.
Other:				
Crude	2,233	1,787	--	Greece 1,763.
Slag and dross, not metal-bearing	--	20	--	All from Netherlands.

See footnotes at end of table.

Table 3.—Cyprus: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	188	287	--	Greece 258; United Kingdom 29.
Carbon black	6	4	--	West Germany 3; Switzerland 1.
Coal:				
Anthracite and bituminous	180	51,818	--	All from U.S.S.R.
Briquets of anthracite and bituminous coal	--	201	--	All from Belgium-Luxembourg.
Lignite including briquets	207	90	--	All from Greece.
Coke and semicoke	50	110	--	Belgium-Luxembourg 100.
Peat including briquets and litter	1,451	1,909	--	Sweden 865; West Germany 568; Ireland 220.
Petroleum:				
Crude thousand 42-gallon barrels	2,939	4,271	NA	Iraq 2,125; U.S.S.R. 1,654; Algeria 344.
Refinery products:				
Liquefied petroleum gas do	238	230	--	Greece 127; Libya 31.
Gasoline, motor do	54	126	--	Italy 73; Iraq 47.
Mineral jelly and wax do	3	3	--	West Germany 1; Netherlands 1.
Kerosene and jet fuel do	525	632	--	Italy 400; France 102; U.S.S.R. 67.
Distillate fuel oil do	223	466	--	Italy 169; France 101; Bulgaria 76.
Lubricants do	51	64	1	Belgium-Luxembourg 21; United Kingdom 16; Portugal 5.
Residual fuel oil do	2,035	2,102	--	Syria 1,206; Greece 406; Romania 234.
Bitumen and other do	--	(4)	--	Mainly from Greece.
Bituminous mixtures do	--	4	NA	United Kingdom 2; Greece 1; Italy 1.
Petroleum coke do	21	(4)	--	All from West Germany.

NA Not available.
[1]Table prepared by Virginia A. Woodson.
[2]Unreported quantity valued at $17,000.
[3]Unreported quantity valued at $1,776,000.
[4]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Hellenic Mining Co. Ltd. (Helco), a past producer of chromite in Cyprus, had not produced chromite since 1982. Exploration for chromite ores was carried out in 1984 in the Akapanou Forest area; however, no extensive deposits have as yet been reported.

INDUSTRIAL MINERALS

Asbestos.—The production of asbestos in Cyprus comes from a serpentine deposit within the Troodos Massif from a single open pit mine near Amaindos, which is owned by Cyprus Asbestos Mines Ltd. Production of asbestos fiber rose 120% in 1985 from the output of 1984, even though asbestos rock production declined. Export values of fiber fell over 30% between 1984 and 1985. The company introduced two new grades of fiber in 1985 with sales mainly to Middle East markets. The new fiber may not be as high in quality as in previous years, and this could account for lower-than-normal export values.

Celestite.—A deposit of celestite, north of Maroni village in the Larnaca District, was opened for production in late 1985. The mineralization was found in the Koronia limestone of the Dhali Group, in veins, veinlets, and minor disseminations within the Koronia limestone. The deposit belongs to Helco. The ore, processed at the Vasilico dressing plant, contained commercial concentrates of 94% strontium sulfate. Approximately 1,400 tons was produced in 1985.

Cement.—The two cement plants, operated by Vassiliko Cement Works Ltd. and Cyprus Cement Co. Ltd., produced 659,089 tons of cement, which represented almost a 23% reduction from the 1984 production. Cement pricing remained relatively unchanged compared with the 1984 unit price. Rated capacity of both plants collectively was 1.2 million tons per year. The plants produced portland, pozzolanic, and sulfate-resisting types of cement. The Vassiliko cement plant reportedly changed fuels from oil to coal. Cement sales were predominantly to North Africa and the Middle East.

Clays.—*Bentonite.*—Production of bentonite in 1985 was 52,000 tons, a 60.5% increase over production in 1984. The sale price per ton increased 5.4% over that of 1984. Cyprus bentonite was estimated to account for less than 1% of the total world production. Peletico Plasters Ltd., west of Larnaca, produced the major part of the bentonite. A new plant at Pentakomo contributed to the increased production of bentonite. Other companies producing bentonite in Cyprus were Bentex Minerals Co. Ltd. and Egeko Ltd. A new company, Drapia Mining, also held a license to extract bentonite from a deposit near Kalavasos, close to the Port of Zyyi. The company reported plant construction under way at the Kalavasos site in 1985.

Gypsum.—The production of gypsum dropped approximately 28% to 16,000 tons. Exports of both raw and calcined gypsum remained small. Even though the production of gypsum had declined, vast reserves have been identified in the Aradippou area northwest of Larnaca.

MINERAL FUELS

Cyprus Petroleum Refinery Ltd. produced small quantities of asphalt, fuel oil, gasoline, jet fuel, kerosene, and liquefied petroleum gas at its only refinery at Larnaca. Crude oil totaling 3,463,018 barrels was imported from Algeria (7.6%), Iraq (74.9%), and the U.S.S.R. (17.5%). The refinery, with a throughput capacity of 16,000 barrels per day, was operated at 59% of capacity.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Cypriot pounds (£C) to U.S. dollars at the rate of £C1=US$1.64.

The Mineral Industry of Czechoslovakia

By John R. Craynon[1]

Czechoslovakia remained an important producer of coal, graphite, kaolin, magnesite, pig iron, and steel during 1985. The highly industrialized economy required imports of many raw materials, however. Domestic petroleum and gas resources were limited. Uranium deposits in North Bohemia were reportedly quite extensive and were being exploited in several mining operations. Although domestic coal provided about 60% of the country's fuel and energy needs, imports of fuels still accounted for over one-third of the total. According to preliminary results, gross national income grew by 3.3% compared with that of 1984. Industrial production, including mining and mineral-related industries, increased 3.4%. Relative domestic consumption of energy, raw materials, and industrial materials has decreased.[2] Out of a 1984 work force of 2.1 million, 146,000 were employed in coal and petroleum production and processing; 39,000 in electricity and heat generation; 131,000 in the iron and steel industry, including ore mining; and 30,000 were involved in the nonferrous metals industry, including ore mining.[3] In 1984, mining and quarrying accounted for 3.8% of the total industrial output of Czechoslovakia. Coal production made up 2.9% of this amount; crude oil, 0.1%; metallic ores, 0.4%; and other mining, 0.4%. Petroleum refinery products made up 3.4% of total industrial output. The iron and steel industry contributed 9.1% of the total; industrial minerals, 2.5%; and nonferrous metals, 2.1%.[4] Construction of Soviet natural gas pipelines through Czechoslovak territory continued during the year. The fourth and last of the transit gas lines planned is scheduled for completion in 1989. The total capacity of the transit gas system, when completed, will be 2.4 billion cubic feet per year. Czechoslovakia agreed to aid in the construction of a new gas pipeline being planned in the U.S.S.R. This pipeline, which will originate in Siberia, will provide another link from vast Soviet reserves to both East and West Europe. Czechoslovakia will be paid 176.5 billion cubic feet of natural gas annually starting in 1990 for its involvement in the project. This amounts to about 50% of Czechoslovak 1985 consumption of natural gas. Construction began at Bruntal on a new hydrometallurgical plant to process mixed metal concentrates from domestic sources. This plant, which will reduce Czechoslovak dependence on foreign sources of nonferrous metals, is scheduled for completion in 1990.

Government Policies and Programs.—The annual extraction plan was met or exceeded in all segments of the mining industry during 1985.[5] In the coal industry, total production decreased slightly, but still exceeded the plan. The metallurgical industry, including ore mining, increased total production more than had been planned. Electrical power generation increased to 80.6 billion kilowatt hours, or approximately 3% more than in 1984. Although pig iron production was at the same level as in previous years, crude steel production increased 1.4%, utilizing imported raw materials. Production of rolled material also increased.

The seventh 5-year plan, which covered the years 1981-85, had called for improvement in the efficiency of raw material and energy usage. The plan called for brown coal and lignite output of about 100 million tons, bituminous coal output of nearly 28 million tons, and crude steel production of about 16 million tons. In addition, provisions were made to increase electrical power generation to a level of 80 to 83 billion kilowatt hours, including 15 billion kilowatt hours generated by nuclear plants. These goals were generally achieved, although steel output fell nearly 1 million tons short of the plan. Electrical power generation in nuclear-powered facilities increased to approximately 11.5 billion kilowatt hours, far short of the 5-year plan goals.

The eighth 5-year plan covering 1986-90 envisioned a shift in the structure of Czechoslovak industry away from energy and raw material intensive industries toward electronics and bulk chemicals production. The specific goals for the plan were not outlined by the time of the party congress in late March 1986.

PRODUCTION

Production of graphite was approximately 9% of the world's total in 1985. Magnesite production amounted to about 6% of the total; kaolin, about 3%; and crude steel and pig iron, both about 2% of the world's total production. The major coal producing areas remained the Ostrava-Karvina Basin for bituminous coal and the North Bohemia Basin for brown coal. North Moravia remained the most important region for steel production, the Vitkovice steel plant being one of the largest. Kaolin production was concentrated in the Karlovy Vary area and in West Bohemia. Magnesite was produced at six mines in Slovakia.

Table 1.—Czechoslovakia: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984[p]	1985[e]
METALS					
Aluminum:					
Alumina	90,000	80,000	80,000	85,000	85,000
Aluminum ingot, primary only	32,684	33,830	36,156	31,635	32,000
Antimony, mine output, metal content	730	700	900	1,000	1,000
Copper:					
Mine output, metal content	9,200	9,300	9,800	10,000	10,300
Metal:					
Smelter, primary only	8,000	10,800	10,000	10,000	10,200
Refined including secondary	25,513	25,636	25,746	26,068	26,500
Iron and steel:					
Iron ore:					
Gross weight thousand tons	1,935	1,861	1,903	1,869	1,900
Metal content do.	502	483	490	481	490
Metal:					
Pig iron do.	9,393	9,525	9,466	9,561	[2]9,562
Ferroalloys: Electric furnace do.	173	164	162	151	155
Steel, crude do.	15,270	14,992	15,024	14,831	[2]15,036
Semimanufactures do.	12,323	12,185	12,254	12,431	12,700
Lead:					
Mine output, metal content	3,400	3,132	3,162	3,078	3,200
Metal including secondary	20,663	21,071	21,030	21,134	21,500
Manganese ore, gross weight[e] [3]	900	900	900	900	950
Mercury 76-pound flasks	4,438	4,380	4,177	4,409	4,400
Nickel metal, primary[e]	[r]1,600	[r]1,500	[r]3,000	[r]4,500	4,500
Silver thousand troy ounces	1,125	1,061	964	1,029	1,000
Tin:					
Mine output, metal content	[r]300	200	200	200	200
Metal including secondary	289	295	307	425	430
Tungsten: Mine output, metal content[e]	50	50	50	50	50
Zinc:					
Mine output, metal content	6,790	6,929	7,064	7,185	7,300
Metal including secondary	9,004	9,184	[e]9,100	[e]9,100	9,250
INDUSTRIAL MINERALS					
Barite[e]	61,000	61,000	60,000	60,000	60,000
Cement, hydraulic thousand tons	10,646	10,325	10,498	10,530	[2]10,265
Clays: Kaolin do.	508	527	662	668	650
Fluorspar[e] do.	96	96	96	96	95
Graphite[e] do.	50	50	50	50	60
Gypsum and anhydrite, crude do.	767	794	848	842	850
Lime, hydrated and quicklime do.	3,234	3,088	3,100	3,117	[2]3,227
Magnesite, crude do.	664	672	662	660	670
Nitrogen: N content of ammonia[e] do.	850	850	850	850	860
Perlite	42,336	45,667	44,019	[e]44,000	44,000
Pyrite, gross weight[e] thousand tons	140	140	140	140	145
Salt do.	311	327	240	243	245

See footnotes at end of table.

Table 1.—Czechoslovakia: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984[p]	1985[e]
INDUSTRIAL MINERALS —Continued					
Sodium compounds, n.e.s.:					
Caustic soda ---------- thousand tons--	331	325	332	329	330
Carbonate, manufactured --------do----	118	106	95	101	100
Stone:					
Limestone and other calcareous stone -do----	24,155	23,818	23,519	23,684	23,600
Quarry stone, not further described thousand cubic meters--	36,220	32,988	32,844	32,274	32,500
Sulfur:[e]					
Native -------------- thousand tons--	5	5	5	5	6
From pyrites ----------------do----	60	60	60	60	62
Byproducts, all sources ----------do----	10	10	10	10	12
Total -----------------do----	75	75	75	75	80
Sulfuric acid ----------------do----	1,317	1,252	1,244	1,246	1,250
MINERAL FUELS AND RELATED MATERIALS					
Coal:					
Bituminous -----------------do----	27,007	27,059	26,437	25,947	[2]26,223
Brown and lignite -------------do----	96,365	98,944	102,416	104,743	[2]100,387
Coke:					
Metallurgical----------------do----	8,575	8,670	8,529	8,211	8,200
Unspecified------------------do----	1,748	1,896	1,811	2,091	1,900
Fuel briquets from brown coal--------do----	1,069	1,111	1,104	1,069	1,100
Gas:					
Manufactured, all types - million cubic feet--	268,639	275,737	268,532	271,710	272,000
Natural, marketed[e 4] -----------do----	26,000	26,000	26,000	[r]24,500	24,500
Petroleum:					
Crude:					
As reported -------- thousand tons--	89	89	93	91	90
Converted - thousand 42-gallon barrels--	603	603	629	629	602
Refinery products:					
Gasoline, motor-------------do----	12,775	11,680	12,775	NA	NA
Jet fuel------------------do----	--	2,555	2,920	NA	NA
Kerosene-----------------do----	3,650	--	--	NA	NA
Distillate fuel oil (including diesel) do----	30,295	28,470	27,375	NA	NA
Residual fuel oils -----------do----	60,225	50,370	49,640	NA	NA
Lubricants (including greases) ---do----	2,555	2,555	2,555	NA	NA
Other --------------------do----	9,490	8,030	8,395	NA	NA
Refinery fuel and losses -------do----	17,520	13,870	9,125	NA	NA
Total ---------------do----	[r]136,510	117,530	112,785	[e]125,000	127,500

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.

[1]Table includes data available through June 30, 1986. In addition to the commodities listed, arsenic, feldspar, gold, uranium, and a variety of other petroleum products are produced, but information is inadequate to make reliable estimates of output levels.

[2]Reported figure.

[3]This material, although reported as manganese ore, is believed to be manganiferous iron ore with a manganese content of about 17% and as such is not equivalent to material ordinarily reported as manganese ore, which generally contains 25% or more manganese.

[4]Includes gas produced from coal mines. Gross output of natural gas is not reported, but it is believed to exceed reported marketed output by a relatively inconsequential amount.

TRADE

The planned goals in foreign trade, chiefly increases in the proportion of trade with Council for Mutual Economic Assistance (CEMA) countries and in exports of manufactured goods, were reportedly carried out during 1985. The trade turnover was higher than included in the state plan. Trade with CEMA countries showed higher volumes of both imports and exports. CEMA countries demanded more exports than had been foreseen, but imports were less than expected. Total foreign trade increased in value by 5.3%. Trade with the U.S.S.R. increased 4.7% and accounted for nearly 45% of the total. The U.S.S.R. remained Czechoslovakia's sole supplier of natural gas and nitrogen fertilizer and supplied the vast majority of petroleum, iron ore, pig iron, nonferrous metals, ferroalloys, manganese, and chromium ore imports. The value of fuels, mineral raw materials, and metals amounted to about 16% of all exports and nearly 50% of imports.

Table 2.—Czechoslovakia: Apparent exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS				
Aluminum:				
Ash and residue containing aluminum	2,813	1,202	--	All to West Germany.
Metal including alloys:				
Scrap	189	226	--	Do.
Unwrought	21,588	18,174	--	Japan 12,701; West Germany 2,661; Poland 2,292.
Semimanufactures	2,762	2,455	--	Poland 1,980; Hungary 398; Sweden 31.
Copper:				
Ore and concentrate	1,000	1,040	--	All to United Kingdom.
Oxides and hydroxides	--	502	--	Italy 480; Sweden 22.
Sulfate	3,946	3,978	--	West Germany 2,614; France 662; Austria 192.
Ash and residue containing copper	--	300	--	All to West Germany.
Metal including alloys:				
Scrap	930	685	--	West Germany 484; Austria 138; Sweden 63.
Semimanufactures	31	223	59	Yugoslavia 152; Italy 11.
Iron and steel: Metal:				
Scrap	124,437	185,774	--	Italy 95,700; Austria 47,784; Yugoslavia 25,119.
Pig iron, cast iron, related materials	2,394	2,016	--	West Germany 823; Sweden 702.
Ferroalloys:				
Ferrochromium	3,671	3,420	--	Austria 2,760; West Germany 496.
Ferromolybdenum	46	12	--	All to Sweden.
Ferrosilicomanganese	15,653	9,787	--	All to West Germany.
Ferrosilicon	347	1,299	--	West Germany 1,262.
Silicon metal	1	--		
Unspecified	6,302	7,002	--	Austria 3,405; United Kingdom 2,096; Italy 1,360.
Steel, primary forms[2] thousand tons	270	437	--	Yugoslavia 301; Bulgaria 43; Italy 23.
Semimanufactures:				
Bars, rods, angles, shapes, sections do	1,319	1,361	21	West Germany 153; unspecified 855.
Universals, plates, sheets do	974	1,018	32	Yugoslavia 330; West Germany 150; Austria 81.
Hoop and strip do	156	154	--	West Germany 15; Yugoslavia 15; unspecified 109.
Rails and accessories do	30	31	--	NA.
Wire do	138	134	--	West Germany 25; Hungary 12; unspecified 79.
Tubes, pipes, fittings[2] do	718	701	4	U.S.S.R. 432; Hungary 68; Poland 40;
Castings and forgings, rough do	25	22	--	Poland 4; unspecified 17.
Lead:				
Ore and concentrate	5,692	5,757	--	All to West Germany.
Metal including alloys:				
Scrap	198	254	--	All to Austria.
Unwrought	--	109	--	All to France.
Manganese: Ore and concentrate, metallurgical-grade	--	1	--	Do.
Nickel:				
Oxides and hydroxides	40	20	--	All to West Germany.
Metal including alloys, unwrought	[3]600	4	--	All to Netherlands.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$153	$286	--	West Germany $274; United Kingdom $12.
Rare-earth metals including alloys, all forms	--	45	--	All to Austria.
Silver:				
Waste and sweepings value, thousands	[4]$413	$150	--	All to West Germany.
Metal including alloys, unwrought and partly wrought do	$41	$550	--	United Kingdom $509; West Germany $41.
Titanium: Oxides	3,432	2,432	--	Italy 1,041; West Germany 674; United Kingdom 497.
Tungsten: Metal including alloys, semimanufactures	--	2	--	All to Yugoslavia.
Zinc:				
Ore and concentrate	14,938	14,441	--	Yugoslavia 12,044; West Germany 1,725.
Oxides	1,678	1,270	--	Yugoslavia 1,160; West Germany 70.
Ash and residue containing zinc	4,723	4,096	--	All to West Germany.
Metal including alloys:				
Scrap	180	147	--	Do.
Semimanufactures	1,271	2,836	--	Yugoslavia 2,830.

See footnotes at end of table.

Table 2.—Czechoslovakia: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued				
Other:				
Ores and concentrates	1,234	NA		
Oxides and hydroxides	30	116	--	Yugoslavia 59; Italy 38; Netherlands 10.
Ashes and residues	1,514	5,706	--	Austria 5,573; United Kingdom 121.
Base metals including alloys, all forms	11	7	--	All to Yugoslavia.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	20	2	--	All to Austria.
Artificial:				
Corundum	4,651	4,922	--	Italy 2,864; West Germany 871; Belgium-Luxembourg 400.
Silicon carbide	791	584	--	West Germany 570; Switzerland 14.
Dust and powder of precious and semiprecious stones including diamond value, thousands	$2	$4	--	All to Sweden.
Grinding and polishing wheels and stones	383	534	NA	Italy 149; Yugoslavia 104; West Germany 87.
Asbestos, crude	--	50	--	All to Turkey.
Barite and witherite	1,994	2,030	--	All to Austria.
Cement[2] thousand tons	270	336	--	Hungary 113; West Germany 112; Yugoslavia 52.
Clays, crude:				
Bentonite	--	500	--	All to Norway.
Chamotte earth	115,816	117,335	--	Hungary 68,916; West Germany 23,607; Austria 1,991.
Fire clay	21,498	NA		
Kaolin[2]	390,000	389,000	--	West Germany 143,000; Poland 78,000; Yugoslavia 34,000.
Unspecified	144,734	150,028	--	West Germany 76,050; Hungary 58,411; Austria 14,125.
Diamond:				
Gem, not set or strung value, thousands	$5	NA		
Industrial stones do	--	$13	--	Switzerland $8; Belgium-Luxembourg $5.
Diatomite and other infusorial earth	2,396	3,062	--	All to Austria.
Feldspar, fluorspar, related materials	2,656	360	--	All to Yugoslavia.
Fertilizer materials:				
Crude, n.e.s	--	3,418	--	Austria 3,393; West Germany 25.
Manufactured:				
Ammonia	22,551	37,106	--	Austria 30,517; Yugoslavia 4,109; Switzerland 2,056.
Nitrogenous, N_2 content[5]	251,000	332,000	--	NA.
Potassic	208	49	--	All to Yugoslavia.
Unspecified and mixed	529	310	--	Yugoslavia 240; Denmark 48.
Graphite, natural	3,445	2,774	--	Poland 1,500; Yugoslavia 1,245; Italy 27.
Iodine	170	NA		
Lime	24,626	23,292	--	Hungary 17,393; West Germany 5,764.
Magnesium compounds: Magnesite[2] thousand tons	291	428	3	Hungary 85; Poland 72; East Germany 52.
Mica: Worked including agglomerated splittings	65	104	--	Yugoslavia 64; Italy 12; United Kingdom 12.
Nitrates, crude	--	20	--	All to Italy.
Pigments, mineral: Iron oxides and hydroxides, processed	1,245	1,277	--	Italy 1,004; Yugoslavia 239.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$31	$165	--	Hong Kong $106; Canada $56.
Synthetic do	$117	$72	--	Yugoslavia $58; Singapore $9.
Salt and brine	1,802	3,040	--	All to Hungary.

See footnotes at end of table.

Table 2.—Czechoslovakia: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Destinations, 1984: United States	Destinations, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Sodium compounds, n.e.s.: Carbonate, manufactured	[5]10,300	[5]9,300	--	West Germany 9,162.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	43,772	1,899	--	West Germany 1,652; Austria 154.
Worked	13,546	12,618	--	All to West Germany.
Gravel and crushed rock	10,581	9,617	--	West Germany 9,134; Poland 460.
Limestone other than dimension	23,031	26,775	--	All to West Germany.
Sand other than metal-bearing	269,000	278,637	--	Austria 159,970; Hungary 99,307; Yugoslavia 13,741.
Sulfur:				
Elemental:				
Crude including native and by-product	16,268	29,191	--	Austria 27,669; West Germany 1,468.
Colloidal, precipitated, sublimed	20	--		
Sulfuric acid	[5]10,500	[5]5,900	--	Austria 2,562; Yugoslavia 2,162.
Talc, steatite, soapstone, pyrophyllite	7,829	7,200	--	Poland 7,080; Yugoslavia 120.
Vermiculite, perlite, chlorite	1,359	NA		
Other:				
Crude	32,813	28,553	--	Hungary 16,725; Austria 7,444; West Germany 4,382.
Slag and dross, not metal-bearing	13,555	16,284	--	All to West Germany.
MINERAL FUELS AND RELATED MATERIALS				
Carbon black	43	94	--	West Germany 40; Turkey 29; Italy 24.
Coal:[2]				
Anthracite and bituminous thousand tons	2,928	2,672	--	Austria 762; East Germany 600; Hungary 348.
Lignite including briquets do.	2,679	2,644	--	West Germany 2,609.
Coke and semicoke[2] do.	1,247	1,312	--	East Germany 485; Austria 355; Hungary 195.
Gas, natural: Gaseous[5] million cubic feet	9,994	950	--	NA.
Peat including briquets and litter	--	35	--	NA.
Petroleum:				
Crude[5] thousand 42-gallon barrels	3,146	--		
Refinery products:				
Liquefied petroleum gas do.	977	972	--	West Germany 586; Italy 180; Austria 73.
Gasoline do.	[5]1,369	[5]901	--	West Germany 578; Austria 168; Netherlands 126.
Mineral jelly and wax do.	2	1	--	Mainly to Yugoslavia.
Kerosene and jet fuel do.	658	650	--	West Germany 326; Austria 201; Yugoslavia 104.
Distillate fuel oil do.	[5]5,491	[5]1,984	--	West Germany 1,125; Austria 576.
Lubricants do.	578	276	--	Austria 158; Yugoslavia 47; West Germany 19.
Residual fuel oil do.	2,954	3,701	--	Austria 1,975; West Germany 1,726.
Bitumen and other residues do.	15	20	--	Austria 19.

[p]Preliminary. NA Not available.
[1]Table prepared by Jozef Plachy. Owing to a lack of official trade data published by Czechoslovakia, this table should not be taken as a complete presentation of this country's mineral trade. Unless otherwise specified, these data have been compiled from various sources, which include United Nations information and data published by trading partner countries.
[2]Official trade statistics of Czechoslovakia.
[3]World Metal Statistics, World Bureau of Metal Statistics, London, United Kingdom.
[4]May include other precious metals.
[5]Statistical Yearbook of Members of the Council for Mutual Economic Assistance, Moscow, U.S.S.R.

Table 3.—Czechoslovakia: Apparent imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS				
Aluminum:				
Ore and concentrate[2] thousand tons	469	349	--	Hungary 270; Yugoslavia 54.
Oxides and hydroxides	19,907	10,646	2	Yugoslavia 10,462; West Germany 146.
Metal including alloys:				
Scrap	876	1,310	--	Austria 833; West Germany 461.
Unwrought[2] thousand tons	88	90	--	U.S.S.R. 72; Yugoslavia 9.
Semimanufactures	16,579	16,199	--	Yugoslavia 14,585; Hungary 912.
Antimony: Oxides	--	23	--	All from France.
Cadmium: Metal including alloys, all forms[2]	201	303	--	Finland 62; Bulgaria 54; Yugoslavia 27.
Chromium:				
Ore and concentrate[2] thousand tons	185	176	--	U.S.S.R. 130; Albania 11; Switzerland 4.
Oxides and hydroxides	576	880	--	U.S.S.R. 450; United Kingdom 413.
Cobalt:				
Oxides and hydroxides	--	1	--	All from United Kingdom.
Metal including alloys, all forms	19	NA		
Columbium and tantalum: Metal including alloys, all forms, columbium (niobium)	1	68	--	All from West Germany.
Copper:				
Ore and concentrate	6,945	NA		
Metal including alloys:				
Scrap	197	330	--	Do.
Unwrought[2] thousand tons	66	62	--	U.S.S.R. 38; Poland 7; United Kingdom 7.
Semimanufactures	20,174	18,810	--	Poland 14,449; Yugoslavia 3,538.
Gold: Metal including alloys, unwrought and partly wrought troy ounces	514	556	--	All from West Germany.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite[2] thousand tons	11,683	11,108	--	U.S.S.R. 9,561; Brazil 1,012; India 183.
Metal:				
Scrap do.	157	156	--	Norway 71; U.S.S.R. 52; West Germany 33.
Pig iron, cast iron, related materials[2] do.	780	745	--	U.S.S.R. 742.
Ferroalloys:				
Ferrochromium	1,207	1,037	--	All from West Germany.
Ferromanganese	695	NA		
Ferrosilicon	--	32	--	All from Norway.
Silicon metal	--	1,319	--	Do.
Unspecified	1,467	2,178	--	Sweden 1,167; United Kingdom 636; France 143.
Steel, primary forms	22,000	154,000	--	NA.
Semimanufactures:				
Bars, rods, angles, shapes, sections thousand tons	186	229	--	Hungary 29; Yugoslavia 15; unspecified 184.
Universals, plates, sheets do.	150	147	([3])	Bulgaria 13; Yugoslavia 8; unspecified 117.
Hoop and strip do.	22	22	--	West Germany 3; Hungary 3; unspecified 14.
Rails and accessories do.	3	4	--	NA.
Wire do.	3	3	--	Austria 1; West Germany 1; Yugoslavia 1.
Tubes, pipes, fittings do.	146	193	--	West Germany 124; Italy 26; Yugoslavia 3.
Castings and forgings, rough do.	16	14	--	NA.
Lead:				
Oxides	1,442	1,196	--	France 1,195.
Metal including alloys:				
Scrap	238	978	--	All from West Germany.
Unwrought[2] thousand tons	28	27	--	U.S.S.R. 9; Yugoslavia 8.
Semimanufactures	1	301	--	United Kingdom 300.
Magnesium: Metal including alloys:				
Scrap	4	7	--	All from West Germany.
Unwrought	--	44	--	All from Yugoslavia.
Semimanufactures	24	29	--	West Germany 28.
Manganese:				
Ore and concentrate, metallurgical-grade[2] thousand tons	506	482	--	U.S.S.R. 243; Bulgaria 36; India 29.
Metal including alloys, all forms	37	NA		

See footnotes at end of table.

Table 3.—Czechoslovakia: Apparent imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Mercury 76-pound flasks	1,218	261	--	All from Netherlands.
Molybdenum:				
Ore and concentrate	790	308	--	West Germany 197; Netherlands 111.
Metal including alloys, all forms	2	10	4	Switzerland 5; France 1.
Nickel:				
Matte and speiss, Ni content	976	1,616	--	All from Cuba.
Oxides and hydroxides	2,172	2,438	--	Do.
Metal including alloys:				
Unwrought[2]	8,060	6,483	--	U.S.S.R. 4,219; Cuba 1,029; United Kingdom 920.
Semimanufactures	47	52	--	West Germany 48; Switzerland 2.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$188	$205	--	United Kingdom $109; West Germany $95.
Silver: Metal including alloys, unwrought and partly wrought do	$4,751	$6,230	--	Yugoslavia $6,206; Switzerland $15.
Tin: Metal including alloys, unwrought[2]	2,933	2,896	--	Bolivia 1,322; Indonesia 600; Malaysia 476.
Titanium:				
Ore and concentrate	--	70,569	--	All from Norway.
Oxides	680	555	--	West Germany 344; United Kingdom 211.
Metal including alloys, all forms	--	4		All from West Germany.
Tungsten:				
Ore and concentrate	34	40	--	All from Netherlands.
Metal including alloys, all forms	1	1	([3])	Japan 1.
Vanadium: Oxides and hydroxides	42	NA		
Zinc:				
Ore and concentrate	120	90		All from United Kingdom.
Oxides	90	NA		
Metal including alloys:				
Scrap	100	--		
Unwrought[2] thousand tons	56	59	--	Yugoslavia 13; Bulgaria 11; Finland 11.
Semimanufactures	6,960	6,287	--	Yugoslavia 5,052; Poland 1,226.
Zirconium: Ore and concentrate	2,208	1,577	--	All from West Germany.
Other:				
Ores and concentrates	60,614	414	--	Belgium-Luxembourg 294; Italy 120.
Oxides and hydroxides	577	3,486	--	Austria 2,499; Sweden 971.
Ashes and residues	--	1,893	--	Italy 1,441; Belgium-Luxembourg 404.
Base metals including alloys, all forms	34	77	--	France 30; Yugoslavia 27; Australia 19.
Nonferrous metals and alloys, rolled[2]	9,000	10,000	--	All from U.S.S.R.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	444	281	--	Italy 261; West Germany 20.
Artificial:				
Corundum	2,805	2,108	--	Hungary 1,560; Yugoslavia 49; West Germany 35.
Silicon carbide	293	291	--	Italy 290.
Dust and powder of precious and semiprecious stones including diamond value, thousands	$125	$711	$6	Switzerland $705.
Grinding and polishing wheels and stones	520	709	--	West Germany 302; Italy 179; Austria 116.
Asbestos, crude[2]	41,681	45,335	--	U.S.S.R. 32,587; Canada 5,183; Republic of South Africa 3,514.
Barite and witherite	45	85	--	All from West Germany.
Boron materials:				
Crude natural borates	3,500	7,260	--	All from Netherlands.
Oxides and acids	2,943	2,625	--	Italy 1,971; France 653.
Cement[2] thousand tons	187	178	--	East Germany 113; U.S.S.R. 57.
Chalk	1,543	1,473	--	Belgium-Luxembourg 685; France 524; Austria 264.
Clays, crude:				
Chamotte earth	1,441	752	--	Poland 749.
Kaolin	7,008	5,320	--	Hungary 5,280.
Unspecified	538	227	--	West Germany 200; Netherlands 27.

See footnotes at end of table.

Table 3.—Czechoslovakia: Apparent imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Diamond:				
Gem, not set or strung value, thousands	$76	$36	--	All from Belgium-Luxembourg.
Industrial stones do	$1,470	$1,664	--	Belgium-Luxembourg $897; Switzerland $711.
Diatomite and other infusorial earth	2,464	2,652	--	Iceland 2,151; Austria 296; France 172.
Feldspar, fluorspar, related materials	938	160	--	West Germany 144.
Fertilizer materials:				
Crude, n.e.s	--	14,799		All from Austria.
Manufactured:				
Ammonia	268	4	--	All from Belgium-Luxembourg.
Nitrogenous, N_2 content[2] thousand tons	133	175	--	U.S.S.R. 174.
Phosphatic, P_2O_5 content do	[4]149	[4]127	11	Yugoslavia 16; unspecified 100.
Potassic, K_2O content[2] do	580	556	--	East Germany 413; U.S.S.R. 143.
Unspecified and mixed	([3])	18	--	All from Austria.
Graphite, natural	521	331	--	West Germany 169; Japan 162.
Gypsum and plaster[2] thousand tons	21	24	--	East Germany 23.
Iodine	--	15	--	Japan 13; Netherlands 2.
Lime	--	28	--	All from West Germany.
Magnesium compounds:				
Oxides and hydroxides	497	856	--	Austria 398; France 378.
Other	1,181	23	--	Netherlands 22.
Mica:				
Crude including splittings and waste	10	54	--	Austria 30; France 24.
Worked including agglomerated splittings	12	8	--	Austria 7.
Nitrates, crude	807	1,067	--	All from Bulgaria.
Phosphates, crude, P_2O_5 content[2] thousand tons	281	276	--	U.S.S.R. 169; Jordan 41; Morocco 29.
Pigments, mineral:				
Natural, crude	22	38	--	All from France.
Iron oxides and hydroxides, processed	1,083	1,098	--	West Germany 1,056; Belgium-Luxembourg 22.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$51	$46	--	West Germany $37; France $6.
Synthetic do	$58	$22	--	All from Switzerland.
Pyrite, unroasted	40	124	--	All from Italy.
Salt and brine	140,149	120,358	--	U.S.S.R. 120,340.
Sodium compounds, n.e.s.: Carbonate, manufactured[2] thousand tons	174	175	--	East Germany 72; Bulgaria 42; Poland 42.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	10,614	15,961	--	Yugoslavia 14,418; Hungary 1,480.
Worked	5,495	2,865	--	Yugoslavia 2,663; Italy 182.
Dolomite, chiefly refractory-grade	1,988	339	--	Poland 273; West Germany 66.
Gravel and crushed rock	1,069	2,028	--	France 1,821; Austria 111; Italy 96.
Quartz and quartzite	1,032	1,027	--	West Germany 977; Italy 50.
Sand other than metal-bearing	676	377	--	Belgium-Luxembourg 230; West Germany 147.
Sulfur:				
Elemental:				
Crude including native and byproduct[2] thousand tons	525	469	--	All from Poland.
Colloidal, precipitated, sublimed	--	80	--	France 60; Italy 20.
Dioxide	425	282	--	All from West Germany.
Sulfuric acid[2]	61,270	66,845	--	U.S.S.R. 60,334; East Germany 6,511.
Talc, steatite, soapstone, pyrophyllite	883	699	--	Austria 364; West Germany 225; Norway 72.
Other:				
Crude	8,691	6,334	--	Hungary 5,129; West Germany 1,030.
Slag and dross, not metal-bearing	168	81	--	Netherlands 73.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	60	63	--	All from West Germany.
Carbon black[2]	17,961	14,606	--	U.S.S.R. 9,917; Romania 2,389; West Germany 784.
Coal:[2]				
Anthracite and bituminous thousand tons	5,028	4,565	--	U.S.S.R. 3,115; Poland 1,421.
Lignite including briquets do	676	708	--	All from East Germany.

See footnotes at end of table.

Table 3.—Czechoslovakia: Apparent imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Sources, 1984: United States	Sources, 1984: Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Gas, natural: Gaseous million cubic feet	327,367	371,367	--	Mainly from U.S.S.R.
Peat including briquets and litter	--	51		All from United Kingdom.
Petroleum:				
Crude thousand 42-gallon barrels	125,685	126,420	--	Mainly from U.S.S.R.
Refinery products:				
Liquefied petroleum gas do	9	6	--	West Germany 5.
Gasoline do	[4]3,613	[4]4,318	--	Mainly from U.S.S.R.
Mineral jelly and wax do	9	10	--	West Germany 7; Yugoslavia 2.
Kerosene and jet fuel do	65	50	--	West Germany 45; Italy 2.
Distillate fuel oil do	[4]1,223	[4]141	--	Mainly from U.S.S.R.
Lubricants do	227	[4]65	(3)	West Germany 12; Austria 8; unspecified 32.
Residual fuel oil do	(3)	62	--	West Germany 61.
Petroleum coke do	23	16	--	All from West Germany.
Unspecified do	648	503	--	NA.

[p]Preliminary. NA Not available.
[1]Table prepared by Jozef Plachy. Owing to a lack of official trade data published by Czechoslovakia, this table should not be taken as a complete presentation of this country's mineral trade. Unless otherwise specified, these data have been compiled from various sources, which include United Nations information and data published by the trading partner countries.
[2]Official trade statistics of Czechoslovakia.
[3]Less than 1/2 unit.
[4]Statistical Yearbook of Members of the Council for Mutual Economic Assistance, Moscow, U.S.S.R.

COMMODITY REVIEW

METALS

Copper.—In the course of prospecting for uranium near Novoveska Huta in the county of Spisska Nova Ves, a copper deposit was discovered. The deposit was estimated to include about 5.1 million tons of reserves at an average copper content of 1.11%. These reserves were established by means of borehole drilling and included some regions not economically feasible for immediate exploitation. Further exploration was continuing in the area.

Gallium.—The Slovak National Uprising plant Ziar nad Hronom, East Slovakia, announced expansion plans designed to increase production fivefold by 1992. The facility has been operating since 1975. It has produced gallium arsenide for laser applications and semi-isolation gallium for replacement of silicon in rapid integrated circuits. Some of the gallium arsenide has also been used for the production of photoelectric solar cells.

Gold.—Ten gold prospects have been discovered since 1980 in North Moravia between Olomouc and the Polish border as part of large polymetallic deposits. One of these will be thoroughly investigated by state geologists during 1986, it was announced. Plans to resume gold mining at the Celina Morkrsko open pit mine in Central Bohemia were also disclosed. The mine, which has been closed since the 1960's, will be reopened by 1990. About 60 tons of gold metal reportedly can be effectively recovered at current prices. Mining will also be reinstated in the central region of the Vultana River Basin and in South Bohemia. The hydrometallurgical plant now under construction at Zlate Hory near Jesenik in North Moravia will recover byproduct gold when it opens in 1989.

Iron and Steel.—The No. 6 blast iron furnace at the Great October Socialist Revolution enterprise in Trinec, North Moravia, was reconstructed and modernized during 1985. The work, begun in August and completed in late November, was intended to improve furnace efficiency and working conditions. The modernization included installation of Soviet "Kiev" and Czechoslovak "Tesla" computers. Several Polish enterprises were involved in the renovation. The furnace had been in operation since 1973 and had produced a total of 9 million tons of pig iron. A contract was signed in November for the import of Soviet iron ore worth R247 million[6] during 1986. This ore will be used at the Klement Gottwald iron and steel enterprise at Kuncice, which has imported 300 million tons of Soviet ore since it opened. At the East Slovakia steelworks in Kosice, 200,000 tons of tinplate was produced in 1985. Of this total, 160,000 tons was electroplated, while the remaining 40,000 tons was hot-dipped. The Kovosrot Brno State Enterprise purchased a new continuous detinning facility from Vulcan Materials Co. of the United Kingdom for recycling tinplate scrap. The plant, based on technology developed by Wellman Process Engineering Ltd. of the United Kingdom, has a capacity of 30,000 tons of scrap annually. It is able to recover high-grade tin ingots and detinned steel plate for further processing.

Nonferrous Metals.—Construction of a new ore processing plant in Bruntal began in 1985. The plant, estimated to cost Kcs1.17 billion,[7] will annually process 60,000 tons of complex base metal concentrates from many domestic sources containing copper, lead, zinc, and other trace and rare elements. In addition, the facility will treat scrap metal of various types. This installation will save Czechoslovakia about Kcs700 million in convertible currencies per year, as the country has been dependent on market economy countries for its supply of nonferrous metals. The first stage of construction is scheduled for completion in March 1989, with the tungsten, nickel, and cadmium production circuits the first to go on-stream. The entire plant is scheduled to be operational during the third quarter of 1990. Discoveries of polymetallic base metal ores were made in North Moravia near Olomouc and near Kruzanovice in the Zelezne Hory Mountains in 1985.

INDUSTRIAL MINERALS

Clays.—*Bentonite.*—Bentonite was reportedly discovered in West Bohemia. Reserves of this deposit were estimated as 63 million tons. In 1985, Czechoslovakia consumed 150,000 tons, compared with a consumption of 55,000 tons in 1970.

China Clay.—Deposits of china clay sufficient to extend reserves 100 years were discovered in the Karlovy Vary and Plzen Districts.

Kaolin.—A survey by state geologists completed during 1985 demonstrated a 200-year reserve base at present domestic and export demand levels.

Graphite.—An advanced method of processing graphite allowing a significant increase in the production of high-quality (99.5% carbon), lubricant-grade graphite from domestic sources was reportedly introduced at the Tyn nad Vltavou chemical treatment plant. Details of the process were not disclosed. As a result, the reported exports to market economy countries increased by one-third and those to Hungary also increased.

Magnesite.—Six magnesite mines remained in operation during the year. These enterprises employed about 36,500 people, and the value of their total output was about Kcs6.2 billion. Projections were made for continued growth in the magnesite industry through the year 2000.

MINERAL FUELS

Coal.—Total production of bituminous coal and lignite in 1985 was slightly more than provided for in the state plan, but decreased slightly from 1984 production levels. Czechoslovakia's reserves of brown coal (high-grade lignite) amounted to about 2.8 billion tons, with another 1.9 billion tons expected to become available through new developments. The bituminous reserve base was about 2.7 billion tons. In addition to the coal mined domestically, Czechoslovakia imported over 5 million tons of bituminous coal: about 3 million tons from the U.S.S.R. and about 2 million tons from Poland. A small quantity of brown coal briquets was also imported, mostly from the German Democratic Republic. The start of bituminous coal production from the 592-million-ton Frenstat East deposit in North Moravia was delayed because of environmental concerns.

Additional lignite and brown coal mines were being developed to add nearly 5 million tons per year production capacity.

Natural Gas.—Czechoslovakia's natural gas reserves were estimated at 350 billion cubic feet. From these reserves, nearly 25 billion cubic feet was produced in 1985. Promising results were obtained from exploration carried out in South Moravia and in southern and eastern Slovakia. Plans called for increasing the use of natural gas to replace manufactured coal gas in residential and industrial uses. These plans relied on the quantities of natural gas that will be obtained from Soviet pipelines, which remained under construction during the year.

Nuclear Power.—The commissioning of nuclear powerplants in Jasolvke Bohunice and Dukovany increased the output of nuclear-generated power by 52.7%. With these plants on-line, nuclear power reached a 14.6% share of the total electrical power generation. Hydroelectric power generation increased by 34.5%. These increases made it possible to decrease the output of fossil fuel-fired thermal plants by 5.4%.

Petroleum.—Production of crude petroleum remained at an insignificant level of about 2,000 barrels per day. This compared with consumption of nearly 330,000 barrels per day in 1985. Czechoslovakia's reserves were estimated to be 20 million barrels, situated primarily in small fields.

Uranium.—A program of continued exploration and development was also being carried out under the jurisdiction of Uranium Exploration Liberec. The main areas of future study were to be concentrated in West and South Bohemia and West Moravia. Several areas of mining were already in full production during the year. In Moravia, the Dolni Rozinka Mines were producing uranium from the Rozna deposit. The deposit was to be mined to a depth of 900 meters by block-caving and from 900 to 1,200 meters by selective mining methods to be determined by local geologic and tectonic conditions.

In West Bohemia, several uranium mines were operating near Zadni Chadov. The Vitkov II deposit was mined at a depth of 700 meters, and it was planned that the mine would eventually reach 950 meters. The Zadni Chadov deposit was mined at a depth of 1,100 meters; Okrouha Rodoun, in the county of Jindrichuv Hradec, at 400 meters; and Dylen, in Cheb, was mined at 860 meters depth.

The uranium mines at Pribram in Central Bohemia, which were the first to open in Czechoslovakia, continued to operate during 1985. The deposit was in metamorphic rock and was of the vein type. It was being mined at 1,300 meters. Geological studies indicated that the mining could be extended to a depth of 1,400 to 1,450 meters. A selective mining method, based on a modified retreat system, was being employed in the deposit. Punch mining and other selective methods were also being used. In the past, unusual trackless extraction methods have made up the basis of secondary extraction. The procedure of washing the ore near the primary and secondary mining areas has served to identify major minerals and to provide data for processing models and practice.

In addition to the producing mining areas, several mines were being developed in North Bohemia in 1985. The Hamr I mine was being developed using room-and-pillar mining in a 1.6-meter-thick sedimentary deposit lying at a depth of 300 meters. The Krizany I Mine was being driven using an open-stoping method for large deposit thicknesses and a room-and-pillar method for thicknesses of about 1.6 meters. The Hamr II Mine was also under construction. Geological investigation was continuing to establish the best method of mining this deposit. The Straz deposit was being readied for in situ leaching. The important considerations for this technology were the control of leach solution acidity and temperature and the contact time with the ore.

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[1]Physical scientist, Division of International Minerals.
[2]Rude Pravo. Jan. 25, 1986, p. 1.
[3]Statisticka Rockenko 1985. P. 363.
[4]Page 359 of work cited in footnote 3.
[5]Work cited in footnote 2.
[6]The Soviet ruble (R) is not convertible to U.S. dollars, and as such, values are expressed in rubles. The official exchange rate does not reflect comparative values of the two currencies.
[7]The Czechoslovak koruna (Kcs) is not convertible to U.S. dollars, and as such, values are expressed in korunas. The official exchange rate does not reflect comparative values of the two currencies.

The Mineral Industry of Denmark and Greenland

By Richard H. Singleton[1]

DENMARK

Denmark has no commercial metallic ore deposits. Known reserves of a few low-unit-value nonfuel mineral commodities include clays, diatomaceous earth and moler, limestone, peat, salt, and sand and gravel. Significant petroleum resources exist, particularly in the North Sea. Denmark was not a significant producer of mineral commodities for export in 1985 and imported about one-half of its consumption of these materials.

Lead production in Denmark was seriously curtailed by closure of the country's secondary lead plant. Production of steel semimanufactures increased somewhat as a result of improved market conditions and an increase in the European Economic Community (EEC) sales quota for steel plate. Denmark's large fertilizer company suffered greatly reduced profits because of heavy losses in its U.S. fertilizer operations.

Denmark continued to become less dependent on mineral fuel imports as its production of North Sea oil and gas increased. A gas pipeline to Sweden was completed. The pipeline network for domestic natural gas distribution was almost completed as homes and businesses began converting from oil to gas for space heating and the electrical power industry began to substitute gas for coal in some power stations. Parliament called for a complete cessation of coal imports from the Republic of South Africa. North Sea drilling activity was heavy for oil and gas field delineation and reserve estimation as well as for development of production capabilities. Exploration completed in Denmark's first formal round of licensing yielded no new discoveries. Bidding for the second round closed, but licensees had not yet been selected.

Denmark's economic policies continued to be successful in most areas. Business investment and employment were up sharply; the inflation rate increase continued to be dampened, to 4.7%; and interest rates decreased. The 2.7% growth in gross domestic product, although lower than the 3.9% increase in 1984, reflected a 7.5% expansion in the construction industry and a 4.5% growth in manufacturing. However, the annual balance-of-payments deficit increased to $2.6 billion[2] compared with $1.7 billion in 1984. Exports decreased, partly because of spring strikes caused by disagreements over wages and working hours. Imports increased largely owing to an increase in personal buying power, which caused an increase in demand for consumer goods. The country's total cumulative debt had increased to $23 billion compared with $17 billion in 1983.

PRODUCTION

Output of North Sea gas and crude petroleum increased significantly. Significant decreases occurred in the production of secondary lead, and sulfur.

Table 1.—Denmark: Sales of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984	1985[p]
Cement, hydraulic thousand tons	1,602	1,770	1,657	1,668	1,739
Clays:					
Kaolin	[e]10,000	4,996	[e]10,000	[e]14,000	[e]15,000
Other	20,525	4,514	[r] [e]4,500	4,168	4,686
Cryolite	NA	12,500	26,100	19,700	19,000
Diatomaceous materials:					
Diatomite	3,465	3,903	[e]6,000	[r] [e]12,000	[e]5,000
Moler	63,406	70,484	[e]65,000	63,745	72,029
Gas, natural: Marketed million cubic feet	--	--	--	7,800	31,000
Iron and steel:[2]					
Iron ore (less than 42% Fe):					
Gross weight thousand tons	8	8	--	--	--
Metal content of ore do	3	3	--	--	--
Steel, crude do	612	560	493	548	530
Semimanufactures do	560	467	410	467	511
Lead metal including alloys, secondary[3]	24,030	15,927	10,052	13,019	4,503
Lime, hydrated and quicklime thousand tons	99	100	108	124	125
Nitrogen: N content of ammonia	31,200	30,700	11,700	[e]15,000	[e]15,000
Peat thousand tons	33	36	[e]34	31	36
Petroleum:[2]					
Crude thousand 42-gallon barrels	5,815	12,721	[e]15,800	16,975	21,828
Refinery products:					
Gasoline do	9,852	8,475	10,548	10,438	9,800
Jet fuel do	48	176	264	664	1,070
Kerosene do	101	233	333	1,077	1,180
Distillate fuel oil do	19,926	19,389	22,358	23,350	21,600
Residual fuel oil do	11,995	12,334	13,740	14,486	12,800
Other do	3,095	4,124	4,494	5,166	4,830
Refinery fuel and losses do	2,287	2,430	2,602	2,670	2,460
Total do	47,304	47,161	54,339	57,851	53,740
Salt[2] thousand tons	398	[r]447	[r]407	523	532
Sand and gravel thousand cubic meters	5,846	5,819	[e]6,000	7,076	8,006
Sodium carbonate	149	119	144	126	114
Stone:					
Crushed:					
Flint thousand cubic meters	[e]70	[e]75	[e]60	47	54
Limestone:					
Agricultural thousand tons	1,611	2,164	[e]2,200	2,163	1,882
Industrial do	200	144	[e]140	145	142
Chalk do	112	154	[e]180	220	203
Other thousand cubic meters	948	893	[e]1,000	1,183	1,275
Dimension (mostly granite) do	60	55	[e]100	154	156
Sulfur, byproduct	5,575	7,421	[e]9,000	10,859	5,575

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through May 30, 1986.
[2]Data represent production.
[3]Includes antimonial lead.

TRADE

Noteworthy increases in imports of unwrought aluminum and copper semimanufactures occurred in 1984; net imports of each item approximately doubled in the 3-year period ending in 1984. Denmark changed from a net exporter of unwrought lead in 1981 to a net importer in 1983 and 1984. Exports of chalk increased significantly in 1983 and 1984, as did production. Both ammonia and nitrogenous fertilizer imports increased significantly in 1984 as did imports of cryolite. Denmark became for the first time a net exporter of natural gas in 1984, essentially all to the Federal Republic of Germany.

Table 2.—Denmark: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS				
Aluminum:				
Ore and concentrate	414	3,089	--	All to Sweden.
Oxides and hydroxides	167	192	51	United Kingdom 52; Sweden 51.
Ash and residue containing aluminum	30	89	--	NA.
Metal including alloys:				
Scrap	15,002	15,726	--	West Germany 11,157; Netherlands 1,647; Norway 1,385.
Unwrought	8,986	9,733	--	West Germany 4,698; Belgium-Luxembourg 2,260; Sweden 836.
Semimanufactures	24,636	28,459	240	Sweden 9,181; West Germany 6,824; United Kingdom 5,138.
Cadmium: Metal including alloys, all forms	1	1	NA	NA.
Chromium:				
Oxides and hydroxides	8	3	--	Sweden 2.
Metal including alloys, all forms	1	7	NA	Sweden 6.
Cobalt: Oxides and hydroxides	([3])	6	--	All to Netherlands.
Columbium and tantalum: Metal including alloys, all forms, tantalum	--	1	--	All to Spain.
Copper:				
Matte and speiss including cement copper	5	--		
Oxides and hydroxides	4	8	--	Ecuador 7.
Sulfate	20	9	NA	NA.
Ash and residue containing copper	1,022	1,470	--	West Germany 774; Sweden 200; Finland 107.
Metal including alloys:				
Scrap	15,707	14,458	--	West Germany 12,243; Belgium-Luxembourg 672.
Unwrought	1,894	3,841	--	Sweden 1,708; West Germany 1,553; Norway 298.
Semimanufactures	3,661	3,746	7	West Germany 1,212; United Kingdom 643; Ireland 612.
Gold:				
Waste and sweepings value, thousands	$9,079	$6,503	NA	Netherlands $2,173; France $1,831; West Germany $1,059.
Metal including alloys, unwrought and partly wrought troy ounces	6,655	10,499	NA	Netherlands 4,028; France 1,958; West Germany 1,521.
Iron and steel:				
Iron ore and concentrate, excluding roasted pyrite	11,565	6,647	54	United Kingdom 3,725; Netherlands 1,483; Belgium-Luxembourg 1,266.
Metal:				
Scrap	174,803	234,100	--	West Germany 203,702; Sweden 9,375.
Pig iron, cast iron, related materials	323	236	--	Sweden 146; West Germany 64.
Ferroalloys:				
Ferrosilicomanganese	1	--		
Ferrosilicon	--	27	--	All to West Germany.
Silicon metal	6	9	9	
Unspecified	--	2	--	NA.
Steel, primary forms	3,848	11,624	--	West Germany 4,696; Belgium-Luxembourg 2,938; France 2,754.
Semimanufactures:				
Bars, rods, angles, shapes, sections	70,598	87,661	150	Sweden 28,431; West Germany 27,884; United Kingdom 13,430.
Universals, plates, sheets	295,742	294,056	4,743	West Germany 91,473; Sweden 64,699; Norway 52,579.
Hoop and strip	23,406	22,290	([3])	Sweden 13,140; United Kingdom 4,773.
Rails and accessories	2,071	90	--	West Germany 77.
Wire	3,487	5,110	735	Sweden 1,496; West Germany 778.
Tubes, pipes, fittings	395,011	214,590	79	Norway 131,060; Sweden 43,067; West Germany 14,756.
Castings and forgings, rough	27,305	33,837	([3])	West Germany 14,392; Sweden 10,446; United Kingdom 3,797.
Lead:				
Ore and concentrate	220	--		
Oxides	20	10	--	Sudan 4; Ecuador 2; Kenya 2.
Ash and residue containing lead	1,127	1,071	--	West Germany 492; United Kingdom 20.

See footnotes at end of table.

Table 2.—Denmark: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued				
Lead —Continued				
Metal including alloys:				
Scrap	8,025	14,158	--	Sweden 6,661; West Germany 4,025; East Germany 3,234.
Unwrought	7,924	10,825	40	Norway 3,539; Japan 2,513; Sweden 1,951.
Semimanufactures	66	127	--	Sweden 42; West Germany 23; Norway 16.
Magnesium: Metal including alloys:				
Scrap	172	256	--	West Germany 224; Italy 32.
Unwrought	2	--		
Semimanufactures	6	2	--	Chile 1; West Germany 1.
Manganese: Oxides	3	37	27	United Arab Emirates 4; United Kingdom 3.
Mercury 76-pound flasks	145	220	20	United Kingdom 110; West Germany 64.
Molybdenum: Metal including alloys:				
Scrap	2	3	--	West Germany 2.
Unwrought	--	1	--	All to West Germany.
Nickel:				
Ash and residue containing nickel	77	465	--	West Germany 433.
Metal including alloys:				
Scrap	58	76	--	West Germany 35; United Kingdom 20.
Semimanufactures	7	1	--	Mainly to Iceland.
Platinum-group metals:				
Waste and sweepings value, thousands	$1,776	$1,154	--	West Germany $604; United Kingdom $276.
Metals including alloys, unwrought and partly wrought troy ounces	4,437	2,384	--	Sweden 1,448; Switzerland 367.
Silver:				
Waste and sweepings value, thousands	$9,905	$6,921	--	United Kingdom $3,304; France $1,769; Netherlands $1,201.
Metal including alloys, unwrought and partly wrought thousand troy ounces	1,104	1,470	NA	Sweden 1,012; Finland 274.
Tellurium, elemental and arsenic	5	(2)	NA	NA.
Tin:				
Ore and concentrate	27	--		
Ash and residue containing tin	859	678	--	All to United Kingdom.
Metal including alloys:				
Scrap	7	67	--	United Kingdom 39; West Germany 12.
Unwrought	1,191	1,822	193	Sweden 914; United Kingdom 178.
Semimanufactures	38	76	(2)	Norway 44; West Germany 20.
Titanium:				
Oxides	101	224	20	West Germany 71; United Kingdom 54.
Metal including alloys, all forms	4	9	--	United Kingdom 7; Sweden 2.
Tungsten: Metal including alloys:				
Scrap	5	22	--	All to West Germany.
Semimanufactures	(2)	2	--	West Germany 1.
Vanadium:				
Ash and residue containing vanadium	34	--		
Metal including alloys, all forms	5	--		
Zinc:				
Oxides	64	29	--	Yemen (Aden) 10; Malta 8.
Blue powder	319	132	13	West Germany 77; Saudi Arabia 10.
Matte	999	--		
Ash and residue containing zinc	723	1,387	--	Norway 872; West Germany 224; Belgium-Luxembourg 157.
Metal including alloys:				
Scrap	3,666	4,304	--	West Germany 2,214; Norway 1,368.
Unwrought	330	287	--	West Germany 137; Sweden 103.
Semimanufactures	r20	67	--	West Germany 48; Greenland 16.
Other:				
Ores and concentrates	438	580	--	Sweden 227; West Germany 207; Norway 105.
Oxides and hydroxides	2	1	--	All to Indonesia.
Ashes and residues	3,214	266	--	West Germany 185; Norway 29.

See footnotes at end of table.

Table 2.—Denmark: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	41	9	--	West Germany 6; Norway 1.
Artificial: Corundum	--	1	--	All to Sweden.
Grinding and polishing wheels and stones	2,370	1,347	2	Yemen (Sanaa) 284; Egypt 276; Ethiopia 253.
Asbestos, crude	9	1	--	NA.
Barite and witherite	77	19	--	Iceland 15; Ecuador 3.
Boron materials:				
Crude natural borates	--	6	--	Iceland 5.
Oxides and acids	24	5	--	Sweden 4.
Cement	416,650	388,566	43,288	Saudi Arabia 165,002; Kuwait 20,094; Sweden 14,871.
Chalk	46,829	80,280	451	Finland 64,381; Sweden 6,724; Norway 5,017.
Clays, crude:				
Bentonite	13	29	--	NA.
Chamotte earth	4	1,087	--	Sweden 1,042.
Kaolin	639	686	--	Sweden 331; Norway 57.
Unspecified	1,068	1,150	2	Sweden 440; Norway 277; West Germany 191.
Cryolite and chiolite	28,225	22,113	NA	NA.
Diamond:				
Gem, not set or strung ---- carats	320	399	--	Sweden 133; Belgium-Luxembourg 91; Norway 58.
Industrial stones ---- do	3	23	--	All to Belgium-Luxembourg.
Diatomite and other infusorial earth	65,458	67,880	--	West Germany 22,195; United Kingdom 13,950; Netherlands 11,129.
Feldspar	26	1	NA	NA.
Fertilizer materials:				
Crude, n.e.s	40	14	--	All to Netherlands.
Manufactured:				
Ammonia	574	655	--	Sweden 597; Angola 9.
Nitrogenous	79	36	--	Greenland 11; Iceland 11.
Phosphatic	34,379	79,206	--	Sweden 280; undetermined 78,661.
Potassic	29	34	--	Sweden 22; Libya 12.
Unspecified and mixed	456,246	478,810	25	Sweden 1,155; Finland 502; undetermined 476,900.
Graphite, natural	(2)	9	3	India 5.
Gypsum and plaster	688	1,841	--	Sweden 1,325; West Germany 377; Austria 79.
Iodine	2	7	NA	Thailand 2.
Kyanite and related materials	20	157	--	NA.
Lime	15,294	14,536	--	Norway 9,158; Finland 3,071; Greenland 1,026.
Magnesium compounds: Oxides and hydroxides	r74	39	--	Netherlands 24; Sweden 5.
Mica: Crude including splittings and waste	13	(2)	NA	NA.
Phosphates, crude	333	1,789	383	United Kingdom 1,368.
Pigments, mineral:				
Natural, crude	10	56	--	Turkey 23.
Iron oxides and hydroxides, processed	245	295	5	Sweden 115; Canada 54; Iceland 24.
Precious and semiprecious stones other than diamond:				
Natural ---- kilograms	178	478	--	NA.
Synthetic ---- do	5	24	NA	NA.
Salt and brine	191,422	232,515	2	Sweden 134,222; Norway 80,595.
Sodium compounds, n.e.s.: Carbonate, manufactured	74	66	--	Norway 25; Iceland 19.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	64,423	77,660	--	West Germany 77,414; Sweden 63.
Worked	8,281	10,824	5	West Germany 9,151; Sweden 654.
Dolomite, chiefly refractory-grade	398	204	--	Iceland 151; Sweden 27.
Gravel and crushed rock	884,049	790,947	--	West Germany 772,312; Sweden 11,022.
Limestone other than dimension	133,545	147,044	--	West Germany 68,513; Norway 47,678; Sweden 25,263.
Quartz and quartzite	46	82	--	Saudi Arabia 34; Sweden 18.
Sand other than metal-bearing	169,039	202,264	94	Sweden 165,581; West Germany 16,356; Finland 13,174.

See footnotes at end of table.

Table 2.—Denmark: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984 United States	Destinations, 1984 Other (principal)
INDUSTRIAL MINERALS —Continued				
Sulfur:				
Elemental:				
Crude including native and byproduct	3,430	3,368	--	West Germany 3,317; Netherlands 30.
Colloidal, precipitated, sublimed	1	327	--	Norway 326.
Dioxide	1	1	NA	NA.
Sulfuric acid	676	6,828	--	Netherlands 2,884; Sweden 2,435; West Germany 1,332.
Talc, steatite, soapstone, pyrophyllite	98	90	--	Sweden 50; Ecuador 14; Iceland 5.
Vermiculite, perlite, chlorite	24	92	--	Norway 67.
Other:				
Crude	896	817	--	West Germany 494; Greenland 59; Sweden 55.
Slag and dross, not metal-bearing	142,701	133,825	--	Norway 105,638; West Germany 14,180; France 10,126.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	90	78	--	West Germany 39; Finland 12; Sweden 10.
Carbon: Carbon black	31	32	--	Sweden 16; Iceland 5; Thailand 2.
Coal:				
Anthracite	--	2,594	--	All to United Kingdom.
Bituminous	3,091	74,156	--	United Kingdom 57,285; Sweden 15,723.
Briquets of anthracite and bituminous coal	2	2	--	All to Iceland.
Lignite including briquets	--	2	--	West Germany 1.
Coke and semicoke	37,756	2,665	--	Sweden 2,113; Norway 491.
Gas, natural: Gaseous million cubic feet	(2)	5,628	--	West Germany 5,627.
Peat including briquets and litter	3,220	4,028	31	Netherlands 3,145; United Kingdom 662.
Petroleum:				
Crude thousand 42-gallon barrels	8,551	6,150	--	Sweden 3,497; West Germany 2,653.
Refinery products:				
Liquefied petroleum gas do	174	265	(2)	Sweden 107; Netherlands 56; United Kingdom 38.
Gasoline do	3,498	4,517	--	Sweden 3,640; United Kingdom 319; Netherlands 174.
Mineral jelly and wax do	5	7	--	Sweden 3; Nigeria 1.
Kerosene and jet fuel do	112	546	--	West Germany 383; Greenland 89; Sweden 71.
Distillate fuel oil do	4,894	5,385	--	Sweden 3,353; West Germany 661; France 394.
Lubricants do	160	178	1	Norway 129; West Germany 9.
Residual fuel oil do	3,695	5,608	--	United Kingdom 4,539; Sweden 566; France 169.
Bitumen and other residues do	93	100	--	Finland 94; Sweden 3.
Bituminous mixtures do	72	31	(2)	Norway 20; West Germany 5.
Petroleum coke do	38	103	--	Norway 32; Netherlands Antilles 29; Finland 23.

[r]Revised. NA Not available.
[1]Table prepared by Jozef Plachy.
[2]Less than 1/2 unit.

Table 3.—Denmark: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS				
Alkali and alkaline-earth metals:				
Alkali metals	287	263	--	West Germany 258; France 5.
Alkaline-earth metals	1	(2)	NA	NA.
Aluminum:				
Ore and concentrate	18	18	--	United Kingdom 14; Canada 3.
Oxides and hydroxides	4,000	4,285	896	United Kingdom 2,735; West Germany 568.
Ash and residue containing aluminum	623	1,345	NA	West Germany 762; Sweden 583.
Metal including alloys:				
Scrap	3,292	4,295	--	West Germany 2,703; Norway 856; Sweden 392.
Unwrought	24,716	29,776	(2)	Norway 17,243; West Germany 6,248; Sweden 2,074.
Semimanufactures	62,808	68,999	193	West Germany 19,283; Norway 8,958; Belgium-Luxembourg 7,961.
Antimony:				
Oxides	36	--		
Metal including alloys, all forms	54	16	NA	China 10; Belgium-Luxembourg 5.
Arsenic: Oxides and acids	19	75	--	Sweden 42; United Kingdom 18; Belgium-Luxembourg 15.
Beryllium:				
Oxides and hydroxides	51	45	--	All from West Germany.
Metal including alloys, all forms	5	1	(2)	Mainly from West Germany.
Bismuth: Metal including alloys, all forms	3	1	NA	NA.
Cadmium: Metal including alloys, all forms	2	3	NA	NA.
Chromium:				
Ore and concentrate	1,532	1,463	--	All from West Germany.
Oxides and hydroxides	582	186	(2)	West Germany 109; Finland 47.
Metal including alloys, all forms	2	(2)	NA	NA.
Cobalt:				
Oxides and hydroxides	8	10	--	United Kingdom 6; Belgium-Luxembourg 3.
Metal including alloys, all forms	24	27	NA	Belgium-Luxembourg 19; France 5.
Copper:				
Matte and speiss including cement copper	1	--		
Oxides and hydroxides	1,063	876	--	West Germany 602; Norway 220.
Sulfate	1,449	2,320	NA	Belgium-Luxembourg 1,483; Italy 381; West Germany 173.
Ash and residue containing copper	1,437	2,118	NA	West Germany 1,375; Netherlands 741.
Metal including alloys:				
Scrap	3,029	5,147	1	Sweden 2,828; West Germany 1,341; Ireland 428.
Unwrought	1,311	1,776	1	Sweden 1,335; United Kingdom 229.
Semimanufactures	31,659	37,447	65	West Germany 16,397; Sweden 7,947; Belgium-Luxembourg 3,700.
Gold:				
Waste and sweepings value, thousands	$60	$128	--	Norway $97; Sweden $12.
Metal including alloys, unwrought and partly wrought troy ounces	22,088	24,317	369	Netherlands 8,874; Switzerland 7,041; West Germany 6,623.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite	62,855	1,331	--	Sweden 1,230.
Pyrite, roasted	13,977	20,348	--	All from Norway.
Metal:				
Scrap	67,374	131,536	91	United Kingdom 101,420; West Germany 19,101.
Pig iron, cast iron, related materials	32,435	43,009	5	Brazil 21,849; Canada 6,179.
Ferroalloys:				
Ferrochromium	812	234	--	Sweden 152; West Germany 67.
Ferromanganese	1,967	2,708	--	Norway 2,682; West Germany 24.
Ferromolybdenum	18	14	--	Sweden 10; West Germany 4.
Ferrosilicochromium	5	16	--	Sweden 14.
Ferrosilicomanganese	2,911	3,540	--	Norway 3,463; West Germany 40.
Ferrosilicon	3,250	3,140	--	Norway 2,502; West Germany 546.
Silicon metal	440	553	NA	Norway 328; France 198.
Unspecified	100	1,155	--	Norway 745; United Kingdom 184; West Germany 174.
Steel, primary forms	94,449	108,693	(2)	Finland 35,606; West Germany 27,412; Sweden 12,807.

See footnotes at end of table.

Table 3.—Denmark: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal —Continued				
Semimanufactures:				
Bars, rods, angles, shapes, sections	304,042	345,999	45	Sweden 95,565; West Germany 63,247; Belgium-Luxembourg 34,863.
Universals, plates, sheets	714,294	751,870	109	West Germany 167,718; Sweden 120,945; United Kingdom 76,333.
Hoop and strip	62,979	73,705	(2)	West Germany 38,932; Sweden 11,909; Austria 7,085.
Rails and accessories	11,886	9,907	6	West Germany 8,072; Finland 1,240.
Wire	31,689	35,155	(2)	West Germany 15,015; Belgium-Luxembourg 9,541; Sweden 6,540.
Tubes, pipes, fittings	239,888	236,498	59	West Germany 86,538; United Kingdom 26,755; France 20,950.
Castings and forgings, rough	4,011	3,472	(2)	West Germany 1,712; Norway 878.
Lead:				
Oxides	214	282	--	West Germany 218; France 35.
Ash and residue containing lead	3,354	4,610	671	United Kingdom 1,286; Netherlands 1,172.
Metal including alloys:				
Scrap	6,749	5,864	38	Norway 3,663; Sweden 662; United Kingdom 662.
Unwrought	13,181	16,073	--	West Germany 7,886; Sweden 4,790; United Kingdom 3,027.
Semimanufactures	4,107	3,945	(2)	West Germany 3,735; Greece 104.
Lithium: Metal including alloys, all forms	1	1	1	
Magnesium: Metal including alloys:				
Scrap	96	195	--	Sweden 178; West Germany 17.
Unwrought	175	115	--	All from Norway.
Semimanufactures	86	88	24	Sweden 30; Switzerland 20.
Manganese:				
Ore and concentrate, metallurgical-grade	322	416	--	Netherlands 325; West Germany 66.
Oxides	1,601	1,839	(2)	Belgium-Luxembourg 1,210; Greece 340; West Germany 141.
Metal including alloys, all forms	201	27	NA	Sweden 24.
Mercury .... 76-pound flasks	232	348	29	Turkey 174; Switzerland 87.
Molybdenum:				
Oxides and hydroxides	8	11	--	Netherlands 10.
Metal including alloys, all forms	1	2	--	France 1.
Nickel:				
Ore and concentrate	12	--		
Matte and speiss	26	15	--	Finland 10; Sweden 5.
Oxides and hydroxides	--	3	NA	NA.
Ash and residue containing nickel	--	465	NA	West Germany 433.
Metal including alloys:				
Scrap	2	1	--	All from Sweden.
Unwrought	244	349	11	Sweden 91; Netherlands 50; Canada 46.
Semimanufactures	119	173	24	West Germany 70; Norway 28.
Platinum-group metals:				
Waste and sweepings .... value, thousands	$65	$16	--	NA.
Metals including alloys, unwrought and partly wrought ... troy ounces	21,348	26,481	880	United Kingdom 8,970; Netherlands 5,691; Switzerland 4,887.
Selenium, elemental	1	2	NA	Canada 1.
Silver:				
Ore and concentrate .... value, thousands	--	$1	--	All from Canada.
Waste and sweepings .... do	$485	$911	--	Sweden $739; Norway $90; Finland $49.
Metal including alloys, unwrought and partly wrought .... thousand troy ounces	2,391	3,187	NA	France 1,289; Switzerland 483; West Germany 402.
Tellurium, elemental and arsenic	1	12	--	All from Sweden.
Tin:				
Oxides	14	1	--	All from United Kingdom.
Ash and residue containing tin	1,322	2,630	1,353	Netherlands 330; United Kingdom 236.

See footnotes at end of table.

Table 3.—Denmark: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Tin —Continued				
Metal including alloys:				
Scrap	364	120	27	Finland 19; West Germany 18.
Unwrought	519	751	--	Netherlands 212; Brazil 199; United Kingdom 117.
Semimanufactures	31	43	(2)	United Kingdom 20; West Germany 15.
Titanium:				
Oxides	7,210	8,211	220	United Kingdom 2,598; Norway 2,590; West Germany 1,050.
Metal including alloys:				
Scrap	1	(2)	NA	NA.
Unwrought	(2)	1	(2)	Mainly from Sweden.
Semimanufactures	85	88	13	West Germany 67; Japan 4.
Tungsten:				
Scrap	--	1	--	NA.
Unwrought	2	1	NA	Mainly from West Germany.
Semimanufactures	8	9	NA	Sweden 7; West Germany 1.
Vanadium: Metal including alloys, all forms	2	5	3	Republic of South Africa 2.
Zinc:				
Oxides	2,752	2,737	--	West Germany 1,732; France 739; Norway 200.
Blue powder	1,203	919	--	Norway 390; Belgium-Luxembourg 296; Netherlands 173.
Ash and residue containing zinc	301	244	NA	West Germany 238.
Metal including alloys:				
Scrap	92	248	--	West Germany 210; Yugoslavia 25.
Unwrought	11,969	13,287	--	Norway 5,401; Finland 5,098; United Kingdom 1,040.
Semimanufactures	r3,415	3,644	--	France 2,312; West Germany 1,035.
Zirconium:				
Ore and concentrate	219	226	--	West Germany 215; Sweden 10.
Metal including alloys, all forms	(2)	10	NA	NA.
Other:				
Ores and concentrates	383	142	--	Finland 54; Sweden 53; Norway 30.
Oxides and hydroxides	r4	66	--	United Kingdom 38.
Ashes and residues	658	670	NA	Norway 560; West Germany 100.
Base metals including alloys, all forms	2	2	1	United Kingdom 1.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	12,203	8,314	--	Israel 7,659; Netherlands 488; West Germany 119.
Artificial:				
Corundum	534	665	--	West Germany 651; France 12.
Silicon carbide	656	918	NA	Norway 874; West Germany 41.
Dust and powder of precious and semiprecious stones including diamond kilograms	30	48	7	Switzerland 40.
Grinding and polishing wheels and stones	1,024	1,087	4	West Germany 335; Austria 296; Sweden 128.
Asbestos, crude	16,585	13,536	75	Canada 12,692; Greece 608.
Barite and witherite	23,726	11,097	--	Netherlands 9,862; West Germany 578; United Kingdom 417.
Boron materials:				
Crude natural borates	4,107	4,085	2,598	Belgium-Luxembourg 701; West Germany 611.
Elemental	5	(2)	NA	NA.
Oxides and acids	351	411	17	Italy 178; France 158; United Kingdom 38.
Bromine	52	74	--	Israel 48; United Kingdom 17.
Cement	36,087	41,977	33	Poland 18,145; West Germany 14,578; East Germany 6,999.
Chalk	9,763	13,405	(2)	West Germany 5,689; France 3,891; Austria 2,199.
Clays, crude:				
Bentonite	3,726	3,234	198	West Germany 1,499; Italy 690; Netherlands 540.
Chamotte earth	283	947	NA	France 640; West Germany 222.
Kaolin	37,689	38,167	154	United Kingdom 34,445; West Germany 2,048.
Unspecified	7,501	5,872	258	West Germany 4,068; Netherlands 857; United Kingdom 663.

See footnotes at end of table.

Table 3.—Denmark: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Cryolite and chiolite	46,450	67,205	--	All from Greenland.
Diamond:				
Gem, not set or strung ____ carats	4,334	5,672	--	Belgium-Luxembourg 2,726; Switzerland 1,134; Sweden 996.
Industrial stones ____ do	1,121	1,073	--	NA.
Diatomite and other infusorial earth	7,966	6,054	1,270	Iceland 2,816; France 669.
Feldspar, fluorspar, related materials:				
Feldspar	3,873	5,678	--	Norway 4,446; Sweden 1,059.
Fluorspar	615	586	--	East Germany 444.
Unspecified	71	45	--	NA.
Fertilizer materials:				
Crude, n.e.s	486	428	--	West Germany 388; Sweden 38.
Manufactured:				
Ammonia	363,677	419,992	--	West Germany 202,193; Trinidad and Tobago 88,026; U.S.S.R. 64,970.
Nitrogenous	115,771	159,246	(2)	West Germany 47,315; Norway 45,565; Yugoslavia 18,562.
Phosphatic	5,698	4,505	--	Netherlands 1,529; Republic of South Africa 1,334; West Germany 1,231.
Potassic	261,952	288,013	--	West Germany 145,893; East Germany 68,095; U.S.S.R. 40,825.
Unspecified and mixed	694,506	740,457	16,613	Norway 438,003; West Germany 86,286; Romania 54,763.
Graphite, natural	1,225	1,414	91	West Germany 1,240; United Kingdom 65.
Gypsum and plaster	273,701	208,130	15	Spain 195,076; Sweden 7,092.
Iodine	2	4	--	Japan 2; West Germany 1.
Kyanite and related materials	270	415	NA	West Germany 330.
Lime	6,973	23,081	3	Belgium-Luxembourg 8,940; West Germany 8,914; Sweden 4,990.
Magnesium compounds:				
Magnesite	r6	24	--	NA.
Oxides and hydroxides	r11,047	11,374	136	China 3,637; Austria 2,436; Spain 2,220.
Other	r69,733	70,960	--	East Germany 49,514; West Germany 21,445.
Mica:				
Crude including splittings and waste	223	254	--	United Kingdom 126; Norway 87; Austria 21.
Worked including agglomerated splittings	60	57	--	Belgium-Luxembourg 40; Austria 10.
Nitrates, crude	49	--		
Phosphates, crude	286,185	315,995	--	Morocco 158,854; Republic of South Africa 110,029; U.S.S.R. 32,995.
Pigments, mineral:				
Natural, crude	463	225	NA	Cyprus 201.
Iron oxides and hydroxides, processed	4,551	5,632	23	West Germany 4,842; Spain 416; Italy 193.
Potassium salts, crude	1,275	--		
Precious and semiprecious stones other than diamond:				
Natural ____ kilograms	3,623	3,514	1,046	West Germany 162; Hong Kong 82.
Synthetic ____ do	23	33	4	France 6; West Germany 6.
Pyrite, unroasted	112	74	--	Sweden 64; West Germany 10.
Quartz crystal, piezoelectric kilograms	41	32	--	West Germany 27; Japan 5.
Salt and brine	168,465	217,428	51	West Germany 69,711; East Germany 59,310; U.S.S.R. 51,069.
Sodium compounds, n.e.s.: Carbonate, manufactured	46,610	48,688	--	West Germany 19,801; Netherlands 14,516; East Germany 11,165.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	268,247	269,429	--	Sweden 134,470; Norway 123,550.
Worked	29,663	39,512	--	Poland 14,277; Sweden 13,179; Italy 5,362.
Dolomite, chiefly refractory-grade	21,314	25,012	--	Norway 12,479; Sweden 5,538; West Germany 5,105.
Gravel and crushed rock	782,840	835,579	6	Sweden 692,505; Norway 137,065.
Limestone other than dimension	166,979	179,173	--	United Kingdom 98,479; Sweden 72,797.
Quartz and quartzite	8,431	19,573	19	Sweden 17,600; Norway 1,518.
Sand other than metal-bearing	67,100	91,772	7	Sweden 38,095; Belgium-Luxembourg 37,464; Norway 8,912.

See footnotes at end of table.

Table 3.—Denmark: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Sulfur:				
Elemental:				
Crude including native and byproduct	60,905	63,460	--	West Germany 63,087; Poland 340.
Colloidal, precipitated, sublimed	103	76	--	West Germany 75.
Dioxide	1,122	2,167	NA	West Germany 1,470; Sweden 387; Norway 306.
Sulfuric acid	15,532	5,743	--	West Germany 5,072; East Germany 511.
Talc, steatite, soapstone, pyrophyllite	8,466	9,612	48	Norway 3,741; Finland 3,190; Austria 1,155.
Vermiculite, perlite, chlorite	927	3,975	NA	Republic of South Africa 2,307; Greece 1,550.
Other:				
Crude	r10,168	11,127	572	Norway 5,196; Sweden 2,379; West Germany 957.
Slag and dross, not metal-bearing	4,041	27,337	18	Sweden 15,061; West Germany 7,539; Norway 4,616.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	6,466	5,894	171	Sweden 1,380; Netherlands 1,372; Norway 1,350.
Carbon: Carbon black	4,292	4,730	133	Sweden 2,071; West Germany 1,054; Norway 1,022.
Coal:				
Anthracite and bituminous thousand tons	8	10	(2)	France 7; West Germany 2.
Bituminous do	8,529	9,797	684	Poland 3,136; Republic of South Africa 2,738; Australia 1,768.
Briquets of anthracite and bituminous coal do	(2)	(2)	--	All from United Kingdom.
Lignite including briquets do	42	39	--	East Germany 28; West Germany 11.
Coke and semicoke do	55	63	2	West Germany 29; France 23; United Kingdom 6.
Gas, natural: Gaseous million cubic feet	478	1,787	1	West Germany 1,786.
Peat including briquets and litter	21,676	22,929	--	Sweden 12,088; U.S.S.R. 5,746; Finland 2,639.
Petroleum:				
Crude thousand 42-gallon barrels	38,810	38,673	--	United Kingdom 14,571; Kuwait 11,251; U.S.S.R. 6,064.
Refinery products:				
Liquefied petroleum gas do	1,686	1,338	(2)	United Kingdom 938; Norway 143; West Germany 134.
Gasoline do	6,211	6,021	(2)	Sweden 3,545; Finland 1,258; Norway 595.
Mineral jelly and wax do	84	92	(2)	West Germany 57; United Kingdom 6.
Kerosene and jet fuel do	6,087	6,043	(2)	Netherlands 3,068; Sweden 870; United Kingdom 662.
Distillate fuel oil do	16,712	17,842	(2)	Sweden 9,773; Norway 2,410; Finland 2,268.
Lubricants do	1,231	1,468	7	U.S.S.R. 717; West Germany 202; Netherlands 190.
Residual fuel oil do	10,909	8,764	--	Sweden 3,858; East Germany 3,234; U.S.S.R. 532.
Bitumen and other residues do	1,171	1,168	(2)	West Germany 449; Sweden 336; Netherlands 212.
Bituminous mixtures do	10	26	(2)	Norway 15; West Germany 4.
Petroleum coke do	1,607	1,834	1,326	Netherlands Antilles 219; Argentina 121.

rRevised. NA Not available.
[1]Table prepared by Jozef Plachy.
[2]Less than 1/2 unit.

COMMODITY REVIEW

Metals.—*Lead.*—Paul Bergsoe & Son A/S closed its 40,000-ton-per-year secondary lead plant at Glostrup as part of the company's restructuring program. Danish lead production was thereby seriously curtailed.

Steel.—Production of rolled steel semimanufactures increased by nearly 10% because of improved market conditions augmented by a 25,000-ton increase in the EEC plate sales quota, effective July 1, 1985. Production of rolled products increased to above the 500,000-ton level for the first time since 1981. The sole plant, at Frederiksvaerk, returned to a two arc furnace operation after operating briefly with one in 1984-85. Two-thirds of the product was heavy plate, and 72% of total sales went to EEC countries. Most of the 10% production increase was in nonflat rolled products other than plate. Danish Steel Works Ltd., the sole operator, improved its net loss to only about $400,000 from $3.4 million in 1984 despite a cold winter and a labor conflict near the end of the first quarter. Contributing to the improved earnings were the lower price for steel scrap and lower energy costs, both during the second half. The heating furnaces were converted from oil to gas at midyear.

Industrial Minerals.—*Cryolite.*—Kryolitselskabet Öresund A/S suspended mining of cryolite in Greenland in 1985 and stated that it had sufficient stocks of crude ore to continue production of beneficiated cryolite at its Copenhagen plant for 3 years. The company applied for a permit to construct a new cryolite plant based on recovering cryolite from used aluminum pot liners and other sources. The earliest expected startup of this plant was late 1987.

Fertilizer Materials.—Superfos A/S, 1 of the world's top 10 fertilizer producers, suffered greatly reduced profits because of heavy losses in its U.S. fertilizer operations. This was attributed to low world prices for diammonium phosphate because of a sluggish fertilizer market and to the high value of the U.S. dollar. The newly acquired, wholly owned U.S. subsidiary, Royster Co., with major phosphate operations in Florida, was one of four companies that resigned from the Phosphate Chemical Export Association because of controversy with designated allocations.

Superfos submitted plans for Government approval to construct a 120,000-ton-per-year potassium sulfate fertilizer plant following pilot testing. The process was to be based on an ionic exchange process using phosphogypsum as feed material.

Mineral Fuels.—Total energy consumption continued to increase and that derived from indigenous sources increased to 23% of the total as domestic production of North Sea oil and gas increased. Total generation of electrical power increased by 6%. Most electricity, 97% in 1985, continued to be generated from imported coal. In 1973, before Government policy required elimination of oil for electrical power generation, only 30% of electrical power had been generated from coal. An oil stockpile, mostly for space heating, was sufficient in October for 156 days. Government policy was to switch away from oil for home heating.

Coal.—Approximately 90% of the consumption of coal, all imported, continued to be for electrical power and the balance was for industry and agriculture, 6%; and space heating, 4%. Approximately one-half of the carbon requirements, about 500,000 tons, of the Danish cement industry was met by imported coke, mostly from the United States. Of the approximately 9 million tons of coal imported, nearly one-third came from the Republic of South Africa and the balance mainly from Australia, Poland, and the United States. Transportation costs from Australia were less than those from the United States because of the larger distances overland to U.S. ports.

Coal made up about 85% of the value of total imports from the Republic of South Africa, and these coal imports increased during the first half of 1985. However, this import source was severely curtailed beginning in November because of a Danish trade union embargo. In December, Parliament called for a cessation of all trade with the Republic of South Africa; passage of the required boycotting law was scheduled for April 1986. If passed, Denmark was to become the first country to impose a total trade embargo on the Republic of South Africa.

Legislation was passed limiting the sulfur content of powerplant coal to 1.2% maximum, measured at an 8% moisture content, effective October 1, 1985. Exceptions could be granted when the user could otherwise lower sulfur emissions by sulfur removal from the coal during burning or from the flue gases.

Natural Gas.—Deliveries of natural gas from the Danish North Sea quadrupled to approximately 30 billion cubic feet in 1985. Projected 1987 deliveries were nearly 90 billion cubic feet, two-thirds of which were to be to domestic users and the balance to the Federal Republic of Germany and Sweden. Export to Sweden began at midyear when the pipeline to the Swedish grid was completed. The domestic market was expected to include 300,000 home heating units, 300 industrial and business consumers, and about 300 central and district heating plants. The end-use breakdown was home heating, 38%; industrial and business, 31%; and district heating, 31%. In addition, a number of electrical power stations were being made partially dependent on gas in addition to coal. One station was being converted almost totally to gas firing because of environmental considerations, and two others were to follow by 1991. By yearend, a total of 220 kilometers of offshore pipeline and about 600 kilometers of onshore pipeline had been completed. Two more sections to North Jutland, totaling 100 kilometers, were planned, one to be completed in 1987. Ownership and operation of the gas transmission system was vested in Dansk Naturgas A/S, a wholly owned subsidiary of Dansk Olie og Naturgas A/S (DONG). Total system investment was above $750 million.

Exploratory drilling activity continued in the Lulu geological structure in the North Sea near the boundary with the Norwegian North Sea, about 50 miles north-northwest of the Tyra Gasfield. The fourth and decisive drilling, West-Lulu 3, was undertaken in the fall to determine the extent of the structure. As part of a contract with DONG, A. P. Moller, on behalf of the Dansk Undergrunds Consortium (DUC), submitted an application for development of the Roar Gasfield. The Energy Board had required that the Roar Field be in production by October 1, 1989. However, Moller's application recommended that the Roar Field development be delayed for a few years because gas reserves in the Tyra Field had been proven to be so large. The Roar Field, when developed, was to consist of an unmanned platform with 10 gas wells.

Petroleum.—Production of crude petroleum increased 29% to a record high of 21.8 million barrels, most of which was from the Gorm Field in the North Sea. Total reported production prior to 1985 had been 68 million barrels. Proven reserves reported at the beginning of 1985 were approximately 460 million barrels. North Sea drilling activity for oil and gas was heavy in 1985 for field delineation as well as development, and five drilling rigs were active.

A. P. Moller was required at yearend to yield its last major Danish North Sea exploration concession area, about 36,000 square kilometers, where it had exclusive exploration rights on behalf of DUC. Moller was to be allowed to continue exploring in only a few small areas of the southwestern portion of the Danish section of the North Sea near two producing oilfields, Gorm and Dan, and the gasfield Tyra. In the fall, Moller undertook exploratory drilling at Kim-1 in the northern part of the Danish section of the North Sea, 60 miles northwest of the Gorm Field. Another rig was conducting exploratory drilling at North Jens-1, about 20 miles north of the Gorm Field. Jens was reported to be possibly one of the largest oilfields in the Danish North Sea area. Earlier exploratory drillings for DUC within the Lulu Field had confirmed the existence of large amounts of oil as well as gas. The partners in Lulu, led by Moller, deferred any development decision until at least mid-1986.

Exploration scheduled in Denmark's first formal licensing round was completed both offshore and onshore with no new discoveries made. Applications for the second round, to explore a total of 33,000 square kilometers, including two-thirds of the Danish Continental Shelf, opened at midyear and closed in November. The Bornholm area of the Baltic Sea was included for the first time. Thirty companies applied, including 5 consortia and 3 individual firms. The new potential consortia leaders included two U.S. companies, Arco International Oil and Gas Co. and Texas Eastern Denmark A/S; Norway's Den Norske Stats Oljeselskap A/S and Norsk Hydro A/S; and Britoil PLC. Amoco Denmark Exploration Co. was already a consortium operator with a 75% group interest. Other U.S. applicants were Amerada Hess Corp. and, as a sole operator, Monsanto Industrial Chemicals Co. The Government indicated that participation was satisfactory and that licenses would not be granted until mid-1986.

DUC continued development of two new oilfields, Rolf and Dan-F. Developmental drilling was under way in Rolf, and an unmanned platform made in Japan was scheduled for delivery at yearend. Crude deliveries were expected to begin by mid-1986 at the rate of 6,000 to 7,000 barrels per day but were expected to decline rapidly thereafter. DUC installed two wellhead platforms for the new (second) Dan Field. Production was expected to begin in 1987 at a rate of 20,000 barrels per day. Annual production was expected to be about 7 million barrels during the first year and about 4 million barrels thereafter.

GREENLAND

The cryolite mine was closed and closure of the lead-zinc mine appeared imminent. Minerals exploration continued in Greenland for cryolite, graphite, tungsten, and columbium and tantalum. The tungsten province near the capital city of Nuuk (Godthaab) was shown to be significantly larger than had been previously reported. Scheelite-bearing amphibolite seams up to 12 feet thick and containing 2.5% tungsten oxide equivalent and 0.16 part per million of gold were found. Kidd Creek Mines Ltd. obtained an exploratory concession in 1985 for the tungsten area near Nuuk, which is favorably situated near the sea. Continuing EEC-sponsored explorations over a 6-year period had revealed deposits of columbium and tantalum in southern Greenland. Serious exploration for oil and gas in eastern Greenland, which was about to begin, could have significant impact on the country's future economic independence. After years of negotiation, a new consortium led by Atlantic Richfield Co. was to conduct oil and gas exploration in Jameson Land near the east coast of Greenland. Test drilling was expected to begin in 1987.

Greenland was released from the EEC effective February 1 after 12 years of membership. Home rule had been granted in 1979 as the first step in its detachment from Denmark. However, approximately $200 million in revenues was still allocated to Greenland annually by the Danish Government. Part of this was to finance services administered directly by Danish citizens, including housing, health, justice, and the police, because of a dearth of technically trained Greenlandic personnel. For many years, Greenland had sought a greater share of the Danish Government's profits from ongoing and potential mining operations including future oil and gas production. Current law, however, allowed little or none of this funding to go to Greenland until its annual subsidy from Denmark had been covered. The Danish Ministry of Greenlandic Affairs was scheduled to terminate after the next Danish parliamentary elections, scheduled for late 1987, when a small caretaker group would continue to administer a much smaller Greenlandic budget.

Table 4.—Greenland: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984	1985[p]
Cryolite, crude ore[2]	44,200	43,900	46,500	67,200	111,500
Lead: Concentrate, metal content	26,900	26,500	[r]22,300	17,700	17,944
Silver: In lead concentrate, metal content[e] thousand troy ounces	[r]700	[r]700	[r]600	[r]500	500
Zinc: Concentrate, metal content	79,700	80,000	73,100	71,300	70,711

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through May 30, 1986.
[2]Shipments.

Table 5.—Greenland: Exports of selected mineral commodities[1]

(Metric tons)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
Copper: Metal including alloys, scrap	36	26	--	All to Denmark.
Cryolite and chiolite	46,450	67,205	--	Do.
Iron and steel: Metal, scrap	20	24	--	Sweden 20; Denmark 4.
Lead: Ore and concentrate	34,216	29,376	--	Belgium-Luxembourg 16,204; West Germany 13,172.
Zinc: Ore and concentrate	152,599	133,759	--	West Germany 51,870; Belgium-Luxembourg 48,337; Finland 27,170.

[1]Table prepared by Jozef Plachy.

Table 6.—Greenland: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS				
Aluminum: Metal including alloys, semimanufactures	55	95	--	Denmark 88; Sweden 7.
Copper: Metal including alloys, semimanufactures	59	75	(2)	Denmark 72.
Iron and steel: Metal:				
Scrap	--	7	--	All from Denmark.
Semimanufactures	4,651	4,911	2	Denmark 4,152; Sweden 290.
Lead: Metal including alloys, all forms	5	3	--	All from Denmark.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$21	$62	--	Do.
Silver: Metal including alloys, unwrought and partly wrought do	$22	$21	--	Do.
Zinc: Metal including alloys, all forms	12	16	--	Do.
Other: Ashes and residues	20	--		
INDUSTRIAL MINERALS				
Abrasives, n.e.s.: Grinding and polishing wheels and stones	3	2	--	Do.
Cement value, thousands	$1,655	$754	--	Denmark $751.
Clays, crude	25	19	--	All from Denmark.
Diamond:				
Gem, not set or strung value, thousands	$15	$20	--	Do.
Industrial stones do	--	$1	--	All from Belgium-Luxembourg.
Diatomite and other infusorial earth	3	3	--	All from Denmark.
Fertilizer materials: Manufactured:				
Ammonia	33	5	--	Do.
Nitrogenous	656	1,023	--	Canada 681; Sweden 331.
Phosphatic	3	6	--	All from Denmark.
Unspecified and mixed	231	216	--	Do.
Gypsum and plaster	4	88	--	Do.
Lime	1,232	1,026	--	Do.
Precious and semiprecious stones other than diamond: Natural value, thousands	$1	$2	--	Do.
Salt and brine	3,255	3,770	--	Denmark 3,170; Canada 600.
Sodium compounds, n.e.s.: Carbonate, manufactured	11	11	--	All from Denmark.
Stone, sand and gravel:				
Dimension stone, worked	16	20	--	Do.
Dolomite, chiefly refractory-grade	4	1	--	Do.
Gravel and crushed rock	6	14	--	Do.
Sand other than metal-bearing	227	330	--	Do.
Sulfur: Sulfuric acid	15	33	--	Do.
Other:				
Crude	82	60	--	Do.
Slag and dross, not metal-bearing	--	20	--	Do.
MINERAL FUELS AND RELATED MATERIALS				
Coal: Anthracite and bituminous	637	818	--	Do.
Petroleum refinery products:				
Gasoline thousand 42-gallon barrels	48	62	--	Do.
Kerosene and jet fuel do	103	139	--	Denmark 89; Sweden 50.
Distillate fuel oil do	1,103	1,172	--	Denmark 812; Sweden 280.
Lubricants do	11	11	(2)	Denmark 10.

[1]Table prepared by Jozef Plachy.
[2]Less than 1/2 unit.

COMMODITY REVIEW

Metals.—The Black Angel lead-zinc mine at Maarmorilik on the west coast of Greenland operated at a loss in 1985 because of low metal prices, a fall in zinc concentrate sales, and leaner ores as reserves neared depletion. Concentrate production approximately equaled that of 1984 and continued to be shipped to Western European smelters, partly on a toll basis. Late in the year, an agreement was reached between the operator, Greenex A/S, the Governments of Greenland and Denmark, and the company's creditors to continue operation until June 1, 1986. A decision was to be reached by April 11, 1986, on whether or not to continue the operation after June 1, 1986. Greenex also reached an agreement with the Greenlandic Government that the company would commit a sum not to exceed $7.5 million for cleanup if the mine closed permanently. Also, the Danish Government was given an option to buy Greenex at its liquidation value upon closure. Because of the operation's uncertain future, Cominco Ltd., owner of 62.5% of Greenex through its parent, Vestgron Mines Ltd., wrote off its investment in the venture on its 1985 balance sheet. Certain new reserves had been found about 2 miles from the mine under about 1,000 feet of ice and 1,000 feet of rock in an area known as the Deep Ice Zone, and a search continued for other deposits in that and adjacent areas.

Industrial Minerals.—The cryolite mine at Ivigtut was closed, and the phasing out of the entire operation was scheduled to be completed in 1986 in accordance with an agreement with the Greenlandic Government. Total shipments of low-grade ore, all to Denmark, were 111,000 tons in 1985, and another 50,000 tons remained to be shipped as a result of the cleanup of the quay area.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Danish krone (DKr) to U.S. dollars at the rate of DKr10.60=US$1.00, the average for 1985.

The Mineral Industry of Egypt

By Ben A. Kornhauser[1]

Oil production remained the mainstay of the Egyptian economy, accounting for 69% of total exports and 20% of current account receipts. Declining oil prices and increased domestic oil consumption were factors in lowering earned oil revenues. The other mineral industry contributors to the economy were aluminum metal, cement, iron and steel, phosphate rock, and fertilizer materials.

The United Kingdom pledged a $67 million[2] loan, of which $17 million was a grant toward a $105 million investment to construct a modern coal mine at Maghara in the Sinai Desert. Up to 400,000 tons of the subbituminous coal was expected either to be blended with imported coal to produce metallurgical coke for domestic use, now costing $100 million annually, or to be used in a planned coal-fired power station in the Sinai.

A number of countries and their affiliated banks were extending loans for projects in cement, fertilizer, glass, and oil pipelines and refineries.

Exploration for crude oil continued to be very active by the Gulf of Suez Petroleum Co. (GUPCO), owned equally by the Egyptian General Petroleum Corp. (EGPC) and Amoco International Oil Co. of the United States. GUPCO remained the country's prime oil producer, producing about 875,000 barrels per day (bbl/d). Egypt was Amoco's largest African producer; in 1985, Amoco had two discoveries in the Western Desert and one in the Gulf of Suez.

PRODUCTION AND TRADE

In the past 10 years, Egypt had increased its dependency on oil export revenues; however, these decreased with falling oil prices and rising local consumption, which absorbed nearly one-half of oil output. In fiscal year 1985 (starting in July 1984), revenues from oil exports, remittances from expatriates abroad, and Suez Canal tolls were about $2.1 billion, $3.7 billion, and $900 million, respectively. Oil production averaged about 875,000 bbl/d and accounted for about 69% of total exports but only 20% of current account receipts. Natural gas production and domestic consumption increased about 22% compared with those of 1984, while the use of natural gas for power generation rose 32%. The $6 billion trade deficit was about 8% higher than that of fiscal year 1984. In 1985, imports totaled $11.7 billion. However, oil trade amounted to $3.32 billion in exports and $710 million in imports, changes of plus 6.3% and minus 11.6%, respectively, with a 12.4% surplus in trade, compared with that of 1984. The deterioration in the capital account was due to the heavy debt repayment schedule and the decreased income from the aforementioned sources. The International Monetary Fund (IMF) estimated fiscal year 1985 external debt at $21 billion and the cost of debt service at $3.6 billion, or 35% of annual current earnings.[3] Nearly $10 billion of Egypt's $33 billion foreign debt was owed to the U.S. Government. U.S. trade with Egypt declined with U.S. exports at $2.3 billion and imports at $84 million, decreases of 14% and 54%, respectively, from those of 1984.

Phosphate rock production for fertilizer materials decreased 43% from 1984 production; 28% of this was exported. The major importing areas were the Far East (59%)

and Eastern and Western Europe (41%).

The Gulf of Suez continued as the most prolific oil-producing area and accounted for nearly 90% of current production, although activity increased in the Western Desert. U.S. firms produced about 69% of Egypt's oil, mainly Amoco through GUPCO.

Approximately 1.7 million people were employed in manufacturing and mining, and 27,000 persons were engaged in producing and refining petroleum.

Table 1.—Egypt: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984[p]	1985[e]
METALS					
Aluminum metal	133,812	141,000	140,194	166,000	[2]208,587
Copper, refined, secondary	2,000	2,400	2,400	2,600	2,600
Iron and steel:					
Iron ore and concentrate ___ thousand tons	1,943	2,140	2,223	2,500	[2]87
Pig iron ___ do	220	113	196	225	225
Steel, crude ___ do	900	480	125	200	[2]533
Semimanufactures ___ do	850	900	378	500	500
Ferroalloys: Ferrosilicon[e]	5,000	6,000	6,000	7,500	7,500
INDUSTRIAL MINERALS					
Asbestos	325	424	245	325	[2]229
Barite	2,108	3,101	3,185	3,500	[2]4,426
Cement: Hydraulic ___ thousand tons	3,499	[r]4,260	5,500	6,500	[2]5,749
Clays:					
Bentonite	5,200	5,200	2,512	3,000	3,000
Fire clay	995,000	975,263	205,000	250,000	250,000
Kaolin	32,113	49,787	100,176	120,000	[2]108,378
Feldspar, crude	3,480	8,436	5,945	5,500	[2]19,073
Fluorspar	535	90	12	50	[2]85
Gypsum and anhydrite, crude	950,000	931,150	721,340	750,000	[2]841,467
Lime	91,294	94,000	93,660	97,500	97,000
Nitrogen: N content of ammonia thousand tons	518	639	905	686	[2]647
Phosphate: Phosphate rock ___ do	720	708	623	1,043	[2]599
Pigments, mineral, natural: Iron oxide	130	150	--	--	--
Salt, marine ___ thousand tons	679	829	918	1,000	[2]1,061
Sodium compounds:					
Sodium carbonate	23,364	41,273	43,000	40,000	[2]49,108
Sodium sulfate	3,000	3,000	1,950	2,000	[2]66,830
Stone, sand and gravel:					
Basalt ___ thousand cubic meters	103	90	NA	100	[2]720
Dolomite ___ thousand tons	500	500	500	500	500
Granite, dimension ___ cubic meters	6,400	4,765	NA	4,000	4,000
Gravel ___ thousand cubic meters	3,400	6,480	7,000	7,500	[2]10,736
Limestone and other calcareous n.e.s ___ do	5,535	7,037	9,276	10,000	[2]12,059
Marble blocks (including alabaster) cubic meters	46,930	19,380	16,400	17,500	[2]43,312
Quartz	10,000	10,000	NA	7,500	7,500
Sand including glass sand thousand cubic meters	6,200	6,874	166	1,500	[2]12,677
Sandstone ___ do	32	785	613	710	[2]486
Sulfur:					
Elemental, byproduct	2,408	2,281	1,000	1,250	[2]3,000
Sulfuric acid	44,111	45,118	44,899	45,000	[2]46,452
Talc, steatite, soapstone, pyrophyllite	5,723	8,291	4,519	12,213	[2]7,699
Vermiculite	730	280	300	325	[2]488
MINERAL FUELS AND RELATED MATERIALS					
Coke: Oven and beehive ___ thousand tons	920	974	916	950	[2]895
Gas, natural:					
Gross production ___ million cubic feet	108,000	114,074	120,000	140,000	172,000
Marketed ___ do	70,000	78,000	95,000	110,000	134,000
Petroleum:					
Crude ___ thousand 42-gallon barrels	234,330	245,645	262,486	302,000	319,000
Refinery products:					
Gasoline and naphtha ___ do	16,000	16,200	20,500	25,000	25,000
Kerosene and jet fuel ___ do	13,208	14,100	18,500	20,000	20,000
Distillate fuel oil ___ do	19,000	19,250	25,000	25,000	25,000
Residual fuel oil ___ do	49,004	52,650	70,000	75,000	65,000
Lubricants ___ do	600	650	1,000	1,000	1,000
Liquefied petroleum gas ___ do	1,800	1,900	2,000	2,500	2,000
Asphalt ___ do	1,800	1,900	2,200	2,500	2,500
Unspecified ___ do	400	450	800	1,000	1,000
Refinery fuel and losses ___ do	4,600	4,650	6,000	6,500	6,500
Total ___ do	106,412	111,750	146,000	158,500	148,000

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through June 12, 1986.
[2]Reported figure.

COMMODITY REVIEW

METALS

Aluminum.—Computerized control of the potlines was installed about 1983 at the Aluminum Co. of Egypt (Egyptal). The computers adjusted the anode-cathode distance every minute, controlled the current automatically, and performed other monitoring. Since installation of the computers, current efficiency rose to about 87% from the prior efficiency of 84%. The plant was in continuous operation on five shifts; four shifts worked in a day while one rested. Although the hydroelectric power from the Aswan High Dam was subsidized, electric power costs had been rising. The plant operated on an incentive plan of base pay plus a bonus based on the efficiency of each potline and each worker's contribution.

Egyptal decided to build a rolling mill with a 49,000-ton-per-year installed capacity alongside the Nag Hammadi smelter, and the plant was expected to be completed by 1988.[4] About two-thirds of Egyptal's production of billets, cylinders, ingots, slabs, etc., was exported by truck via Safaga and the Red Sea to the European Economic Community (EEC) countries, the Far East, and the United States. The remainder of the output was consumed domestically. However, aluminum products such as sheet and foil were still imported. Alumina for the smelters was imported from Australia and Greece.

Gold.—Minex Minerals (Egypt) Ltd., a subsidiary of Greenwich Resources PLC, signed an agreement with the Egyptian Geological Survey and Mining Authority (EGSMA) for the exploration and exploitation of gold and associated minerals in the Central Desert. The agreement was awaiting ratification by the Egyptian Parliament. It would permit exploring the two previously worked goldfields, Barramiya and El Sid, in an area of 5,000 square kilometers. If exploration were successful, a 25-year exploitation lease would be granted to an operating company, owned by Minex (48%) and EGSMA (52%). After the start of commercial production, profits would be exempt from taxation for 8 years. The company would be permitted to deduct exploration and development costs but would be required to pay royalties to the Government.[5]

Iron and Steel.—Construction of the El Dikheila steelworks of the Alexandria National Iron & Steel Co. (ANSDK) in Alexandria under the direction of Japan's Nippon Kokan K.K. (NKK) continued on schedule. ANSDK signed a process license agreement with Midrex International BV to furnish a direct-reduction plant to produce sponge iron and also contracted with Kobe Steel Ltd. to supply equipment and services for the plant. NKK was granted the contract for the 430,000-ton-per-year bar mill, and the SMS-Danieli Engineering of Italy consortium won the contract for the 425,000-ton-per-year rod mill. The direct-reduction plant will import 720,000 tons per year of iron ore pellets to produce 716,000 tons per year of sponge iron. The sponge iron, plus an additional 25% of scrap iron, would be melted in four electric arc furnaces to produce 840,500 tons per year of molten steel that would be cast continuously into 798,500 tons per year of billets for the bar and rod mills. The final products would be reinforcing bar, rod, and wire for domestic use. The project cost was estimated at $800 million, of which $685 million came from various loan agencies, banks, and Japanese participating capital, and $115 million came from loans from the involved contracting companies. Construction of the adjacent port area was under separate funding.

The blast furnaces of the Egyptian Iron and Steel Co. at Helwan were in various stages of rebuilding by the U.S.S.R. and by companies from the Federal Republic of Germany. When rebuilt, a combined annual capacity of 2 million tons of pig iron was expected. Annual capacity in 1985 was about 1 million tons of pig iron.

INDUSTRIAL MINERALS

Cement.—Several large kilns started operating during the year, decreasing annual production to an estimated 5.7 million tons of cement. One-half of Egypt's cement needs, about 8 million tons, was imported. The Ministry of Electricity was giving top priority to supplying the new plants with electricity.

UBE Industries of Japan had a $126 million contract to build an extension to the Qatamiya cement plant on the outskirts of Cairo for the privately held Suez Cement Co. The extension would have a capacity of 1.4 million tons per year and was expected to be completed in 3 years. Except for $18 million, the construction was to be financed by Japanese loans repayable in 8 years after a 4-year grace period.[6]

The European Investment Bank of the EEC was lending $24 million toward the construction of a white cement plant in Minya. The balance of the financing would come from French buyers' credits and local sources. Fives-Cail Babcock S.A., the French builder, was negotiating final contract details with the Helwan Portland Cement Co. Planned output was 200,000 tons per year.[7]

The Korea Heavy Industries Construction Co. Ltd. and the Suez Cement Co. signed an agreement for a $128 million extension to an existing cement plant south of Suez on the Red Sea. Construction was scheduled to begin in 1986, with completion within 3 years. The plant was being financed by the Korean Export-Import Bank, $78 million; West German and Swiss suppliers' credits, $20 million; and local sources, $30 million. Soft loans will cover imported components. The turnkey project was to be repaid over 8 years in 16 equal installments.[8]

Fertilizer Materials.—The modernized Abu Zaabal Fertilizer & Chemical Co. plant was expected to produce 80,000 tons per year of P_2O_5 triple superphosphate in 1985. Phosphoric acid for the facility was to be supplied by a 66,000-ton-per-year unit, built by Babcock-Moxley Lurgi A.G.

Phosphate rock production decreased 43% from 1984 production and had an average P_2O_5 content of 27.6%. Most of that production was used domestically. The major export areas were to the Far East (59%) and Eastern and Western Europe (41%). The major customers were North Korea, 30,100 tons; Sri Lanka, 28,000 tons; and Romania, 21,200 tons.

Sulfur.—New sulfur deposits were discovered in the Tuani District, west of Siwa Oasis. Feasibility studies on exploiting the deposits were under way.

MINERAL FUELS

Coal.—Egypt received a $17 million grant as part of a $67 million loan package toward the $105 million investment to reconstruct and modernize the Maghara coal mine in the Sinai Desert. The mine, which had been closed since the 1967 war, would be the country's first mechanized longwall coal mine. When fully developed, the mine was expected to produce 600,000 tons per year for 25 years. EGSMA hoped either to blend up to 400,000 tons annually of this coal with imported coal to produce coke for metallurgical use or to use the coal in a coal-fired powerplant in the Sinai. In 1985, Egypt imported 1.5 to 2 million tons of coking coal annually at a cost of about $100 million. Babcock Contractors Ltd. of the United Kingdom was awarded the contract to oversee the mine opening. The main coal seam at Maghara, which averaged 3 feet in thickness at a 10° dip, was a low-grade bituminous coal with relatively high sulfur, greater than 36% volatile matter, and 7% to 10% ash.

Natural Gas.—Natural gas production and domestic consumption increased approximately 22% over those of 1984. Gas output increased, mainly as the result of the Abu Madi Field doubling its gas production to 240 million cubic feet per day. The use of natural gas for power generation rose by 32% compared with use in 1984, in part owing to the startup of the three 315-megawatt generators at the Shouba-el-Kherma power station in Cairo. One condition of the United States and the International Bank for Reconstruction and Development's financing of the power station was that it would be run on natural gas. Plans were under way to put six gasfields into production to conserve energy and crude oil. Of these discoveries, three were offshore (Alif north of Abu Qir, Timsah north of Damietta, and Tina north of Port Fuad) and three were onshore (Qantara West in the Suez Canal area, Abu Senan and Badr Al-Din in the Western Desert). The El Morgan, July, and Ramadan Oilfields of GUPCO were to supply associated gas for electrical generation.

Technip Geoproduction completed two major offshore projects, a production and treatment platform for the Western Desert Petroleum Co.'s (Wepco) Abu Qir Gasfield, 150 million cubic feet per day (MMcf/d) capacity, and a seawater pumping and distribution platform for the Belayim Petroleum Co.'s (Petrobel) Abu Redies Field. EGPC, through an associate company, was to provide the management and technical follow-up for a 7.2-MMcf/d gas plant, producing liquefied natural gas at Petrobel's Abu Madi Oilfield in the northern Nile Delta. Snamprogetti S.p.A. of Italy, the general contractor, expected to complete the plant in 8 months. The plant would have a production capacity of 240 MMcf/d. Construction of the liquefied petroleum gas (LPG) plant at Amoco's Ras Shukheir terminal on the Gulf of Suez was awarded to Hitachi Zosen Corp. and Nissho-Iwai Corp. of Japan.

The plant would have an LPG producing capacity of 90 MMcf/d and was expected to be completed in April 1987.

Petroleum.—*Exploration.*—The Government approved Conoco Khalda Inc.'s acquisition of a 50% interest in the Khalda concession in the northwestern part of the Western Desert from Phoenix Resources Co., a subsidiary of the Texas International Co. of Oklahoma City, Oklahoma. Conoco would operate the 500,000-acre block and would spend $150 million with Phoenix to explore and develop the acreage. Phoenix made two substantial oil discoveries: the Salam 2X and 3X wells. The Salam 2X well tested 4,000 to 6,000 bbl/d of 40° API oil from the Bahariya sands and 2,000 bbl/d of 45° API oil from the Upper Aptian sands. The Salam 3X well was spudded about 0.5 mile east of Salam 2X to probe the Jurassic sands at 12,500 feet and flowed at a combined rate of 16,000 bbl/d of oil and 35 MMcf/d of gas from three intervals. Phoenix was embarking on a 10-well exploration and appraisal program to be completed before the end of its final exploration period in April 1987. Phoenix also was preparing to declare its discoveries as commercial and form an operating company, the Khalda Petroleum Co., equally owned by Phoenix and EGPC. Phoenix's discovery was significant because it was the first time that deep oil and gas deposits were discovered in the Jurassic sands in the Western Desert, that the crude oil was of high quality, and that the output (21,000+ bbl/d from Salam 2X and 3X combined) was considerable compared with the Western Desert's present output of just over 35,000 bbl/d. The Salam Field adjoined the promising Western Desert concession, Meleiha, operated by Agypetco Oil & Gas Corp., a subsidiary of Denison Mines Ltd. of Canada.

Chevron Corp. of the United States was drilling a wildcat, 3X South Geisum, on South Geisum Island on the Chadwan concession in the Gulf of Suez. The targeted depth was 5,500 feet, about 1 mile from Conoco Inc.'s main platform in the Geisum Field. The concession was owned by Chevron, the operator, 32.5%; Marathon International Oil Co., 32.5%; and Consolidated International Petroleum Corp. of Vancouver, Canada, 35%.

Compagnie Française des Pétroles (CFP)-TOTAL struck oil at its Tawila West-1 well in the Umm Agawish offshore concession at the Gulf of Suez mouth. The well flowed 3,700 bbl/d of 40° API crude from 8,600 feet and 3,000 bbl/d from 8,430 feet. A third, shallower zone tested appreciable volumes of natural gas and condensates. The 600-square-kilometer concession was owned by CFP-TOTAL, the operator, 50%; Marathon of the United States, 25%; and Chevron, 25%.

GUPCO, on a farmout from Lochiel Exploration Ltd. of Calgary, Canada, was scheduled to drill two wildcats in the Western Desert. The 18-1 Sheiba would be drilled to 9,100 feet in the Bahrein and Kharita Formations. The 18-0 Sheiba would be drilled to 7,800 feet in the Bahrein Formation. The drill sites were near a Locheil wildcat, abandoned in 1983.

The Japan Suez Petroleum Development Co. was formed by Teikoku Oil Co. Ltd., Mitsui Oil Exploration Co. Ltd., and Daiichi Oil Development Co. Ltd. to drill a well in the 340-square-kilometer Sabil exploration block of Union Oil Co. The new firm would gain a 25% interest for the effort.

Production.—Conoco started production from its Geisum Field in its concession in the Gulf of Suez, about 20 miles north of Hurghada. Initial production was 2,000 bbl/d from one well and rose to 7,500 bbl/d from two additional wells. Three more wells were to be drilled to increase production to 11,000 bbl/d with gravities ranging from 17° to 28° but averaging 21° API. The production would come through a platform and to a production-storage tanker of 229,000 deadweight tonnage permanently moored in 150 feet of water. The operating company, Geisum Oil Co., was formed and owned equally by EGPC and the Conoco group. The group consisted of Conoco, the operator, 49.5% equity; Texaco Suez Inc., 22.5%; Mobil Exploration Egypt Inc., 5%; Mobil Oil AG of the Federal Republic of Germany, 5%; Norsk Hydro Geisum AS, 9%; and Oranje-Nassau Geisum BV, 9%.

The Suez Oil Co. (SUCO) output was averaging 135,000 bbl/d from its three Gulf of Suez fields—Ras Budran, Ras Fanar, and Zeit Bay. SUCO was owned equally by EGPC and a group consisting of British Petroleum Ltd. (United Kingdom), Royal Dutch/Shell (Netherlands), and Deutsche Erdölversorgungsgeselleschaft mbH (Federal Republic of Germany).

Crude oil output was up about 5.6% compared with that of 1984.

Pipelines.—Costain Process Ltd. of the United Kingdom received a contract from EGPC for the turnkey construction of onshore pipeline facilities. Petroleum Pipelines Co. also engaged Costain to build pump stations for the gas produced at Ras Shukheir and Tebin, and receiving stations on the Nile River at Beni Suef, El Minya, and Assuit. Construction was expected to be completed and operating within 21 months.

Refining.—Petroleum and Process Industries of Cairo let contracts for a refinery at Assuit to more than 30 suppliers of equipment from the United Kingdom and Italy. The refinery was estimated to cost $193 million with credit financing being raised by Lloyds Bank International and export credit guarantees offered by the United Kingdom's Export Credits Guarantee Department and Italy's Sezione Speciale per l'Assicurazione del Credito all' Esportazione. On completion of the first phase, the refinery would have a 40,000-bbl/d capacity and would produce middle distillates for domestic use in Upper Egypt. The second phase, planned for completion in 1990, would double the capacity. In 1985, Egypt's refineries processed about 400,000 bbl/d with plans for increasing the capacity to 580,000 bbl/d by the early 1990's. Petroleum imports cost the Government about $700 million per year in 1985.[9]

The first phase of the petrochemical complex at al'-Amiriya near Alexandria was near completion. This phase included three plants, for the manufacture of polyvinyl chloride (PVC), vinyl chloride monomer, and chlorine-caustic soda. The PVC plant, which was being built by Technipetrol S.p.A. of Italy, would have an initial capacity of 80,000 tons per year with capability of expanding to 120,000 tons per year. The vinyl chloride monomer plant, which was being built by Toyo Engineering Corp. of Japan, would have an initial capacity of 100,000 tons per year with the capability of expanding to 120,000 tons per year. The chlorine and/or caustic soda plant, which also was being built by Toyo, would have an initial capacity of 60,000 tons per year of chlorine with the capability of expanding to 66,000 and 75,000 tons per year of caustic soda. Initially, the ethylene feedstock would be imported. The second phase of the planned petrochemical complex included the construction of plants to manufacture 200,000 tons per year of ethylene, 100,000 tons per year of low density polyethylene, and 40,000 tons per year of high-density polyethylene. In 1981, the Egyptian Petrochemical Co., owned by EGPC, was established to operate the complex.[10]

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[1]Physical scientist, Division of International Minerals.
[2]Where necessary, values have been converted from Egyptian pounds (£E) to U.S. dollars at the rate of £E1=US$1.00.
[3]Middle East Economic Digest (London). V. 30, No. 6, Feb. 8, 1986, p. 10.
[4]Metal Bulletin (London). No. 7032, Oct. 29, 1985, p. 11.
[5]Mining Magazine. July 1985, p. 18.
[6]Middle East Economic Digest (London). V. 29, No. 34, Aug. 25, 1985, p. 3.
[7]———. V. 29, No. 29, July 20, 1985, p. 3.
[8]Financial Times (London). No. 29,744, Oct. 4, 1985, p. 4.
[9]Middle East Economic Digest (London). V. 29, No. 39, Sept. 28, 1985, p. 8.
[10]———. V. 29, No. 48, Dec. 2, 1985, p. A5.

The Mineral Industry of Finland

By Roman V. Sondermayer[1]

Finland continued to be a modest producer of minerals by world standards. Finland's share of world production of minerals was as follows: Vanadium, about 12%; chromite and talc, 5%; cobalt, about 4%, and nickel (smelter), over 2%. The rest of the production was of domestic significance only. The short-term outlook of the industry was good. Nevertheless, if new deposits are not discovered soon, mining will decline greatly by the end of the century. Except for two mines, ore reserves in Finland will soon be largely depleted. Outokumpu Oy was seeking to obtain one-half or at minimum one-third of its total raw materials from foreign mines in which it holds shares or with which it has long-term contracts. A new unit of Outokumpu Oy, the Foreign Mining Projects Div., was established to assure the supply of crude materials. Outokumpu Oy pursued that goal by participation in prospecting abroad, purchasing shares in existing operations abroad, and purchasing active mines. Finland's mining industry produced slightly more than 8 million tons of materials, about 1 million tons less than that of 1984. Low prices of metals on world markets slowed down mining operations in the country.

The share of the mining industry in the gross domestic product was 0.4%. When processing, smelting, refining, and related activities are included, this share reaches 10%. Principal events related to the mining industry included startup of the Enonkoski nickel mine, the end of cobalt and copper production at the Vuonos Mine, expansion of the Tornio ferrochrome plant, closing of the Otanmaki iron ore mine, start of construction of a hot-rolling mill in the steel plant at Torino, and startup of a new granite-cutting plant at Taivassalo.

PRODUCTION

Low metal prices affected production of metals in Finland. The downtrend in production was a result in part of the depletion of metallic ores. In recent years, exploration for metals has not resulted in signficant discoveries. Consequently, efforts were made to increase exploration for industrial minerals.

Finland's mineral industry in 1985 consisted of large Government-owned and small private companies. The four largest companies, all Government-owned, were Outokumpu Oy (metals); Rautaruukki Oy (iron and steel); Neste Oy (petroleum and natural gas); and Kemira Oy (chemicals). All Government-owned companies were operated for profit.

Table 1.—Finland: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984	1985[p]
METALS					
Aluminum, secondary	9,300	9,400	13,200	17,100	17,200
Cadmium, refined	621	566	616	614	565
Chromium: Chromite:					
Gross weight:					
Lump ore ---- thousand tons	210	160	85	312	[e]347
Concentrate ---- do.	181	160	141	119	[e]150
Foundry sand ---- do.	21	25	19	15	[e]25
Total ---- do.	412	345	245	446	522
Cr_2O_3 content:					
Lump ore ---- do.	53	46	24	151	[e]168
Concentrate ---- do.	72	64	58	47	[e]60
Foundry sand ---- do.	10	12	9	7	[e]12
Cobalt:					
Mine output, metal content	1,034	1,036	1,035	912	[e]665
Metal, refined	1,229	1,455	1,550	1,453	1,427
Copper:					
Mine output, metal content	38,539	37,800	39,300	31,285	27,897
Metal:					
Smelter:					
Primary	54,747	66,333	[r]74,455	71,216	[e]71,000
Secondary	12,950	19,051	12,597	12,050	[e]12,000
Total	67,697	85,384	[r]87,052	83,266	[e]83,000
Refined:					
Primary	23,796	37,969	45,376	47,318	[e]46,766
Secondary[e]	10,000	10,000	10,000	10,000	12,000
Total	33,796	47,969	55,376	57,318	58,766
Gold metal ---- troy ounces	31,893	36,780	25,206	28,067	19,130
Iron and steel:					
Iron ore, marketable, all types:					
Gross weight ---- thousand tons	1,230	1,238	1,277	1,231	1,122
Fe content ---- do.	789	786	822	788	806
Metal:					
Pig iron ---- do.	1,978	1,957	1,898	2,034	1,891
Ferroalloys, ferrochromium ---- do.	52	55	59	59	133
Steel, crude ---- do.	2,428	2,414	2,416	2,632	2,518
Semimanufactures, rolled ---- do.	[r]1,850	[r]1,847	1,964	1,987	[e]2,000
Lead:					
Mine output, metal content	1,580	1,883	2,125	2,478	2,422
Refined, secondary	4,500	4,400	6,000	4,500	[e]4,400
Mercury ---- 76-pound flasks	1,949	2,068	1,857	2,292	3,630
Molybdenum	165	216	218	265	326
Nickel:					
Mine output, metal content	6,864	6,332	5,314	6,929	8,547
Metal, electrolytic	13,310	12,615	14,837	15,282	15,656
Platinum-group metals:					
Palladium ---- troy ounces	1,993	4,662	2,283	1,093	1,125
Platinum ---- do.	1,608	4,147	2,186	1,061	1,125
Selenium ---- kilograms	19,422	10,020	11,172	16,975	14,088
Silver ---- thousand troy ounces	1,215	1,188	980	1,123	998
Titanium concentrate: Ilmenite:					
Gross weight	161,500	167,800	163,900	167,000	53,300
Ti content	72,840	75,846	74,083	75,317	24,145
Vanadium (V_2O_5):					
Gross weight	5,557	5,619	5,694	5,469	3,805
V content	3,112	3,147	3,189	3,063	2,132
Zinc:					
Mine output, metal content	53,480	54,568	55,913	60,200	60,606
Metal	139,835	[r]155,000	155,336	158,819	160,377
INDUSTRIAL MINERALS					
Barite	--	--	3,400	8,704	8,690
Cement, hydraulic ---- thousand tons	1,862	1,907	1,969	1,645	1,608
Feldspar	63,066	69,600	52,066	56,265	52,940
Lime ---- thousand tons	263	263	231	241	[e]250
Nitrogen: N content of ammonia	68,800	64,800	67,700	68,700	[e]70,000
Phosphate rock, apatite concentrate:					
Gross weight ---- thousand tons	201	233	381	477	512
P_2O_5 ---- do.	72	83	141	176	189
Pyrite, gross weight ---- do.	403	385	499	477	493
Sodium sulfate[e] ---- do.	40	40	35	35	35

See footnotes at end of table.

Table 1.—Finland: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984	1985[p]
INDUSTRIAL MINERALS —Continued					
Stone, crushed:					
Limestone and dolomite:					
For cement manufacture thousand tons	2,416	2,446	2,609	2,287	2,217
For agriculture do.	631	864	1,370	1,192	1,453
For lime manufacture do.	383	359	344	367	357
Fine powders do.	315	258	287	316	313
Metallurgical do.	75	52	52	45	26
Total do.	3,820	3,979	4,662	4,207	4,366
Quartz silica sand do.	255	249	213	262	223
Sulfur:					
S content of pyrite do.	184	177	224	211	[e]225
Byproduct:					
Of metallurgy do.	268	270	264	265	[e]260
Of petroleum do.	45	40	48	45	[e]45
Total do.	497	487	536	521	[e]530
Sulfuric acid do.	1,058	1,032	1,315	1,418	1,439
Talc do.	308	325	318	327	319
Wollastonite	13,690	14,962	15,402	14,669	16,917
MINERAL FUELS AND RELATED MATERIALS					
Peat:					
For fuel use thousand tons	1,303	5,500	3,355	2,713	[e]3,000
For agriculture and other uses do.	204	578	275	225	[e]200
Petroleum refinery products thousand 42-gallon barrels	66,003	70,000	78,788	[e]80,000	[e]82,000

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through July 16, 1986.

TRADE

During 1984, the latest year for which complete data were available, Finland had a negative trade balance in minerals and fuels. Imports, mostly fuels, amounted to 31% of the value of total country imports of \$12.4 billion.[2] The share of crude petroleum was 16% of total country imports and 51% of the country's mineral imports. Exports of minerals equaled about 13% of the value of total country exports of \$13.5 billion. Fuels, mostly petroleum refinery products, were approximately 6% of the value of total exports and about 41% of the value of exported minerals. Products of ferrous and nonferrous metallurgy followed with shares of 4% and 3% in the value of the country's exports, respectively. Their share in the value of mineral exports was 30% and 23%, respectively.

Table 2.—Finland: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984	
			United States	Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides	17	39	--	Portugal 19; Norway 10; Hungary 8.
Metal including alloys:				
Scrap	45	207	--	Japan 166; United Kingdom 22.
Unwrought	10,679	13,576	323	Japan 7,223; Sweden 2,520; Republic of Korea 503.
Semimanufactures	20,724	22,886	22	West Germany 4,910; Sweden 4,775; United Kingdom 3,917.
Chromium:				
Ore and concentrate	133,952	273,069	10,188	Sweden 253,376; Poland 4,912; Netherlands 1,794.
Oxides and hydroxides	11	25	--	All to Sweden.
Cobalt: Oxides and hydroxides	159	966	4	Norway 637; Netherlands 293.
Columbium and tantalum: Metal including alloys, all forms, tantalum	--	4	--	Mainly to Austria.

See footnotes at end of table.

Table 2.—Finland: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued				
Copper:				
Ore and concentrate	14,096	--		
Matte and speiss including cement copper	--	3	--	All to U.S.S.R.
Metal including alloys:				
Scrap	1,337	2,126	--	Sweden 1,845; Denmark 231; West Germany 31.
Unwrought	28,541	24,279	69	Belgium-Luxembourg 9,895; United Kingdom 3,804; West Germany 2,414.
Semimanufactures	34,972	45,182	4,246	United Kingdom 9,925; West Germany 6,713; Sweden 4,356.
Iron and steel: Metal:				
Scrap	170	9,466	--	Sweden 9,242; United Kingdom 219.
Pig iron, cast iron, related materials	63	725	--	Sweden 717; U.S.S.R. 5.
Ferroalloys:				
Ferromanganese	30	--		
Unspecified	r18,494	7,685	--	Sweden 5,124; Netherlands 2,556.
Steel, primary forms	118,776	147,602	16,518	West Germany 38,046; Cyprus 33,670; United Kingdom 20,170.
Semimanufactures:				
Bars, rods, angles, shapes, sections	153,113	180,754	12,991	West Germany 42,598; Sweden 42,039; United Kingdom 22,594.
Universals, plates, sheets	620,280	516,011	93,696	West Germany 107,305; Denmark 93,220.
Hoop and strip	35,107	31,516	131	U.S.S.R. 8,219; West Germany 4,933; Sweden 4,095.
Rails and accessories	449	3,858	3	Italy 3,570; U.S.S.R. 177; Sweden 80.
Wire	5,142	6,016	--	Sweden 3,704; Netherlands 923; Norway 570.
Tubes, pipes, fittings	100,992	111,782	2,417	Sweden 30,926; U.S.S.R. 16,931; United Kingdom 12,577.
Castings and forgings, rough	2,073	2,139	--	Sweden 1,640; U.S.S.R. 330; Norway 95.
Lead:				
Ore and concentrate	42,708	7,494	--	Belgium-Luxembourg 6,242; West Germany 1,252.
Oxides	31	--		
Metal including alloys:				
Scrap	372	262	--	Denmark 185; Sweden 53; United Kingdom 24.
Unwrought	1,345	25	--	All to Sweden.
Semimanufactures	22	1	--	All to U.S.S.R.
Magnesium: Metal including alloys:				
Scrap	163	126	--	Italy 54; West Germany 52; United Kingdom 20.
Unwrought	--	97	--	Belgium-Luxembourg 49; Italy 48.
Manganese:				
Ore and concentrate, metallurgical-grade	4	--		
Oxides	14	2	--	All to Denmark.
Mercury ... 76-pound flasks	1,914	5,133	--	Netherlands 2,901; Belgium-Luxembourg 1,856; India 348.
Nickel:				
Matte and speiss	955	--		
Metal including alloys:				
Scrap	4,268	2,269	--	Norway 2,265; West Germany 4.
Unwrought	11,322	13,247	4,173	United Kingdom 1,910; France 1,544.
Semimanufactures	53	336	287	United Kingdom 42; Venezuela 3.
Platinum-group metals: Metals including alloys, unwrought and partly wrought ... value, thousands	$549	$407	--	United Kingdom $306; Sweden $92.
Silver:				
Waste and sweepings[2] ... do	$5,890	$7,237	$1,972	United Kingdom $2,499; Sweden $1,609.
Metal including alloys, unwrought and partly wrought ... do	$12,764	$8,580	$195	United Kingdom $6,568; Sweden $997; West Germany $691.
Tin: Metal including alloys:				
Scrap	34	43	--	United Kingdom 29; West Germany 13.
Unwrought	8	12	--	Sweden 9; West Germany 3.
Semimanufactures	2	(3)	--	All to Sweden.
Titanium: Oxides ... value, thousands	$2,945	$5,397	NA	NA.

See footnotes at end of table.

Table 2.—Finland: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued				
Tungsten: Metal including alloys, all forms	10	16	--	Belgium-Luxembourg 6; West Germany 5; Switzerland 5.
Zinc:				
Ore and concentrate	14,913	5,190	--	All to U.S.S.R.
Oxides	--	78	--	Norway 53; Denmark 25.
Metal including alloys:				
Scrap	636	1,528	--	Norway 1,001; West Germany 234; Sweden 176.
Unwrought	131,559	136,237	22,557	United Kingdom 25,304; Netherlands 19,895.
Semimanufactures	r150	185	--	U.S.S.R. 93; India 52; Sweden 23.
Other:				
Ores and concentrates	458	695	--	East Germany 438; Romania 207; Sweden 50.
Oxides and hydroxides	8,894	11,331	14	West Germany 3,926; France 3,575; U.S.S.R. 1,798.
Ashes and residues	1,716	3,939	777	Sweden 1,589; West Germany 680.
Base metals including alloys, all forms	2,270	1,947	523	United Kingdom 452; East Germany 173; Sweden 169.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	16	--		
Grinding and polishing wheels and stones	150	78	(3)	U.S.S.R. 54; Norway 7; Sweden 3.
Barite and witherite	2,305	1,386	--	West Germany 784; Netherlands 602.
Boron materials: Crude natural borates	70	1,821	--	All to Sweden.
Cement	54,741	13,343	--	U.S.S.R. 10,769; Sweden 1,460; Norway 984.
Chalk	20	--		
Clays, crude	295	302	12	Sweden 218; West Germany 25; Italy 22.
Diamond:				
Gem, not set or strung value, thousands	$294	$389	--	Sweden $383; Hong Kong $5.
Industrial stones do	--	$5	--	All to Sweden.
Diatomite and other infusorial earth	4	97	--	U.S.S.R. 90; Sweden 6.
Feldspar, fluorspar, related materials	35,498	35,348	--	United Kingdom 21,765; West Germany 7,615; Poland 2,174.
Fertilizer materials:				
Crude, n.e.s	112	427	--	United Arab Emirates 180; Sweden 130; Saudi Arabia 100.
Manufactured:				
Ammonia	--	3,020	--	All to Sweden.
Nitrogenous	74,688	29,782	--	France 6,977; United Kingdom 6,597; Spain 5,600.
Phosphatic	1	7	--	Sudan 4; U.S.S.R. 3.
Potassic	31,002	38,500	--	Pakistan 17,976; Tanzania 8,931; East Germany 6,899.
Unspecified and mixed	450,983	517,964	--	U.S.S.R. 200,105; China 186,372; Saudi Arabia 23,886.
Graphite, natural	5	--		
Lime	1,562	1,842	--	Sweden 1,246; West Germany 280; Republic of South Africa 214.
Magnesium compounds	278	65	--	Sweden 64.
Mica: Crude including splittings and waste	814	548	--	Japan 433; United Kingdom 76; Netherlands 20.
Phosphates, crude	--	3	--	All to U.S.S.R.
Pigments, mineral: Iron oxides and hydroxides, processed	10	--		
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$17	$9	--	West Germany $5; Spain $2.
Synthetic do	$195	$147	$106	Sweden $40.
Pyrite, unroasted	157,180	1,735	--	West Germany 1,030; Netherlands 475; Italy 230.
Salt and brine	231	196	--	Denmark 193.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	214,920	249,200	41	Italy 136,273; France 42,377; Spain 24,973.
Worked	2,936	3,268	17	Sweden 1,287; West Germany 821; U.S.S.R. 632.

See footnotes at end of table.

Table 2.—Finland: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Stone, sand and gravel —Continued				
Gravel and crushed rock	150,211	86,284	6	Netherlands 77,373; Sweden 5,858; U.S.S.R. 3,041.
Limestone other than dimension	8,780	6,874	--	Sweden 6,698; Malaysia 52; Denmark 49.
Quartz and quartzite	16,408	7,138	--	Sweden 4,723; Netherlands 1,200; U.S.S.R. 241.
Sand other than metal-bearing	3,876	1,261	--	Sweden 687; Romania 255; U.S.S.R. 249.
Sulfur: Sulfuric acid	659	2,337	--	Netherlands 1,918; United Kingdom 172; Sweden 119.
Talc, steatite, soapstone, pyrophyllite	42,911	47,904	--	West Germany 12,185; Sweden 7,810; Netherlands 6,604.
Other:				
Crude	25,422	13,365	2	West Germany 7,097; Italy 1,577; Spain 1,323.
Slag and dross, not metal-bearing	565	484	--	Sweden 426; West Germany 38.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	1,610	6,280	--	U.S.S.R. 6,243; Bulgaria 20.
Carbon black	46	2,973	--	Ireland 2,970; Norway 3.
Coal:				
Anthracite and bituminous	--	11,937	--	United Kingdom 7,144; Sweden 4,789.
Briquets of anthracite and bituminous coal	19	--		
Coke and semicoke	17,692	17,858	--	Norway 17,828; Sweden 29.
Peat including briquets and litter	40,441	46,328	22	Netherlands 15,954; Sweden 8,732; Saudi Arabia 5,355.
Petroleum refinery products:				
Liquefied petroleum gas thousand 42-gallon barrels	1	([3])	--	Mainly to U.S.S.R.
Gasoline do.	8,391	7,849	--	Sweden 3,858; Netherlands 1,492; West Germany 1,244.
Kerosene and jet fuel do.	572	816	--	Sweden 538; Denmark 277.
Distillate fuel oil do.	7,729	9,822	380	West Germany 2,987; Sweden 2,363; Denmark 2,356.
Lubricants do.	303	259	--	U.S.S.R. 254; Sweden 5.
Residual fuel oil do.	963	4,011	287	United Kingdom 1,784; Sweden 647; Denmark 376.
Bitumen and other residues do.	230	279	--	Sweden 144; Denmark 134.
Bituminous mixtures do.	93	8	--	Sweden 7.

[r]Revised. NA Not available.
[1]Table prepared by Jozef Plachy.
[2]May include other precious metals.
[3]Less than 1/2 unit.

Table 3.—Finland: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS				
Aluminum:				
Ore and concentrate	4,152	2,564	--	West Germany 2,161; Italy 345; China 58.
Oxides and hydroxides	20,615	27,376	24	West Germany 14,374; Hungary 4,333; United Kingdom 3,935.
Metal including alloys:				
Scrap	22,608	16,289	147	U.S.S.R. 7,583; Norway 2,293; United Kingdom 1,388.
Unwrought	26,270	20,721	--	U.S.S.R. 11,715; Norway 2,505; Hungary 1,960.
Semimanufactures	30,168	30,695	52	West Germany 7,495; Sweden 6,245; Norway 5,168.
Chromium:				
Ore and concentrate	527	--		
Oxides and hydroxides	847	921	18	West Germany 532; Poland 175; Brazil 100.

See footnotes at end of table.

Table 3.—Finland: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Copper:				
Ore and concentrate	103,800	120,130	--	Sweden 47,440; Norway 25,311; Chile 21,385.
Matte and speiss including cement copper	2	7,770	--	All from Poland.
Metal including alloys:				
Scrap	702	463	--	United Kingdom 212; West Germany 123; Denmark 40.
Unwrought	19,017	15,282	--	U.S.S.R. 7,452; Sweden 2,654; Zambia 2,527.
Semimanufactures	12,855	13,278	51	West Germany 5,898; Sweden 3,630; United Kingdom 1,044.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite thousand tons	1,299	1,856	--	Sweden 1,001; U.S.S.R. 678; Norway 175.
Pyrite, roasted do	2	--		
Metal:				
Scrap	37,293	32,516	(2)	U.S.S.R. 26,137; United Kingdom 6,200.
Pig iron, cast iron, related materials	14,429	11,897	(2)	West Germany 3,829; United Kingdom 2,410; Sweden 1,926.
Ferroalloys:				
Ferromanganese	3,779	5,824	--	Norway 5,508; West Germany 226; Sweden 52.
Silicon metal	r37,250	55,846	(2)	Norway 15,313; U.S.S.R. 11,125; France 6,875.
Steel, primary forms	7,206	20,718	--	West Germany 11,349; Netherlands 6,347; Sweden 2,864.
Semimanufactures:				
Bars, rods, angles, shapes, sections	225,652	222,639	8	Sweden 65,627; West Germany 27,190; France 21,218.
Universals, plates, sheets	222,436	206,188	1	West Germany 54,935; Sweden 30,275; U.S.S.R. 20,831.
Hoop and strip	27,068	29,275	(2)	Sweden 12,108; West Germany 5,731; United Kingdom 4,361.
Rails and accessories	2,157	3,389	4	West Germany 1,671; Belgium-Luxembourg 697; Sweden 615.
Wire	22,097	20,226	1	Sweden 7,434; Belgium-Luxembourg 3,917; West Germany 2,559.
Tubes, pipes, fittings	112,047	112,212	82	West Germany 28,346; United Kingdom 17,919; Spain 12,501.
Castings and forgings, rough	3,123	3,279	1	West Germany 1,208; Sweden 810; Poland 312.
Lead:				
Oxides	171	150	--	West Germany 143; Sweden 6.
Metal including alloys:				
Unwrought	12,318	14,940	38	U.S.S.R. 8,061; Sweden 6,687; West Germany 108.
Semimanufactures	701	1,037	1	West Germany 731; Belgium-Luxembourg 250; Sweden 47.
Magnesium: Metal including alloys:				
Unwrought	74	83	3	Norway 77; Yugoslavia 3.
Semimanufactures	347	363	3	Norway 290; Belgium-Luxembourg 56; West Germany 8.
Manganese:				
Ore and concentrate, metallurgical-grade	10,154	7,005	--	Ghana 7,000; Netherlands 5.
Oxides	462	649	36	Netherlands 284; Belgium-Luxembourg 242; China 50.
Mercury 76-pound flasks	--	29	--	West Germany 25.
Molybdenum: Metal including alloys, all forms	2	7	1	Austria 4; France 1.
Nickel:				
Ore and concentrate	12,188	7,325	--	Norway 6,941; Sweden 363.
Matte and speiss	9,901	8,786	--	Canada 4,362; Australia 4,419.
Metal including alloys:				
Scrap	1,987	2,489	291	Netherlands 1,494; Canada 445.
Unwrought	4,973	4,661	535	Canada 2,982; U.S.S.R. 576.
Semimanufactures	69	47	11	West Germany 13; United Kingdom 12.

See footnotes at end of table.

Table 3.—Finland: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$719	$864	$5	United Kingdom $486; Sweden $125; Switzerland $105.
Silver:				
Waste and sweepings[3] do	$100	--		
Metal including alloys, unwrought and partly wrought do	$8,965	$5,159	$15	United Kingdom $1,923; Sweden $1,611; West Germany $1,021.
Tin: Metal including alloys:				
Unwrought	133	124	--	West Germany 33; United Kingdom 30; Denmark 20.
Semimanufactures	141	189	(²)	United Kingdom 142; West Germany 38.
Titanium: Oxides	481	1,212	480	West Germany 432; Belgium-Luxembourg 155.
Tungsten: Metal including alloys, all forms	20	20	18	United Kingdom 2.
Zinc:				
Ore and concentrate	205,579	167,309	--	Sweden 74,535; Canada 38,566; Greenland 22,703.
Oxides	386	468	--	West Germany 444; United Kingdom 13.
Metal including alloys:				
Scrap	27	282	--	United Kingdom 107; Denmark 94; West Germany 40.
Unwrought	1,188	105	1	Netherlands 54; West Germany 20; Sweden 13.
Semimanufactures	r697	605	--	Norway 422; West Germany 92; France 50.
Other:				
Ores and concentrates	32,953	1,799	261	United Kingdom 635; Norway 401.
Oxides and hydroxides	883	778	2	Australia 216; United Kingdom 192; Belgium-Luxembourg 183.
Ashes and residues	4,925	4,816	1,544	Belgium-Luxembourg 1,970; Netherlands 642; Norway 238.
Base metals including alloys, all forms	378	489	14	Sweden 124; West Germany 101; Japan 72.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	121	7,590	(²)	Iceland 7,508; Italy 48; West Germany 18.
Artificial: Corundum	1,236	1,528	--	Austria 692; Hungary 372; United Kingdom 217.
Dust and powder of precious and semiprecious stones including diamond value, thousands	$23	$21	--	Switzerland $12; West Germany $5; Netherlands $4.
Grinding and polishing wheels and stones	2,092	2,115	26	West Germany 592; Austria 385; Italy 206.
Asbestos, crude	2,561	3,157	2	Republic of South Africa 1,452; Canada 995; U.S.S.R. 482.
Barite and witherite	1,613	1,419	--	West Germany 858; United Kingdom 333; China 181.
Boron materials:				
Crude natural borates	13,806	18,450	2,339	Turkey 16,050; United Kingdom 60.
Oxides and acids	303	564	39	Turkey 313; France 205.
Cement	25,622	17,709	7	Denmark 9,415; West Germany 3,513; U.S.S.R. 2,152.
Chalk	56,712	93,000	1	Denmark 70,973; West Germany 15,362; Sweden 3,516.
Clays, crude	466,382	554,993	17,836	United Kingdom 493,092; West Germany 16,710.
Cryolite and chiolite	49	22	--	All from United Kingdom.
Diamond:				
Gem, not set or strung value, thousands	$5,916	$5,389	$39	Israel $2,661; Belgium-Luxembourg $1,958; Switzerland $323.
Industrial stones do	$52	$68	--	Belgium-Luxembourg $46; United Kingdom $18.
Diatomite and other infusorial earth	4,312	4,295	1,026	Norway 1,196; United Kingdom 750.
Feldspar, fluorspar, related materials	4,438	6,519	--	Mexico 3,852; Canada 1,512; United Kingdom 561.

See footnotes at end of table.

Table 3.—Finland: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Fertilizer materials:				
Crude, n.e.s	23	21	--	Ireland 14; United Kingdom 7.
Manufactured:				
Ammonia	307,074	345,860	--	U.S.S.R. 214,290; Netherlands 82,787; United Kingdom 27,677.
Nitrogenous	54,706	26,268	(*)	Norway 10,993; U.S.S.R. 9,435; Sweden 5,448.
Phosphatic	21	100	--	All from Netherlands.
Potassic	374,898	405,863	--	U.S.S.R. 161,337; East Germany 117,921; West Germany 74,401.
Unspecified and mixed	97,337	47,397	516	Romania 21,102; United Kingdom 14,730; Hungary 10,001.
Graphite, natural	263	37	--	West Germany 26; Norway 6; China 3.
Gypsum and plaster	176,263	178,331	--	Spain 93,356; Poland 32,493; East Germany 29,614.
Lime	7,887	7,991	1	Denmark 4,723; Sweden 2,943; Hungary 320.
Magnesium compounds	21,336	14,359	7	China 7,915; Spain 2,864; Norway 1,151.
Mica:				
Crude including splittings and waste	239	198	--	United Kingdom 149; Norway 48.
Worked including agglomerated splittings	28	41	--	Austria 16; United Kingdom 11; West Germany 5.
Nitrates, crude	2,495	20	--	All from Chile.
Phosphates, crude	443,613	387,694	149,532	Morocco 135,207; U.S.S.R. 65,692.
Pigments, mineral: Iron oxides and hydroxides, processed	3,941	3,793	27	West Germany 3,415; United Kingdom 275.
Precious and semiprecious stones other than diamond:				
Natural ..... value, thousands	$328	$325	$5	West Germany $150; Australia $44; Austria $28.
Synthetic ..... do	$613	$622	$451	Switzerland $59; France $42.
Pyrite, unroasted	13	4	--	All from West Germany.
Salt and brine	495,618	662,659	3	Netherlands 245,320; Poland 159,106; West Germany 74,151.
Sodium compounds, n.e.s.: Carbonate, manufactured	79,393	66,848	70	U.S.S.R. 23,414; East Germany 15,127; West Germany 13,841.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	3,947	1,960	--	Norway 914; France 425; Republic of South Africa 197.
Worked	1,201	1,662	1	Sweden 731; Italy 657; Portugal 89.
Dolomite, chiefly refractory-grade	19,833	17,634	--	Belgium-Luxembourg 9,519; West Germany 2,303; Sweden 2,194.
Gravel and crushed rock	10,274	11,997	--	Sweden 9,070; Denmark 1,131; Norway 868.
Limestone other than dimension	759,546	679,236	--	Sweden 675,748; Denmark 1,833.
Quartz and quartzite	856	134	53	Sweden 47; West Germany 19.
Sand other than metal-bearing	47,049	64,315	60	Belgium-Luxembourg 34,416; Sweden 15,041; Denmark 13,788.
Sulfur:				
Elemental:				
Crude including native and byproduct	54,460	84,902	1	Poland 57,119; West Germany 24,027; France 2,100.
Colloidal, precipitated, sublimed	19	10	--	Belgium-Luxembourg 5; West Germany 5.
Sulfuric acid	371	233	--	U.S.S.R. 167; Netherlands 38; West Germany 27.
Talc, steatite, soapstone, pyrophyllite	671	5,515	--	Spain 3,000; Sweden 1,875; Belgium-Luxembourg 297.
Other:				
Crude	r67,349	98,386	26	Norway 96,352; U.S.S.R. 558; Sweden 469.
Slag and dross, not metal-bearing	60,926	45,114	6	East Germany 24,409; Sweden 18,950.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	173	628	94	Austria 199; Trinidad and Tobago 25.
Carbon black	9,105	8,740	187	Netherlands 3,233; Sweden 2,859; West Germany 1,940.

See footnotes at end of table.

Table 3.—Finland: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Coal:				
Anthracite and bituminous thousand tons	4,390	3,582	1	Poland 2,361; U.S.S.R. 908; United Kingdom 144.
Lignite including briquets do	13	9	--	East Germany 8; Hungary 1.
Coke and semicoke do	1,128	1,215	--	U.S.S.R. 704; West Germany 229; Sweden 202.
Gas, natural: Gaseous million cubic feet	23,367	27,243	--	All from U.S.S.R.
Peat including briquets and litter	605	819	--	U.S.S.R. 810.
Petroleum:				
Crude thousand 42-gallon barrels	75,733	68,611	--	U.S.S.R. 55,098; United Kingdom 5,910; Saudi Arabia 5,717.
Refinery products:				
Liquefied petroleum gas do	246	697	--	U.S.S.R. 696.
Gasoline do	84	101	(2)	Netherlands 55; West Germany 18; Belgium-Luxembourg 13.
Mineral jelly and wax do	95	97	(2)	West Germany 71; China 9.
Kerosene and jet fuel do	19	13	--	U.S.S.R. 7; Netherlands 4.
Distillate fuel oil do	8,189	9,513	--	U.S.S.R. 9,512.
Lubricants do	1,025	909	6	United Kingdom 168; Italy 155; France 97.
Residual fuel oil do	10,942	9,829	--	U.S.S.R. 9,828.
Bitumen and other residues do	199	173	--	Denmark 100; Sweden 70.
Bituminous mixtures do	45	32	2	Sweden 26; France 1.
Petroleum coke do	169	182	170	Argentina 6; United Kingdom 4.

[r]Revised.
[1]Table prepared by Jozef Plachy.
[2]Less than 1/2 unit.
[3]May include other precious metals.

COMMODITY REVIEW

METALS

Chromium.—Expansion of the ferrochrome plant at Outokumpu Oy's Tornio Works was completed in March 1985. Capacity was increased threefold and reached 180,000 tons per year. A new electric furnace with a power rating of 75 megavolt-amperes was erected in line with the existing furnace rated at 33 megavolt-amperes. The new furnace is of a closed design. Carbon monoxide gas, generated in the furnace, is used to preheat the smelting charge. The process computer system that was developed controls and manages the operation of the new furnace. The automation has increased productivity, and after expansion, the total work force of the plant increased by only 15%. The expansion program was completed in 15 months at a cost of $35 million.

Cobalt.—Closure of Outokumpu Oy's Vuonos copper mine in the summer will lower mine production of cobalt by about 260 tons per year starting in 1986. Cobalt was recovered as a byproduct of copper mining. Outokumpu Oy's Keretti Mine remained the only cobalt producer in the country in 1985.

Copper.—The Vuonos Mine, which had started production in 1973, closed during 1985. During the mine's lifetime, 5.4 million tons of ore was mined. From this ore, approximately 111,000 tons of copper, 29,000 tons of zinc, and 2,300 tons of cobalt were extracted. At the peak of its production, the Vuonos Mine employed 400 persons. The Keretti Mine remains the only copper-producing mine owned by Outokumpu Oy in Finland.

Outokumpu Oy's Harjavalta smelter started receiving copper concentrates from the Bidjovagge Mine at Kautokeino in northern Norway. The Bidjovagge Mine was purchased by the company in the fall of 1984.

Exploration led to the discovery of a promising copper deposit situated about 20 kilometers from the Luilonlahti Mine in Kaavi. The Geological Research Institute of Finland, which explored the areas, found nickel, zinc, and cobalt in the ore. Several years of exploratory drilling in the area will be needed before a decision on development of the deposit can be made. A polymetallic deposit was discovered near Vehkalahti. Average content of copper was 4%. Samples also contained 0.2% zinc and 0.1% cobalt. Exploration was in the early stages, and reserves were not reported.

Gold.—Outokumpu Oy discovered gold at Laivankongas, close to the city of Raahe, situated on the Bottinska Viken (Gulf of Bothnia). Development plans call for an open pit mine with a capacity of 400,000 tons of ore per year. The ore contains an average of 4 grams of gold per ton of ore. The ore will be processed in the nearby Vihanty flotation plant where a new line for recovery of gold was completed. Outokumpu Oy invested about $0.5 million in exploration for this deposit. In addition, other gold exploration included activities in Ilomants, Reisjarvi, Kangaskyla, Hejtajarvi at Kanus, Pohala at Haapavesi, and Kiankura at Kalajoki.

Iron and Steel.—Rautaruukki Oy closed its Otanmaki iron ore mine. Otanmaki Mine produced between 30% and 40% of the company's concentrates. Closure of facilities at Otanmaki lowered production of iron concentrates in Finland by about one-third compared with the output in 1984. A contract for delivery of equipment for the hot-rolling mill under construction at Tornio was signed. The contracting parties were Outokumpu Oy, as purchaser and, as suppliers, a consortium of Mannesmann-Demag AG from the Federal Republic of Germany as the leading partner, and Hitachi Europe Ltd. and Nissho-Iwai Corp. from Japan. Plans call for start of production in 1987 or 1988. The new mill will have the capacity to produce 200,000 tons per year of hot-rolled products. When in full operation, the mill should employ between 50 and 60 persons. At the Tornio Works, the full production chain was in place except for hot rolling. Slabs from Tornio were hot rolled at Rautaruukki's Raahe Steel Mill and in Bremen, Federal Republic of Germany. With this hot-rolling mill in operation, Tornio Works are fully integrated, and its production processes will be completely controlled by Outokumpu Oy's Stainless Steel Div. Production costs should be lower because the cost of transporting slabs to hot-rolling mills and returning bands will be eliminated. In addition, costs should drop because the size of slabs will be doubled. Production throughput time should be shortened. Furthermore, the new hot-rolling mill will make it possible for Outokumpu Oy to develop new types of stainless steel.

Nickel.—Outokumpu Oy completed development of a nickel mine and construction of a nickel mill and flotation plant at Enonkoski, in the main sulfide block of southern Finland. The mine started production during 1985, and the mill will be in production in early 1986.

The deposit, which was discovered in 1969, had not been developed because of the low grade of the ore. In 1979, higher grade ore was located in the northern segment of the property. The rich part of the deposit is a small pipe-like body, and ore minerals were pyrrhotite, pentlandite, and chalcopyrite. Reserves at Enonkoski were reported at 4 million to 5 million tons of ore.

The underground mine was opened with a vertical shaft and used sublevel caving. An underground crusher does the primary crushing. The concentrator was designed to process 500,000 tons of ore per year. Nickel and copper concentrates will be produced when the mill is completed. Annual output of nickel concentrates, with 7% to 8% nickel, should range from 30,000 to 90,000 tons. Production of copper concentrates containing 25% copper should be between 1,500 and 4,000 tons per year. Large variations in the concentrator's output are expected because the grade of the feed may vary widely. The process in the concentrator is fully automated. Outokumpu Oy's Electronics Proscon P. M. control system controls the operation. A Courier 300 on-stream analyzer analyzes 14 slurry streams. A Proscon system is used to control underground crushing and mine ventilation.

The concentrates will be shipped for further processing to the Harjavalta nickel plant. When in full operation, the mine and concentrator at Enonkoski will employ about 100 persons. Total investment in the project amounted to an equivalent of $29 million.

Platinum.—Rautaruuki Oy, together with Outokumpu Oy, has explored platinum mineralization in the belt between Kemi and Ranua. Reports indicated that inventories of ore have been made, but quantities were not made public.

Zinc.—Development continued on two small zinc deposits in central Finland. Outokumpu Oy planned to process ores from the Kangosparor deposit at Kallioykyla near Kiuruvesi, at the Pyhasalmi concentrator. Both mines are being developed as opencast operations.

Other Metals.—Exploration continued of columbium lanthanide mineralization at the Otanmaki orefield. Exploration was under way for tungsten in the Hameenlinna and Samatti regions.

Based on aerial survey, uranium was found in what may be commercial deposits in Lapland, North Karelia, and Usimaa Provinces. In 1985, costs for aerial exploration totaled about \$5.5 million. The Geological Institute of Finland conducted the exploration. Closure of the Otanmaki and Mustavara Mines ended production of vanadium pentoxide in Finland.

INDUSTRIAL MINERALS

Ammonia.—Construction of a 320,000-ton-per-year ammonia plant at Uusikaupunki, in southern Finland, may be delayed. Kemira Oy failed to negotiate a contract for deliveries of natural gas by Neste Oy, believing that the prices asked by Neste Oy for Soviet gas were too high. The Government of Finland decided to assist Kemira Oy to continue planning for the construction of an ammonia plant based on peat. The subsidy was proposed because peat is not competitive with fuel oil as feedstock. In addition, the project will provide work for over 250 persons, and the new plant will be an important factor in the economy of the region.

Mica.—At yearend, Kemira Oy was close to completing a plant for the recovery of phlogopite from tailings from the apatite concentrator at its Siilinjarvi Mine. The plant was designed to produce 10,000 tons of crude mica and 6,000 tons of ground mica.

Phosphate Rock.—Kemira Oy purchased the rights to the Sokoli phosphate deposit from Rautaruukki Oy. The Sokoli deposit contained about 100 million tons of phosphates, reportedly of good grade. In the past, the deposit had not been exploited because of low prices for phosphates. Nevertheless, the Government of Finland indicated that it was prepared to subsidize the Sokoli project with an equivalent of \$26 million to \$31 million. Kemira Oy will explore the deposit in detail. Exploration activity should continue about 2 years.

Stone.—Finland remained among the leading world exporters of rough granite. Domestic finishing was on a modest scale. Outokumpu Oy purchased a majority of shares of Suomen Kiviteollisuus Finska Steinindustrie AB the largest Finnish granite quarrying company. Later in the year, Outokumpu Oy merged its Granite Products Ltd. with the company.

A new granite processing plant, which uses Italian technology, went on-stream at the Taivassalo granite quarry in southwestern Finland. Reports indicated initial annual capacity of about 50,000 meters of 2- to 3-centimeter-thick polished and sawn granite slabs.

MINERAL FUELS

Finland was not a producer of coal, crude petroleum, or natural gas. Domestic primary energy carriers were peat, fuelwood, and hydroelectric power. Imported crude petroleum and coals provided about 50% to 60% of the national energy supply.

Natural Gas.—Construction continued of a gas pipeline in southern Finland. In addition, Neste Oy concluded an agreement with a local enterprise in Ouly for constructing a pipeline spur to bring natural gas from the U.S.S.R. to industrial areas in Finland. The pipeline will start south of Tampere and run through the city of Nokia. Its north branch will go to Kyreskoski.

During November, the supply of Soviet gas diminished, and Neste Oy had to announce restriction on the use of natural gas in Finland. Disruption was caused by greater use of natural gas than anticipated. The yearly quota was used before the yearend. The supply of gas was restored after an agreement was reached for supply of additional quantities of natural gas.

Peat.—Peat remained an important source of energy. Efforts were made to develop peat production methods that would be less sensitive to weather changes. Work on artificial dewatering methods progressed during the year. One of the methods tested during the year, developed by Jakko Poyry Energ Oy in its plant at Haukineva, Peraseinajoki, produced about 1,000 tons of wet carbonized peat.

Construction of two new district heat-powerplants continued at Jyvaskyla and Joensuu. The total peat consumption of both plants should reach between 1.5 million and 2 million cubic meters per year when they are completed by 1989.

[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from finnmarks (Fimr) to U.S. dollars at the rate of Fimr6.2=\$1.00.

The Mineral Industry of France

By John R. Craynon[1]

The production of minerals in France continued to decline in terms of world importance in 1985. However, France remained an important processor of imported and domestic crude minerals and fuels. Much of the mineral-related industry was Government subsidized, and many uneconomical facilities were operated to prevent unemployment and social disruptions in the regions where the operations were located. The domestic production of several mineral commodities was of world significance. France produced about one-fifth of the world's arsenic, one-seventh of the total diatomite, and one-tenth of the gypsum. Also, the output of alumina, bromine, cadmium, feldspar, ferroalloys, fluorspar, magnesium metal, potash, talc, and zinc metal were of world importance.

The Bureau de Recherches Géologiques et Minières (BRGM), France's most important Government organization involved in mineral activities, continued its worldwide efforts to guarantee the supply of minerals and fuels. BRGM was active in a number of domestic exploration and mining projects. A power agreement between Pechiney and Électricité de France (EdF), the construction of an aluminum-lithium alloy plant near Puy-de-Dôme, continued reorganization in the steel industry, the development of the Rouez and Chessy sulfide deposits, a detailed investigation of the Echassière deposit, and the discovery of a uranium deposit were the major events in the minerals industry.

PRODUCTION

The majority of mineral producing and processing companies were Government owned or controlled. Among those were Pechiney, Imetal S.A., Charbonnages de France, Union Sidérugique du Nord et de l'Est de la France S.A. (Usinor), and Société Nationale Elf Aquitaine. The output of mineral commodities showed mixed results compared with that of 1984. Production of most minerals increased in response to the improving economic conditions.

Table 1.—France: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984	1985[p]
METALS					
Aluminum:					
Bauxite, gross weight ----- thousand tons--	1,827	1,662	1,663	1,607	1,484
Alumina:					
Crude ---------- do----	1,236	1,087	1,009	1,034	[e]1,000
Calcined ---------- do----	1,095	960	853	898	877
Metal:					
Primary ---------- do----	436	390	361	342	293
Secondary ---------- do----	156	154	170	174	164

See footnotes at end of table.

Table 1.—France: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984	1985[p]
METALS —Continued					
Antimony:					
Mine output, metal content	312	308	111	--	--
Metal, including regulus	5,223	5,867	6,442	7,036	[e]6,500
Arsenic, white	[e]5,200	[e]6,000	4,727	3,828	[e]4,000
Cadmium metal	663	793	513	568	337
Cobalt metal including powder	447	568	131	116	[e]110
Copper:					
Mine output, metal content	98	199	114	79	200
Metal:					
Blister, secondary	6,500	8,100	7,210	6,796	7,000
Refined:					
Primary[e]	23,000	24,000	23,000	20,931	23,500
Secondary[e]	23,000	23,060	22,063	20,000	20,200
Total	46,000	47,060	45,063	40,931	43,700
Gold, mine output, metal content troy ounces	36,362	67,967	71,659	70,279	90,021
Iron and steel:					
Iron ore and concentrate:					
Gross weight thousand tons	21,598	19,391	15,930	14,839	14,681
Metal content do.	6,800	6,186	5,061	4,680	4,700
Metal:					
Pig iron do.	17,268	15,031	13,856	15,089	15,426
Ferroalloys:					
Blast furnace: Spiegeleisen and ferromanganese do.	313	333	[r]270	329	331
Electric-furnace:					
Ferrochrome do.	27	[r]15	20	19	[e]20
Ferromanganese do.	10	29	33	35	[e]35
Ferrosilicon do.	189	169	193	205	[e]205
Silicon metal do.	60	57	65	71	[e]70
Other do.	[r]118	[r]104	103	119	[e]120
Total do.	[r]717	[r]707	684	778	[e]781
Steel ingots and castings do.	21,258	18,416	17,623	19,008	18,832
Semimanufactures do.	18,780	16,431	15,348	16,543	17,234
Lead:					
Mine output, metal content	17,200	5,859	1,512	2,263	1,600
Smelter, primary only	128,600	122,700	114,948	117,900	133,600
Refined:					
Primary: Soft lead	128,600	122,700	114,948	117,900	133,600
Secondary:					
Soft lead	35,319	22,400	37,464	24,900	25,525
Lead content of antimonial lead	64,119	63,500	62,000	62,900	64,475
Total	228,038	208,600	214,412	205,700	223,600
Magnesium metal including secondary	7,263	9,610	11,075	12,972	13,800
Nickel: Cathodes	10,051	[3]7,361	[3]4,878	[3]5,217	[3]7,020
Silver: Mine output, metal content:					
Lead and zinc concentrates thousand troy ounces	NA	NA	[r]560	624	[e]650
Mixed copper, gold, silver concentrates do.	NA	NA	[r]136	146	[e]215
Total do.	1,707	983	[r]696	770	865
Metal, Ag content of final smelter products do.	9,729	30,955	[e]30,000	[e]30,000	[e]31,000
Tin, smelter output of solder and other alloys, secondary	7,438	6,141	6,708	6,700	2,929
Tungsten concentrate, metal content	591	727	832	796	733
Uranium:					
Mine output, metal content	2,550	3,020	3,890	3,116	3,227
Chemical concentrate, U_3O_8 equivalent	2,554	2,872	3,299	3,676	3,752
Zinc:					
Mine output, metal content	37,429	37,021	34,272	36,231	[e]40,600
Metal including secondary:					
Slab	257,130	243,800	249,500	258,800	247,200
Dust	9,250	9,400	9,300	7,400	8,200
INDUSTRIAL MINERALS					
Barite	190,150	143,324	152,600	148,200	[e]150,000
Bromine, elemental[e]	16,500	[r]17,000	[r]16,000	[r]17,500	20,000
Cement, hydraulic thousand tons	28,229	26,150	24,504	22,724	[e]22,200

See footnotes at end of table.

Table 1.—France: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984	1985[p]
INDUSTRIAL MINERALS —Continued					
Clays:					
Bentonite[4]	e3,000	3,290	3,091	3,475	e3,200
Kaolin and kaolinitic clay (marketable) thousand tons	331	347	289	307	e310
Refractory clay, unspecified do	1,457	r e1,500	413	458	e450
Diatomite do	210	244	221	247	e250
Feldspar, crude do	191	173	e175	209	e210
Fluorspar:					
Crude do	524	451	396	504	e550
Marketable:					
Acid- and ceramic-grade do	169	161	141	159	e160
Metallurgical-grade do	88	82	55	73	e100
Total do	r257	r243	r196	232	260
Gypsum and anhydrite, crude do	6,204	6,039	5,557	5,401	e5,500
Kyanite, andalusite, related materials do	e30	42	43	52	e50
Lime: Quicklime, hydrated lime, dead-burned dolomite do	3,366	3,510	2,946	3,130	e3,000
Mica	9,059	7,950	9,286	10,854	e10,000
Nitrogen: N content of ammonia thousand tons	2,250	1,900	1,960	2,350	2,010
Pigments, mineral, natural: Iron oxides[e]	15,000	16,000	16,000	15,000	14,500
Phosphates:					
Phosphate rock (phosphatic chalk)	12,340	--	--	--	--
Thomas slag thousand tons	r1,451	r1,343	1,124	1,194	e1,200
Potash:					
Gross weight (run-of-mine) do	11,344	10,904	10,874	12,480	12,500
K_2O equivalent (run-of-mine) do	1,969	1,824	1,651	1,852	e1,900
K_2O equivalent (marketable) do	1,831	1,704	1,537	1,739	1,750
Pozzolan and lapilli do	450	716	607	500	e550
Salt:					
Rock salt do	298	382	282	226	368
Brine salt (refined) do	1,092	1,071	1,074	1,136	1,154
Marine salt do	e1,300	1,539	1,354	1,381	e1,400
Salt in solution do	3,870	3,711	4,239	4,417	4,167
Total do	6,560	6,703	6,949	7,160	7,089
Sodium compounds:[e]					
Sodium sulfate do	150	150	150	120	125
Sodium carbonate do	1,600	1,000	1,000	900	900
Stone, sand and gravel					
Limestone, agricultural and industrial do	5,407	5,854	6,625	e6,700	e7,000
Slate, roof do	88	NA	52	59	e65
Sand and gravel:					
Industrial sands, total do	6,046	5,486	5,558	5,395	e5,500
Other sand and gravel, alluvial do	218,300	r211,000	199,000	181,000	e180,000
Sulfur, byproduct:					
Of natural gas do	1,701	1,690	1,653	1,589	1,424
Of petroleum do	221	235	157	163	122
Of unspecified sources do	120	110	160	182	177
Total do	2,042	2,035	r1,970	1,934	1,723
Talc:					
Crude	313,140	312,920	315,800	320,300	316,595
Powder	309,270	276,440	286,500	292,406	310,897
MINERAL FUELS AND RELATED MATERIALS					
Asphaltic material	54,020	50,230	47,000	44,500	e45,000
Carbon black	e170,000	205,730	218,600	165,900	e200,000
Coal including briquets:					
Anthracite and bituminous coal thousand tons	18,588	16,896	17,021	16,594	15,120
Lignite do	2,945	3,060	2,591	2,426	1,860
Total do	21,533	19,956	19,612	19,020	16,980
Briquets do	1,596	1,320	1,512	1,450	1,400
Coke, metallurgical do	10,723	9,935	8,458	8,999	8,700
Gas, natural:					
Gross million cubic feet	358,936	369,054	234,313	224,601	191,759
Marketed do	249,900	258,321	r221,953	213,124	181,341

See footnotes at end of table.

Table 1.—France: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984	1985[p]
MINERAL FUELS AND RELATED MATERIALS —Continued					
Natural gas liquids thousand 42-gallon barrels	7,446	8,027	7,480	7,424	6,840
Peat[e] thousand tons	130	120	110	228	200
Petroleum:					
Crude thousand 42-gallon barrels	12,288	12,011	12,093	19,117	23,479
Refinery products:					
Liquefied petroleum gas do	31,320	29,626	28,037	27,863	30,334
Gasoline, all kinds do	151,880	143,266	136,777	138,782	141,950
Jet fuel do	35,152	32,392	35,797	35,488	34,176
Kerosene do	1,449	938	1,434	388	481
Distillate fuel oil do	242,293	212,580	181,802	218,302	217,989
Heavy fuel oil do	176,244	128,771	115,983	103,889	89,636
Unspecified do	46,740	28,949	23,804	5,119	53,164
Refinery fuel and losses do	45,312	40,064	40,020	39,744	35,261
Total do	730,390	616,586	563,654	569,575	602,991

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through Oct. 10, 1986.
[2]In addition to the commodities listed, France also produces germanium from domestic ores and has been described as the world's leading producer of this commodity in French sources. Output was reported as 14 metric tons in 1980, all from the Saint-Salvy Mine. Unfortunately, actual output is not regularly reported, and the ore from this mine is not sufficiently uniform in grade to permit estimates of output based on reported concentrate production. In addition, France produces large quantities of dimension stone, but statistics on output are not available for 1981-85.
[3]From 1982 nickel metal in cathodes only.
[4]Includes smectic clay.

TRADE

Although the overall trade balance for France was positive, the trade in minerals and fuels yielded a negative balance. Imports of mineral-related commodities accounted for over one-half of the total imports. Of these raw material imports, nearly three-quarters were fuels.

Table 2.—France: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS				
Alkali and alkaline-earth metals:				
Alkali metals	17	69	1	Tunisia 29; Lebanon 10; Morocco 10.
Alkaline-earth metals	405	665	22	United Kingdom 219; Yugoslavia 121; Belgium-Luxembourg 88.
Aluminum:				
Ore and concentrate	68,651	245,208	--	West Germany 210,402; Sweden 21,536; Italy 3,776.
Oxides and hydroxides	269,731	231,793	5,175	Italy 82,195; Netherlands 74,519; Norway 17,537.
Ash and residue containing aluminum	9,661	16,393	--	Belgium-Luxembourg 5,918; Italy 4,727; West Germany 3,288.
Metal including alloys:				
Scrap	90,365	88,858	--	Italy 37,318; Belgium-Luxembourg 22,335; West Germany 20,100.
Unwrought	160,718	146,404	6,319	West Germany 45,032; Italy 30,690; Belgium-Luxembourg 23,286.
Semimanufactures	294,744	287,402	32,504	West Germany 75,186; United Kingdom 33,487.
Antimony:				
Ore and concentrate	26	54	--	All to Spain.
Oxides	5,233	5,931	1,601	West Germany 1,670; United Kingdom 715.
Metal including alloys, all forms	66	55	--	Italy 25; Belgium-Luxembourg 11.

See footnotes at end of table.

Table 2.—France: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued				
Arsenic:				
Oxides and acids	3,287	7,280	1,599	United Kingdom 2,070; Australia 725.
Metal including alloys, all forms	27	128	126	Switzerland 2.
Beryllium: Metal including alloys, all forms ... value, thousands	$17	$3	$1	India $1; Spain $1.
Bismuth: Metal including alloys, all forms	13	12	2	Spain 4; Belgium-Luxembourg 3.
Cadmium: Metal including alloys, all forms	344	490	25	Belgium-Luxembourg 114; West Germany 112; Netherlands 60.
Chromium:				
Ore and concentrate	1,316	1,069	--	Italy 807; Spain 139.
Oxides and hydroxides	91	174	--	Italy 60; West Germany 30; United Kingdom 30.
Metal including alloys, all forms	740	1,630	422	Netherlands 674; West Germany 172.
Cobalt:				
Ore and concentrate	--	17	--	Madagascar 13; U.S.S.R. 3.
Oxides and hydroxides	111	47	--	West Germany 20; Yugoslavia 13.
Metal including alloys, all forms	1,133	1,216	167	West Germany 623; Italy 112.
Columbium and tantalum: Metal including alloys, all forms:				
Columbium (niobium) ... value, thousands	$38	$7	--	West Germany $5; Italy $1.
Tantalum	12	10	1	Netherlands 6; United Kingdom 2.
Copper:				
Ore and concentrate	448	293	--	All to West Germany.
Matte and speiss including cement copper	2,603	4,812	--	Spain 2,915; Belgium-Luxembourg 1,668.
Oxides and hydroxides	54	193	--	Italy 49; Belgium-Luxembourg 48; West Germany 31.
Sulfate	3,409	5,388	26	Equatorial Guinea 1,488; West Germany 1,344; Egypt 1,006.
Ash and residue containing copper	16,359	11,263	--	Belgium-Luxembourg 7,097; Spain 1,845; Sweden 1,341.
Metal including alloys:				
Scrap	126,003	120,467	452	West Germany 50,634; Belgium-Luxembourg 29,768; Italy 28,261.
Unwrought	26,229	10,191	133	Belgium-Luxembourg 5,108; West Germany 1,886; Algeria 916.
Semimanufactures	251,196	276,323	22,466	West Germany 71,505; Italy 50,328.
Germanium: Metal including alloys, all forms ... value, thousands	$2,454	$2,561	$1,027	United Kingdom $1,436; Belgium-Luxembourg $65.
Gold:				
Waste and sweepings ... do	$6,852	$31,004	--	Spain $29,364; Belgium-Luxembourg $991; Turkey $436.
Metal including alloys, unwrought and partly wrought ... do	$121,669	$115,125	$39	United Kingdom $51,468; Switzerland $27,158; West Germany $19,785.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite ... thousand tons	5,031	4,752	--	Belgium-Luxembourg 4,749; Italy 1.
Pyrite, roasted	14	25	--	All to Italy.
Metal:				
Scrap ... thousand tons	3,227	4,103	(2)	Italy 2,172; Spain 1,098; Belgium-Luxembourg 516.
Pig iron, cast iron, related materials	191,077	246,576	8,485	Belgium-Luxembourg 66,432; Italy 57,835; West Germany 33,412.
Ferroalloys:				
Ferrochromium	516	1,452	--	Italy 600; West Germany 233; Belgium-Luxembourg 147.
Ferromanganese	282,508	314,111	52,650	Italy 54,266; Gabon 42,672.
Ferromolybdenum	1,022	1,333	--	Netherlands 946; West Germany 212; Italy 101.
Ferronickel	48,464	56,408	--	West Germany 23,451; Sweden 10,082; Italy 7,830.
Ferrosilicochromium	898	121	5	West Germany 115.
Ferrosilicomanganese	6,530	21,551	127	West Germany 8,184; Belgium-Luxembourg 5,239; Saudi Arabia 3,000.
Ferrosilicon	86,022	82,294	85	West Germany 23,933; Japan 23,259; Italy 16,037.
Unspecified	36,319	45,249	5,293	West Germany 8,281; Italy 5,369.

See footnotes at end of table.

Table 2.—France: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal —Continued				
Steel, primary forms thousand tons	2,419	3,037	386	Italy 864; Belgium-Luxembourg 453.
Semimanufactures:				
Bars, rods, angles, shapes, sections do	2,385	2,684	255	West Germany 487; Belgium-Luxembourg 331.
Universals, plates, sheets do	2,838	3,291	304	West Germany 663; Italy 398.
Hoop and strip do	453	490	12	West Germany 157; Italy 85; Belgium-Luxembourg 72.
Rails and accessories do	164	180	25	Italy 28; Morocco 22.
Wire do	216	241	50	West Germany 44; United Kingdom 17.
Tubes, pipes, fittings do	1,376	1,588	150	U.S.S.R. 348; West Germany 175.
Castings and forgings, rough do	65	65	4	West Germany 27; Belgium-Luxembourg 14; United Kingdom 9.
Lead:				
Ore and concentrate	3,096	122	2	Austria 111; United Arab Emirates 4.
Oxides	7,535	8,445	--	U.S.S.R. 1,755; Algeria 1,319; Czechoslovakia 1,185.
Ash and residue containing lead	7,875	15,835	--	Belgium-Luxembourg 8,558; West Germany 7,067.
Metal including alloys:				
Scrap	10,674	17,973	--	West Germany 8,532; Italy 5,265; Belgium-Luxembourg 3,142.
Unwrought	49,649	53,836	20	West Germany 16,625; Belgium-Luxembourg 14,826; Netherlands 3,591.
Semimanufactures	2,205	2,368	10	Belgium-Luxembourg 1,045; West Germany 577; United Kingdom 115.
Lithium:				
Oxides	62	79	--	West Germany 76.
Metal including alloys, all forms	([2])	18	--	All to Gabon.
Magnesium: Metal including alloys:				
Scrap	666	597	--	Italy 309; Netherlands 171; West Germany 56.
Unwrought	5,735	6,739	406	West Germany 2,176; Netherlands 743; Italy 535.
Semimanufactures	3,112	1,771	54	West Germany 983; Italy 656.
Manganese:				
Ore and concentrate, metallurgical-grade	20,907	76,454	2,540	Norway 31,100; Italy 19,010; Gabon 17,100.
Oxides	996	1,265	--	Morocco 276; Italy 259; Ivory Coast 253.
Metal including alloys, all forms	4,949	6,434	294	Italy 1,654; U.S.S.R. 1,102; Belgium-Luxembourg 836.
Mercury 76-pound flasks	3,104	2,292	551	Netherlands 609; West Germany 493.
Molybdenum:				
Ore and concentrate	364	227	--	Belgium-Luxembourg 112; Netherlands 51; Italy 47.
Oxides and hydroxides value, thousands	$6	$7	--	Morocco $6.
Metal includng alloys:				
Scrap	87	76	4	Belgium-Luxembourg 21; United Kingdom 4.
Unwrought	156	172	--	West Germany 57; Austria 40; India 37.
Semimanufactures	41	40	([2])	United Kingdom 11; West Germany 9; Italy 5.
Nickel:				
Ore and concentrate	2	83	--	West Germany 82.
Matte and speiss	4	19	--	Morocco 8; Belgium-Luxembourg 6; Tunisia 2.
Oxides and hydroxides	62	80	--	Belgium-Luxembourg 38; Poland 17; Netherlands 7.
Ash and residue containing nickel	3,147	3,650	--	Netherlands 1,117; Sweden 1,055; West Germany 762.
Metal including alloys:				
Scrap	2,070	3,602	311	West Germany 1,776; Austria 346.
Unwrought	5,416	5,582	1,481	West Germany 1,754; Sweden 565.
Semimanufactures	4,940	5,762	784	West Germany 4,069; United Kingdom 245.

See footnotes at end of table.

Table 2.—France: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued				
Platinum-group metals:				
Waste and sweepings value, thousands	$8,067	$3,937	--	Spain $2,365; United Kingdom $1,206; Belgium-Luxembourg $182.
Metals including alloys, unwrought and partly wrought:				
Palladium troy ounces	43,666	29,250	--	West Germany 7,375; Switzerland 6,753; Italy 5,592.
Platinum do	109,546	152,361	1,788	Netherlands 38,420; United Kingdom 36,816; Belgium-Luxembourg 14,560.
Unspecified do	20,761	33,202	--	Bulgaria 13,889; West Germany 7,780; Netherlands 5,917.
Rare-earth metals including alloys, all forms	59	1,009	--	Japan 903; United Kingdom 50; Italy 19.
Rhenium: Metal including alloys, all forms value, thousands	$99	$101	$2	Japan $75; Netherlands $21.
Selenium, elemental	1	2	--	West Germany 1; Morocco 1.
Silicon, high-purity	1	130	1	Belgium-Luxembourg 110; West Germany 19.
Silver:				
Ore and concentrate[3] value, thousands	$709	$1,546	--	All to Sweden.
Waste and sweepings do	$24,725	$32,756	--	Spain $27,589; Sweden $1,952; Switzerland $1,694.
Metal including alloys, unwrought and partly wrought thousand troy ounces	15,995	16,347	752	United Kingdom 5,347; West Germany 5,019; Switzerland 1,783.
Tellurium, elemental	22	--		
Tin:				
Ore and concentrate	27	7	--	All to Spain.
Oxides	13	30	--	Italy 24; Netherlands 2.
Ash and residue containing tin	152	84	--	West Germany 60; United Kingdom 23.
Metal including alloys:				
Scrap	328	287	([4])	West Germany 103; Belgium-Luxembourg 97; United Kingdom 51.
Unwrought	343	269	--	Saudi Arabia 100; United Kingdom 61; Belgium-Luxembourg 22.
Semimanufactures	255	249	13	Switzerland 35; Italy 34; Belgium-Luxembourg 26.
Titanium:				
Ore and concentrate	235	95	--	Ivory Coast 94; Senegal 1.
Oxides	17,450	22,488	8,663	West Germany 5,301; Italy 1,293.
Metal including alloys:				
Scrap	810	1,067	176	Spain 339; United Kingdom 270; West Germany 239.
Unwrought	14	1	--	All to United Kingdom.
Semimanufactures	145	120	22	West Germany 33; United Kingdom 25.
Tungsten:				
Ore and concentrate	818	522	20	Japan 152; Austria 117; Sweden 95.
Oxides and hydroxides	23	8	--	Switzerland 4; Hungary 2; Yugoslavia 2.
Ash and residue containing tungsten	31	189	--	West Germany 180; Austria 8.
Metal including alloys:				
Scrap	266	228	40	West Germany 102; Belgium-Luxembourg 39.
Unwrought	80	112	--	West Germany 60; Switzerland 16; United Kingdom 15.
Semimanufactures	52	32	2	West Germany 5; Belgium-Luxembourg 3.
Uranium and/or thorium:				
Oxides and other compounds	510	232	--	U.S.S.R. 224; Italy 8.
Metal including alloys, all forms, uranium	4,231	2,485	197	U.S.S.R. 1,269; West Germany 541; Netherlands 236.
Vanadium:				
Oxides and hydroxides	6	12	--	India 7; United Kingdom 5.
Ash and residue containing vanadium	40	100	--	All to West Germany.
Metal including alloys:				
Scrap	98	237	--	All to United Kingdom.
Unwrought value, thousands	--	$2	--	All to Belgium-Luxembourg.
Semimanufactures do	$34	$3	--	West Germany $2; United Kingdom $1.

See footnotes at end of table.

Table 2.—France: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued				
Zinc:				
Ore and concentrate	98,338	117,188	--	Belgium-Luxembourg 96,421; Italy 16,830; Netherlands 3,936.
Oxides	16,974	22,124	--	Belgium-Luxembourg 5,043; West Germany 3,679; Romania 3,621.
Blue powder	3,835	3,905	--	West Germany 2,196; Italy 840; Spain 304.
Matte	3,767	5,428	--	Italy 2,283; West Germany 1,517; Belgium-Luxembourg 664.
Ash and residue containing zinc	15,519	15,995	--	Belgium-Luxembourg 8,954; West Germany 2,361; Sweden 1,937.
Metal including alloys:				
Scrap	11,908	11,456	--	Italy 7,174; Belgium-Luxembourg 1,255; West Germany 1,117.
Unwrought	52,641	95,188	9,609	Belgium-Luxembourg 20,883; West Germany 19,524; Netherlands 11,929.
Semimanufactures	41,021	34,858	53	Belgium-Luxembourg 14,174; West Germany 13,505; Denmark 2,710.
Zirconium: Ore and concentrate	188	61	--	Switzerland 21; West Germany 15; Ivory Coast 14.
Other:				
Ores and concentrates	385	15	--	West Germany 6; Tunisia 5; Morocco 1.
Oxides and hydroxides	116	157	--	Senegal 86; West Germany 55; Benin 10.
Ashes and residues	18,084	19,114	90	Sweden 7,348; Belgium-Luxembourg 5,929; West Germany 2,577.
Base metals including alloys, all forms	142	28	12	Japan 7; United Kingdom 7.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	1,808	1,486	(2)	West Germany 248; Martinique 195; Spain 170.
Artificial: Corundum	19,740	21,862	2,444	Italy 3,676; Belgium-Luxembourg 2,462; West Germany 2,444.
Grinding and polishing wheels and stones	5,740	7,821	768	West Germany 1,682; United Kingdom 974.
Asbestos, crude	3,195	921	--	Tunisia 365; Belgium-Luxembourg 207.
Barite and witherite	109,752	131,394	--	West Germany 122,713; Italy 2,067; Romania 1,500.
Boron materials:				
Crude natural borates	3,689	4,596	--	Spain 3,809; Italy 462; Belgium-Luxembourg 139.
Elemental	1	8	--	All to Guadeloupe.
Oxides and acids	23,584	28,056	126	West Germany 10,085; United Kingdom 3,971; East Germany 3,735.
Cement thousand tons	2,867	3,157	226	West Germany 855; Cameroon 502; Algeria 385.
Chalk	550,087	656,784	1,728	West Germany 319,097; Belgium-Luxembourg 95,503; Switzerland 43,205.
Clays, crude:				
Bentonite	10,404	7,676	--	West Germany 1,347; Portugal 1,221; Italy 1,040.
Chamotte earth	141,508	163,345	--	Italy 59,096; United Kingdom 32,006; West Germany 22,393.
Kaolin	143,859	147,872	--	West Germany 44,607; Italy 34,887; Belgium-Luxembourg 28,755.
Unspecified	297,169	335,564	25	Italy 151,509; West Germany 87,101; United Kingdom 30,554.
Cryolite and chiolite	19	43	--	Italy 11; Morocco 10; Spain 8.
Diamond:				
Gem, not set or strung carats	98,298	48,959	826	Belgium-Luxembourg 24,555; Switzerland 17,067; Israel 1,971.
Industrial stones do	148,930	358,172	4,013	Ireland 300,615; Belgium-Luxembourg 41,026; West Germany 5,424.
Dust and powder kilograms	61	70	2	Italy 45; Syria 9; Switzerland 6.
Diatomite and other infusorial earth	26,984	31,655	--	West Germany 11,538; Belgium-Luxembourg 5,152; Italy 3,391.

See footnotes at end of table.

Table 2.—France: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Feldspar, fluorspar, related materials:				
Feldspar	54,445	59,566	--	Belgium-Luxembourg 20,892; Spain 17,637; West Germany 6,697.
Fluorspar	47,356	60,928	103	West Germany 22,684; Italy 15,348; Poland 7,340.
Unspecified	13	20	--	Cameroon 10; Reunion 9.
Fertilizer materials:				
Crude, n.e.s	24,599	22,811	23	Switzerland 14,696; Belgium-Luxembourg 2,864; West Germany 1,287.
Manufactured:				
Ammonia	182,965	248,800	22	West Germany 108,094; Spain 60,399; Turkey 17,165.
Nitrogenous	714,061	757,762	2,044	Netherlands 272,972; Belgium-Luxembourg 100,983; China 52,500.
Phosphatic	216,287	180,559	--	Switzerland 64,256; Austria 41,057; Italy 40,582.
Potassic	456,507	457,875	2,304	Belgium-Luxembourg 118,903; Switzerland 95,999; Italy 90,002.
Unspecified and mixed	432,043	507,346	22	West Germany 128,175; Belgium-Luxembourg 125,604; Ireland 71,043.
Graphite, natural	891	555	19	West Germany 186; Morocco 46; Belgium-Luxembourg 2.
Gypsum and plaster -- thousand tons	1,048	1,189	--	West Germany 574; Belgium-Luxembourg 262; Netherlands 167.
Iodine	48	52	--	West Germany 23; Belgium-Luxembourg 9; Netherlands 5.
Kyanite and related materials	166	51	--	West Germany 37; Italy 13.
Lime	300,755	316,666	--	West Germany 219,123; Belgium-Luxembourg 59,125; Guinea 20,090.
Magnesium compounds:				
Magnesite	r66	222	--	Italy 111; Switzerland 99; West Germany 10.
Oxides and hydroxides	r12,356	13,148	20	U.S.S.R. 2,650; Italy 2,368; West Germany 1,528.
Sulfate	--	71	--	All to Martinique.
Mica:				
Crude including splittings and waste	5,801	9,598	--	West Germany 3,195; United Kingdom 3,161; Belgium-Luxembourg 913.
Worked including agglomerated splittings	848	1,127	16	Switzerland 250; West Germany 227; Hong Kong 182.
Nitrates, crude	3	5	--	Portugal 1.
Phosphates, crude	4,953	1,931	--	Cameroon 760; Belgium-Luxembourg 366; West Germany 346.
Pigments, mineral:				
Natural, crude	3,146	715	--	Algeria 105; Ivory Coast 93; West Germany 69.
Iron oxides and hydroxides, processed	4,421	4,116	6	Italy 1,064; West Germany 537; United Kingdom 471.
Potassium salts, crude	11,088	3,378	--	Belgium-Luxembourg 3,111; Mexico 2.
Precious and semiprecious stones other than diamond:				
Natural ----- value, thousands	$31,222	$45,801	$1,454	Switzerland $36,354; United Kingdom $3,042; Belgium-Luxembourg $1,606.
Synthetic -------- do	$6,161	$5,629	$822	Switzerland $3,586; Italy $222.
Pyrite, unroasted	105	44	--	Saudi Arabia 21; Republic of South Africa 18.
Quartz crystal, piezoelectric kilograms	7	320	--	NA.
Salt and brine	448,765	606,316	150,312	Italy 172,700; West Germany 100,147.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	219,925	204,079	60	China 31,251; Argentina 29,281; United Kingdom 27,680.
Sulfate, manufactured	30,670	20,638	1	Italy 12,377; West Germany 3,896; Belgium-Luxembourg 1,622.

See footnotes at end of table.

Table 2.—France: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	118,684	105,217	444	Belgium-Luxembourg 41,082; West Germany 26,316; Switzerland 12,608.
Worked	56,015	56,867	2,818	Belgium-Luxembourg 21,157; West Germany 14,897; Saudi Arabia 5,767.
Dolomite, chiefly refractory-grade	35,027	31,313	--	Belgium-Luxembourg 10,306; West Germany 7,890; Spain 2,986.
Gravel and crushed rock thousand tons	9,643	9,063	3	West Germany 5,120; Switzerland 1,867; Netherlands 1,145.
Limestone other than dimension	316,708	441,155	--	West Germany 385,634; Belgium-Luxembourg 42,009.
Quartz and quartzite	3,447	2,737	320	United Kingdom 634; Switzerland 27.
Sand other than metal-bearing thousand tons	3,878	3,406	--	West Germany 1,919; Italy 676; Switzerland 609.
Sulfur:				
Elemental:				
Crude including native and byproduct	678,920	719,218	(2)	United Kingdom 220,500; Netherlands 13,308; Tunisia 58,620.
Colloidal, precipitated, sublimed	2,603	5,961	20	Algeria 3,584; Belgium-Luxembourg 578; West Germany 498.
Dioxide	5,446	4,069	--	Netherlands 2,349; Belgium-Luxembourg 1,655.
Sulfuric acid	239,675	204,192	8	Belgium-Luxembourg 173,016; United Kingdom 17,678; Spain 4,913.
Talc, steatite, soapstone, pyrophyllite	82,480	94,011	5,491	West Germany 33,241; Belgium-Luxembourg 11,620; United Kingdom 8,261.
Vermiculite	2,512	609	--	India 336; Algeria 101; Spain 96.
Other:				
Crude thousand tons	1,024	1,035	--	Belgium-Luxembourg 736; Switzerland 280; West Germany 13.
Slag and dross, not metal-bearing do	1,704	1,461	(2)	West Germany 688; Belgium-Luxembourg 418; Israel 101.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	30,776	62,152	--	Belgium-Luxembourg 56,656; United Kingdom 4,290; Morocco 186.
Carbon:				
Carbon black	79,382	87,237	19	West Germany 23,891; Spain 15,023; Belgium-Luxembourg 14,961.
Gas carbon	r952	756	--	Senegal 618; United Kingdom 108; Portugal 22.
Coal:				
Anthracite	120,732	170,756	--	United Kingdom 86,464; Belgium-Luxembourg 38,988; Ireland 13,106.
Bituminous	601,240	721,378	--	West Germany 371,627; United Kingdom 168,971; Norway 101,831.
Briquets of anthracite and bituminous coal	25,704	49,024	--	United Kingdom 23,050; Belgium-Luxembourg 20,200; Ireland 4,703.
Lignite including briquets	3,397	2,434	--	Spain 2,335.
Coke and semicoke	r963	1,082	32	West Germany 299; United Kingdom 183; Belgium-Luxembourg 164.
Gas, natural: Gaseous million cubic feet	27,634	5,631	--	Switzerland 3,795; Belgium-Luxembourg 1,834.
Peat including briquets and litter	831	814	--	Switzerland 252; Saudi Arabia 214; Morocco 168.
Petroleum:				
Crude thousand 42-gallon barrels	3,179	497	--	West Germany 496; Canada 1.
Refinery products:				
Liquefied petroleum gas do	7,897	7,672	922	Spain 1,827; Italy 1,165.
Gasoline do	13,658	11,354	1,040	Netherlands 2,507; West Germany 1,852; Switzerland 1,815.
Mineral jelly and wax do	413	520	1	West Germany 203; Netherlands 173; Belgium-Luxembourg 35.
Kerosene and jet fuel do	8,888	8,631	155	Switzerland 2,508; West Germany 2,399; Netherlands 919.

See footnotes at end of table.

Table 2.—France: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum —Continued				
Refinery products —Continued				
Distillate fuel oil thousand 42-gallon barrels	20,112	19,841	914	Switzerland 7,203; West Germany 5,268.
Lubricants do	5,502	5,529	47	West Germany 483; United Kingdom 477; U.S.S.R. 440.
Residual fuel oil do	24,956	27,828	338	United Kingdom 10,578; Italy 6,669; Portugal 3,481.
Bitumen and other residues do	1,175	880	--	West Germany 288; Switzerland 216; Belgium-Luxembourg 152.
Bituminous mixtures do	337	235	1	Algeria 102; West Germany 24; Belgium-Luxembourg 23.
Petroleum coke do	49	107	--	Italy 56; Morocco 44; West Germany 6.

[r]Revised. NA Not available.
[1]Table prepared by staff, Branch of Geographic Data.
[2]Less than 1/2 unit.
[3]May include other precious metals.

Table 3.—France: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS				
Alkali and alkaline-earth metals:				
Alkali metals	63	313	2	West Germany 151; United Kingdom 119; Italy 33.
Alkaline-earth metals	64	237	5	Canada 199; Austria 15; China 6.
Aluminum:				
Ore and concentrate thousand tons	1,079	981	([2])	Guinea 544; Australia 240; China 61.
Oxides and hydroxides	91,116	49,999	840	West Germany 24,586; Guinea 14,080; Netherlands 5,591.
Ash and residue containing aluminum	9,638	8,845	--	West Germany 4,969; Italy 1,828; Cameroon 1,687.
Metal including alloys:				
Scrap	60,016	66,541	1,853	Netherlands 17,760; Belgium-Luxembourg 17,323; West Germany 14,236.
Unwrought	394,641	364,957	149	Netherlands 64,073; West Germany 53,679; Cameroon 44,960.
Semimanufactures	217,089	215,348	1,140	West Germany 80,669; Belgium-Luxembourg 51,789; Italy 19,089.
Antimony:				
Ore and concentrate	10,273	11,255	--	Bolivia 3,678; China 2,957; Thailand 1,219.
Oxides	437	504	--	Belgium-Luxembourg 205; United Kingdom 129; China 58.
Metal including alloys, all forms	593	568	([2])	China 289; Spain 97; Peru 73.
Arsenic:				
Oxides and acids	135	214	16	United Kingdom 105; Italy 68.
Metal including alloys, all forms	99	135	--	Netherlands 66; Sweden 63.
Beryllium:				
Oxides and hydroxides value, thousands	$34	$1	--	All from United Kingdom.
Metal including alloys, all forms	6	7	6	West Germany 1.

See footnotes at end of table.

Table 3.—France: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Bismuth: Metal including alloys, all forms	274	232	1	Belgium-Luxembourg 168; United Kingdom 46.
Cadmium: Metal including alloys, all forms	744	921	(2)	Belgium-Luxembourg 485; Netherlands 216; Australia 89.
Cesium and rubidium: Metal including alloys, all forms	(2)	20	(2)	Mainly from United Kingdom.
Chromium:				
Ore and concentrate	54,509	57,596	--	Republic of South Africa 41,291; Albania 8,665; Finland 3,243.
Oxides and hydroxides	4,736	6,049	6	West Germany 2,146; United Kingdom 1,783; Italy 1,143.
Metal including alloys, all forms	276	290	2	United Kingdom 191; Japan 61.
Cobalt:				
Ore and concentrate	211	314	1	Belgium-Luxembourg 196; Finland 57; West Germany 23.
Metal including alloys, all forms	1,397	1,574	141	Zaire 801; Zambia 136.
Columbium and tantalum:				
Ore and concentrate value, thousands	--	$32	--	All from United Kingdom.
Ash and residue containing columbium and tantalum	--	19	--	All from Italy.
Metal including alloys, all forms:				
Columbium (niobium)	26	37	1	West Germany 36.
Tantalum	31	48	27	West Germany 20; Austria 1.
Copper:				
Ore and concentrate	46	356	--	Zaire 300; Australia 52.
Matte and speiss including cement copper	64	--		
Oxides and hydroxides	659	800	(2)	Norway 247; Belgium-Luxembourg 205; Italy 194.
Sulfate	4,630	4,297	--	Italy 1,450; Spain 767; Czechoslovakia 662.
Ash and residue containing copper	4,945	5,339	--	Japan 2,195; Belgium-Luxembourg 1,051; United Kingdom 955.
Metal including alloys:				
Scrap	32,714	31,623	373	West Germany 8,843; Belgium-Luxembourg 5,226; Netherlands 3,541.
Unwrought	357,266	364,154	1,789	Chile 119,698; Belgium-Luxembourg 71,650; Zambia 47,316.
Semimanufactures	164,597	169,545	1,564	West Germany 58,943; Belgium-Luxembourg 50,532; Italy 29,335.
Germanium: Metal including alloys, all forms value, thousands	$842	$707	$5	Belgium-Luxembourg $597; China $51.
Gold:				
Waste and sweepings do.	$5,843	$4,572	$560	Switzerland $2,786; Spain $298.
Metal including alloys, unwrought and partly wrought do.	$147,459	$117,920	$54,424	Republic of South Africa $26,907; United Kingdom $8,609.
Hafnium: Metal including alloys, all forms do.	$17	$564	$547	NA.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite thousand tons	12,553	16,088	--	Brazil 3,601; Sweden 2,779; Australia 2,752.
Pyrite, roasted do.	83	73	--	Italy 38; Belgium-Luxembourg 14; Spain 13.
Metal:				
Scrap	306,757	406,539	5,078	Belgium-Luxembourg 182,661; West Germany 92,567; United Kingdom 63,497.
Pig iron, cast iron, related materials	447,270	431,721	40	West Germany 361,212; United Kingdom 23,385; Canada 17,912.

See footnotes at end of table.

Table 3.—France: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984	
			United States	Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal —Continued				
Ferroalloys:				
Ferrochromium	113,135	154,506	187	Republic of South Africa 94,158; Sweden 18,220; Zimbabwe 9,428.
Ferromanganese	22,722	40,990	([3])	Norway 13,878; Portugal 11,850; Belgium-Luxembourg 8,092.
Ferromolybdenum	1,445	1,367	--	Belgium-Luxembourg 579; United Kingdom 296; Austria 170.
Ferronickel	76,983	93,980	--	New Caledonia 69,423; Greece 10,953; Colombia 5,739.
Ferrosilicochromium	1,030	849	--	Zimbabwe 745; Belgium-Luxembourg 24; U.S.S.R. 22.
Ferrosilicomanganese	27,144	41,018	--	Norway 27,349; Italy 9,042; Yugoslavia 1,842.
Ferrosilicon	26,420	136,656	1	Norway 121,586; West Germany 8,104; Italy 2,242.
Silicon metal	3,960	5,780	1	Norway 2,584; Brazil 1,137; Sweden 643.
Unspecified	3,045	5,765	1	Italy 1,215; West Germany 1,205; United Kingdom 870.
Steel, primary forms thousand tons	1,979	2,453	6	Belgium-Luxembourg 1,484; West Germany 500; Spain 154.
Semimanufactures:				
Bars, rods, angles, shapes, sections do.	2,080	2,100	6	Italy 614; West Germany 541; Belgium-Luxembourg 539.
Universals, plates, sheets do.	2,484	2,498	1	Belgium-Luxembourg 1,111; West Germany 547; Italy 316.
Hoop and strip do.	351	370	([3])	West Germany 181; Belgium-Luxembourg 95; Italy 40.
Rails and accessories do.	45	57	([3])	Belgium-Luxembourg 38; United Kingdom 15; West Germany 3.
Wire do.	189	210	([3])	Belgium-Luxembourg 68; West Germany 60; Italy 42.
Tubes, pipes, fittings do.	472	519	2	Italy 155; West Germany 147; Belgium-Luxembourg 49.
Castings and forgings, rough do.	45	47	([3])	West Germany 28; Italy 8; Spain 3.
Lead:				
Ore and concentrate	144,346	158,366	--	Republic of South Africa 67,207; Peru 15,549; Sweden 15,042.
Oxides	776	1,312	2	West Germany 473; United Kingdom 420; Belgium-Luxembourg 276.
Ash and residue containing lead	16,310	15,233	--	Belgium-Luxembourg 6,088; Italy 6,050; West Germany 1,486.
Metal including alloys:				
Scrap	13,246	4,870	--	Belgium-Luxembourg 2,216; Netherlands 676; West Germany 576.
Unwrought	49,132	55,249	1,596	Belgium-Luxembourg 18,987; United Kingdom 15,079; West Germany 12,628.
Semimanufactures	5,211	5,778	10	Belgium-Luxembourg 3,699; West Germany 1,981.
Lithium:				
Oxides and hydroxides	602	474	144	West Germany 216; China 86.
Metal including alloys, all forms	8	29	([3])	United Kingdom 13; West Germany 9.
Magnesium: Metal including alloys:				
Scrap	176	239	--	West Germany 59; Netherlands 57; Belgium-Luxembourg 23.
Unwrought	5,018	4,685	1,588	Norway 2,829; Yugoslavia 87.
Semimanufactures	236	471	35	Italy 123; West Germany 71; Switzerland 70.
Manganese:				
Ore and concentrate, metallurgical-grade thousand tons	746	1,008	([3])	Gabon 629; Republic of South Africa 248; Australia 44.
Oxides	6,978	7,092	38	Belgium-Luxembourg 3,191; Greece 1,722; West Germany 844.
Metal including alloys, all forms	1,461	1,184	33	Republic of South Africa 1,038; Netherlands 97.

See footnotes at end of table.

Table 3.—France: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Mercury 76-pound flasks	4,960	4,293	29	Spain 3,017; Turkey 377; Mexico 290.
Molybdenum:				
Ore and concentrate	5,650	6,246	1,885	Canada 1,573; Belgium-Luxembourg 779.
Oxides and hydroxides	35	77	33	United Kingdom 18; Netherlands 14.
Metal including alloys:				
Scrap	49	50	1	Austria 18; West Germany 17; Belgium-Luxembourg 8.
Unwrought	82	104	15	Austria 40; West Germany 23.
Semimanufactures	94	89	11	Austria 43; Belgium-Luxembourg 9.
Nickel:				
Ore and concentrate	(2)	20	--	All from Republic of South Africa.
Matte and speiss	7,092	8,649	--	New Caledonia 7,334; Australia 800; Canada 438.
Oxides and hydroxides	545	283	--	Cuba 245; Canada 27.
Ash and residue containing nickel	401	571	(2)	West Germany 205; Netherlands 195.
Metal including alloys:				
Scrap	529	917	97	United Kingdom 399; West Germany 173.
Unwrought	20,552	22,698	2,143	West Germany 4,866; U.S.S.R. 2,730.
Semimanufactures	3,640	4,567	399	United Kingdom 1,669; West Germany 1,268.
Platinum-group metals:				
Waste and sweepings value, thousands	$11,374	$21,388	$12	West Germany $11,350; Netherlands $4,022; Yugoslavia $2,288.
Metals including alloys, unwrought and partly wrought:				
Palladium troy ounces	85,830	63,446	1,331	U.S.S.R. 33,631; Switzerland 7,164; United Kingdom 5,347.
Platinum do	95,935	135,952	7,822	United Kingdom 56,706; Republic of South Africa 22,011; West Germany 17,104.
Unspecified do	28,223	67,986	9,021	Republic of South Africa 23,656; United Kingdom 11,704; West Germany 10,155.
Rare-earth metals including alloys, all forms	75	162	(2)	Austria 141; Spain 20.
Rhenium: Metal including alloys, all forms value, thousands	$89	$71	$13	West Germany $33; Belgium-Luxembourg $16.
Selenium, elemental	42	46	1	Canada 25; United Kingdom 7; Chile 5.
Silicon, high-purity	153	15	(2)	West Germany 14; Belgium-Luxembourg 1.
Silver:				
Ore and concentrate[3]	3,649	16,688	--	Greece 15,400; Peru 1,272; Argentina 16.
Waste and sweepings value, thousands	$6,128	$6,183	$3,539	Canada $568; Spain $550.
Metal including alloys, unwrought and partly wrought thousand troy ounces	15,502	15,778	2,235	United Kingdom 3,658; Belgium-Luxembourg 1,235.
Tellurium, elemental	9	30	NA	Belgium-Luxembourg 8.
Tin:				
Oxides	145	109	(2)	Italy 41; West Germany 35; United Kingdom 33.
Ash and residue containing tin	251	4	--	Mainly from Italy.
Metal including alloys:				
Scrap	75	41	--	United Kingdom 17; Netherlands 16; Italy 6.
Unwrought	8,044	8,187	95	Malaysia 2,895; Netherlands 1,231; Indonesia 1,068.
Semimanufactures	148	182	3	West Germany 87; Denmark 35; Netherlands 24.
Titanium:				
Ore and concentrate	178,321	167,851	--	Australia 63,445; Canada 62,960; India 26,253.
Oxides	14,182	14,438	3,311	Netherlands 3,752; West Germany 3,489.
Metal including alloys:				
Scrap	208	182	34	West Germany 69; United Kingdom 16.
Unwrought	192	1,432	424	Japan 816; West Germany 188.
Semimanufactures	1,374	783	270	West Germany 245; United Kingdom 153.

See footnotes at end of table.

Table 3.—France: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Tungsten:				
Ore and concentrate	277	2,632	--	Sri Lanka 1,927; China 209; Canada 122.
Oxides and hydroxides	44	15	--	All from West Germany.
Ash and residue containing tungsten	63	10	--	Do.
Metal including alloys:				
Scrap	116	15	1	United Kingdom 5.
Unwrought	119	112	1	West Germany 76; Belgium-Luxembourg 12; United Kingdom 11.
Semimanufactures	86	56	4	Austria 11; Belgium-Luxembourg 10; West Germany 8.
Uranium and/or thorium:				
Ore and concentrate	13,639	12,947	749	Australia 9,634; Malaysia 962; Thailand 952.
Oxides and other compounds value, thousands	$9	$21	--	Mainly from Belgium-Luxembourg.
Metal including alloys, all forms:				
Uranium	10,044	7,904	180	Niger 2,950; Republic of South Africa 1,668; Gabon 951.
Thorium value, thousands	$5	$1	--	All from United Kingdom.
Vanadium:				
Oxides and hydroxides	1,126	2,501	--	Finland 1,320; Republic of South Africa 778; Belgium-Luxembourg 212.
Metal including alloys:				
Unwrought	29	52	--	All from West Germany.
Semimanufactures value, thousands	$42	$65	$13	West Germany $40; United Kingdom $5.
Zinc:				
Ore and concentrate	583,938	558,386	--	Peru 142,306; Canada 110,043; Ireland 72,605.
Oxides	7,398	8,465	3	Italy 2,119; Netherlands 2,055; Belgium-Luxembourg 1,743.
Blue powder	4,653	2,952	--	Belgium-Luxembourg 2,195; Netherlands 596; West Germany 77.
Matte	4,399	5,511	--	Belgium-Luxembourg 2,534; West Germany 1,806; United Kingdom 770.
Ash and residue containing zinc	34,274	34,887	1,018	Belgium-Luxembourg 11,535; West Germany 10,759; Peru 3,600.
Metal including alloys:				
Scrap	7,154	6,345	21	Belgium-Luxembourg 3,216; Netherlands 1,083; United Kingdom 810.
Unwrought	79,344	89,889	251	Belgium-Luxembourg 31,102; Netherlands 24,220; West Germany 15,650.
Semimanufactures	8,516	8,382	6	West Germany 4,882; Netherlands 1,069; Belgium-Luxembourg 1,064.
Zirconium:				
Ore and concentrate	34,935	36,624	879	Australia 27,354; Republic of South Africa 7,833.
Metal including alloys:				
Scrap	92	57	19	West Germany 38.
Unwrought	1	24	6	Sweden 14; Japan 2.
Semimanufactures	16	84	18	West Germany 13; Belgium-Luxembourg 3.
Other:				
Ores and concentrates	13,536	22,448	([3])	Peru 7,739; Canada 6,591; Tunisia 5,124.
Oxides and hydroxides	969	956	32	Belgium-Luxembourg 351; United Kingdom 198; West Germany 127.
Ashes and residues	35,874	26,359	115	Spain 14,004; Italy 6,147; West Germany 4,072.
Base metals including alloys, all forms value, thousands	$1,360	$1,160	$110	United Kingdom $413; Belgium-Luxembourg $272.

See footnotes at end of table.

Table 3.—France: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	15,375	9,560	413	Italy 2,511; West Germany 2,313; Spain 763.
Artificial:				
Corundum	6,107	9,483	324	West Germany 4,502; Austria 2,302; U.S.S.R. 923.
Silicon carbide	13,922	16,544	75	Norway 5,608; Netherlands 1,843; Belgium-Luxembourg 1,470.
Dust and powder of precious and semiprecious stones excluding diamond kilograms	26	47	4	Belgium-Luxembourg 11; Ireland 11.
Grinding and polishing wheels and stones	9,584	9,868	52	Italy 2,649; West Germany 1,922; Belgium-Luxembourg 1,656.
Asbestos, crude	76,265	70,170	178	Canada 30,810; U.S.S.R. 26,268; Italy 8,130.
Barite and witherite	18,543	30,855	--	West Germany 14,891; Morocco 11,960; Netherlands 1,715.
Boron materials:				
Crude natural borates	115,571	132,794	54,525	Turkey 77,124; Netherlands 945.
Elemental	2	275	(2)	United Kingdom 273; West Germany 2.
Oxides and acids	1,530	1,517	35	Italy 1,184; United Kingdom 103; Turkey 96.
Bromine	4,479	5,173	--	Israel 4,143; United Kingdom 563; East Germany 288.
Cement	395,415	408,715	17	Belgium-Luxembourg 340,516; West Germany 56,296; Italy 6,269.
Chalk	48,466	28,122	6	West Germany 22,252; Belgium-Luxembourg 5,244.
Clays, crude:				
Bentonite	89,298	95,069	11,580	Greece 41,506; Italy 29,357.
Chamotte earth	6,000	7,283	427	West Germany 5,522; Czechoslovakia 1,138.
Kaolin	325,242	360,501	33,227	United Kingdom 269,061; West Germany 20,632.
Unspecified	223,039	257,021	2,409	West Germany 182,967; Senegal 46,915; United Kingdom 18,335.
Cryolite and chiolite	724	733	22	Denmark 688.
Diamond:				
Gem, not set or strung thousand carats	559	1,248	3	Belgium-Luxembourg 1,097; Switzerland 59; India 42.
Industrial stones do	489	480	13	Ireland 257; Republic of South Africa 70; Belgium-Luxembourg 66.
Dust and powder kilograms	957	933	414	Republic of South Africa 334; Switzerland 81.
Diatomite and other infusorial earth	9,816	8,638	2,797	West Germany 2,742; Spain 2,221.
Feldspar, fluorspar, related materials:				
Feldspar	19,353	19,846	--	West Germany 14,283; Portugal 2,322; Spain 1,564.
Fluorspar	1,535	15,425	--	Italy 8,876; Spain 5,160; West Germany 684.
Unspecified	49,841	47,073	--	Norway 43,863; Canada 2,736.
Fertilizer materials:				
Crude, n.e.s	26,715	26,771	--	Belgium-Luxembourg 19,973; Italy 3,785; West Germany 1,411.
Manufactured:				
Ammonia thousand tons	212	195	(2)	Trinidad and Tobago 59; Belgium-Luxembourg 37; West Germany 34.
Nitrogenous do	2,295	2,388	(2)	Netherlands 1,060; Belgium-Luxembourg 898; West Germany 119.
Phosphatic do	578	690	83	Belgium-Luxembourg 138; Netherlands 138; Tunisia 129.
Potassic do	852	864	--	Israel 236; Canada 182; Belgium-Luxembourg 137.
Unspecified and mixed do	1,711	1,585	63	Belgium-Luxembourg 834; Netherlands 305; West Germany 168.
Graphite, natural	3,662	4,578	26	China 2,077; West Germany 567; Madagascar 546.
Gypsum and plaster	33,346	25,821	93	Switzerland 13,203; Spain 5,319; West Germany 4,817.

See footnotes at end of table.

Table 3.—France: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Iodine	1,122	880	3	Japan 653; Chile 198; Indonesia 12.
Kyanite and related materials	3,741	4,221	1,930	Republic of South Africa 899; West Germany 594.
Lime	104,449	102,067	--	West Germany 68,532; Belgium-Luxembourg 16,675.
Magnesium compounds:				
Magnesite	r5,691	80	--	Netherlands 68; West Germany 12.
Oxides and hydroxides	r162,374	167,233	4,267	Spain 45,155; Greece 43,951; Austria 21,034.
Sulfate	76,152	101,651	258	West Germany 77,995; East Germany 19,570; Belgium-Luxembourg 2,846.
Mica:				
Crude including splittings and waste	2,253	4,047	636	Morocco 1,434; India 1,279.
Worked including agglomerated splittings	197	210	1	Japan 70; Belgium-Luxembourg 63; Switzerland 22.
Nitrates, crude	6,032	7,319	--	Chile 7,049.
Phosphates, crude ___ thousand tons	4,516	4,652	730	Morocco 1,908; Togo 561.
Phosphorus, elemental	701	395	1	Italy 211; Netherlands 103; Republic of South Africa 61.
Pigments, mineral:				
Natural, crude	595	585	--	Austria 161; Belgium-Luxembourg 131; Spain 101.
Iron oxides and hydroxides, processed	30,238	72,854	601	West Germany 66,033; Belgium-Luxembourg 2,075; Italy 1,359.
Potassium salts, crude	--	255	--	West Germany 250.
Precious and semiprecious stones other than diamond:				
Natural ___ value, thousands	$73,989	$75,031	$2,631	Switzerland $43,168; Thailand $8,257; United Kingdom $3,610.
Synthetic ___ do	$1,902	$2,018	$473	Switzerland $415; West Germany $405.
Pyrite, unroasted	1,028	1,553	--	Italy 837; Spain 502; West Germany 190.
Quartz crystal, piezoelectric ___ kilograms	1	809	NA	NA.
Salt and brine	162,837	154,850	(2)	Belgium-Luxembourg 58,088; Netherlands 39,983; West Germany 31,684.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	54,549	56,110	--	Poland 27,495; West Germany 24,432; Belgium-Luxembourg 2,964.
Sulfate, manufactured	59,118	69,809	(2)	Belgium-Luxembourg 50,833; Spain 11,390; West Germany 3,131.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	282,623	266,799	27	West Germany 59,041; Republic of South Africa 50,755; Italy 41,400.
Worked	244,045	286,837	(2)	Spain 177,520; Italy 74,387; West Germany 21,748.
Dolomite, chiefly refractory-grade	331,324	318,886	--	Belgium-Luxembourg 259,040; West Germany 29,621; Italy 25,456.
Gravel and crushed rock ___ thousand tons	3,589	3,230	(2)	Belgium-Luxembourg 2,582; Norway 210; United Kingdom 198.
Limestone other than dimension	162,292	157,862	--	Belgium-Luxembourg 157,611; West Germany 247.
Quartz and quartzite	157,499	286,079	574	Belgium-Luxembourg 225,676; Spain 50,561; Italy 5,609.
Sand other than metal-bearing ___ thousand tons	2,053	1,931	(2)	Belgium-Luxembourg 994; United Kingdom 732; Netherlands 127.
Sulfur:				
Elemental:				
Crude including native and byproduct	537,987	553,174	41,447	Poland 272,571; Canada 146,887.
Colloidal, precipitated, sublimed	68	178	(2)	Spain 134; West Germany 40.
Dioxide	300	310	--	Mainly from West Germany.
Sulfuric acid	135,805	153,872	4	West Germany 118,089; Belgium-Luxembourg 24,488; United Kingdom 10,406.
Talc, steatite, soapstone, pyrophyllite	23,217	20,976	510	Italy 9,031; Belgium-Luxembourg 3,129; Spain 2,790.
Vermiculite, perlite, chlorite	71,219	61,185	--	Republic of South Africa 17,950; U.S.S.R. 17,336; Italy 13,381.

See footnotes at end of table.

Table 3.—France: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Other:				
Crude ---------- thousand tons--	825	1,383	4	Switzerland 1,034; Spain 103; Norway 88.
Slag and dross, not metal-bearing do----	2,019	1,666	2	West Germany 988; Belgium-Luxembourg 475; Canada 97.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural -------	1,755	2,777	835	Belgium-Luxembourg 1,285; Italy 461.
Carbon:				
Carbon black ----------------	72,901	79,644	1,859	West Germany 28,965; Netherlands 28,312; Spain 8,261.
Gas carbon ----------------	3,859	4,188	--	West Germany 4,119.
Coal:				
Anthracite------ thousand tons--	1,177	1,140	7	West Germany 503; Republic of South Africa 364; China 84.
Bituminous ------------do----	18,592	19,491	3,470	Republic of South Africa 5,215; Australia 4,026.
Briquets of anthracite and bituminous coal---------------do----	152	113	--	West Germany 96; Poland 9; Belgium-Luxembourg 6.
Lignite including briquets --do----	129	130	--	West Germany 122; East Germany 7.
Coke and semicoke----------do----	r1,404	2,030	--	West Germany 1,350; Belgium-Luxembourg 369; Netherlands 308.
Gas, natural:				
Gaseous -----million cubic feet--	r518,931	511,162	--	Netherlands 276,581; U.S.S.R. 150,553; Norway 82,365.
Liquefied------- thousand tons--	5,998	6,048	(2)	Mainly from Algeria.
Peat including briquets and litter-----	149,979	253,849	152	West Germany 138,034; Netherlands 72,223; U.S.S.R. 22,812.
Petroleum:				
Crude- thousand 42-gallon barrels--	508,401	538,261	--	United Kingdom 97,933; Nigeria 76,929; Saudi Arabia 66,402.
Refinery products:				
Liquefied petroleum gas do----	10,104	11,722	69	Saudi Arabia 3,261; United Kingdom 3,167; Algeria 2,626.
Gasoline ----------do----	45,479	44,006	216	Netherlands 7,727; Italy 5,915; United Kingdom 5,578.
Mineral jelly and wax --do----	163	235	15	Finland 85; West Germany 51; Netherlands 28.
Kerosene and jet fuel---do----	486	375	63	Netherlands 142; United Kingdom 80.
Distillate fuel oil -----do----	44,709	46,652	65	United Kingdom 11,421; Netherlands 7,208; Algeria 6,007.
Lubricants ----------do----	854	1,424	68	Italy 489; Netherlands 214; Belgium-Luxembourg 165.
Residual fuel oil------do----	50,438	35,763	1,261	U.S.S.R. 11,848; Syria 5,160; Belgium-Luxembourg 3,674.
Bitumen and other residues do----	903	575	--	Belgium-Luxembourg 294; Netherlands 121; West Germany 96.
Bituminous mixtures---do----	59	49	1	Belgium-Luxembourg 24; West Germany 6; Spain 4.
Petroleum coke ------do----	13,151	8,775	7,758	United Kingdom 513; West Germany 465.

rRevised. NA Not available.
[1]Table prepared by staff, Branch of Geographic Data.
[2]Less than 1/2 unit.
[3]May include other precious metals.

COMMODITY REVIEW

METALS

Aluminum.—Pechiney, France's leading producer of aluminum, entered into a long-term agreement with EdF for electrical power. The agreement covers a 10-year period ending in 1996. Pechiney will receive 3 billion kilowatt hours annually in exchange for "titres participatifs," a form of nonvoting stock with a minimum guaranteed interest rate. The stock, valued at $223 million,[3] will be issued by Pechiney subsidiaries Aluminium Pechiney S.A. and Pechiney Électrométallurgie S.A. This agreement supplemented the one reached in 1983 that gave Pechiney 2 billion kilowatt hours annually for 25 years at a total cost of $223 million cash. The company has ensured that over 50% of its power requirement will be provided at fixed cost. The electricity in excess of these contracts will cost Pechiney the standard industrial rate. EdF supplied the company with 9 billion kilowatt hours in 1985.

Pechiney began construction of a commercial-scale aluminum-lithium-alloy facility at the Cegedur Pechiney S.A.'s plant in Issoire, central France. The installation, due on-stream in 1987, was projected to cost $33.4 million with $22.3 million needed for initial development. The initial capacity of the alloy line will be 3,500 tons per year. Plans called for increasing the capacity to 12,000 tons in the second phase of development. According to Pechiney officials, the plant will produce 7-ton ingots, with the price of the finished products being 2.5 times that of conventional alloys. The lithium metal used to produce the alloys, developed at the company's Voreppe research center, will initially be purchased from Metallgesellschaft AG of the Federal Republic of Germany. Planned increases in lithium production by Pechiney subsidiary Métaux Spéciaux S.A. will eventually meet the demand of the new facility.

In an effort to strengthen its position in the packaging industry, Pechiney entered into a joint venture agreement with Swiss Aluminium Ltd. (Alusuisse) to manufacture components for aluminum tubes and aerosol cans. Pechiney will take a 51% stake in Alusuisse's aluminum draft production facility at Beaurepaire in eastern France. Alusuisse will retain 49% of the plant and will help finance the modernization and enlargement of the complex. The installation will be supplied with raw material from Pechiney's Saint Jean de Maurienne smelters and will have a capacity of 15,000 tons annually when renovations are completed. Poor market conditions delayed the opening of the new 89,000-ton-per-year primary smelter at Saint Jean de Maurienne from late 1985 until early 1986. A 17,000-ton-per-year facility also at Saint Jean and a 19,000-ton-per-year plant at L'Argenetière were idle for most of the year.

Bismuth.—Société des Mines et Produits Chimiques de Salsigne S.A. (Salsigne) announced that the resumption of its bismuth operations would be delayed until the second quarter of 1986. The works were closed in 1980 when Government restrictions on the use of bismuth and the low price of $2 per pound made continued operation unfeasible. The company announced in October 1984 that production would resume in March 1985, but after delays caused by organizational problems, Salsigne rescheduled the opening until late 1985. Continued difficulties forced the further postponement. The plant produced about 50 tons annually before closing. Plans called for an output of 100 tons per year after reopening.

Copper.—Development continued at two sulfide deposits. The deposit at Rouez, Sarthe Department, was being prepared for mining to begin during 1986. The work was carried out by a 50-50 consortium of BRGM and Elf Aquitaine. At Chessy, Rhône Department, BRGM subsidiary Compagnie Française des Mines S.A. (Coframines) continued its detailed investigations and development work. Mining operations were scheduled to begin at yearend 1988. Coframines expected the deposit to be an important source of both copper and zinc.

Gold.—The sulfide deposit at Rouez, being readied for production by a joint venture of Elf Aquitaine and BRGM, was expected to yield 3 tons of gold and 4 tons of silver over a 4-year period when mining commences in 1986.

Modernization of the processing plants at the Salsigne Mine at Aude continued in 1985. The mine was operated by Salsigne.

Iron and Steel.—The French steel industry continued its reorganization. Plans to merge the large nationalized companies Usinor and Société des Aciéries et Laminoirs de Lorraine (Sacilor) were reportedly postponed. Under an agreement apparently implemented at yearend, Sacilor became the sole shareholder of the subsidiaries Unimétal and Ascométal organized jointly with Usinor in 1984. Both Usinor and Sacilor became holding companies during the year by setting up subsidiaries for flat steel production; Usinor-Aciers and Solmétal, respectively.

Although conditions improved during the year and the losses for Usinor and Sacilor combined were reduced by 50% to $835 million, the Government of France reportedly agreed to provide aid to the two companies totaling $2.22 billion for 1986 and 1987. This subsidy was viewed by the Government as being the final step necessary to return the industry to economic health.

Usinor reached a major agreement to supply steel to the U.S.S.R. The contract covered 1986 and 1987 and provided for the delivery of about 2 million tons of steel products. The deal was the largest ever signed between a French company and the Soviet Union.

Specialty steel producer Cie. Française des Aciers Spéciaux (Asfor) announced plans to expand its Decazeville works in southwestern France. Asfor reported that new refining and casting lines are to be established in 1986. The company continued the refitting of one of its blast furnaces. A new ladle metallurgy unit and a twin-strand centrifugal caster were scheduled for installation after completion of the blast furnace modifications. The works produced about 100,000 tons in 1985, nearly 70% of which was seamless tubes.

Ferroalloys.—Sté. du Ferromanganese de Paris-Outreau (SFPO) completed the modernization of its ferromanganese plant at Boulogne. The improvements were undertaken to ensure the company's competitiveness at a time of serious overcapacity in the ferroalloys industry. The installation of plasma torches in the No. 7 blast furnace, a first in a commercial operation according to SFPO, was only one of the modifications. The operation of the company's three furnaces, No. 5, No. 6, and No. 7, was automated and computerized, and the capacity of the screening operation was tripled. The improvements reduced the work force requirement by 50%. The three furnaces have a total capacity of about 420,000 tons per year of ferromanganese or silicomanganese. SFPO produced only ferromanganese in 1985.

Pechiney Électrométallurgie, formerly known as Société Française d'Électrométallurgie, closed its ferrosilicon furnace at its Anglefort plant during September. The plant's 15,000-ton-per-year ferrosilicon capacity was converted to 12,000- to 13,000-ton-per-year silicon metal capacity. Silicon metal production was expected to begin in early 1986. The conversion action followed the closure of the company's Laval-de-Cere ferrosilicon plant in March. Company officials reported that the actions had been taken in response to overcapacity in ferrosilicon.

The modernization of Pechiney Électrométallurgie's remaining ferrosilicon operations continued. Standard ferrosilicon was produced at works in Dunkirk and Laudun, and high-purity alloy at the Bellegarde works. The total capacity of the plants was 160,000 tons per year with installed power of 165 megawatts.

Lithium.—The construction of Pechiney's new aluminum-lithium alloys production line at the Issoire plant greatly increased the interest in lithium production in France. The BRGM decided to accelerate the evaluation of the lithium-tin-tantalum deposit at Echassières in the Department of Allier in central France. Echassières was estimated to contain 300,000 tons of lithium oxide, 50,000 tons of tin ore, and 20,000 tons of mixed tantalum-columbium minerals. The 50-million-ton deposit was being mined for kaolin and also contains beryllium, cesium, gallium, and rubidium. The deposit is the largest known source of lithium in France and perhaps Europe. Researchers for BRGM and Pechiney were working to develop a new technology to recover the lithium. The lithium mineralization consists of lepidolite (4% to 5% lithium) rather than spodumene (about 10% lithium), which occurs in most commercially viable deposits.

Nickel.—The shareholders of Société Métallurgique le Nickel-SLN (SLN) approved in July the reorganization of the company retroactive to January 1. Under the terms of the agreement, a newly formed company ERAMET-SLN, became the holder of the France-based assets of the former company SLN. The New Caledonian mining and metallurgical assets were assigned to ERAMET-SLN's wholly owned subsidiary Société le Nickel-SLN. ERAMET-SLN agreed to purchase all materials produced by its subsidiary and to be responsible for the marketing of those products. Société le Nickel-SLN reserved the exclusive rights to its products for its parent company. In addition, the agreement stipulated that production levels and the composition of manufactured products would be negotiated by the two companies. The production of pure nickel at the Sandouville plant near Le Havre was the responsibility of ERAMET-SLN. The SLN Group remained under the ownership of state-owned companies Essence et Lubrificants de France-Entreprises de Recherches et d'Activités Pétrolières, 70%; Elf Aquitaine, 15%; and Imetal, 15%.

INDUSTRIAL MINERALS

Cement.—Société des Ciments Française (SCF) nearly completed the modernization of its facilities at Beaucaire. A 1,500-ton-per-day Lepol kiln was converted to a five-stage preheater kiln with a precalcining unit. The company expected that production would increase to 2,800 tons per day. SCF also completed the improvements at its Bussac plant. It added a precalcining unit and a traveling grate cooler to a Dopol kiln. Production at Bussac was expected to increase from 1,800 to 2,600 tons per day. Work began at SCF's Beffes plant on a 60,000-ton clinker silo, four additive silos, and a 50-ton-per-hour cement mill. Additionally, other plant buildings were under construction. The company also began building a new technical center at Guerville near Paris.

Magnesia.—Pechiney Électrométallurgie remained the world's leading producer of fused magnesia. The company employed tilt furnaces to produce 13,000 tons in 1985, 80% of which was exported.

Sulfur.—Sté. des Mines et Fonderies de Zinc de la Vieille Montagne (Vieille Montagne) of Belgium completed the takeover of Asturienne France S.A. and Française Asturienne de Participations S.A. effective July 1. Vieille Montagne had previously owned 51% of the two companies. The company then announced the planned closure of the 90,000-ton-per-year Viviez smelter in 1988. The action will also close the 75,000-ton-per-year smelter gas sulfuric acid plant. The timing of the shutdown coincides with the startup of the 200,000-ton-per-year capacity zinc smelter at Auby-les-Douai, formerly owned by Asturienne. A 180,000-ton-per-year smelter gas sulfuric acid plant was in operation at Auby.

Shell Française S.A. announced plans to close its 550,000-barrel-per-year petroleum refinery in Pauillac near Bordeaux in an effort to cut costs. Two sulfur recovery operations at the site with a total capacity of 61,000 tons of sulfur annually will also close.

Sulfur production continued to decline at Elf Aquitaine's plants at Lacq. Total production at Lacq decreased by 13% in 1985 compared with that of 1984. Elf Aquitaine was reviewing its export policies taking into consideration the declining gas reserves and sulfur production at Lacq.

MINERAL FUELS

The domestic primary energy producing sector was modest by world standards. Consequently, the production of energy carriers was far below the country's demand. Large imports, particularly of crude petroleum and natural gas, were essential to meet France's energy demand. To lessen import dependence, the Government continued programs of energy conservation and development of nuclear energy.

Liquid fuels remained the principal source of energy; however, their share in the total, about 42% in 1985, continued to decline. Electrical power generation in nuclear plants followed in importance. Nuclear power's share in primary energy output increased to about 25%. Coal and natural gas each made up about 13% of the total. Hydropower accounted for only 7% of total primary energy needs.

Coal.—Compared with production in 1984, output of coal decreased by about 2 million tons. Domestic coal production was supplemented by significant imports. The Republic of South Africa was the largest supplier. However, coal import agreements with the Republic of South Africa reportedly will not be renewed when they expire.

A large coal deposit of national significance, Luenay-les-Aix, was discovered near the city of Decize in Burgundy. This was the first discovery of an important coal deposit in France during the last 30 years. According to BRGM, the coal seams are 20 to 25 meters thick and lie at depths between 250 and 600 meters. Reserves of coal in place were estimated at 200 million tons. The deposit consists of two regions. The eastern section, 500 to 600 meters deep, may be suitable for underground gasification. The western part, which is much shallower, could be surface mined.

Petroleum and Natural Gas.—Exploration and production results for petroleum were better than in 1984. However, the decline in natural gas production at Lacq in Aquitaine continued, and imports of natural gas had to be increased. Petroleum production remained modest and accounted for only about 3% of the requirements.

In the petroleum sector, Compagnie Française des Pétroles S.A. (CFP)-TOTAL and Elf Aquitaine were the most active companies. CFP-TOTAL acquired six exploration permits in the Paris Basin and one permit in Aquitaine. The new permits covered an area of 2,381 square kilometers. In addition, CFP-TOTAL drilled 77 wells in the Villeperdue and Saint Germain Fields in the Paris area. With this drilling, CFP-TOTAL extended the Chanoy Field onto the Melun block.

Elf Aquitaine spent $75.7 million on exploration in 1985, one-half of which was spent in the Aquitaine region. Additionally, the company drilled 23 wells in the Paris Basin, resulting in two discoveries.

Refinery capacity was lower than that of 1984. The loss of capacity resulted from the closure of sections at the Bordeaux, Feyzin, and Grand Puits refineries. At the beginning of 1985, the total capacity of petroleum refineries was about 24 million barrels lower than at the beginning of 1984.

During June, Compagnie Française de Raffinage (CFR) started production in a new visbreaker at its refinery in Gonfreville, near Le Havre. In addition, CFR awarded a contract to Air Liquide S.A. for construction of a liquefied petroleum gas recovery unit at its La Mede refinery in Provence.

Uranium.—A uranium deposit was discovered near the Bernard North area. Compagnie Minière Dong-Trieu S.A. conducted and financed the exploration. Reports indicated seams 25 meters thick at a depth of 350 meters. In addition, the same company discovered a new ore body near the Piégut Mine.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from French francs (F) to U.S. dollars at the rate of F8.98=US$1.00, the average rate in 1985.

The Mineral Industry of Gabon

By Ben A. Kornhauser[1]

Oil production in 1985 was maintained at current levels and probably would not decline in the short term, owing to the recent discoveries by U.S. and French firms, which were mostly offshore.

The iron ore deposits of Gabon and the Congo were to be explored and evaluated, using financing from European development funds. If the Gabon deposits were deemed commercial and their development funded, the Government would need to build an extension of the railroad from Booué to Belinga, in the northeast sector, to export the ore via Owendo. Completion of the railroad and the spur between Moanda and Franceville would provide the option of shipping the manganese ore by rail to Owendo and/or by the present aerial tramway to Pointe Noire, Congo.

Completion of the second leg of the Trans-Gabon Railroad from Booué, in central Gabon, to Franceville, in southeastern Gabon, was expected in 1986. When added to the Libreville to Booué leg, which was completed in 1982, the railroad will provide transportation to a seaport for both newly developed as well as existing mineral resources. About $275 million of the Government's 1985 investment budget was allocated to the railroad, making a total investment exceeding $1.4 billion.[2] United States construction firms were awarded contracts to build the Port of Owendo, the terminus for the ore shipments that were expected to be funneled in by the railroad.

PRODUCTION AND TRADE

The 1985 budget totaled $1.7 billion, an increase of 8%. Oil sales still accounted for about 65% of national revenues, about 50% of gross domestic product, and 79% of exports. The Trans-Gabon Railroad received about one-third of the Government's investment budget of $824 million and expected to complete the last section, Lastoursville to Franceville, by December 1986 instead of in 1987. Work began in 1974; total construction cost was expected to exceed $1.4 billion.

Crude oil exports in 1985 amounted to $1.5 billion. Other important mineral exports were manganese, $110 million; and uranium, $60 million. France was Gabon's largest trading partner, providing about 50% of Gabon's imports ($395 million) and receiving about one-third of its exports ($613 million). The United States was the second largest trading partner, providing $95 million of Gabon's imports, and receiving $523 million of its exports, which were down from $707 million in 1984.

U.S. oil companies, Standard Oil Co. of Indiana (Amoco) and the Tenneco Oil Co. of Gabon Inc., increased investments to maintain productive capacity. In July, the U.S. construction firms, Morrison-Knudsen Co. Inc., Raymond International Inc., and Perini Corp., were awarded the contract for building the facility at Owendo, Gabon's chief port, to export iron and manganese ore. The new installation, estimated to cost $100 million and to be completed in 30 months, was the first major construction contract awarded to U.S. companies in Gabon.

Manganese ore production increased 12%, and battery-grade ore decreased 27%, while total production was 10% more in those two areas than in 1984. Shipments of metallurgical-grade were 78,050 tons to China, 77,150 tons to Poland, 56,676 tons to the U.S.S.R., 44,400 tons to Japan, and 35,400 tons to Yugoslavia. Shipments of battery-grade manganese ore to east European countries totaled 6,362 tons.

Table 1.—Gabon: Production of mineral commodities[1]

Commodity[2]	1981	1982	1983	1984[p]	1985[e]
Cement, hydraulic ---------- metric tons--	149,913	175,103	120,000	207,916	[3 4]244,768
Diamond, gem and industrial ------- carats--	550	550	550	550	550
Gas, natural:					
Gross ------------ million cubic feet--	66,073	66,275	66,300	74,484	75,000
Marketed ------------------- do----	2,684	2,304	4,800	4,800	4,800
Gold, mine output, metal content -- troy ounces--	550	550	550	1,325	[3]1,608
Manganese:					
Ore, gross weight (50% to 53% Mn) metric tons--	1,359,954	1,406,000	1,761,752	2,037,760	[3]2,281,000
Pellets, battery- and chemical-grade, gross weight (82% to 85% MnO_2) ------ do----	127,584	105,000	94,834	81,102	[3]59,000
Total ----------------- do----	1,487,538	1,511,000	1,856,586	2,118,862	[3]2,340,000
Petroleum:					
Crude ------ thousand 42-gallon barrels--	55,439	56,453	56,815	61,582	[3]62,307
Refinery products:					
Gasoline ---------------- do----	648	502	613	490	[3]523
Jet fuel and kerosene -------- do----	728	721	721	703	[3]776
Distillate fuel oil ----------- do----	4,117	2,246	1,566	1,465	[3]1,690
Residual fuel oil ----------- do----	2,182	3,583	2,705	1,285	[3]2,912
Other ------------------ do----	752	717	66	129	135
Refinery fuel and losses ------- do----	20	282	193	148	200
Total --------------- do----	8,447	8,051	5,864	4,220	6,236
Uranium oxide (U_3O_8), content of concentrate metric tons--	1,604	976	1,006	1,000	[3]1,225

[e]Estimated. [p]Preliminary.
[1]Table includes data available through June 20, 1986.
[2]In addition to the commodities listed, a variety of crude construction materials (clays, sand and gravel, and stone) is also produced, but output is not reported, and available information is inadequate to make reliable estimates of output levels.
[3]Reported figure.
[4]Of the cement produced, 221,610 tons were from domestic clinker.

Table 2.—Gabon: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
METALS				
Aluminum: Metal including alloys, scrap	18	31	--	Belgium-Luxembourg 20; Ivory Coast 9.
Copper: Metal including alloys, scrap---	108	289	--	France 149; Belgium-Luxembourg 51; Hungary 19.
Iron and steel: Metal:				
Scrap -------------------	--	1,754	--	All to Spain.
Semimanufactures: Tubes, pipes, fittings -----------------	3	655	--	Belgium-Luxembourg 440; West Germany 86; Nigeria 77.
Lead: Metal including alloys, unwrought	39	--		
Manganese: Ore and concentrate, metallurgical-grade - thousand tons--	1,419	1,987	128	France 447; Norway 213; Greece 189.

See footnotes at end of table.

Table 2.—Gabon: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
INDUSTRIAL MINERALS				
Barite and witherite	53	--		
Cement	--	171	--	All to Angola.
Diatomite and other infusorial earth	--	4	--	All to France.
Salt and brine	--	250	--	All to Spain.
Sodium compounds, n.e.s.: Sulfate, manufactured	5	--		
Stone, sand and gravel: Sand other than metal-bearing	--	146	NA	Italy 96; unspecified 50.
MINERAL FUELS AND RELATED MATERIALS				
Petroleum:				
Crude thousand 42-gallon barrels	41,655	38,070	11,157	France 10,485; Spain 4,063; Brazil 2,170.
Refinery products:				
Gasoline, motor value, thousands	$7,479	$10,496	--	Netherlands $7,167; France $3,328.
Kerosene and jet fuel thousand 42-gallon barrels	(2)	--		
Distillate fuel oil do	234	252	--	All to Netherlands.
Lubricants value, thousands	--	$15	--	France $7; Singapore $7.
Residual fuel oil thousand 42-gallon barrels	1,721	1,525	--	Netherlands 908; United Kingdom 335; France 156.

NA Not available.
[1]Table prepared by Virginia A. Woodson.
[2]Less than 1/2 unit.

Table 3.—Gabon: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides value, thousands	$8	$2	--	Belgium-Luxembourg $1; France $1.
Metal including alloys, semimanufactures	674	211	3	France 172; Belgium-Luxembourg 16.
Chromium: Oxides and hydroxides	4	--		
Copper: Metal including alloys:				
Unwrought	3	2	--	All from France.
Semimanufactures	75	90	NA	France 77; Austria 9.
Iron and steel: Metal:				
Pig iron, cast iron, related materials	2	2	--	All from France.
Ferroalloys	235	282	--	West Germany 211; France 71.
Steel, primary forms	4	9	--	West Germany 7.
Semimanufactures:				
Bars, rods, angles, shapes, sections	14,169	12,150	1	France 7,455; Belgium-Luxembourg 2,250.
Universals, plates, sheets	5,859	5,116	1	France 2,999; Belgium-Luxembourg 1,215.
Hoop and strip	158	214	NA	France 107; West Germany 95.
Rails and accessories	880	1,510	--	France 971; United Kingdom 539.
Wire	795	551	--	Belgium-Luxembourg 324; France 209.
Tubes, pipes, fittings	42,487	26,604	1,484	France 14,095; Japan 6,715.
Lead:				
Oxides	21	24	--	All from France.
Metal including alloys:				
Unwrought value, thousands	$4	$1	--	Do.
Semimanufactures	3	14	--	Do.
Nickel: Metal including alloys, semimanufactures	2	5	--	France 4.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	--	$1	--	All from France.

See footnotes at end of table.

Table 3.—Gabon: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983 United States	Sources, 1983 Other (principal)
METALS —Continued				
Silver: Metal including alloys, unwrought and partly wrought value, thousands	$12	$25	--	All from France.
Tin: Metal including alloys, semimanufactures	2	1	--	Do.
Titanium: Oxides	103	115	--	France 111.
Zinc: Metal including alloys, semimanufactures	89	37	--	All from France.
Other:				
Oxides and hydroxides	14	58	1	France 30; Netherlands 20.
Base metals including alloys, all forms	1	1	--	All from France.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Artificial: Corundum	--	1	--	Do.
Grinding and polishing wheels and stones	58	45	NA	France 32; Belgium-Luxembourg 6.
Asbestos, crude	--	6	--	All from France.
Cement	23,104	14,024	--	Spain 6,884; Netherlands 2,902; France 2,489.
Chalk	386	898	--	France 818; Spain 80.
Clays, crude	7,125	3,682	7	Spain 1,718; Italy 801; France 675.
Diatomite and other infusorial earth	354	171	59	France 96; Belgium-Luxembourg 8.
Fertilizer materials:				
Crude, n.e.s	595	119	45	Belgium-Luxembourg 73.
Manufactured:				
Ammonia	17	20	--	France 7; United Kingdom 6.
Nitrogenous	1,782	1,978	NA	West Germany 570; France 551; Switzerland 300.
Phosphatic	444	1,863	300	West Germany 1,117; Belgium-Luxembourg 420.
Potassic	1,098	934	--	West Germany 513; Netherlands 173; France 116.
Unspecified and mixed	655	84	--	Belgium-Luxembourg 64; France 14.
Graphite, natural	1	--		
Lime	2,640	536	--	France 269; Belgium-Luxembourg 244.
Magnesite	197	557	--	All from United Kingdom.
Mica:				
Crude including splittings and waste	38	48	--	France 27; Netherlands 17.
Worked including agglomerated splittings value, thousands	$1	--		
Phosphates, crude	3	5	--	Mainly from Belgium-Luxembourg.
Pigments, mineral: Iron oxides and hydroxides, processed	8	47	--	West Germany 36; France 11.
Precious and semiprecious stones other than diamond: Natural value, thousands	--	$5	--	France $2; Republic of South Africa $1.
Salt and brine	9,051	6,779	--	Senegal 2,526; France 1,404; West Germany 1,210.
Sodium compounds, n.e.s.: Sulfate, manufactured	983	1,071	4	France 432; Netherlands 426; Italy 83.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	20	13	--	All from France.
Worked	108	120	--	Italy 103; Yugoslavia 11.
Dolomite, chiefly refractory-grade	442	1,353	--	All from France.
Gravel and crushed rock	290	91	--	Do.
Quartz and quartzite	11	67	--	Do.
Sand other than metal-bearing value, thousands	$123	$1,318	$1,185	France $115.
Sulfur:				
Elemental:				
Crude including native and byproduct	7,849	9,157	--	All from France.
Colloidal, precipitated, sublimed value, thousands	$1	--		
Sulfuric acid	--	103	NA	France 71; Netherlands 19.
Talc, steatite, soapstone, pyrophyllite	56	115	--	France 114.
Other: Crude	5	4	--	All from France.

See footnotes at end of table.

Table 3.—Gabon: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983 United States	Sources, 1983 Other (principal)
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	42	--		
Carbon black	1	45	--	All from France.
Coal: Briquets of anthracite and bituminous coal	38	107	74	France 30.
Coke and semicoke	--	1	--	All from Netherlands.
Petroleum:				
Crude ——— 42-gallon barrels	5,760	7	--	All from France.
Refinery products:				
Liquefied petroleum gas — do	1,693	1,972	NA	Spain 1,589; Italy 220.
Gasoline, motor — do	14,884	13,566	--	Netherlands Antilles 7,608; France 5,143.
Mineral jelly and wax — do	8	16	--	All from France.
Kerosene and jet fuel value, thousands	$400	$344	--	Mainly from France.
Distillate fuel oil 42-gallon barrels	--	62,045	--	France 53,742; Belgium-Luxembourg 8,296.
Lubricants — do	34,643	50,624	322	France 44,814; Netherlands 4,830.
Residual fuel oil — do	--	646	--	All from France.

NA Not available.
[1]Table prepared by Virginia A. Woodson.

COMMODITY REVIEW

METALS

Iron Ore.—In January, Gabon and the Congo signed an agreement to finance a project to explore and to evaluate the Haut-Ivindo iron ore deposits that straddled parts of Gabon and the Congo, and abutted Cameroon. The European Development Fund was providing $5.6 million, of which 70% was a grant and 30% was a special loan, to the Congo. The European Investment Bank was providing $1.8 million as a loan on equity capital. The agreement covered Gabon's Belinga iron ore deposit, estimated at 400 million tons of ore, containing 65% iron content with less than 0.1% phosphorus. The project manager was France's Bureau de Recherches Géologiques et Minières (BRGM). Cie. Française de Forages Minères, a BRGM subsidiary, was a member of the Franco-West German consortium responsible for the prospecting, drilling, and site preparation work. The West German partners were Exploration und Bergbau and Gauff Engineering. Sampling and analyses of the ores was to be done by Finsider International of Italy. Projected capacity, if the deposit came on-stream in the 1990's, would be 10 million tons per year. If the feasibility study was favorable and the project was financed, the Gabon Government would build a 144-mile extension of the Trans-Gabon Railroad from Booué to Belinga to link the mine to the Port of Owendo.

Manganese.—The comparatively high-grade deposits in Australia, Brazil, Gabon, and the Republic of South Africa enabled these countries to continue to control the manganese market even though manganese demand had been decreasing over the past few years to 7% to 10%. In 1985, manganese usage dropped to 5% in the steelmaking industry. Gabon's share of the market was 19%.

The deposit at the Bangombe plateau was about 50% depleted. Usable ore was being mined around a core of carbonate ore that was capped with sandstone that Compagnie Minière de l'Ogooue S.A. did not plan to mine, and that was being used to store mine waste.

Completion of the Trans-Gabon Railroad and the Moanda and Franceville spur would permit ore haulage via both the currently-used monocable ropeway to Pointe Noire, Congo, and the railroad. However, the rail service would not be available until freight terminals and ancillary belt conveyors were built, the port at Libreville (Owendo) for 50,000-ton vessels was finished, and rolling stock was obtained. Completion of the railroad would expand the limited hauling capacity of the tramway to permit increasing theoretical production capacity of the Ogooue Mine at Moanda to 4 million tons of ore, of which battery-grade ore could total 200,000 tons.

A ferromanganese plant would be feasible in the future since hydroelectric power was supplied to the mine. The power came from the 13-megawatt Pubara plant on the Mpassa River near Franceville.

Gabon was the primary supplier of battery-grade ore to the Union Carbide Corp., the world's leading dry cell battery producer. Union Carbide's central plant for manganese ore processing and storage in the United States was at Newport News, Virginia, a convenient port for sea transport from Gabon.

INDUSTRIAL MINERALS

Compagnie des Mines de la Nyanga was established to mine barite at Dourakiki in the Nyanga region. The $16 million project was expected to produce from 40,000 to 50,000 tons per year. Reserves were over 1 million tons.

MINERAL FUELS

Petroleum.—Oil production averaged 153,000 barrels per day (bbl/d), about midway between 1984 production and the Organization of Petroleum Exporting Countries' quota of 150,000 bbl/d. The average quota excess was due to the increased production in the last 4 months of 1985. Recent discoveries indicated that an oil production decline in the short term could be averted.

Essence et Lubrificants de France (ELF)-Gabon Oil Co. (ELF-Gabon) discovered a new petroleum reservoir off the Gabonese coast about 10 miles west of Port-Gentil in an average water depth of 490 feet. ELF-Gabon made the discovery in its wholly owned Grand Anguille Roussette Marine 1 well (GAROM-1). The drilling penetrated a series of pay zones in the Pointe Clairette and Upper Anguille formations at depths between 8,800 and 9,200 feet. The well flowed 3,775 bbl/d of water-free oil. Further testing was necessary to determine the size and potential of the reservoirs.

A consortium led by Tenneco confirmed its oil discovery on a 250,000 acre block offshore Gabon. The confirmation well, the Octopus Marin 2, which was drilled to 11,769 feet, tested at combined rates of 5,904 bbl/d of oil from three zones at 10,272 to 10,735 feet on restricted choke sizes. Another test well at the group's Pelican Marin 1A flowed 1,362 bbl/d of 31.3° gravity oil and 899 million cubic feet per day of gas from depths of 9,414 to 9,437 feet in Cretaceous N'Tecnengue Ocean sands. A confirmation well, Pelican Marin 2, was drilling ahead.

A group led by ELF-Gabon gauged oil at a wildcat, the 1 Vanneau Marine, on its Eyena Marine permit, about 17 miles northeast of Grondon. Oil was found in several zones at 7,687 to 8,548 feet in the Pointe Clairette, Upper and Lower Anguille, and Cap Rock. On a production test, the well flowed 1,890 bbl/d from the Anguille. The partners were ELF-Gabon, the operator, 55%; Spain's Hispánica de Petróleos S.A., 25%; and Société Nationale Elf-Aquitaine, 20%.

The Murphy Oil Corp. increased its production by 20% from the Breme Field by using a gas lift and water flooding. The company also acquired interests ranging from 40% to 45% in production sharing contracts covering three new permits: the 191,218-acre Kobe Marin area, the 217,942-acre Nazare Marin area, and the 352,241-acre N'Komi Marin area. The contracts required seismic surveys and the drilling of five wells over a 3-year period, with the first well scheduled for late 1986 in the Kobe Marin area.

Uranium.—Compagnie Générale des Matières Nucléaires, Compagnie des Mines d'Uranium de Franceville, and Urangesellschaft mbH consortium signed an agreement with Gabon to explore for uranium in the Haut-Ogooue region. The exploration cost was estimated from $10 to $50 million, depending on results.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Communauté Financière Africaine francs (CFAF) to U.S. dollars at the rate of CFAF450=US$1.00. The official CFAF exchange rate was maintained at CFAF50 per French franc and was freely convertible.

The Mineral Industry of the German Democratic Republic

By George A. Rabchevsky[1]

After posting moderate gains in 1984, the Government claimed that 1985 was one of the most successful years in the economy of the German Democratic Republic (GDR). About the size of Tennessee, with a population of 17 million, the country employed over 3.3 million in industry. The metallurgical industry employed 138,182 persons in 1984, and the energy and fuel sector, 223,753 persons. The mining and minerals industry employed 750,000 people, or 4% of the population.

The GDR's limited indigenous raw material resources were declining, and the economy had to rely more than ever on its materials processing industry and foreign trade. Brown coal, cement, lignite, potash, salt, sand and gravel, and a few other industrial minerals were the only abundant and marketable raw materials. Copper, lead, tin, and zinc ores were also mined, but the quantities were insufficient to meet domestic requirements. The country had strong technology in underground mining, construction of metals treatment plants, and construction of coal surface mining machinery. Much of this technology and equipment was destined for the foreign market.

The new 5-year plan (1986-90), submitted to the Party Congress in East Berlin, envisaged the continuation of economic growth rates, but did not contain any extraordinary measures or programs. Energy consumption was to be cut by an average of 4% per year, lignite would continue to be the main energy source, and nuclear energy would be expanded to account for 15% of total energy production. Coal gasification research was to be supported and upgraded.

PRODUCTION

According to official claims for the last year of the current (1981-85) 5-year plan, labor productivity rose by 8.4%, and industrial goods production, by 4.5%. Consumption, on the other hand, declined by 3.5%. In the mining and metals processing sectors, however, the situation remained static, except for growth in the output of coal, pig iron, and steel. The plan fulfillment report claimed that the production volume in the metalworking industry rose by 7%, and that 15,000 fewer tons of rolled steel was used to accomplish this. The consumption of raw steel declined by 3.5%, and that of finished steel, by 7%.[2]

In the production of metals, especially steel, Government policy stressed the improvement of product quality, and the increased expansion of the number of the various grades, primarily destined for the export market.[3] The plan fulfillment report claimed that industry introduced 5,000 new products, initiated new technical processes and technologies, and stated that 57,000 industrial robots were at work.

Table 1.—German Democratic Republic: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984[p]	1985[e]
METALS					
Aluminum:					
Alumina:					
For metallurgical use	45,164	46,085	42,156	43,239	43,500
For other use[e]	20,000	20,000	20,000	20,000	20,000
Metal:[e]					
Primary	60,000	[3]58,000	57,000	58,000	58,000
Secondary	52,000	50,000	52,000	52,000	52,000
Total	112,000	108,000	109,000	110,000	110,000
Cadmium metal, primary[e]	16	16	[r]15	[r]15	15
Copper:					
Mine output, metal content[e]	[3]12,000	13,000	12,000	12,000	10,000
Metal:					
Smelter, primary	16,000	17,000	17,000	14,000	11,000
Refined:[e]					
Primary	34,000	32,000	31,000	[r]33,000	33,000
Secondary	20,000	19,000	19,000	[r]22,000	22,000
Total	54,000	51,000	50,000	[r]55,000	55,000
Iron and steel:					
Iron ore and concentrate ___ thousand tons	40	40	40	40	[3]40
Metal content ___ do.	20	20	20	20	20
Metal:					
Pig iron ___ do.	2,441	2,149	2,207	2,357	2,400
Ferroalloys, electric furnace ___ do.	135	125	128	127	[3]124
Steel, crude ___ do.	7,467	7,169	7,219	7,573	7,900
Semimanufactures (hot-rolled only) ___ do.	5,061	4,959	5,084	5,386	5,600
Lead:[e]					
Smelter, primary	22,000	20,000	20,000	22,000	20,000
Refined, all sources	[r]43,000	[r]38,000	[r]36,000	[r]35,000	36,000
Nickel:					
Mine output, metal content, recoverable	2,700	2,500	2,200	[e]2,000	1,600
Metal, refined[e]	2,800	3,000	3,000	3,000	3,000
Silver, mine output, metal content, recoverable ___ thousand troy ounces	1,450	1,450	1,380	1,290	1,400
Tin:[e]					
Mine output, metal content, recoverable	1,600	1,700	1,800	1,800	1,800
Metal, smelter output including secondary	1,500	2,000	2,000	2,000	2,200
Zinc metal including secondary	16,000	17,000	16,500	[e]17,000	16,000
INDUSTRIAL MINERALS					
Barite[e]	35,000	35,000	35,000	35,000	34,000
Boron materials: Processed borax, $Na_2B_4O_7 \cdot 10H_2O$ content[e]	[3]4,300	4,200	4,000	4,000	4,000
Cement, hydraulic ___ thousand tons	12,204	11,721	11,782	11,555	12,000
Chalk[e] ___ do.	50	50	40	40	40
Clays, kaolin:[e]					
Crude ___ do.	400	420	400	350	350
Marketable ___ do.	200	210	200	175	175
Fluorspar[e] ___ do.	100	100	100	100	100
Gypsum and anhydrite:					
Crude[e] ___ do.	360	360	360	360	360
Calcined ___ do.	303	310	297	302	310
Lime and dead-burned dolomite ___ do.	3,441	3,510	3,458	3,597	3,600
Nitrogen: N content of ammonia ___ do.	1,205	1,170	1,211	1,202	1,210
Potash, marketable, K_2O equivalent ___ do.	3,460	3,434	3,431	3,465	3,475
Pyrite, gross weight[e] ___ do.	25	20	20	(4)	--
Salt:					
Marine ___ do.	56	55	56	58	55
Rock ___ do.	3,056	3,060	[e]3,070	[e]3,075	3,080
Total ___ do.	3,112	3,115	3,126	3,133	3,135
Sodium compounds, n.e.s.:					
Caustic soda ___ do.	631	695	687	694	700
Sodium carbonate ___ do.	878	882	887	890	900
Sodium sulfate ___ do.	128	142	152	164	165
Stone, sand and gravel:					
Crushed stone[e] ___ do.	15,500	15,000	16,000	14,500	15,000
Sand and gravel ___ do.	9,803	8,566	8,628	8,599	8,700
Sulfur:					
Byproduct:[e]					
Elemental ___ do.	80	90	90	80	80
Other forms ___ do.	270	270	270	270	250
From pyrite[e] ___ do.	10	--	--	--	--
Sulfuric acid ___ do.	948	920	926	884	850

See footnotes at end of table.

Table 1.—German Democratic Republic: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984[p]	1985[e]
MINERAL FUELS AND RELATED MATERIALS					
Coal, brown coal (lignite) ----- thousand tons--	266,734	276,038	277,968	296,341	312,000
Coke:					
From anthracite and bituminous coal[e] do----	1,391	1,226	1,200	1,150	--
From brown coal:					
High-temperature ----------do----	2,612	2,592	2,510	2,463	2,400
Low-temperature----------do----	2,747	2,919	3,210	3,327	3,400
Total ----------------do----	6,750	6,737	6,920	6,940	5,800
Fuel briquets (from lignite) ---------do----	49,803	50,005	50,047	50,270	50,300
Gas:					
Manufactured -------million cubic feet--	209,483	224,173	255,320	272,695	273,000
Natural, marketed production[e] -----do----	301,000	286,000	353,000	[r]459,000	459,000
Petroleum:					
Crude ------ thousand 42-gallon barrels--	400	422	383	430	430
Refinery products:					
Gasoline ----------------do----	29,257	33,071	33,618	35,193	35,000
Kerosene, jet fuel, distillate fuel oil do----	42,665	46,679	46,915	47,525	47,000
Residual fuel oil -----------do----	[r]59,940	56,610	56,610	59,940	57,000
Lubricants---------------do----	3,012	3,058	3,238	3,231	3,200
Total[5] ---------------do----	[r]134,874	139,418	140,381	145,889	142,200

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through Aug. 29, 1986.
[2]In addition to the commodities listed, magnesium, peat, and a variety of construction materials were produced, but output was not reported, and available information is inadequate to make reliable estimates of output levels.
[3]Reported figure.
[4]Revised to zero.
[5]Total of listed products only; no estimates have been made for unreported products or refinery fuels and losses.

TRADE

Because of the scarcity of indigenous raw and finished materials, the GDR's mineral industries depended heavily on imports. Virtually all crude oil consumed had to be imported, along with 90% of the iron ore, 70% of the zinc, 65% of the natural gas, 60% of the aluminum, 60% of the lead, 50% of the copper, and 40% of the rolled steel.

The GDR's trade with the U.S.S.R. and other countries of the Council for Mutual Economic Assistance (CEMA)[4] continued to be essential to the economy. Trade also continued with the neighboring Federal Republic of Germany (FRG). The GDR-FRG trade was especially active in energy raw materials. Because of the severe winter conditions, more bituminous coal was imported from the FRG than ever, and for the first time, heating oil was also imported.[5] In the minerals sector, lignite briquets, potash, and rock salt remained the main export commodities.

A cooperation protocol was signed with China in the field of geology and minerals resources, without specifying details. A 1986 trade agreement was signed with Albania concerning the exchange of goods and method of payment. Albania is to export to the GDR chrome ore, copper wire, and other nonmineral goods, and is to import from the GDR chemical products, equipment, machinery, nonmineral goods, potassium fertilizer, and steel rods. In 1985, the GDR imported ferroalloys, pig iron, rolled steel, and steel tubes from the U.S.S.R. The new seventh 5-year plan calls for an 11% to 12% annual increase in exports.

Table 2.—German Democratic Republic: Apparent exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides	479	NA		
Ash and residue containing aluminum	501	1,787	--	All to Netherlands.
Metal including alloys:				
Scrap	9,780	3,539	--	Netherlands 1,865; France 973; Belgium-Luxembourg 471.
Unwrought	25,704	30,593	--	West Germany 24,396; Poland 3,001; Japan 1,863.
Semimanufactures	21,621	22,171	150	West Germany 15,989; Hungary 2,997; Sweden 944.
Chromium: Oxides and hydroxides	--	161	--	Yugoslavia 136; Sweden 20.
Copper: Metal including alloys:				
Scrap	355	498	--	All to Belgium-Luxembourg.
Unwrought	12,261	12,624	--	West Germany 6,827; Netherlands 4,568; France 879.
Semimanufactures	35,616	44,132	2	West Germany 43,014; Sweden 368; Hong Kong 347.
Iron and steel: Metal:				
Scrap	20,654	36,708	--	West Germany 29,615; Spain 4,500; Thailand 2,305.
Pig iron, cast iron, related materials	8,841	5,180	--	West Germany 5,021; Sweden 102; Denmark 30.
Ferroalloys:				
Ferrochromium	1,575	100	--	All to West Germany.
Ferromanganese	450	100	--	Do.
Ferromolybdenum	9	NA		
Ferrosilicon	9,207	6,539	--	West Germany 6,312; France 227.
Unspecified	654	639	--	Turkey 297; Belgium-Luxembourg 248; United Kingdom 64.
Steel, primary forms thousand tons	402	167	2	Mainly to West Germany.
Semimanufactures:				
Bars, rods, angles, shapes, sections do	220	1,583	80	Hong Kong 68; Singapore 43; undetermined 1,171.
Universals, plates, sheets do	429	929	166	West Germany 154; Italy 37.
Hoop and strip do	75	578	--	NA.
Rails and accessories do	3	13	--	NA.
Wire do	10	44	--	West Germany 25; Netherlands 1; undetermined 17.
Tubes, pipes, fittings do	[2]168	[2]240	([3])	West Germany 47; France 19; Poland 14.
Castings and forgings, rough do	46	59	--	West Germany 33; Poland 15.
Lead:				
Oxides	1,493	546	--	Sweden 307; Yugoslavia 150; France 89.
Metal including alloys:				
Scrap	523	NA		
Unwrought	500	50	--	All to West Germany.
Semimanufactures	38	21	--	Do.
Nickel: Metal including alloys:				
Scrap	46	NA		
Unwrought	536	590	--	Sweden 545; Belgium-Luxembourg 27.
Semimanufactures	5	20	--	All to West Germany.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$53	NA		
Silicon, high-purity	6	NA		
Silver:				
Waste and sweepings value, thousands	$225	NA		
Metal including alloys, unwrought and partly wrought do	$75,805	$79,919	--	United Kingdom $79,507; West Germany $395.
Tin: Metal including alloys, all forms	45	90	--	West Germany 45; Sweden 40.
Zinc:				
Oxides	785	608	--	All to Norway.
Metal including alloys:				
Scrap	202	NA		
Unwrought	309	50	--	Indonesia 25; Switzerland 25.

See footnotes at end of table.

Table 2.—German Democratic Republic: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued				
Other:				
Ores and concentrates	--	154	--	All to Belgium-Luxembourg.
Oxides and hydroxides	81	187	--	Belgium-Luxembourg 102; France 85.
Ashes and residues	27,963	23,791	--	Austria 16,646; West Germany 3,840; Norway 3,288.
Base metals including alloys, all forms	5,013	8,277	NA	West Germany 7,893; Poland 363.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Artificial: Corundum	5	404	--	West Germany 396; Hungary 8.
Grinding and polishing wheels and stones	288	597	--	West Germany 273; Pakistan 84; Yugoslavia 83.
Barite and witherite	8,551	1,650	--	West Germany 1,570; France 40; Austria 20.
Boron materials: Oxides and acids	--	11	--	All to Greece.
Bromine	587	635	--	France 288; West Germany 198; Hungary 149.
Cement thousand tons	[3]1,222	[3]1,395	(5)	West Germany 477; Hungary 155; Sweden 127.
Chalk	[4]21,856	[3]27,982	--	West Germany 8,384; undetermined 19,418.
Clays, crude:				
Kaolin	[4]111,417	[4]147,848	--	West Germany 97,482; Netherlands 13,273; Hungary 11,292.
Unspecified	16,921	23,002	--	West Germany 17,109; Hungary 4,948; Austria 795.
Cryolite and chiolite	--	200	--	All to Norway.
Diamond:				
Gem, not set or strung value, thousands	$2,850	NA		
Industrial stones do	$21	$203	--	All to Belgium-Luxembourg.
Feldspar, fluorspar, related materials:				
Fluorspar	29,382	35,014	--	West Germany 17,599; Norway 7,022; Austria 5,981.
Unspecified	9,718	5,559	--	Italy 4,218; Yugoslavia 1,208; France 67.
Fertilizer materials: Manufactured:				
Ammonia thousand tons	85	150	--	West Germany 91; Austria 26; Spain 24.
Nitrogenous do	1,309	1,716	62	West Germany 1,640; New Zealand 9.
Phosphatic do	4	11	--	Netherlands 7; Austria 3.
Potassic, K_2O content[4] do	2,905	2,776	92	Czechoslovakia 408; Brazil 402; India 235.
Unspecified and mixed do	9	11	--	West Germany 10.
Graphite, natural	1,382	525	--	All to West Germany.
Gypsum and plaster	[4]84,363	[4]88,663	--	Hungary 70,544.
Magnesium compounds	28,180	68,588	--	Denmark 49,514; Malaysia 7,199; Belgium-Luxembourg 5,657.
Phosphates, crude	22,635	25,025	--	Bulgaria 25,000; Sweden 25.
Pigments, mineral: Iron oxides and hydroxides, processed	432	403	--	Yugoslavia 318; United Kingdom 79.
Potassium salts, crude	18,849	47,158	--	West Germany 25,689; United Kingdom 14,848; Belgium-Luxembourg 4,622.
Precious and semiprecious stones other than diamond: Natural value, thousands	$4	$29	--	West Germany $26; Norway $2.
Salt and brine thousand tons	[4]1,390	[4]1,501	--	West Germany 125; Sweden 91; undetermined 1,194.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	[4]365,900	[4]368,700	18	Czechoslovakia 72,000; Sweden 54,174; West Germany 48,349.
Sulfate, manufactured	19,606	21,504	--	West Germany 16,645; Sweden 4,185.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked thousand tons	364	29	--	West Germany 28.
Worked do	1	34	--	West Germany 33.
Gravel and crushed rock[4] do	341	262	--	All to West Germany.
Limestone other than dimension do	46	55	--	Do.
Sand other than metal-bearing do	46	32	--	Hungary 14; Austria 12; Yugoslavia 6.

See footnotes at end of table.

Table 2.—German Democratic Republic: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Destinations, 1984: United States	Destinations, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Stone, sand and gravel —Continued				
Sand and gravel[4] __ thousand tons__	2,550	2,368	--	All to West Germany.
Sulfur:				
Elemental:				
Crude including native and byproduct	2,108	13,020	--	All to Italy.
Colloidal, precipitated, sublimed	118	335	--	West Germany 331; Yugoslavia 3.
Sulfuric acid	[2]37,300	[2]26,500	--	West Germany 14,594; Czechoslovakia 6,511.
Talc, steatite, soapstone, pyrophyllite	32	24	--	All to Netherlands.
Vermiculite, perlite, chlorite	170	NA		
Other:				
Crude	81,136	49,505	3,100	France 19,570; United Kingdom 8,690; Norway 5,540.
Slag and dross, not metal-bearing	30,748	29	--	Netherlands 20; United Kingdom 9.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	29	31	--	All to Yugoslavia.
Carbon black	3,961	3,799	--	Czechoslovakia 784; United Kingdom 728; Poland 625.
Coal:				
Anthracite and bituminous thousand tons__	325	69	--	All to United Kingdom.
Briquets of anthracite and bituminous coal__do____	515	556	--	All to Hungary.
Lignite including briquets[4]__do____	3,285	3,971	--	Czechoslovakia 728; West Germany 561; Austria 347.
Coke and semicoke__do____	32	277	--	United Kingdom 104; Spain 62; Norway 49.
Gas, manufactured[4] million cubic feet__	399	498	--	NA.
Peat including briquets and litter	1,189	1,020	--	West Germany 936; France 42; Italy 24.
Petroleum:				
Crude__ thousand 42-gallon barrels__	1,132	NA		
Refinery products:				
Liquefied petroleum gas do____	1,557	608	--	West Germany 559; Italy 33; Netherlands 16.
Gasoline __do____	[4]10,893	[4]5,967	--	West Germany 2,756; Sweden 322; undetermined 2,831.
Mineral jelly and wax __do____	63	82	11	West Germany 27; Netherlands 10.
Kerosene and jet fuel__do____	94	116	--	All to Hungary.
Distillate fuel oil __do____	[4]18,038	[4]6,108	509	Sweden 4,166.
Lubricants __do____	[2]170	[2]124	--	Austria 103; Yugoslavia 13.
Residual fuel oil__do____	[4]13,686	[4]32,634	--	Norway 3,876; Denmark 3,234; Sweden 1,419.
Bitumen and other residues do____	583	579	--	West Germany 578.
Bituminous mixtures__do____	([3])	([3])	--	All to Austria.

[p]Preliminary. NA Not available.
[1]Table prepared by Josef Plachy. Owing to a lack of official trade data published by the German Democratic Republic, this table should not be taken as a complete presentation of this country's mineral trade. Unless otherwise specified, these data have been compiled from United Nations information and data published by the partner trade countries.
[2]Statistical Yearbook of Members of the Council for Mutual Economic Assistance, Moscow, U.S.S.R.
[3]Less than 1/2 unit.
[4]Official Trade Statistics of the German Democratic Republic.

Table 3.—German Democratic Republic: Apparent imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS				
Aluminum:				
Ore and concentrate	[2]103,700	[2]170,600	--	Hungary 140,064; Yugoslavia 4,005.
Oxides and hydroxides	89,178	103,820	--	West Germany 74,629; Hungary 29,077.
Metal including alloys:				
Unwrought	51,105	55,024	--	Yugoslavia 37,619; Hungary 17,009.
Semimanufactures	26,384	26,054	--	West Germany 11,388; Hungary 7,956; Yugoslavia 6,164.
Antimony: Oxides	220	224	--	All from France.
Cadmium: Metal including alloys, all forms	220	141	--	West Germany 80; Japan 36; Netherlands 25.
Chromium: Ore and concentrate, Cr_2O_3 content[3]	51,900	39,800	--	NA.
Cobalt:				
Oxides and hydroxides	--	6	--	All from Netherlands.
Metal including alloys, all forms	132	NA		
Copper:				
Ore and concentrate	--	13,809	--	Morocco 6,157; Spain 3,055; Sweden 3,014.
Metal including alloys:				
Scrap	2,337	1,519	--	Netherlands 550; Switzerland 395; Belgium-Luxembourg 374.
Unwrought	42,635	56,027	--	West Germany 31,969; Chile 11,500; Spain 3,055.
Semimanufactures	8,704	8,610	--	West Germany 6,857; Yugoslavia 977; France 697.
Gold: Metal including alloys, unwrought and partly wrought ... troy ounces	207	209	--	All from West Germany.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite, Fe content[3] ... thousand tons	1,842	1,971	--	U.S.S.R. 1,215; India 577; Sweden 125.
Metal:				
Scrap ... do.	595	1,035	(5)	United Kingdom 232; U.S.S.R. 225; Belgium-Luxembourg 118.
Pig iron, cast iron, related materials ... do.	[4]855	877	--	West Germany 24; undetermined 851.
Ferroalloys:				
Ferrochromium	1,990	241	--	All from West Germany.
Ferromanganese	935	62,000	--	NA.
Ferrosilicomanganese	--	70	--	All from Netherlands.
Ferrosilicon	--	342	--	All from West Germany.
Silicon metal	221	NA		
Unspecified	--	15,930	--	NA.
Steel, primary forms ... thousand tons	[3]729	172	--	Mainly from Austria and West Germany.
Semimanufactures:				
Bars, rods, angles, shapes, sections ... do.	738	974	--	U.S.S.R. 446; Czechoslovakia 81; West Germany 52.
Universals, plates, sheets ... do.	1,063	2,614	--	U.S.S.R. 478; West Germany 289; Austria 142.
Hoop and strip ... do.	95	142	--	West Germany 81; Austria 5; undetermined 55.
Rails and accessories ... do.	4	160	--	NA.
Wire ... do.	9	29	--	West Germany 24.
Tubes, pipes, fittings ... do.	[4]295	330	--	West Germany 57; Czechoslovakia 28; Italy 19.
Castings and forgings, rough ... do.	8	8	--	NA.
Lead:				
Ore and concentrate	--	6,800	--	All from Spain.
Oxides	691	2	--	All from Netherlands.
Metal including alloys:				
Scrap	3,764	4,635	--	Denmark 3,234; Netherlands 617; Belgium-Luxembourg 548.
Unwrought	3,047	4,140	--	Belgium-Luxembourg 1,830; West Germany 816; Sweden 702.
Manganese:				
Ore and concentrate, metallurgical-grade, Mn content[3]	27,400	21,800	--	Mainly from U.S.S.R.
Metal including alloys, all forms	--	17	--	All from Belgium-Luxembourg.
Mercury ... 76-pound flasks	6,380	9,666	--	Algeria 8,062; Netherlands 1,102; West Germany 502.
Molybdenum: Ore and concentrate	310	62	--	All from Netherlands.

See footnotes at end of table.

Table 3.—German Democratic Republic: Apparent imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Nickel:				
Matte and speiss, Ni content	781	668	--	Cuba 649; United Kingdom 19.
Oxides and hydroxides	589	680	--	All from Cuba.
Metal including alloys:				
Unwrought	536	64	--	Yugoslavia 61.
Semimanufactures	90	55	--	West Germany 41; Netherlands 12.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$5,163	$6,539	$2,208	West Germany $4,053; United Kingdom $278.
Silver:				
Waste and sweepings do	$46	$38	--	All from West Germany.
Metal including alloys, unwrought and partly wrought do	$120,241	$120,683	--	West Germany $119,876; United Kingdom $759.
Tellurium, elemental and arsenic	--	5	--	All from Netherlands.
Tin: Metal including alloys, all forms	30	220	--	Switzerland 210; West Germany 10.
Titanium:				
Ore and concentrate	1,752	5,454	--	Norway 3,950; Netherlands 1,504.
Oxides	17,002	16,772	153	Yugoslavia 12,704; Finland 3,915.
Tungsten: Ore and concentrate	45	189	--	All from Netherlands.
Zinc:				
Ore and concentrate	65,338	40,981	--	West Germany 32,581; Sweden 8,400.
Oxides	160	171	--	All from France.
Metal including alloys:				
Scrap	41	25	--	All from Belgium-Luxembourg.
Unwrought	16,545	14,593	--	Yugoslavia 6,378; West Germany 4,351; Netherlands 1,000.
Semimanufactures	2,145	1,853	--	West Germany 1,616; Norway 212; Yugoslavia 20.
Other:				
Ores and concentrates	5,060	28	--	Belgium-Luxembourg 17; Netherlands 11.
Oxides and hydroxides	--	424	--	Sweden 390; Netherlands 22.
Ashes and residues	11,200	10,792	--	West Germany 8,899; Italy 1,441; Belgium-Luxembourg 404.
Base metals including alloys, all forms	49,176	21,030	--	West Germany 21,025.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	24	331	--	Japan 312; Italy 19.
Artificial: Corundum	3,754	2,867	--	All from West Germany.
Dust and powder of precious and semiprecious stones including diamond value, thousands	--	$354	--	Switzerland $246; Netherlands $105.
Grinding and polishing wheels and stones	127	151	--	Austria 127; Yugoslavia 12; Japan 11.
Asbestos, crude[3]	47,000	53,800	--	NA.
Barite and witherite	1,472	2,192	--	All from West Germany.
Boron materials:				
Crude natural borates	9,472	5,569	--	All from Netherlands.
Oxides and acids	4,431	4,092	--	France 3,735; Italy 357.
Cement	[4]6,200	[4]6,700	--	Belgium-Luxembourg 541; undetermined 6,130.
Chalk	--	174	--	France 173; United Kingdom 1.
Clays, crude:				
Bentonite	10,499	8,032	--	All from Hungary.
Fire clay	575	534	--	All from West Germany.
Kaolin	[3]4,600	[3]3,100	--	Hungary 1,000; United Kingdom 78.
Unspecified	2,484	1,085	--	West Germany 860; Netherlands 210.
Diamond:				
Gem, not set or strung value, thousands	$29	$56	--	Belgium-Luxembourg $39; Sweden $17.
Industrial stones do	$447	$1,736	--	Belgium-Luxembourg $1,489; Switzerland $247.
Diatomite and other infusorial earth	1,633	1,534	--	France 1,023; Iceland 256; West Germany 155.
Feldspar, fluorspar, related materials	16,815	18,751	--	Norway 9,950; Sweden 7,079; Yugoslavia 1,722.
Fertilizer materials: Manufactured:				
Ammonia	2,403	NA		
Nitrogenous, N_2 content	[4]110,000	3,624	--	Poland 2,800; West Germany 650.
Phosphatic, P_2O_5 content[3]	15,129	9,200	--	West Germany 7,600.
Potassic	19,023	NA		
Unspecified and mixed	203,340	204,813	--	Austria 188,311; Sweden 16,479.
Graphite, natural	[3]6,359	[3]5,712	--	West Germany 1,141; undetermined 4,571.

See footnotes at end of table.

Table 3.—German Democratic Republic: Apparent imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Gypsum and plaster	170	228	--	All from West Germany.
Magnesium compounds	[2]10,972	63,151	--	Czechoslovakia 52,000; Turkey 10,250; Greece 900.
Mica, all forms[2]	1,350	1,042	--	India 259; undetermined 783.
Phosphates, crude, P_2O_5 content[2] thousand tons	419	425	--	All from U.S.S.R.
Pigments, mineral: Natural, crude	47	73	--	All from Austria.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$43	$35	--	West Germany $34; Switzerland $1.
Synthetic do.	$73	$104	--	Japan $58; West Germany $30; Austria $16.
Sodium compounds, n.e.s.: Carbonate, manufactured	4,999	6	--	All from West Germany.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	5,605	5,026	--	Hungary 3,835; Norway 746; West Germany 345.
Worked	15,120	15,093	--	West Germany 14,466; Yugoslavia 529.
Dolomite, chiefly refractory-grade	--	23	--	Sweden 20; Netherlands 3.
Gravel and crushed rock	263	314	--	Yugoslavia 234; Belgium-Luxembourg 40; Austria 24.
Quartz and quartzite	153	1,238	--	All from West Germany.
Sand other than metal-bearing	10,058	8,329	--	West Germany 7,843; France 356; Belgium-Luxembourg 60.
Sand and gravel	5,051	NA		
Sulfur:				
Elemental, crude including native and byproduct	157,000	135,040	--	Poland 135,000; Italy 40.
Dioxide	1,373	3,210	--	All from West Germany.
Sulfuric acid[4]	1,800	2,200	--	NA.
Talc, steatite, soapstone, pyrophyllite	1,546	1,625	--	West Germany 1,280; Austria 345.
Other:				
Crude	21,494	16,605	--	Hungary 16,043; West Germany 376; Netherlands 117.
Slag and dross, not metal-bearing	700	89,355	--	Sweden 89,145; Netherlands 112.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	4,162	6	--	All from France.
Carbon black	41,926	43,141	--	West Germany 21,306; U.S.S.R. 19,867; Sweden 1,866.
Coal:				
Anthracite and bituminous[2] thousand tons	4,198	3,619	--	U.S.S.R. 2,399; Poland 624; Czechoslovakia 596.
Lignite including briquets do.	200	NA		
Coke and semicoke[2] do.	1,820	1,828	--	U.S.S.R. 1,153; Czechoslovakia 485; Poland 151.
Gas, natural: Gaseous[2] million cubic feet	226,543	217,892	--	U.S.S.R. 198,251.
Peat including briquets and litter	--	674	--	West Germany 650; Netherlands 24.
Petroleum:				
Crude[2] thousand 42-gallon barrels	166,183	170,476	--	U.S.S.R. 125,450.
Refinery products:				
Liquefied petroleum gas do.	433	73	--	West Germany 72.
Gasoline do.	5	150	--	United Kingdom 107; Spain 36.
Mineral jelly and wax do.	(3)	(3)	--	Mainly from Netherlands.
Kerosene and jet fuel do.	8	7	--	All from Yugoslavia.
Distillate fuel oil do.	32	175	--	United Kingdom 171; Sweden 2.
Lubricants[4] do.	159	141	--	NA.
Residual fuel oil[4] do.	679	178	--	Algeria 94; undetermined 84.
Bitumen and other residues do.	2	3	--	Netherlands 2.
Bituminous mixtures do.	(3)	(3)	--	Mainly from France.
Petroleum coke do.	120	130	--	West Germany 129.
Unspecified[4] do.	8	1,309	--	NA.

[p]Preliminary. NA Not available.

[1]Table prepared by Josef Plachy. Owing to a lack of official trade data published by the German Democratic Republic, this table should not be taken as a complete presentation of this country's mineral trade. Unless otherwise specified, these data have been compiled from United Nations information and data published by the partner trade countries.

[2]Official Trade Statistics of the German Democratic Republic.

[3]Less than 1/2 unit.

[4]Statistical Yearbook of Members of the Council for Mutual Economic Assistance, Moscow, U.S.S.R.

COMMODITY REVIEW

METALS

Scrap, waste, and secondary materials were important raw materials for the metallurgical industry. Secondary materials accounted for 50% and 33% of lead and copper production, respectively. The new 5-year plan envisaged the following increases in the usage of secondary material: gold, 66.7%; mercury, 42.9%; molybdenum, 15.4%; palladium, 20%; silver, 8.8%; and tungsten, 33.3%. Each combine (operating unit) was responsible for its own collection, purchase, and utilization of scrap materials.[6]

Silver was reportedly to be produced in 1986 at the Crossen bismuth beneficiation enterprise from local polymetallic ores from Saxony; this would be 18 months ahead of schedule. Precious metals were extracted from recycled scrap in the Dahlwitz-Hoppgarten area, near Berlin, mostly from metals used in electronics.

Aluminum.—The GDR imported about 50% of its aluminum metal, primarily from Hungary and Yugoslavia. The Elektrokemisches Kombinat operated aluminum smelters at Bitterfeld and Lauta with an estimated capacity of 85,000 tons. VEB Mansfeld Kombinat Wilhelm Pieck (MWP) operated an aluminum smelter at Eisleben, which also produced nonferrous alloys and metals. VEB Leichtmetalwerk Nachterstedt in Halle Province produced aluminum metal products. The plant was to install a cold-rolling mill for the production of 60,000 tons of aluminum strip per year by 1988. The mill is to be supplied by FRG's SMS Schloemann-Siemag AG (SMS), a consortium that includes Siemag Transplan AG, Siemens AG, and Voest-Alpine AG of Austria.[7]

Copper.—Small quantities of copper continued to be mined in the GDR by MWP in the Mansfeld Basin and the Sangerhausen and Allstadt areas from cupriferous bituminous marl of Zechstein Upper Permian age. The deposit also contains bornite, chalcocite, chalcopyrite, galena, pyrite, sphalerite, and traces of gold, molybdenum, and silver. The cupriferous shale deposits at Sangerhausen and Niederroeblingen are in highly folded strata at a depth of 1,300 to 3,000 feet and are in mineralized veins 65 to 130 feet thick. The ore is reportedly used in smelters without beneficiation, thus requiring precise mining methods for quality ore. Longwall mining techniques accounted for 88% of the total output.[8] MWP was also sinking a ventilation shaft about 2,300 feet deep at its copper mine at Haldenstedt in Halle Province, using a boring machine weighing 55 tons and with a diameter of 19.5 feet.

Iron and Steel.—The GDR's iron ore deposits were virtually exhausted and the industry imported ore from Brazil, India, and the U.S.S.R.

The steel industry posted the best record in its history. Despite modernization, however, the industry was still unable to meet domestic demand for certain products, and thus continued to rely on imports from the U.S.S.R. and other CEMA countries. High-alloy products, including cold-rolled sheet, tubes, and wire rod and bars were also imported, mainly from France, the FRG, Japan, and the United Kingdom; other suppliers were Austria, Italy, and Sweden. Hoesch AG, Salzgitter AG, and Thyssen AG were the FRG's major suppliers of steel products to the GDR.

The GDR initiated modernization of its steel industry about 10 years ago, emphasizing product quality and gradual expansion of capacity. Minimills were set up at Hennigsdorf (Hennigsdorf Stahl Kombinat, Stahl-und Walzwerk Wilhelm Florin) and Brandenburg (VEB Stahl-und Walzwerk Brandenburg), and in 1984, the first Linz-Donawitz steelwork was built at Eisenhüttenstadt for VEB Bandstahlkombinat "Hermann Matern" of Eisenhüttenkombinat Ost by the Austrian Voest-Alpine.[9] In addition, a new 6-high mill stand was installed at Eisenhüttenstadt to raise output of cold-rolled sheet and coil, and a number of new continuous rolling mills have been brought on-stream, such as the 250-millimeter bar mill at Henningsdorf, a 4-strand wire rod mill at Brandenburg, a 4-high 3,200-millimeter plate mill at Ilsenburg, and a combined section mill comprising a 2-high roughing mill, a 2-high tandem mill, and a universal finishing mill at Unterwellenborn (VEB Maxhütte, Bergbau-und Hüttenkombinat). The new electric and oxygen steelmaking capacity accounted for 30% and 35% of steel production, respectively, with open-hearth furnaces still producing the remaining 40%. GDR's steel output was 40% continuously cast, the plants at Henningsdorf, Brandenburg, and Eisenhüttenstadt being based on 100% continuous casting, which was still low by West European standards.[10]

Tin.—Tin was mined in small quantities in the Erzgebirge region, along the southeastern border, in Saxony, by VEB Bergbau-und Hüttenkombinat Albert Funk. Most of the tin requirements, however, were imported from the FRG. The Albert Funk complex consisted of 10 production units and had its own research and training facilities. In 1985, a new flotation plant was opened as part of a modernization program. Its 840,000-ton-per-year capacity made it the largest cassiterite processing plant in the world.[11] The smelter in Freiberg worked on low-grade, 8% to 12% tin concentrates, producing 99.75% tin. A new tin processing plant was reportedly installed at Freiberg, with a projected capacity of 2,400 tons of tin metal per year in 1986.

INDUSTRIAL MINERALS

Cement.—The GDR was virtually self-sufficient in cement, and production has remained stable since 1975. VEB Zement Kombinat was the sole producer, with about 32 cement plants throughout the country. To expand its foreign trade, the GDR began to modernize its ports, adding new horizontal screw conveyors for cement handling. The equipment was supplied by Sweden's AB Nordstroms, with a capacity of 660 tons per hour.[12]

Potash.—After lignite, potash remained the second most important mineral product. VEB Kombinat Kali was the GDR's sole producer of potash, and the country was the third largest producer in the world. The GDR was the world's second largest exporter of potash, mostly to Czechoslovakia, Poland, Romania, and Yugoslavia. China and India were also becoming significant markets, importing 54,200 tons and 246,000 tons of K_2O in 1985, respectively. A fall in exports to the United States was due to legal actions brought by U.S. producers.

Because of complex geological conditions, the mining of potash was becoming more difficult. A new carnallite deposit was being mined at Bleicherode in the southern Harz Mountains on the FRG's border, but at a greater depth and under more difficult working conditions. The Merkers Mine came into production with 100,000 tons of potassium sulfate in 1985.[13]

MINERAL FUELS

The GDR had the highest per capita energy use among CEMA countries. This was reportedly because of rapid industrialization, with special emphasis put on high-energy consuming chemical and steel industries, but was partly due to the extensive use of low-quality lignite. Lignite continued to be the predominant energy source, and continual efforts were being made to substitute it for oil. Lignite accounted for 72% of total indigenous energy production, natural gas for 5.2%, and nuclear power for 4.1%.

Installed electric power generating capacity was about 104 billion kilowatts, of which 84% was from conventional thermal powerplants; 10.7%, nuclear; and 8%, hydropower. Production targets for electrical power have not been achieved in the last three 5-year plans.

One of the important aspects of the GDR's energy policy was to maintain close cooperation with CEMA countries, in particular with the Soviet Union, in supplies of crude oil, electricity, natural gas, and nuclear technology. Despite a decline in oil imports from the Soviet Union, electricity and natural gas imports were increasing. Almost 40% of the imported electricity came from the U.S.S.R.

Coal.—The GDR produced about one-third of the world's output of lignite. The current 5-year plan saw lignite production grow from 258 million tons in 1980 to 312 million tons in 1985. The 300-million-ton target for 1990 was thus already attained in 1985, mostly as a result of eight new surface mines; four older ones were closed simultaneously because of depletion. The combined capacity of the eight new mines, in the Cottbus, Halle, and Leipzig Districts, was about 40 million tons of lignite per year. A slowdown was anticipated by the year 2000, resulting from the intentional expansion of nuclear power generation. The production of anthracite, or hard coal, ceased in 1979 owing to depletion and difficult mining conditions caused by complex geology. Instead, hard coal was imported from Czechoslovakia, Poland, and the U.S.S.R.

Total GDR lignite reserves was estimated in 1984 at 45 billion tons or 12% of world reserves. Of the 18 billion tons of economically recoverable reserves, 11 billion tons was located in mines in Lusatia, and the rest, in the Leipzig Basin. Because of the high water content of the lignite, the coal freezes in winter and is not suitable or economic for transport over long distances. Therefore, 57% of the coal was burnt in nearby power stations, 28% was used by briquet manufacturers, 4% was burnt in thermal plants, and 1% was used by households. Briquetting was an important part of the GDR's coal processing. About 100 million tons of lignite was annually processed into 50 million tons of briquets, about 5% of which was exported.

Mining conditions have become more complicated. About 4.5 cubic meters of overburden had to be removed for every ton of coal, compared with 4.2 cubic meters in 1981. Surface mines were also becoming deeper, at an average depth of 235 feet, with some over 330 feet deep.

VEB Gaskombinat Schwarze Pumpe (GSP), the GDR's largest and most significant coal refining and coal gasification complex, was expanding its operations. It manufactured about 247 billion cubic feet, or 90%, of the country's city gas, 40% of lignite briquets, 10% of electricity, and 10% of liquid products from coal, and managed the distribution and processing of natural gas from the Soviet Union and domestic wells. GSP also had the capacity to store 46 billion cubic feet of city gas in seven underground tanks. Gas was also stored in aquifers, caves, depleted gas reservoirs, and abandoned mines.[14]

Natural Gas.—Natural gas reserves in the GDR were estimated at 150 billion to 200 billion cubic meters and were situated in Salzwedel and Peckensen, in the Magdeburg area. The quality of the gas, however, was low, with an average of 3,000 kilocalories per cubic meter, which was far below the standard calorific value of 7,600 kilocalories per cubic meter in northern and western European countries. Exploration and test drilling for gas was reportedly in progress along the Baltic Sea coast and in the Erzgebirge area, in the south.

Gas imports from the Soviet Union started in April 1973. In 1984, the GDR received 218 billion cubic meters of gas from the Soviet Union through the pipeline laid across Czechoslovakia. The higher quality gas imported from the Soviet Union was used mainly in the chemical, ceramics, glass, and metallurgical industries, and light industry.

Nuclear Energy.—The construction of the first nuclear powerplant in CEMA, with U.S.S.R. aid, started in the GDR in late 1957 at Rheinsberg; this was a small unit with a capacity of 70 megawatts. The first industrial nuclear reactor, Bruno Leuschner, of four 440-megawatt units was built at Greifswald. The final unit was commissioned in 1979, with maximum capacity of 3,520 megawatts. The plant had four operating reactors in 1985. About 11% of the GDR's electricity generated in 1985 came from nuclear power stations.

The completion of the third plant, at Stendal in Magdeburg District, with two pressurized water reactors, was delayed in 1985, because in the GDR's new energy policy to promote lignite-fired power stations, it may come on-stream between 1991 and 1993.

Uranium ore was mined by SDAG Wismut and was exported to the Soviet Union for enrichment.

Petroleum.—The GDR was virtually 100% dependent on imported oil, mainly from the U.S.S.R. Almost 80% of oil from the U.S.S.R. was transported through the "Friendship Pipeline," which was completed in 1964. In 1973, a parallel pipeline was brought into service, which covers the distance of 3,300 miles between the GDR and the western Siberian oilfields. Another line brings oil via Rostok to VEB Petrochemisches Kombinat, a major refinery and petrochemical complex at Schwedt. The VEB Leunawerke "Walter Ulbricht," was the other main refinery. The Schwedt combine had been built 25 years earlier and in 1985 employed more than 8,500 people, 2,000 of whom worked in research and development.

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[1]Physical scientist, Division of International Minerals.
[2]Hank, P. German Democratic Republic. Min. Annu. Rev. (London), July 1986, p. 463.
[3]Giessereitechnik (Leipzig). V. 31, No. 6, June 1986, pp. 171-175.
[4]The Council for Mutual Economic Assistance (CEMA) is an organization of centrally planned economy countries involved in economic cooperation and coordination comprising the following countries: Bulgaria, Cuba, Czechoslovakia, the German Democratic Republic, Hungary, Mongolia, Poland, Romania, the U.S.S.R., Vietnam, and Yugoslavia.
[5]DIW Wochenbericht (Berlin). No. 32, Aug. 1985, pp. 355-361.
[6]Diter Zaidel. Secondary Metallurgical Resources of GDR. Council for Mutual Economic Assistance (Moscow), Nov. 2, 1986, pp. 31-33.
[7]Soviet Kirgizia (Frunze, U.S.S.R.). Apr. 7, 1986, p. 3.
[8]Mining Magazine (London). Mining in the German Democratic Republic. Dec. 1985, p. 548.
[9]Metal Bulletin Monthly (London). Jan. 1985, pp. 27-31.
[10]Mining Bulletin Monthly (London). July 1986, pp. 50-53.
[11]Mosch, E. Largest Cassiterite Flotation Plant in the World Under Test Operation at Altenberg (GDR). Min. Mag. (London), Dec. 1985, pp. 531-537.
[12]Rock Products. Apr. 1986, p. 41.
[13]Phosphorus & Potassium (London). No. 143, May-June 1986, pp. 9-10.
[14]Energietechnik (Leipzig). V. 35, No. 5, May 1985, pp. 161-167.

The Mineral Industry of the Federal Republic of Germany

By George A. Rabchevsky[1]

Steady economic growth, falling interest rates, and rising exports, helped the minerals industry and the general economy of the Federal Republic of Germany (FRG) to resume its growth, although unemployment remained steady at 9.3%. Corporate profits of almost all major energy metals producers and processors also benefitted from decreased capacity utilization. Veba AG, of Düsseldorf, perhaps the largest West German energy and chemicals concern, produced record-high output in electricity, coal, gas, oil, and petroleum products. Most other metals and minerals producers also did well. Metallgesellschaft AG, for example, an industrial giant in the FRG with extensive holdings in mining and minerals processing, paid an annual dividend for the first time in 4 years. Hoesch AG, of Dortmund, a major West German steel producer with 36,000 employees, was actively expanding its operations. Degussa AG, headquartered in Dortmund and with interests worldwide, including the United States, increased its sales by 5%. The company specialized in the production of precious and specialty metals, among other products. There were about 40 enterprises in the FRG actively engaged in domestic and foreign activities in mining, metals, and mineral fuels production.

Despite the FRG's most damaging strike in the post-World War II period by metal workers in May-June 1984, business confidence and West German international competitiveness recovered. In 1985, almost 100,000 new employees were hired by the metals industry, which was the sharpest 1-year rise in personnel in that sector in 20 years. The metals processing and production industry employed about 3.7 million workers, including administration staff in 1985, although only 1,850 people worked in metal mines.[2]

PRODUCTION

The production of copper, iron and steel, and zinc, and several other metals resumed its growth, most of it due to vigorous foreign sales. The mining industry, on the other hand, which was dominated by coal, lead, potash, zinc, and industrial minerals, declined slightly. Partly as a result of a severe winter and the subsequent slowdown in the building industry, the output of construction materials also declined. The overall industrial production of the West German industry rose 4.5% over that of 1984, the best increase in almost a decade. Production of indigenous raw materials continued to decline, and the FRG's minerals industry was actively negotiating with foreign suppliers for raw materials and scrap.

Table 1.—Federal Republic of Germany: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984	1985[p]
METALS					
Aluminum:					
Bauxite, gross weight	79	494	359	[e]300	[e]300
Alumina thousand tons	1,651	1,510	1,580	1,701	1,657
Metal:					
Primary do	729	723	743	777	745
Secondary:					
Alloyed do	360	364	387	402	415
Unalloyed do	41	45	41	44	44
Cadmium metal, smelter	1,192	1,030	1,094	1,111	1,095
Cobalt metal, smelter[e]	150	150	(2)	(2)	100
Copper:					
Mine output, metal content	1,429	1,303	1,209	1,046	857
Metal:					
Smelter:					
Primary	163,100	161,800	159,100	148,800	[e]160,000
Secondary	88,300	78,200	94,500	76,700	[e]80,000
Total	251,400	240,000	253,600	225,500	240,000
Refined including secondary:					
Electrolytic	304,068	313,664	332,397	297,854	330,037
Fire-refined	83,370	80,408	87,928	81,144	84,264
Total	387,438	394,072	420,325	378,998	414,301
Gold:					
Mine output, metal content troy ounces	3,051	1,813	[e]1,900	[e]1,500	[e]1,200
Metal including secondary do	298,873	[e]299,000	[e]300,000	[e]310,000	[e]250,000
Iron and steel:					
Iron ore and concentrate:					
Gross weight thousand tons	1,572	1,319	976	977	1,034
Iron content do	476	386	279	293	309
Metal:					
Pig iron do	31,876	27,621	26,598	30,203	31,497
Blast furnace ferromanganese, spiegeleisen, ferrosilicon do	264	242	174	309	205
Ferroalloys, electric-furnace do	154	131	119	156	224
Steel, crude do	41,610	35,880	35,729	39,389	40,500
Semimanufactures do	30,850	25,782	26,061	27,957	28,919
Lead:					
Mine output, metal content	21,605	23,455	23,523	20,998	20,496
Metal:					
Smelter:					
Primary	107,493	110,749	116,216	102,289	109,674
Secondary	254,824	239,746	236,259	254,944	246,803
Total	362,317	350,495	352,475	357,233	356,477
Refined:					
Primary	189,500	201,600	217,000	191,900	193,500
Secondary	158,800	148,900	135,500	165,300	163,000
Total	348,300	350,500	352,500	357,200	356,500
Mercury (secondary only) 76-pound flasks	2,205	1,537	2,005	--	--
Nickel metal including secondary[e] [3]	1,200	1,200	1,200	1,000	700
Platinum[e] troy ounces	2,411	2,420	2,450	2,000	2,200
Silver:					
Mine output, metal content thousand troy ounces	1,126	1,279	1,167	1,225	1,225
Metal including secondary do	21,126	[e]21,000	[e]20,000	[e]21,500	[e]20,500
Tin metal including secondary	1,815	608	417	[r][e]417	[e]400
Zinc:					
Mine output:					
Metal content	110,700	105,800	113,500	113,000	117,800
Metal content, recoverable	91,779	86,920	92,562	92,467	95,505
Metal, unwrought, unalloyed:					
Primary	331,471	303,373	328,689	325,567	339,878
Secondary	35,085	31,578	27,848	30,825	27,886
Total	366,556	334,951	356,537	356,392	367,764
INDUSTRIAL MINERALS					
Abrasives: Artificial corundum	97,026	80,385	74,201	88,962	91,506
Barite	165,189	165,661	163,965	166,568	171,269
Bromine	3,567	3,073	3,136	3,306	3,077

See footnotes at end of table.

Table 1.—Federal Republic of Germany: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984	1985[p]
INDUSTRIAL MINERALS —Continued					
Cement and clinker:					
Cement (excluding clinker) thousand tons	31,498	30,078	30,466	28,909	25,758
Clinker do	1,364	959	702	742	599
Clays:					
Fire clay excluding klebsand do	5,478	5,594	5,792	[e]5,800	6,000
Kaolin, marketable do	475	454	407	360	410
Bleaching do	625	700	601	[e]650	[e]650
Other (schieferton) do	131	86	75	[e]100	[e]100
Diatomite and similar earth, marketable	42,373	42,695	44,195	[e]44,500	[e]45,000
Feldspar, marketable	342,148	331,430	330,000	297,850	[e]280,000
Fluorspar, marketable:					
Acid-grade[e]	64,627	70,779	72,607	[r]72,900	73,500
Metallurgical-grade[e]	7,181	7,860	8,100	[r]8,200	9,500
Total	71,808	78,639	80,707	[e]81,100	[e]83,000
Graphite:					
Crude	16,372	23,305	[e]23,500	[e]24,000	[e]23,500
Marketable[e]	8,186	11,653	10,000	[r]8,520	12,000
Gypsum and anhydrite, marketable thousand tons	1,952	1,721	2,485	2,262	2,367
Lime (hydrated), quicklime, dead-burned dolomite do	7,916	6,898	6,871	6,941	6,845
Nitrogen: N content of ammonia do	1,962	1,570	1,703	1,963	1,908
Phosphates: Thomas slag-based fertilizer, P_2O_5 content do	138	130	93	62	67
Pigments, mineral, natural	22,524	18,589	19,886	[e]20,000	[e]21,000
Potash, K_2O equivalent:					
Crude, marketable thousand tons	72	75	87	92	88
Chemically processed do	2,519	1,981	2,332	2,552	2,495
Total do	2,591	2,056	2,419	2,644	2,583
Pumice:					
Crude and washed do	1,253	745	645	1,013	690
Marketable do	399	220	200	355	207
Pyrites, marketable concentrate, gross weight do	483	508	554	[e]500	[e]400
Quartz, quartzite, glass sand:					
Quartzite do	395	326	331	362	346
Quartz sand, ground do	422	378	337	316	304
Quartz sand, unground and glass sand do	7,018	7,320	7,391	7,195	7,021
Salt, marketable:					
Rock do	8,367	7,034	6,265	[e]7,000	7,500
Marine and other do	4,174	3,944	4,137	[e]4,200	4,550
Sodium compounds:					
Carbonate do	1,189	1,105	1,218	1,364	1,412
Sulfate, synthetic do	255	214	125	128	139
Stone, sand and gravel, n.e.s.:					
Dimension stone[4] thousand cubic meters	324	254	237	291	254
Limestone, industrial thousand tons	49,243	42,935	44,371	43,505	40,403
Crushed and broken stone do	99,149	93,286	91,445	97,439	94,072
Slate do	52	53	62	23	28
Basalt lava and lava sand do	7,784	7,010	6,350	7,482	6,460
Calcite do	3	3	4	[e]3	[e]3
Grinding stone[e] cubic meters	42	40	40	42	40
Sand and gravel thousand tons	164,437	150,016	146,414	143,278	131,014
Sulfur:					
S content of pyrites do	213	229	--	--	--
Byproduct:					
Of metallurgy[e] do	400	400	400	350	320
Of natural gas do	834	872	632	[r e]900	[e]950
Of petroleum[e] do	190	220	195	190	200
Unspecified[e] do	95	100	95	90	85
Total do	1,732	1,821	1,322	[r e]1,530	1,555
Talc including talc schist do	15	15	14	[r e]17	[e]14
MINERAL FUELS AND RELATED MATERIALS					
Carbon black	354,191	348,037	362,125	382,420	387,134

See footnotes at end of table.

Table 1.—Federal Republic of Germany: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984	1985[P]
MINERAL FUELS AND RELATED MATERIALS —Continued					
Coal:					
Anthracite and bituminous _ thousand tons	88,460	89,014	82,202	79,426	82,396
Lignite do.	130,619	127,307	124,281	126,739	120,667
Total do.	219,079	216,321	206,483	206,165	203,063
Coke, metallurgical do.	27,914	26,275	22,427	20,586	22,331
Fuel briquets:					
Of anthracite and bituminous coal do.	1,332	1,285	1,244	1,437	1,511
Of lignite do.	4,169	3,951	3,568	3,818	4,068
Gas:					
Manufactured (excluding that from petroleum refineries):[5]					
Blast furnace million cubic feet	185,752	153,545	145,917	174,345	176,641
Coke oven do.	227,246	214,144	185,858	174,345	187,588
Natural, gross do.	673,014	568,909	622,339	563,258	510,605
Peat:					
Agricultural use thousand tons	1,742	1,842	1,868	1,429	1,516
Fuel use do.	246	253	259	277	284
Petroleum:					
Crude thousand 42-gallon barrels	32,207	30,734	29,730	29,289	29,650
Refinery products:					
Gasoline, motor do.	167,731	171,599	170,885	170,629	173,290
Jet fuel (including aviation gasoline) do.	11,802	11,099	11,231	13,318	13,797
Kerosene do.	349	388	356	295	196
Distillate fuel oil do.	270,977	264,823	252,029	260,018	256,691
Residual fuel oil do.	143,037	127,852	104,649	92,701	81,272
Lubricants do.	9,874	9,229	8,687	11,205	10,656
Liquefied petroleum gas do.	26,425	26,262	23,942	24,511	25,462
Bitumen do.	18,470	17,676	19,460	18,514	17,076
Unspecified do.	47,304	38,205	45,809	42,665	40,315
Refinery fuel and losses do.	55,762	52,255	50,169	48,769	46,557
Total do.	751,731	719,388	687,217	682,625	665,312

[e]Estimated. [P]Preliminary. [r]Revised.
[1]Table includes data available through July 1986.
[2]Revised to zero.
[3]Primary nickel and nickel contained in ferronickel, Monel metal, and nickel oxide directly used by the steel industry.
[4]Incomplete data.
[5]Other types of manufactured gas may be produced but production data are not reported, and available information is inadequate to make reliable estimates. Estimates presented in previous editions of this Yearbook are considered unreliable.

TRADE

Exports contributed about one-third to the country's gross national product, and every fourth employee owed his job to exports. Excellent port facilities in the north and the extensive barge and overland transportation networks provided easy access routes to foreign markets. Processed minerals and finished, specialty, and rare metals made up the bulk of mineral-related exports.

All the major West German minerals and metals producing companies were involved in foreign ventures, and some held sizable interests in subsidiaries. Others provided technical expertise in metal processing and mining engineering. Thyssen AG's subsidiary, Thyssen Technik GmbH, was completing the construction of a rolling mill in Krivoy Rog in the Ukraine, U.S.S.R. Mannesman Demag AG also signed a contract to construct two pipe plants in the Soviet Union, one in Baku on the Caspian Sea and the other in Taganrog on the Sea of Azov.

The FRG'S dependence on foreign sources of minerals has become increasingly critical. The country was almost 100% dependent on imports of antimony, asbestos, bauxite, chromite, magnesite, manganese, mercury, molybdenum, nickel, phosphate, platinum, titanium, tungsten, vanadium, and zirconium. It also imported sizable quantities of copper, iron ore, lead, crude oil, and zinc. West German companies and the Federal Government were actively seeking diversified sources for their basic raw materials and for critical and strategic minerals.

Table 2.—Federal Republic of Germany: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS				
Alkaline-earth metals	27	38	2	Italy 17; Spain 7; Japan 5.
Aluminum:				
Ore and concentrate	43,934	43,426	NA	Belgium-Luxembourg 24,272; Austria 6,149; France 4,935.
Oxides and hydroxides	467,939	629,064	16,838	Canada 185,661; Austria 83,066; Netherlands 80,109.
Ash and residue containing aluminum	10,055	10,683	NA	France 4,964; Netherlands 3,354; Italy 1,166.
Metal including alloys:				
Scrap	77,722	88,175	41	Italy 32,493; Netherlands 19,491; France 14,732.
Unwrought	321,146	293,939	6,942	Italy 76,885; France 49,500; Austria 37,657.
Semimanufactures	506,659	538,235	24,886	France 83,302; United Kingdom 78,077; Italy 47,635.
Antimony:				
Oxides	571	755	90	Belgium-Luxembourg 135; Switzerland 99.
Metal including alloys, all forms	17	119	1	Netherlands 71; Yugoslavia 13; Italy 5.
Arsenic: Oxides and acids	471	238	NA	United Kingdom 83; Italy 55.
Beryllium:				
Oxides and hydroxides value, thousands	$24	$2	NA	NA.
Metal including alloys, all forms kilograms	4,158	1,157	NA	India 96; Netherlands 31; France 6.
Bismuth: Metal including alloys, all forms	82	427	38	Netherlands 225; United Kingdom 49.
Cadmium:				
Oxides and hydroxides	20	51	NA	Taiwan 26; Venezuela 10.
Metal including alloys, all forms	633	324	NA	NA.
Cesium and rubidium: Metal including alloys, all forms value, thousands	$47	$38	NA	NA.
Chromium:				
Ore and concentrate	8,694	8,877	NA	Austria 2,768; Denmark 1,752; Netherlands 1,421.
Oxides and hydroxides	12,643	NA		
Metal including alloys, all forms	106	253	(2)	Netherlands 168; Belgium-Luxembourg 41; United Kingdom 9.
Cobalt:				
Oxides and hydroxides	86	112	16	Netherlands 25; France 23.
Metal including alloys, all forms	885	1,270	3	Italy 111; France 33; unspecified 1,018.
Columbium and tantalum:				
Ore and concentrate	1,328	1,347	1,181	Netherlands 158; Belgium-Luxembourg 7.
Ash and residue containing columbium or tantalum	NA	334	--	All to Belgium-Luxembourg.
Metal including alloys, all forms:				
Columbium (niobium)	97	93	2	Czechoslovakia 1; unspecified 88.
Tantalum	86	112	NA	NA.
Copper:				
Ore and concentrate	2,662	11	--	NA.
Matte and speiss including cement copper	2,569	1,124	--	Spain 1,010; United Kingdom 99.
Oxides and hydroxides	2,546	2,774	68	Denmark 601; Netherlands 264; Spain 212.
Sulfate	2,212	2,120	NA	NA.
Ash and residue containing copper	18,986	15,784	NA	Austria 6,897; India 2,760; Belgium-Luxembourg 1,969.
Metal including alloys:				
Scrap	67,128	78,064	303	Italy 28,391; Netherlands 15,063; Belgium-Luxembourg 12,515.
Unwrought	122,905	79,043	432	United Kingdom 26,115; Sweden 12,520; France 8,349.
Semimanufactures	413,782	475,945	57,106	France 58,168; Italy 48,903.
Gallium: Metal including alloys, all forms	14	12	1	Japan 6; Netherlands 2; Switzerland 2.
Germanium: Metal including alloys, all forms value, thousands	$879	$1,576	NA	United Kingdom $1,311; Netherlands $110; Belgium-Luxembourg $84.

See footnotes at end of table.

Table 2.—Federal Republic of Germany: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued				
Gold:				
Ash and residue containing gold value, thousands	$672	$951	NA	United Kingdom $849; Netherlands $90.
Waste and sweepings do	$2,977	$3,974	NA	Spain $2,996; United Kingdom $386; Netherlands $257.
Metal including alloys, unwrought and partly wrought thousand troy ounces	1,211	1,572	77	United Kingdom 849; Switzerland 383; Belgium-Luxembourg 153.
Hafnium: Metal including alloys, all forms value, thousands	$11	$5	NA	NA.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite	9,944	3,022	NA	Austria 1,199; Netherlands 594; United Kingdom 503.
Pyrite, roasted	38,932	32,478	NA	Belgium-Luxembourg 20,049; Austria 3,088.
Metal:				
Scrap thousand tons	3,172	3,268	NA	Italy 1,670; Belgium-Luxembourg 586; Switzerland 213.
Pig iron, cast iron, related materials do	541	554	1	France 362; Italy 65; Switzerland 33.
Ferroalloys:				
Ferroaluminum	22	100	NA	Belgium-Luxembourg 76.
Ferrochromium	55,901	60,977	3,514	France 23,245; Belgium-Luxembourg 8,354; India 5,722.
Ferromanganese	48,198	94,182	19,852	Japan 10,007.
Ferromolybdenum	1,025	819	NA	Netherlands 137; Sweden 107; Belgium-Luxembourg 86.
Ferronickel	274	1,034	NA	Italy 661; Sweden 146; Belgium-Luxembourg 118.
Ferrosilicochromium	3,179	4,184	NA	Belgium-Luxembourg 3,018; France 749; Italy 273.
Ferrosilicomanganese	5,134	4,380	NA	Switzerland 2,048; Netherlands 1,021; Italy 737.
Ferrosilicon	59,052	79,226	982	France 17,260; Italy 14,702; Belgium-Luxembourg 11,613.
Silicon metal	6,378	6,441	601	France 1,496; Netherlands 1,401; Japan 737.
Unspecified	11,754	13,720	2,028	France 2,116; Austria 1,468.
Steel, primary forms thousand tons	2,985	4,279	774	Italy 455; France 454.
Semimanufactures:				
Bars, rods, angles, shapes, sections do	2,866	2,839	191	France 531; Netherlands 396; Belgium-Luxembourg 248.
Universals, plates, sheets do	5,719	5,940	704	U.S.S.R. 776; France 550.
Hoop and strip do	1,253	1,418	50	France 172; U.S.S.R. 171; Netherlands 147.
Rails and accessories do	219	188	35	Italy 67; Netherlands 34.
Wire do	305	389	28	France 59; East Germany 59; Netherlands 55.
Tubes, pipes, fittings do	3,628	4,069	569	U.S.S.R. 1,078; Netherlands 384.
Castings and forgings, rough do	118	142	9	France 23; Netherlands 17; Austria 16.
Lead:				
Ore and concentrate	741	3	NA	NA.
Oxides	13,238	13,788	136	Netherlands 4,432; Sweden 1,764; Belgium-Luxembourg 1,067.
Ash and residue containing lead	18,190	13,157	--	Belgium-Luxembourg 9,178; United Kingdom 1,517; France 1,267.
Metal including alloys:				
Scrap	17,194	15,756	NA	Netherlands 10,097; Italy 1,613; Belgium-Luxembourg 1,122.
Unwrought	120,330	105,742	2,179	Italy 28,786; Austria 14,932; France 11,178.
Semimanufactures	16,905	17,497	264	Denmark 3,743; France 1,599; Saudi Arabia 1,358.

See footnotes at end of table.

Table 2.—Federal Republic of Germany: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued				
Lithium:				
Oxides and hydroxides	610	692	NA	France 210; Italy 157; United Kingdom 142.
Metal including alloys, all forms	60	59	NA	Switzerland 35; France 9; Japan 8.
Magnesium: Metal including alloys:				
Scrap	1,563	1,471	51	Italy 694; Netherlands 404; United Kingdom 69.
Unwrought	92	375	NA	Belgium-Luxembourg 220; Austria 38; Italy 34.
Semimanufactures	883	1,240	16	India 321; Belgium-Luxembourg 206; Netherlands 129.
Manganese:				
Ore and concentrate, metallurgical-grade	4,020	757	NA	Yugoslavia 160.
Oxides	476	536	NA	France 190; Italy 113; Netherlands 65.
Metal including alloys, all forms	143	131	NA	Netherlands 59; Belgium-Luxembourg 25; Italy 3.
Mercury 76-pound flasks	16,675	5,279	61	Netherlands 1,375; Switzerland 789; Belgium-Luxembourg 331.
Molybdenum:				
Ore and concentrate	6,898	5,291	210	Netherlands 2,411; Belgium-Luxembourg 998; Austria 810.
Oxides and hydroxides	1,820	NA		
Metal including alloys:				
Unwrought and scrap	591	637	NA	NA.
Semimanufactures	30	43	7	Brazil 13; Japan 7.
Nickel:				
Ore and concentrate kilograms	--	100	--	NA.
Matte and speiss	5,553	1,786	--	Belgium-Luxembourg 1,085; Sweden 339; Netherlands 224.
Oxides and hydroxides	2,437	76	NA	Italy 23; Yugoslavia 17; United Kingdom 9.
Ash and residue containing nickel	1,583	4,549	--	Sweden 1,626; Austria 1,410; Netherlands 911.
Metal including alloys:				
Scrap	7,637	9,404	144	Sweden 7,339; Netherlands 1,108; United Kingdom 274.
Unwrought	14,358	10,343	244	France 3,993; Netherlands 3,927; Japan 828.
Semimanufactures	8,766	11,441	3,421	United Kingdom 1,607; France 1,054.
Platinum-group metals:				
Ash and residue containing platinum value, thousands	$5	--		
Waste and sweepings do	$1,185	$575	NA	Netherlands $274; Spain $267.
Metals including alloys, unwrought and partly wrought:				
Palladium troy ounces	115,223	162,578	88,198	France 12,877; Switzerland 11,942.
Platinum do	225,203	292,938	20,674	Switzerland 108,098; France 39,407.
Unspecified do	102,236	132,744	28,966	Netherlands 31,898; Japan 20,401.
Rare-earth metals including alloys, all forms	170	22	NA	NA.
Rhenium: Metal including alloys, all forms value, thousands	$19	$39	NA	NA.
Silver:				
Ash and residue containing silver do	$2,904	$1,535	NA	Belgium-Luxembourg $674; United Kingdom $488; Switzerland $196.
Waste and sweepings do	$3,515	$1,886	$183	Spain $997; Belgium-Luxembourg $261.
Metal including alloys, unwrought and partly wrought thousand troy ounces	47,814	29,211	382	Austria 4,331; Sweden 3,422; United Kingdom 3,203.
Tellurium, elemental and arsenic	14	13	4	Belgium-Luxembourg 2; United Kingdom 2.
Tin:				
Ore and concentrate	--	8	--	NA.
Oxides	61	NA		
Ash and residue containing tin	3,652	3,764	1,637	United Kingdom 2,005; Netherlands 81.
Metal including alloys:				
Scrap	230	144	NA	Netherlands 117; Denmark 18; Belgium-Luxembourg 8.

See footnotes at end of table.

Table 2.—Federal Republic of Germany: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued				
Tin —Continued				
Metal including alloys —Continued				
Unwrought	4,356	4,211	1,874	Netherlands 1,144; United Kingdom 422.
Semimanufactures	1,114	1,144	35	Austria 170; Italy 148; Switzerland 98.
Titanium:				
Ore and concentrate	6,652	8,338	NA	Bulgaria 2,608; Hungary 1,976; France 819.
Oxides	58,956	59,954	9,811	Italy 5,934; Canada 4,174.
Metal including alloys:				
Scrap	1,169	906	164	United Kingdom 431; Italy 92.
Unwrought	100	59	NA	Austria 28; Netherlands 20; Italy 4.
Semimanufactures	1,029	1,351	6	France 369; Spain 300; United Kingdom 126.
Tungsten:				
Ore and concentrate	76	--		
Ash and residue containing tungsten	312	136	--	Austria 127.
Metal including alloys:				
Scrap	470	571	NA	NA.
Unwrought	298	378	NA	NA.
Semimanufactures	92	179	13	Romania 60; Brazil 15.
Uranium and thorium:				
Ore and concentrate value, thousands	$10	--		
Oxides and other compounds	647	407	NA	France 360; Italy 2.
Metal including alloys, all forms	r1,260	963	333	France 458; U.S.S.R. 75.
Vanadium:				
Ash and residue containing vanadium	1,486	2,005	NA	Belgium-Luxembourg 1,322.
Metal including alloys:				
Unwrought	192	196	1	United Kingdom 101; Japan 45; France 40.
Semimanufactures value, thousands	$7	$12	NA	NA.
Zinc:				
Ore and concentrate	158,868	116,591	NA	Netherlands 36,367; Belgium-Luxembourg 36,282; France 35,895.
Oxides	19,379	17,931	NA	NA.
Blue powder	5,755	6,442	291	Netherlands 1,007; United Kingdom 769; Hungary 705.
Matte	9,826	10,216	--	Belgium-Luxembourg 3,651; Italy 2,651; Netherlands 1,802.
Ash and residue containing zinc	85,405	97,381	NA	Sweden 35,651; France 27,044; Belgium-Luxembourg 15,337.
Metal including alloys:				
Scrap	14,889	17,523	NA	Netherlands 4,919; Belgium-Luxembourg 4,653; Taiwan 4,051.
Unwrought	133,180	121,256	5,109	Italy 33,673; China 23,124; France 14,271.
Semimanufactures	21,192	19,530	46	France 266; United Kingdom 98; unspecified 18,910.
Zirconium:				
Ore and concentrate	14,461	18,885	NA	Poland 3,156; Netherlands 2,980; France 2,920.
Metal including alloys:				
Scrap	40	61	14	France 33; Sweden 1.
Unwrought	25	21	1	France 2; Sweden 2; United Kingdom 2.
Semimanufactures	21	20	NA	Canada 10; India 4; United Kingdom 4.
Other:				
Ores and concentrates	18	1	NA	NA.
Oxides and hydroxides	11,885	34,500	NA	NA.
Ashes and residues	59,274	105,284	11	Belgium-Luxembourg 47,524; France 43,394; Netherlands 12,412.
Base metals including alloys, all forms	26,020	--		
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	269,338	354,131	NA	Netherlands 340,930; Belgium-Luxembourg 6,284; Switzerland 3,225.

See footnotes at end of table.

Table 2.—Federal Republic of Germany: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Abrasives, n.e.s. —Continued				
Artificial:				
Corundum	45,760	51,670	4,178	Italy 5,360; Netherlands 5,355; France 4,613.
Silicon carbide	26,164	28,875	NA	NA.
Dust and powder of precious and semiprecious stones including diamond kilograms	1,389	3,102	56	Greece 1,996; Austria 253; Brazil 176.
Grinding and polishing wheels and stones	14,202	16,146	914	France 1,914; United Kingdom 1,260; Netherlands 1,017.
Asbestos, crude	34,261	14,928	NA	Portugal 72.
Barite and witherite	37,839	43,836	252	France 14,882; Belgium-Luxembourg 6,516; Austria 5,882.
Boron materials:				
Crude natural borates	13,743	4,175	NA	Sweden 3,972.
Elemental	15	15	5	France 2; Japan 1.
Oxides and acids	665	700	82	Saudi Arabia 136; Switzerland 56.
Bromine	13	28	NA	NA.
Cement thousand tons	2,312	2,281	NA	Netherlands 1,576; Belgium-Luxembourg 111.
Chalk	54,979	61,046	299	Netherlands 23,470; Finland 15,336; Sweden 11,690.
Clays, crude:				
Bentonite	31,488	33,552	NA	Belgium-Luxembourg 13,640; France 7,591; Netherlands 4,756.
Ceramic	839,641	1,050,058	NA	Italy 561,798; Netherlands 192,324; France 141,381.
Chamotte earth	29,950	31,187	NA	Netherlands 9,660; France 6,244; Italy 4,636.
Fire clay	355,235	402,943	NA	Italy 184,455; Belgium-Luxembourg 85,037; Netherlands 79,223.
Fuller's earth	6,361	2,488	NA	France 1,167; Netherlands 456; Belgium-Luxembourg 444.
Kaolin	96,395	91,955	NA	Italy 26,370; Switzerland 13,556; Netherlands 13,000.
Unspecified	219,085	263,017	NA	Netherlands 187,729; Belgium-Luxembourg 28,894; France 17,982.
Cryolite and chiolite	40	128	NA	Italy 72.
Diamond:				
Gem, not set or strung carats	120,733	128,435	10,242	Belgium-Luxembourg 44,199; United Kingdom 33,331; Switzerland 16,917.
Industrial stones do.	321,615	431,563	81,659	Ireland 143,837; Belgium-Luxembourg 43,581.
Diatomite and other infusorial earth	2,660	1,766	NA	Netherlands 528; Nigeria 410; France 100.
Feldspar, fluorspar, related materials:				
Feldspar	17,465	16,570	NA	France 8,194; Belgium-Luxembourg 3,007; Netherlands 2,196.
Fluorspar	12,921	16,518	NA	Netherlands 6,623; Austria 4,151; Belgium-Luxembourg 1,257.
Unspecified	1,235	1,205	NA	Belgium-Luxembourg 1,119.
Fertilizer materials:				
Crude, n.e.s	74,683	97,090	NA	Netherlands 80,419; Saudi Arabia 4,403; Italy 2,964.
Manufactured:				
Ammonia thousand tons	176	358	NA	Denmark 213; United Kingdom 61; France 33.
Nitrogenous do.	1,252	1,486	NA	NA.
Phosphatic do.	70	72	NA	NA.
Potassic do.	2,193	2,638	NA	NA.
Unspecified and mixed do.	1,106	1,052	([2])	Belgium-Luxembourg 383; France 157; Denmark 84.
Graphite, natural	9,978	11,069	701	Bulgaria 1,968; Italy 1,828; Austria 1,394.
Gypsum and plaster	309,826	265,377	NA	Netherlands 109,804; Belgium-Luxembourg 52,014; Switzerland 35,222.
Iodine	50	74	NA	Mexico 36; Italy 6; France 5.
Kyanite and related materials	5,556	8,699	521	Italy 2,145; Austria 2,106; France 988.
Lime	397,465	357,711	NA	Netherlands 210,423; France 63,390; Switzerland 37,805.

See footnotes at end of table.

Table 2.—Federal Republic of Germany: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Magnesium compounds:				
Magnesite	[r]168	133	NA	NA.
Oxides and hydroxides	[r]26,154	24,614	372	France 9,682; Italy 3,282; Netherlands 1,445.
Other	[r]395,986	440,076	9,521	France 77,344; Norway 74,365; Singapore 57,256.
Mica:				
Crude including splittings and waste	919	1,254	20	Netherlands 456; Spain 173; Austria 145.
Worked including agglomerated splittings	220	203	NA	Italy 76; United Kingdom 37; Austria 10.
Phosphates, crude	1,925	2,446	NA	Switzerland 1,680; Netherlands 525.
Pigments, mineral:				
Natural, crude	1,659	1,380	580	Switzerland 475.
Iron oxides and hydroxides, processed	144,553	171,261	11,810	France 26,833; United Kingdom 20,062.
Potassium salts, crude	38,253	42,459	NA	NA.
Precious and semiprecious stones other than diamond:				
Natural kilograms	325,875	393,238	12,201	Japan 138,594; China 51,771; Hong Kong 47,700.
Synthetic do.	22,760	26,103	1,593	Japan 12,778; Switzerland 3,114; Thailand 1,676.
Pyrite, unroasted	1,041	1,302	NA	NA.
Quartz crystal, piezoelectric kilograms	71	172	NA	Iran 124.
Salt and brine thousand tons	1,793	2,116	NA	Belgium-Luxembourg 1,422; Sweden 300; Denmark 68.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	281,745	353,772	NA	Belgium-Luxembourg 148,112; China 23,919; Nigeria 13,249.
Sulfate, manufactured	53,706	48,217	NA	Italy 15,348; Netherlands 8,399; Switzerland 7,302.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked thousand tons	1,119	1,132	(2)	Netherlands 990; Switzerland 69; France 25.
Worked do.	50	40	(2)	Austria 9; Netherlands 7; Switzerland 7.
Dolomite, chiefly refractory-grade do.	211	161	NA	Netherlands 87; France 35; Belgium-Luxembourg 16.
Gravel and crushed rock do.	9,907	9,975	NA	Netherlands 8,085; Switzerland 1,005; Belgium-Luxembourg 403.
Limestone other than dimension do.	37	57	NA	Netherlands 41; Belgium-Luxembourg 9; Italy 3.
Quartz and quartzite do.	124	111	(2)	Belgium-Luxembourg 40; Netherlands 30; Austria 11.
Sand other than metal-bearing do.	7,352	7,142	NA	Netherlands 5,291; Belgium-Luxembourg 910; Austria 405.
Sulfur:				
Elemental:				
Crude including native and byproduct	461,821	509,636	NA	Netherlands 233,674; Denmark 56,314; United Kingdom 41,728.
Colloidal, precipitated, sublimed	314	450	NA	Belgium-Luxembourg 152; Netherlands 136.
Dioxide	18,033	23,326	NA	Austria 9,982; Netherlands 6,781; Belgium-Luxembourg 4,329.
Sulfuric acid	648,629	569,648	NA	NA.
Talc, steatite, soapstone, pyrophyllite	4,663	4,377	NA	Netherlands 1,223; Yugoslavia 633; Romania 290.
Vermiculite, perlite, chlorite	4,841	5,312	NA	Belgium-Luxembourg 2,972; Netherlands 1,357; Austria 477.
Other:				
Crude thousand tons	[r]2,694	2,215	NA	Netherlands 1,410; Belgium-Luxembourg 551; France 127.
Slag and dross, not metal-bearing do.	3,261	3,730	1	Netherlands 2,580; France 932; Belgium-Luxembourg 90.

See footnotes at end of table.

Table 2.—Federal Republic of Germany: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	5,562	4,996	NA	Austria 2,989; Sweden 603; Finland 313.
Carbon:				
Carbon black	24,530	8,086	494	France 1,594; United Kingdom 745; Switzerland 658.
Gas carbon	110,906	120,760	1,195	France 26,503; Austria 13,568; Belgium-Luxembourg 11,383.
Coal:				
Anthracite and bituminous thousand tons	10,582	10,489	NA	France 3,705; Belgium-Luxembourg 2,336; Italy 1,950.
Briquets of anthracite and bituminous coal do.	409	627	NA	United Kingdom 347; France 95; Belgium-Luxembourg 93.
Lignite including briquets do.	661	860	NA	Belgium-Luxembourg 271; Netherlands 162; Austria 142.
Coke and semicoke do.	4,129	6,590	NA	Belgium-Luxembourg 1,922; France 1,291; United Kingdom 913.
Gas:				
Manufactured million cubic feet	72	--		
Gaseous do.	336,530	337,846	NA	NA.
Peat including briquets and litter	528,189	893,656	NA	Netherlands 531,250; France 118,099; Switzerland 62,157.
Petroleum:				
Crude thousand 42-gallon barrels	8,137	36	--	Netherlands 15; United Kingdom 15; Denmark 4.
Refinery products:				
Liquefied petroleum gas do.	8,309	5,940	36	Netherlands 2,698; Italy 1,196; Belgium-Luxembourg 498.
Gasoline do.	13,762	11,981	126	Switzerland 4,164; France 2,460; Austria 1,908.
Mineral jelly and wax do.	1,256	1,282	--	Republic of South Africa 120; Netherlands 109; Belgium-Luxembourg 84.
Kerosene and jet fuel do.	8,583	9,088	([2])	Switzerland 646; Netherlands 199; bunkers 7,892.
Distillate fuel oil do.	7,263	8,418	1	Switzerland 2,777; Netherlands 1,411; France 1,258.
Lubricants do.	3,234	3,633	14	Belgium-Luxembourg 537; United Kingdom 468; U.S.S.R. 343.
Residual fuel oil do.	23,393	21,230	--	United Kingdom 6,172; Belgium-Luxembourg 2,373; bunkers 5,468.
Bitumen and other residues do.	2,262	2,272	([2])	Switzerland 589; Austria 525; Denmark 468.
Bituminous mixtures do.	111	113	([2])	Netherlands 30; Switzerland 23; Belgium-Luxembourg 15.
Petroleum coke do.	1,864	1,974	4	Netherlands 572; France 463; Austria 307.

[r]Revised. NA Not available.
[1]Table prepared by staff, Branch of Geographic Data.
[2]Less than 1/2 unit.

Table 3.—Federal Republic of Germany: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS				
Alkali and alkaline-earth metals:				
Alkali metals	23	4	--	All from United Kingdom.
Alkaline-earth metals	270	377	7	France 238; China 53; Canada 36.
Aluminum:				
Ore and concentrate thousand tons	3,156	4,056	1	Australia 1,472; Guinea 1,468; Sierra Leone 616.
Oxides and hydroxides	488,477	701,868	2,277	Australia 214,797; Guinea 192,635; Italy 144,177.
Ash and residue containing aluminum	40,063	52,267	--	Austria 9,810; Netherlands 9,548; Norway 6,016.
Metal including alloys:				
Scrap	192,452	208,892	4,979	Netherlands 56,279; United Kingdom 47,380; Belgium-Luxembourg 15,049.
Unwrought	592,141	722,773	7,555	Norway 241,489; United Kingdom 59,671; Egypt 55,893.
Semimanufactures	299,920	307,536	2,526	France 75,664; Belgium-Luxembourg 43,196; Netherlands 42,491.
Antimony:				
Ore and concentrate	1,706	2,131	--	Bolivia 1,055; China 964; Turkey 65.
Oxides	5,167	5,536	140	France 1,531; Belgium-Luxembourg 1,243; China 971.
Metal including alloys, all forms	371	582	NA	Belgium-Luxembourg 408; China 114; United Kingdom 21.
Arsenic: Oxides and acids	369	384	(²)	Belgium-Luxembourg 178; France 93; Sweden 48.
Beryllium:				
Oxides and hydroxides value, thousands	$44	$31	$27	Japan $3.
Metal including alloys, all forms kilograms	338	303	248	NA.
Bismuth: Metal including alloys, all forms	418	350	3	Peru 90; United Kingdom 75; Japan 39.
Cadmium:				
Oxides and hydroxides	635	571	--	Belgium-Luxembourg 516; United Kingdom 25; Republic of Korea 20.
Metal including alloys, all forms	829	734	NA	Belgium-Luxembourg 168; Netherlands 167; France 143.
Cesium and rubidium: Metal including alloys, all forms value, thousands	$7	$9	$8	France $1.
Chromium:				
Ore and concentrate	247,187	337,907	34,304	Republic of South Africa 112,027; Albania 96,831; Turkey 46,475.
Oxides and hydroxides	1,918	1,914	10	China 565; Italy 528; Poland 346.
Metal including alloys, all forms	921	1,294	36	United Kingdom 525; Japan 313; China 196.
Cobalt:				
Ore and concentrate	5	17	--	All from Republic of South Africa.
Oxides and hydroxides	409	448	--	Belgium-Luxembourg 155; Finland 118; France 64.
Metal including alloys, all forms	2,009	2,678	64	Zaire 1,036; Zambia 362; France 343.
Columbium and tantalum:				
Ore and concentrate	370	641	NA	NA.
Ash and residue containing columbium and/or tantalum	866	2,422	161	Thailand 584; Nigeria 198.
Metal including alloys, all forms:				
Columbium (niobium)	41	32	29	NA.
Tantalum	126	157	117	United Kingdom 13; Belgium-Luxembourg 9.
Copper:				
Ore and concentrate	496,262	550,531	--	Papua New Guinea 191,245; Mexico 150,879; Poland 137,600.
Matte and speiss including cement copper	11,358	2,724	--	Australia 1,500; France 505; Cyprus 500.
Oxides and hydroxides	979	1,139	2	Belgium-Luxembourg 632; Italy 481.
Sulfate	10,756	11,495	85	Czechoslovakia 2,614; Belgium-Luxembourg 2,532; U.S.S.R. 1,500.
Ash and residue containing copper	17,921	17,763	709	Italy 4,320; Netherlands 3,086; United Kingdom 1,992.

See footnotes at end of table.

Table 3.—Federal Republic of Germany: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Copper —Continued				
Metal including alloys:				
Scrap	205,405	211,756	4,658	France 47,533; United Kingdom 43,699; Netherlands 35,244.
Unwrought	518,073	592,722	3,500	Chile 126,317; Poland 81,642; Zaire 79,065.
Semimanufactures	253,562	298,568	1,418	Belgium-Luxembourg 91,998; France 70,021; Netherlands 9,311.
Gallium: Metal including alloys, all forms	14	11	3	Belgium-Luxembourg 2; France 2.
Germanium: Metal including alloys, all forms kilograms	3,700	5,000	--	United Kingdom 2,800; Belgium-Luxembourg 2,100; Switzerland 100.
Gold:				
Ash and residue containing gold value, thousands	$26,394	$3,717	$609	Sweden $1,009; Denmark $470.
Waste and sweepings do	$22,660	$95,047	NA	Sweden $3,410; Belgium-Luxembourg $2,103; Netherlands $1,782.
Metal including alloys, unwrought and partly wrought thousand troy ounces	1,965	2,352	22	Switzerland 536; U.S.S.R. 445; North Korea 345.
Hafnium: Metal including alloys, all forms kilograms	500	200	200	
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite thousand tons	35,497	42,568	3	Brazil 15,206; Liberia 6,273; Canada 5,837.
Pyrite, roasted do	88	89	--	Sweden 44; Belgium-Luxembourg 24; Norway 10.
Metal:				
Scrap do	1,300	1,785	10	Netherlands 614; France 358; United Kingdom 220.
Pig iron, cast iron, related materials	227,815	266,525	52	Canada 73,392; Brazil 66,944; France 32,078.
Ferroalloys:				
Ferroaluminum	148	502	NA	Belgium-Luxembourg 244; Spain 150; United Kingdom 68.
Ferrochromium	297,662	244,644	2,017	Republic of South Africa 138,622; Zimbabwe 29,481; Turkey 7,747.
Ferromanganese	98,243	87,111	NA	Norway 37,633; France 29,159; Belgium-Luxembourg 8,596.
Ferromolybdenum	4,583	5,401	183	Belgium-Luxembourg 2,058; United Kingdom 1,817; Austria 514.
Ferronickel	73,107	99,327	NA	Greece 49,754; New Caledonia 23,227; Brazil 8,211.
Ferrosilicochromium	5,753	12,520	NA	Zimbabwe 9,161; Sweden 2,132; Norway 845.
Ferrosilicomanganese	115,360	122,635	NA	Norway 64,722; Portugal 17,671; Czechoslovakia 9,787.
Ferrosilicon	195,001	241,655	422	Norway 130,836; France 26,578; U.S.S.R. 7,375.
Silicon metal	65,637	75,557	2	Norway 27,833; France 14,923; Republic of South Africa 5,606.
Unspecified	13,075	15,827	552	France 5,016; Brazil 3,208; United Kingdom 2,065.
Steel, primary forms thousand tons	1,904	2,000	(2)	Belgium-Luxembourg 541; Netherlands 284; East Germany 250.
Semimanufactures:				
Bars, rods, angles, shapes, sections do	4,517	4,129	1	Italy 846; Belgium-Luxembourg 736; France 494.
Universals, plates, sheets do	3,834	3,652	8	Belgium-Luxembourg 913; France 664; Netherlands 257.
Hoop and strip do	623	602	1	Belgium-Luxembourg 214; France 159; Netherlands 52.
Rails and accessories do	17	12	(2)	Netherlands 3; Poland 3; Sweden 1.

See footnotes at end of table.

Table 3.—Federal Republic of Germany: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal —Continued				
Semimanufactures —Continued				
Wire thousand tons	272	299	1	Belgium-Luxembourg 89; France 42; Austria 31.
Tubes, pipes, fittings do	832	990	1	Italy 194; France 177; Netherlands 112.
Castings and forgings, rough do	81	75	(2)	East Germany 33; France 6; Denmark 5.
Lead:				
Ore and concentrate	217,753	206,723	--	Canada 41,056; Morocco 27,640; Sweden 24,251.
Oxides	9,924	9,847	51	Belgium-Luxembourg 3,072; France 618; Netherlands 599.
Ash and residue containing lead	16,091	23,534	1,296	Australia 8,856; France 6,877.
Metal including alloys:				
Scrap	30,886	69,865	NA	United Kingdom 24,312; Netherlands 21,946; France 9,248.
Unwrought	118,670	144,682	224	United Kingdom 63,831; Belgium-Luxembourg 19,146; Sweden 13,320.
Semimanufactures	3,803	3,695	5	Belgium-Luxembourg 2,095; France 546; Yugoslavia 482.
Lithium:				
Oxides and hydroxides	641	674	381	China 192; France 75.
Metal including alloys, all forms	13	21	1	United Kingdom 20.
Magnesium: Metal including alloys:				
Scrap	2,086	3,194	109	Italy 815; Netherlands 436; Belgium-Luxembourg 442.
Unwrought	28,274	28,560	5,991	Norway 14,863; France 2,827.
Semimanufactures	1,362	1,013	8	Austria 639; France 148; Norway 113.
Manganese:				
Ore and concentrate, metallurgical-grade	434,261	535,843	19	Republic of South Africa 320,296; Australia 99,934; Gabon 37,690.
Oxides	2,974	4,467	38	Belgium-Luxembourg 3,558; Japan 644; France 72.
Metal including alloys, all forms	5,468	6,102	220	Republic of South Africa 3,342; Belgium-Luxembourg 722; France 517.
Mercury 76-pound flasks	16,249	12,360	--	Spain 6,466; Algeria 2,065; Netherlands 1,419.
Molybdenum:				
Ore and concentrate	19,061	18,597	4,622	Chile 2,845; Canada 2,615.
Oxides and hydroxides	274	192	7	United Kingdom 103; Netherlands 61; Austria 12.
Metal including alloys:				
Scrap	433	504	NA	Austria 386; Italy 39; United Kingdom 29.
Unwrought	34	130	14	France 54; Sweden 24; United Kingdom 19.
Semimanufactures	282	330	43	Austria 234; United Kingdom 34.
Nickel:				
Ore and concentrate	115	74	--	Australia 49; Italy 23.
Matte and speiss	11,999	12,239	--	Australia 9,285; Canada 2,381; Albania 313.
Oxides and hydroxides	186	383	1	Japan 161; Canada 134; Netherlands 41.
Ash and residue containing nickel	2,037	3,262	72	Netherlands 979; Belgium-Luxembourg 472; France 468.
Metal including alloys:				
Scrap	4,902	8,389	1,201	France 3,640; Netherlands 780.
Unwrought	44,831	48,284	3,549	U.S.S.R. 17,104; Australia 5,736; United Kingdom 4,781.
Semimanufactures	6,654	7,042	475	France 3,549; United Kingdom 1,394.
Platinum-group metals:				
Ash and residue containing platinum value, thousands	$1,627	$9,765	$2,321	United Kingdom $3,326; Republic of South Africa $1,537.
Waste and sweepings do	$38,200	$38,267	$3,363	Norway $5,029; Netherlands $4,300; Hungary $3,380.

See footnotes at end of table.

Table 3.—Federal Republic of Germany: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Platinum-group metals —Continued				
Metals including alloys, unwrought and partly wrought:				
Palladium troy ounces	357,613	567,661	63,605	U.S.S.R. 187,229; Switzerland 131,530; United Kingdom 125,964.
Platinum do	491,913	551,194	96,612	Switzerland 145,046; United Kingdom 98,030.
Unspecified do	170,538	270,366	74,757	United Kingdom 108,734; Republic of South Africa 58,406.
Rare-earth metals including alloys, all forms	129	135	NA	NA.
Rhenium: Metal including alloys, all forms value, thousands	$367	$77	NA	Italy $65.
Selenium, elemental and phosphorus	26,844	28,214	NA	NA.
Silicon, high-purity	54	30	(2)	United Kingdom 12; Denmark 4; Sweden 4.
Silver:				
Ash and residue containing silver value, thousands	$34,794	$46,548	$30,611	United Kingdom $5,494; Canada $3,091.
Waste and sweepings do	$19,469	$15,245	$534	Mexico $4,049; United Kingdom $1,879; Sweden $1,193.
Metal including alloys, unwrought and partly wrought thousand troy ounces	35,679	33,652	4,171	Sweden 6,322; France 4,931.
Tellurium, elemental and arsenic	74	89	--	Belgium-Luxembourg 25; Netherlands 22; Sweden 17.
Tin:				
Ore and concentrate	2,166	1,365	--	Bolivia 677; Burma 400; Zaire 215.
Oxides	82	77	(2)	United Kingdom 45; Italy 20; Japan 5.
Ash and residue containing tin	2,068	8,138	1,222	Malaysia 2,900; Netherlands 1,392; Thailand 1,262.
Metal including alloys:				
Scrap	282	284	NA	Switzerland 66; Netherlands 56; Finland 26.
Unwrought	16,662	18,819	92	Indonesia 3,366; Malaysia 2,887; Thailand 2,822.
Semimanufactures	156	243	NA	United Kingdom 57; Denmark 46; Belgium-Luxembourg 23.
Titanium:				
Ore and concentrate	403,732	455,686	--	Norway 252,889; Canada 99,530; India 44,059.
Oxides	23,487	20,045	3,657	France 5,846; Belgium-Luxembourg 5,762.
Ash and residue containing titanium	195,938	214,318	--	Canada 126,437; Turkey 7,092; Thailand 998.
Metal including alloys:				
Scrap	128	738	73	France 259; United Kingdom 124; Japan 122.
Unwrought	891	2,125	271	Japan 1,133; U.S.S.R. 436.
Semimanufactures	1,027	1,360	108	Japan 883; United Kingdom 236.
Tungsten:				
Ore and concentrate	3,841	7,296	50	China 3,431; Canada 1,005; Peru 323.
Oxides and hydroxides	11	1	(2)	Mainly from China.
Ash and residue containing tungsten	287	272	6	France 119; Austria 40; Netherlands 32.
Metal including alloys:				
Scrap	422	519	10	United Kingdom 119; Netherlands 110; France 84.
Unwrought	444	620	13	Austria 330; United Kingdom 118; France 60.
Semimanufactures	80	102	15	Austria 55; Belgium-Luxembourg 12.
Uranium and/or thorium:				
Ore and concentrate	(2)	6	--	All from France.
Oxides and other compounds	25	24	10	NA.
Metal including alloys, all forms:				
Uranium	1,833	1,618	NA	Australia 950; Republic of South Africa 467; France 173.
Thorium value, thousands	$5	$19	NA	NA.

See footnotes at end of table.

Table 3.—Federal Republic of Germany: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Vanadium:				
Ore and concentrate	5	2	--	Belgium-Luxembourg 1; United Kingdom 1.
Oxides and hydroxides	1,455	1,715	(2)	Finland 1,660; China 50.
Ash and residue containing vanadium	27,826	35,611	336	Italy 2,750; Israel 370.
Metal including alloys, all forms	4	3	NA	NA.
Zinc:				
Ore and concentrate	542,406	594,352	--	Canada 239,284; Australia 79,080; Greenland 59,895.
Oxides	11,887	14,940	8	Netherlands 3,870; France 3,580; Italy 2,217.
Blue powder	11,302	10,490	NA	Belgium-Luxembourg 6,703; France 1,553; Netherlands 1,140.
Matte	9,712	10,660	1,345	Netherlands 3,000; France 1,380; Belgium-Luxembourg 1,373.
Ash and residue containing zinc	60,582	60,649	2,954	Belgium-Luxembourg 9,644; United Kingdom 7,606; Netherlands 5,912.
Metal including alloys:				
Scrap	17,565	18,875	NA	Netherlands 5,464; Italy 3,264; Belgium-Luxembourg 2,593.
Unwrought	161,964	179,454	225	Belgium-Luxembourg 65,598; Netherlands 33,691; France 18,026.
Semimanufactures	30,504	23,169	NA	France 16,032; Netherlands 3,015; Yugoslavia 2,706.
Zirconium:				
Ore and concentrate	68,622	75,486	74	Australia 37,394; Republic of South Africa 34,456; Netherlands 1,913.
Metal including alloys:				
Scrap	11	21	13	NA.
Unwrought	16	16	3	Belgium-Luxembourg 8; United Kingdom 4.
Semimanufactures	339	290	58	France 174; Sweden 55.
Other:				
Ores and concentrates	16,242	10,186	8	China 8,908; Peru 727; Netherlands 538.
Oxides and hydroxides	2,436	511	15	United Kingdom 207; France 187; Brazil 73.
Ashes and residues	r11,982	8,376	950	East Germany 3,840; Belgium-Luxembourg 752.
Base metals including alloys, all forms	5,581	7,893	--	All from East Germany.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	87,026	82,078	840	Greece 49,835; Iceland 16,375; Italy 12,640.
Artificial:				
Corundum	22,966	27,258	532	U.S.S.R. 4,739; Yugoslavia 4,687; Austria 4,580.
Silicon carbide	59,475	76,431	18	Norway 17,434; U.S.S.R. 4,357; Italy 2,578.
Dust and powder of precious and semiprecious stones including diamond	178	302	299	Ireland 2.
Grinding and polishing wheels and stones	8,040	9,943	103	Italy 2,578; Austria 2,067; France 1,672.
Asbestos, crude	188,857	74,438	617	Canada 36,683; Italy 17,452; U.S.S.R. 8,807.
Barite and witherite	141,023	209,419	--	France 103,095; Turkey 21,201; China 20,555.
Boron materials:				
Crude natural borates	109,401	118,175	54,302	Turkey 61,142; Belgium-Luxembourg 1,273.
Elemental kilograms	--	100	100	
Oxides and acids	18,505	21,310	108	France 10,289; Turkey 6,603; Italy 3,611.
Bromine	4,152	5,865	NA	Israel 4,784; United Kingdom 646; East Germany 198.
Cement thousand tons	1,927	1,867	(2)	Belgium-Luxembourg 502; East Germany 477; France 362.
Chalk	180,102	263,684	--	France 228,988; Belgium-Luxembourg 20,635; East Germany 8,384.

See footnotes at end of table.

Table 3.—Federal Republic of Germany: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Clays, crude:				
Bentonite	82,442	82,612	6,141	Greece 44,312; Turkey 13,294; Spain 7,363.
Ceramic	103,207	76,084	66	France 23,885; East Germany 16,159; Czechoslovakia 14,475.
Chamotte earth	56,879	53,049	6,612	Czechoslovakia 23,607; France 14,290.
Fire clay	64,442	92,846	1,320	France 41,681; Czechoslovakia 35,252; China 6,024.
Fuller's earth	5,649	4,593	2,370	United Kingdom 1,443; Spain 558.
Kaolin	863,566	910,815	105,575	United Kingdom 410,976; Czechoslovakia 142,874.
Unspecified	155,619	126,688	8,426	Czechoslovakia 40,798; Netherlands 31,955; Austria 19,245.
Cryolite and chiolite	1,730	1,686	--	All from Greenland.
Diamond:				
Gem, not set or strung _____ carats	534,446	470,999	4,896	Belgium-Luxembourg 210,940; U.S.S.R. 67,508; India 66,743.
Industrial stones _____ do.	939,371	1,082,628	31,899	Belgium-Luxembourg 360,377; Republic of South Africa 308,014; United Kingdom 137,853.
Diatomite and other infusorial earth	36,791	37,363	1,841	Denmark 20,741; France 8,750.
Feldspar, fluorspar, related materials:				
Feldspar	54,356	51,164	1	Norway 20,645; Italy 15,058; Finland 7,614.
Fluorspar	176,124	194,558	8	Republic of South Africa 42,612; Morocco 31,868; China 19,555.
Unspecified	50,597	62,034	--	Norway 49,578; Netherlands 11,918.
Fertilizer materials:				
Crude, n.e.s	30,232	29,422	1,249	Netherlands 19,891; Belgium-Luxembourg 3,244; Italy 1,519.
Manufactured:				
Ammonia _____ thousand tons	198	199	--	France 120; Austria 33; Netherlands 32.
Nitrogenous _____ do.	2,447	2,168	NA	NA.
Phosphatic _____ do.	796	821	NA	NA.
Potassic _____ do.	83	80	NA	NA.
Unspecified and mixed _____ do.	1,655	1,520	45	Netherlands 227; Belgium-Luxembourg 215; Austria 200.
Graphite, natural	28,869	31,983	8	China 9,562; Austria 3,516; Norway 1,826.
Gypsum and plaster	758,492	822,324	79	France 556,823; Austria 187,941; Belgium-Luxembourg 41,517.
Iodine	1,190	961	67	Chile 482; Japan 373.
Kyanite and related materials	72,289	88,902	60,760	Republic of South Africa 20,395; France 3,044.
Lime	285,015	332,255	--	France 218,885; East Germany 16,159; Czechoslovakia 14,475.
Magnesium compounds:				
Magnesite	r4,395	5,779	2	Greece 2,824; Spain 1,218; Netherlands 1,205.
Oxides and hydroxides	r361,852	397,224	2,631	Greece 70,962; Netherlands 52,820; China 51,478.
Mica:				
Crude including splittings and waste	10,515	10,842	129	India 5,047; France 1,527; United Kingdom 847.
Worked including agglomerated splittings	544	609	16	France 220; Belgium-Luxembourg 216; Austria 46.
Nitrates, crude	1,468	1,601	--	Mainly from Chile.
Phosphates, crude _____ thousand tons	2,031	1,933	828	Israel 192; Republic of South Africa 167.
Pigments, mineral:				
Natural, crude	164	2,666	--	Austria 2,412; Cyprus 110.
Iron oxides and hydroxides, processed	15,867	26,326	17,358	Netherlands 2,180; Belgium-Luxembourg 2,029.
Potassium salts, crude	12,393	26,933	--	East Germany 25,689; Belgium-Luxembourg 1,243.
Precious and semiprecious stones other than diamond:				
Natural	900	1,465	620	Brazil 581; Republic of South Africa 56.
Synthetic	23	29	7	Switzerland 13; Bulgaria 5.

See footnotes at end of table.

Table 3.—Federal Republic of Germany: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Pyrite, unroasted	80,190	149,274	--	Yugoslavia 78,158; Finland 60,924; Norway 7,852.
Quartz crystal, piezoelectric ____ kilograms	371	60	NA	United Kingdom 40.
Salt and brine	749,823	765,110	17	Netherlands 476,827.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	168,851	162,896	NA	Netherlands 58,927; East Germany 48,349; Switzerland 10,240.
Sulfate, manufactured	80,873	80,055	NA	Austria 23,182; Spain 20,078; East Germany 16,645.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked ____ thousand tons	875	600	([4])	Sweden 120; Austria 95; Italy 79.
Worked ____ do	732	893	NA	Italy 488; Portugal 174; Spain 48.
Dolomite, chiefly refractory-grade ____ do	457	430	--	Belgium-Luxembourg 375; Norway 23; Austria 15.
Gravel and crushed rock ____ do	9,792	9,997	([4])	France 5,796; Denmark 1,346; Norway 658.
Limestone other than dimension ____ do	1,291	1,493	([4])	Austria 634; France 409; Belgium-Luxembourg 320.
Quartz and quartzite ____ do	63	58	1	Netherlands 22; Belgium-Luxembourg 11; Yugoslavia 7.
Sand other than metal-bearing ____ do	3,332	3,994	2	France 2,142; Netherlands 1,358; Belgium-Luxembourg 233.
Sand and gravel ____ do	2,771	2,925	--	All from East Germany.
Sulfur:				
Elemental:				
Crude including native and byproduct	339,288	328,091	36,956	Canada 180,889; Poland 86,547.
Colloidal, precipitated, sublimed	783	929	4	France 519; East Germany 331; Japan 68.
Dioxide	3,331	4,171	([4])	Sweden 3,094; Norway 503.
Sulfuric acid	88,277	106,109	--	Netherlands 61,980; East Germany 14,594; Switzerland 10,210.
Talc, steatite, soapstone, pyrophyllite	141,788	143,494	432	Austria 57,358; France 31,102; Italy 13,814.
Vermiculite, perlite, chlorite	96,954	101,638	1,273	Greece 72,210; Hungary 12,519; Republic of South Africa 10,188.
Other:				
Crude ____ thousand tons	1,108	1,351	15	Norway 527; Austria 229; Spain 99.
Slag and dross, not metal-bearing ____ do	1,709	1,769	9	Belgium-Luxembourg 702; France 698; Austria 109.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	17,986	23,763	7,144	Trinidad and Tobago 16,226; Denmark 194.
Carbon:				
Carbon black	3,564	1,846	NA	Netherlands 740; France 353; Belgium-Luxembourg 293.
Gas carbon	42,030	54,769	1,474	France 23,312; Netherlands 17,627; United Kingdom 3,258.
Coal:				
Anthracite ____ thousand tons	71	28	([4])	United Kingdom 10; Netherlands 7; Republic of South Africa 4.
Bituminous ____ do	9,051	8,818	688	Poland 3,014; Republic of South Africa 2,294; Australia 696.
Briquets of anthracite and bituminous coal ____ do	([4])	([4])	--	Mainly from Belgium-Luxembourg.
Lignite including briquets ____ do	4,621	4,666	([4])	Czechoslovakia 2,607; East Germany 2,051.
Coke and semicoke ____ do	684	771	42	France 291; Belgium-Luxembourg 174; Netherlands 112.
Gas, natural: Gaseous ____ million cubic feet	1,844,581	1,846,883	--	Netherlands 657,675; Norway 619,629; U.S.S.R. 565,516.
Peat including briquets and litter	46,244	97,212	--	Netherlands 58,126; U.S.S.R. 34,103; Poland 1,132.

See footnotes at end of table.

Table 3.—Federal Republic of Germany: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum:				
Crude — thousand 42-gallon barrels	481,347	490,617	--	United Kingdom 129,628; Libya 73,383; Nigeria 70,615.
Refinery products:				
Liquefied petroleum gas — do	8,427	7,424	NA	Netherlands 2,214; United Kingdom 1,318; Belgium-Luxembourg 660.
Gasoline — do	98,175	93,978	133	Netherlands 34,276; U.S.S.R. 18,708; Belgium-Luxembourg 8,180.
Mineral jelly and wax — do	1,335	1,597	3	France 202; Netherlands 183; unspecified 753.
Kerosene and jet fuel — do	16,701	16,036	116	Netherlands 11,505; Belgium-Luxembourg 2,026; France 878.
Distillate fuel oil — do	127,955	118,838	233	Netherlands 52,267; U.S.S.R. 16,597; East Germany 14,112.
Lubricants — do	2,511	2,650	93	United Kingdom 554; France 451; Netherlands 304.
Residual fuel oil — do	60,006	57,947	2	Netherlands 22,843; U.S.S.R. 10,532; Belgium-Luxembourg 4,701.
Bitumen and other residues — do	2,026	2,447	(2)	Netherlands 853; East Germany 578; France 270.
Bituminous mixtures — do	132	130	4	Netherlands 71; France 21; Belgium-Luxembourg 12.
Petroleum coke — do	5,930	7,268	6,301	Argentina 406; Netherlands 269.
Unspecified — do	--	829	--	All from East Germany.

[r]Revised. NA Not available.
[1]Table prepared by staff, Branch of Geographic Data.
[2]Less than 1/2 unit.

COMMODITY REVIEW

METALS

The FRG was a well-known producer of rare and specialty metals, which were growing in demand to satisfy the needs of high technology. In addition to precious metals, cesium, germanium, indium, rhenium, rubidium, selenium, tantalum, and tellurium were produced. The FRG was the second largest producer of selenium metal, after Belgium, and Hermann C. Starck Berlin dominated the rhenium market. The principal producers of these metals were Degussa; Hermann C. Starck Berlin; Otavi Minen AG; Ingal International Gallium GmbH, a 50% subsidiary of Vereinigte Aluminium-Werke AG (VAW); and W. C. Heraeus GmbH. Two gallium plants with expanded capacity and a new tantalum electron-beam furnace became operational in 1984. The FRG was the principal supplier of cesium and rubidium compounds to the United States.

Aluminum.—The FRG was Europe's largest producer of primary aluminum, with a capacity of 798,000 tons. The smelters ran at 94% capacity. VAW, headquartered in Bonn, was the FRG's largest producer, with 16 aluminum production locations and one gallium facility. VAW was totally owned by the Government concern Vereinigte Industrieunternehmungen AG. The 1985 metal production of VAW declined slightly to 413,700 tons, or over 55% of total domestic output. VAW had a 10% holding in the U.S. company HALCO (Mining) Inc. of Pittsburgh, Pennsylvania, and owned 100% of V.A.W. of America Inc. of Ellenville, New York. Domestic consumption, supplemented by imports, was 1.16 million tons and was expected to rise 2% to 3% in 1986 as a result of the improving West German economy.

Copper.—Mine production of copper ore continued its gradual decline, but the output of metal processed from imported materials increased. Exploration for copper ore in the FRG began in the 1970's and resulted in the discovery of several deposits in the Werra-Fulda Basin of the Hessen region, of which two were considered to be highly promising in 1985.[3]

There were six operating copper rolling mills, three of which were continuous cast rod, and the other three were hot-rolled rod plants. The largest mill was Kupfer Walzwerk Berlin AG (KWB), of which AEG Kabel AG and Kemper AG had equal interests. The two partners in KWB also operated their own hot-rolling mills, Kabel at Rheydt and Kemper at Duisburg.

The FRG's first cold-rolling mill was established by Lacroix and Kress AG, a subsidiary of the Raytheon Co. of the United States, in Bramsche in 1977, and had operated at near capacity for at least the past 5 years.

Ferroalloys.—The production of ferroalloys had been declining for years, except for a rise in 1984. The FRG's ferroalloy industry is relatively young and has nine producers.[4] Despite its small size, however, the ferroalloy sector was specialized in terms of the number of producers and the scale of operations. The works are almost all of medium size; a few are in major industrial cities such as Cologne and Nuremburg, while most are in economically weaker areas such as Weisweiler, Goslar, or Hartz, and Pocking in Bavaria. They are often the major local employer. At least 20,000 people were directly or indirectly dependent on the country's ferroalloy industry.

Ferrosilicon, calcium-silicon, and silicon metal were produced exclusively from indigenous materials, although ores were imported for the production of all other ferroalloys. Ferroaluminum, ferronickel, and ferrosilicomanganese were not produced in the FRG, partly because of high power costs. In some cases, FRG's producers had the advantage of flexibility in using alternative grades of raw materials. Gesellschaft fur Elektrometallurgie mbH, for example, could have used either vanadium pentoxide from vanadium-containing blast furnace slag, ashes, or oil refinery residues.[5]

Iron and Steel.—The FRG's iron ore production rebounded in 1985, following a gradual decline. About 620 workers were still employed by the iron ore mines, operated by two companies in the south. The Leonie Mine at Auerbach, operated by Eisenwerk-Gesellschaft Maximilianshutte mbH, was the largest; the only other iron ore producer was Barbara Rohstoffbetriebe GmbH, with a small mine at Wohlverwahrt-Nammen.

The FRG was the world's second largest importer of iron ore. In 1985, imports amounted to 45.1 million tons, 13.6 million tons of which was pellets. Australia, Brazil, Canada, and Sweden were the main suppliers.

The 1984 steel recovery continued in 1985. The FRG ranked fifth in the world in steel production, at 6% of the total. Since 1974, however, the FRG's steel production had declined by 26%, and the number of employees fell by 32%, to 215,000 workers in 1985. The decline was partly a result of capacity cutbacks initiated by the European Economic Community (EEC). A major reduction of steel production capacity has been under way in the FRG since the mid-1970's, owing to slumping domestic and foreign demand and increased international competition from newly industrialized countries, such as Brazil and the Republic of Korea. The FRG's Iron and Steel Federation was actively seeking more subsidies from the state and the EEC to compensate for losses, but the EEC Commission finally ruled against the Federation. Raw steel capacity at the end of 1985 was 61.4 million tons. The FRG's steel industry was export-dependent, and in 1985, it was exporting an average of 797,000 tons per month, a sizable increase over that of 1984. Most of the steel was delivered to neighboring EEC countries and the United States.

The FRG's rationalization programs have been difficult to implement, largely because of the private ownership of the bulk of the industry. Proposed mergers, such as Krupp-Hoesch, Thyssen-Krupp, and Klöckner-Krupp, have all failed to materialize. The absence of mergers, however, redirected the companies into specialized fields. Hoesch, for example, went into the coated sheet sector, and Krupp AG, into carbon flat products and stainless steel. There was also a trend to rationalize output by an exchange of product programs.[6]

Thyssen AG was the FRG's largest steel company and ranked eighth in the world, producing 11.07 million tons in 1985. Profits were up dramatically at $156.3 million,[7] from $38.0 million in 1984. The sales of semifinished products fell, however, particularly to the United States, largely because of a 3-month modernization of the Belckerwerth slabbing mill. Thyssen AG's steel work force fell by nearly 1,200 in 1984, and about 1,600 jobs were to be lost in 1985 and 1986. In a further step toward its restructuring, the company announced plans to rationalize Thyssen Niederrhein AG and Thyssen Edelstahlwerke AG. Thyssen AG's electric arc furnaces at Oberhausen and Witten were to return to 3-shift operation, and continuous casting capacity at the Thyssen Ruhrort works was to be expanded. The Thyssen Niederrhein works was to close its 320-millimeter light bar and section mill at Oberhausen. In addition, the No. 2 wire rod mill at Oberhausen was to be expanded to produce 18-millimeter diameter wire rod.

Plans were drafted by the Saar regional government and the Federal Government to rescue the ailing Arbed Saarstahl GmbH, through a takeover and a merger with an interested company. Dillinger Hüttenwerke AG was considered as a likely partner. The company employed almost 14,000 workers in the fall of 1985. The Arbed SA Steel Co. of Luxembourg was the parent of the bankrupt Arbed Saarstahl.

Lead and Zinc.—The output of lead ore had been decreasing because of ore depletion, difficult mining conditions, and unfavorable market conditions. Preussag AG, the major mining company, was considering shortening working hours and periodically discontinuing operations at its lead and zinc mine at Bad Grund, in the Harz Mountains. The Rammelsberg Mine at Goslar, just north of Bad Grund, produced about 280,000 tons per year of ore with a metal content of 19%, while the Bad Grund Mine turned out 400,000 tons of ore containing 10% metal. Two-thirds of the lead and one-half of the zinc reserves of the FRG were contained in the Harz Mountains of Lower Saxony.

Tin.—Production of tin from imported materials continued to decline gradually but steadily. The FRG was only a small producer of tin metal. It ranked third, however, in installed capacity to produce tinplate, at 1.6 million tons, although production was about 750,000 tons. The three major producers of tinplate were Ewald Giebel KG, Hoesch Werke AG, and Rasselstein AG. During the year, Giebel installed a new Sendzimir rolling mill for the manufacture of thin plates, with a maximum width of 1.05 meters and in thicknesses of 0.08 to 0.49 millimeters and 0.50 to 4.00 millimeters. In the first half of 1985, the FRG exported 132,757 tons of tinplate.[8]

INDUSTRIAL MINERALS

The FRG was an important consumer and producer of industrial minerals, such as bentonite, ceramic and refractory clays, natural crystalline graphite, gypsum, limestone, potash, salt, silica sand, and sulfur. The FRG's output of sulfur from natural gas increased in 1985 to a record-high level. Total West German industrial minerals production is usually between 50 to 60 million tons per year, excluding sand and gravel. Sand and gravel accounts for 150 to 300 million tons per year, mined from over 3,200 deposits. North Rhine-Westphalia, the most industrialized and diversely populated State, was particularly rich in industrial raw materials such as ceramic and refractory clays, coal, dolomite, limestone, salt, silica sand, and others. The FRG's largest ceramics manufacturer, Villeroy & Boch AG, and three of the FRG's most important glass manufacturers were in that State. Altogether, 156 of the 500 largest West German companies had their offices in North Rhine-Westphalia, including the chemical giant Veba, the steel and ceramics company Thyssen AG, and the energy company Ruhrkohle AG.[9]

Barite.—The production of barite in the FRG has remained constant since 1978, with a minor upward fluctuation in 1980. The FRG has been Western Europe's largest barite producer for 15 years, mining about 400,000 tons per year. All production has been for domestic consumption in the chemical and filler industries. About 50% of barite requirements was imported. Sachtleben Bergbau GmbH, a subsidiary of Metallgesellschaft, was the major producer, with mines at Dreislar and Clara. The Dreislar barite mine, the largest at 90,000 tons per year, was in the Harz Mountains, and the Clara fluorspar-barite mine and flotation plant were at Wolfach in the Black Forest area. The mill produced several barite products, as well as acid-grade fluorspar concentrates and minor amounts of ceramic-grade fluorspar. The company produces about 160,000 tons of barite per year.

Many previously worked mines were considered uneconomical because of high mining costs in complex geological structures. Barite deposits generally occurred in veins up to a maximum thickness of 20 meters. They were found in Baden-Württemberg, Bavaria, Lower Saxony, and North Rhine-Westphalia. Those in Bavaria and Baden-Württemberg were closely associated with fluorite. In addition to Sachtleben Bergbau, there were a few smaller companies mining about 5,000 to 10,000 tons per year, such as Feldhaus Schwerspatgrube GmbH at Eisen. The Bad Lauterberg Mine was operated by Deutsche Baryt-Industrie Dr. Rudolf Alberti & Co., and owned equally by Sachtleben

Bergbau and Kali-Chemie AG, the FRG's other major barium chemicals manufacturer. There were two mines at Bad Lauterberg—Wolkenhugel and Hoher Trost, the latter being the older and operating only occasionally.

Cement.—Cement production in 1985 was the lowest in recent years, because of decreasing demand from the construction industry. There were about 39 operating companies, with over 60 plants throughout the country. The cement industry attempted to adjust its capacity to the long-term outlook by closing plants or reducing production. Dyckerhoff Zementwerke AG, of Wiesbaden, the second largest producer, stopped output of clinker in Bonn and Neuwied, although these plants continued grinding operations. Nordcement AG closed its works in Wunstorf, as other companies made plans to shut down operations temporarily.

Readymix Zementwerke GmbH & Co. installed a tube cooler at its Beckum plant, where the company has been reconditioning its main production line. Additionally, fly ash storage silos have been ordered by two other plants.[10]

Clays.—The West German Government has long supported a high technology advanced ceramics program. A number of West German companies are involved in research and production of advanced ceramics finished shapes, such as Feldmuhle AG (oxide-based ceramics), Hoechst AG (oxide and nonoxides), Friedrichfeld AG (oxides), Hutschenreuther AG (oxides), Degussa (catalysts), Didier-Werke AG, and BASF AG.[11]

Clay was mined throughout the country, but the most important deposits were in the Westerwald and Werra-Meissner areas and near Darmstadt; some were mined in Oberpfalz, north Bavaria, and North Rhine-Westphalia. The most important plastic clay producing region was the Westerwald; it was also Western Europe's largest producer. The FRG had about 150 companies actively recovering varying grades of plastic clay, producing about 5.5 million tons per year. About 50 of these producers were in the Westerwald area and accounted for over 60% of total output. Approximately 2.5 million tons per year was produced for ceramic grades. One of the Westerwald's most important developing export markets was Italy. Other plastic clay producers in Westerwald were Fuchs'sche Tongruben GmbH & Co. KG, Stephan Schmidt KG, Martin & Pagen Stecher GmbH, Goerg & Schneider GmbH, and Marx Bergbau GmbH.

The FRG was a large producer of ball clay, with an output of approximately 3 million tons, including a high proportion of clay used for sewer pipes, tiles, and bricks.

Fluorspar.—The FRG imported about 75% of its requirements for fluorspar, primarily from the Republic of South Africa. Fluss-und Schwerspatwerke Pforzheim GmbH, a subsidiary of Bayer AG, operated mines at Kafersteige, Gottesehre, and three other locations to provide feed for plants at Pforzheim and St. Blasien-Bildstein. There was also a flotation plant at Karlsruhe. Mines operated by VAW Flusspat-Chemie GmbH at Lissenthan, Stulln, and Wolsendorf supplied a plant at Stulln. Sachtleben Bergbau, a 100% subsidiary of Metallgesellschaft, produced fluorspar from barite operations at Wolfach and Bad Lauterberg.

Workable fluorspar deposits in the FRG occur as veins in Baden-Württemberg, the Black Forest, and Upper Palatinate. Many of the thicker veins have been mined out, so that veins less than 1 meter thick were mined underground. The bulk of the fluorspar production was in the form of acid-grade material.

Potash.—Potash continued to be produced in large quantities, at about 90% of capacity, by the sole producer, Kali und Salz AG (K&S), a 72% subsidiary of the BASF Group. Western Europe accounted for 19% of the total world production, nearly 50% of which was by the FRG. The FRG was the fourth largest producer of potash, following the U.S.S.R., Canada, and the German Democratic Republic. About 45% of the total production was consumed domestically; the rest was exported to a variety of markets. K&S operated nine mines, including seven potash mines, a combined potash-rock salt operation, and one rock salt mine. Cutbacks in production, including periodic closure of mines, were anticipated in the coming year as demand declines.

Salt.—The FRG was a large producer of salt, 62% of which was rock salt, 39% was salt in brine, and the remainder was brine salt. Almost 67% of production was exported to countries of the Benelux Economic Union. There were some 15 companies mining the enormous reserves of salt; almost one-half of production was extracted from three mines working the Zechstein deposits in the north. The largest was the Borth Mine in North Rhine-Westphalia, owned by Deutsche Solvay-Werke GmbH, a subsidiary of Belgium's Solvay & Cie. The other two mines, the Niedersachsen-Riedel Mine and the Braunschweig-Luneburg Mine (which mined the Graskeben salt dome near Helmstedt), were operated by K&S. Stade, east of Hamburg, was an important salt-in-brine producing area, operated by Dow Chemical GmbH and Norddeutsche Salinen GmbH.

In the south, mines were operated in Heilbronn, Bad Friedrichshall-Kochendorf, and Stetten, extracting salt from the Triassic Middle Muschelkalk strata. The Sudwestdeutsche Salzwerke AG was the major brine salt and rock salt operator, producing about 50% of the FRG's rock salt. At Berchtesgaden, brines were evaporated in the Bad Reichenhall salt plants.

Stone.—*Slate.*—Production statistics for slate differ, depending on the grades, the official classification codes, and incomplete reporting. The present report utilized production figures as reported by the FRG's industrial statistics office.[12] The production data that follow are derived from a summary of two articles on the West German slate industry.

Slate in the FRG was mined in an area known as Rheinische Schiefergebirge and included the States of Bavaria, Hessen, North Rhine-Westphalia, and Rheinland-Pfalz.[13] There were 14 operating mines, most of them underground, each producing only 30 tons per day, and staffed on the average by 14 workers.

In less than 6 years, the FRG's production of crude slate decreased from 300,000 tons per year to about 70,000 tons in 1985, one-half of which was reworked material from spoil heaps.[14] The FRG's production of roofing slate decreased in 1983 to under 10,000 tons and was insufficient for domestic requirements. Considerable quantities of crude and prefabricated slate were thus imported. Slates of similar color and structure were also imported, particularly from France and Spain. Those imports doubled between 1980 and 1984.

Compared with other roofing and cladding materials, slate was expensive, so that it had only about a 5% share of the market. Production of expanded slate waste was increasing because of its popularity as a filler material. The FRG consumed about 35,000 tons per year of slate waste, especially for the manufacture of slate aggregate concrete. The FRG, like France and the United Kingdom, was finding other ways to utilize slate waste. At least one large company, Graas & Co. GmbH of Frankfurt, was manufacturing a roofing tile from ground slate and polyester resin.

Domestic production of natural slate from the Rheinische Schiefergebirge was 44,795 tons in 1983, of which 13,584 tons was in powder and clips, 8,993 tons for roofing and wall cladding, 815 tons in slab form, and 190 tons for special purposes. An additional 42,334 tons was reclaimed from dumps. The mined slate was of Devonian Age, mined at depths of up to 650 feet. Production by traditional drilling and blasting methods extracted only 15% to 20% of the material, while fully mechanized production extracted up to 40%. Labor costs for slate mining in the FRG accounted for 75% to 85% of total overhead costs. Some of the slate mining companies that were being mechanized were Magog GmbH & Co. KG and Hesse & Schneider KG, both in the Fredeburg area, and H. Prauge und Sohne GmbH of Schwalefeld. Another company was IB Rathscheck Sohne KG, with two slate mines near Mayen-Eifel, about 37 miles south of Bonn. The company employed 200 workers and produced slate roofing tiles and claddings. It also imported slate from Austria, the Benelux countries, France, Spain, and Switzerland.

MINERAL FUELS

The production of coal and natural gas continued to decline, while the output of crude petroleum and petroleum refinery products remained essentially unchanged. The FRG had to supplement its mineral fuels requirements through imports from previously established sources.

Coal.—Western European coal production was dominated by the FRG and the United Kingdom. After the marked decline in coal demand in 1982 and 1983 as a result of the steel crisis, the FRG's coal industry had stabilized and improved. Coal was the FRG's most important domestic source of energy and accounted for more than 30% of total primary energy consumption. Total hard coal production has fallen, however, from its record high in 1957 of 149.3 million tons to 82.4 million tons in 1985. Most of the anthracite and bituminous coal came from underground mines of the northern Ruhr Valley. Of the total hard coal production, 78% came from the Ruhr Coalfields, 13% from the Saar, 6% from Aachen, and 3% from Ibbenbüren.

Most of the lignite was mined in the Rheinland, and some from Hessen Fields. The Ruhr area was mined almost exclusively by Ruhrkohle AG, which operated 22 mines in the region.[15] Reserves of minable coal in unpopulated areas was decreasing, however, and the industry was considering alternative mining procedures in suburban areas. There were 166,000 people working in the hard coal and 20,130 in the lignite industries.

In 1985, 40% of coal (including lignite) output was used for electricity generation, 33% went to the steel industry, 7.5% was exported as mostly high-quality coke; only 8% went to households; and the rest to other small users.

Coal was mined underground almost exclusively by long wall methods, with 185 operating faces. All were completely mechanized, with high performance and reliable mining machines. The average face productivity was 26 tons per worker shift, with peaks of up to 120 tons in the most favorable geologic conditions. Shearers and plows were used in coal mining, in equal proportions. The FRG was the only country using the plow in 50% of its mining, mostly in seams less than 1 meter thick.[16]

The West German Government continued to subsidize its coal industry. In 1985, it agreed to continue paying the subsidy to the end of this century. Together with a contribution from the North Rhine-Westphalian government, the total subsidy was over $2 billion in 1985.

A new coal-fired powerplant started operation at Ibbenbüren in North Rhine-Westphalia. The plant had been approved in 1980 and was to use the anthracite coal from the nearby Ibbenbüren pit. The project saved several thousand coal mining jobs but was opposed by environmentalists. Because of its early approval, the plant was not subject to the stricter emissions guidelines instituted subsequently and was not equipped with catalytic converters needed to reduce its nitrogen oxide emission.

Natural Gas.—Domestic production of natural gas accounted for 30% of consumption, and output dropped to its 1971 level. Production had peaked in 1979 at 743,900 million cubic feet. The FRG was the second largest importer of natural gas in the world, mostly from Denmark, the Netherlands, Norway, and the U.S.S.R. Nonetheless, the FRG ranked 4th in Western Europe and 12th in the world, producing 1.08% of global output. Reserves of natural gas were estimated at 9.5 billion cubic feet. There were five gas processing plants, operated by two companies, with all plants in Lower Saxony. Deutsche Texaco AG reported a discovery of gas northwest of the existing Sohlingen Field in the Hanover area of Lower Saxony. The gas was at a depth of 16,000 feet, and yielded 706,300 cubic feet of gas per hour.

Nuclear Power.—In 1985, nuclear powerplants in the FRG generated almost twice as much electricity as in 1983. The 19 operating plants produced 126 billion kilowatt hours, with 7 of them delivering between 9.6 and 11.5 billion kilowatts each. The KWG Grolinde plant, south of Hanover, was the largest, at 11.5 billion kilowatts. The FRG's powerplants produced about 31% of the FRG's electricity and accounted for 11% of total primary energy consumption.

Petroleum.—The production of crude petroleum was stable for the third year. The Emsland area was the largest producer, at 35%, followed by Hanover, at 22.8%; Weser-Ems, at 22%; Schleswig-Holstein, 11.6%; Prealps, 5.8%; Upper Rhine Valley, 2.7%; and the Ems Estuary, at less than 1%. The FRG's reserves of crude oil were estimated to be 61 million tons. The petroleum and gas industry employed 11,364 people in about 20 companies, of which 9 were major crude oil producers; there were 13 refineries.

In recent years, the petroleum industry in the FRG suffered heavy financial losses, and the refining industry continued its major contraction. Petroleum refining and processing capacity peaked at about 1,000 million barrels in 1979 and was expected to decline further in the future, as the 1985 capacity utilization rate was only 76%.

The FRG was Western Europe's largest importer of petroleum, with a total of 460 million barrels of crude and 330 million barrels of refined products. Exports were negligible. About 55% of crude came from members of the Organization of Petroleum Exporting countries, and 16% of it, from Nigeria. Over 32% was imported from the North Sea area; 27% of it, from the United Kingdom; and 5%, from Norway.

Petroleum accounted for 41.5% of the FRG's primary energy consumption.

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[1]Physical scientist, Division of International Minerals.

[2]Die Welt (Bonn). June 27, 1985, p. 1.

[3]Schumacher, C., and F. Schmidt. Kupferschiefer Exploration in Ostessen und Nordbayern (Exploration of Copper Schist Type Deposits in Eastern Hesse and Northern Bavaria). Erzmetall Weinheim, v. 38, No. 9, 1985, pp. 428-432.

[4]Ferrolegierungen-Gestern, H. M. Fachverband Ferrolegierungen, Stahl-und Leichtmetall. Veredler EV., Dusseldorf, 1985.

[5]Ferro Alloys. West Germany's Industry—Small But Specialized. Met. Bull. Mon. (London), Nov. 1985, p. 27.

[6]Metal Bulletin Monthly (London). June 10, 1985, p. 1.

[7]Where necessary, values have been converted from the Deutsche mark (DM) to U.S. dollars at the rate of DM2.45=US$1.00 for 1985.

[8]Tin International (London). Jan. 1986, p. 19.

[9]Robbins, J. The Industrial Minerals of West Germany. Ind. Miner. (London), Dec. 1985, pp. 15-47.

[10]Rock Products. Apr. 1986, p. 41.

[11]Industrial Minerals (London). Apr. 1986, p. 19.

[12]Statistisches Bundesamt (Wiesbaden). Produktion im Produzierenden Gewerbe (Industrial Production by Commodities). Fachserie 4, Reihe 3.1, 1985, Code 251200 (Tonschiefer), p. 30.

[13]Helms, W., and H. Witting. Dachschieferbergbau im Norden des Rheinischen Schiefergebirges. (Slate Mining Industry in the Northern Part of the Schiefergebirge in the Rhine Region). Erzmetall, v. 39, No. 3, 1986, pp. 101-106.

[14]Industrial Minerals (London). May 1986, p. 19.

[15]Pearse, G. German Coal Mining Equipment. Min. Mag. (London), Mar. 1986, pp. 217-240.

[16]Wyllie, B. European Coal Mining Technology. Eng. and Min. J., New York, June 1986, pp. 26-32.

The Mineral Industry of Ghana

By Ben A. Kornhauser[1]

Production of bauxite, diamond, gold, and manganese ore increased in Ghana compared with that of 1984. The mining sector was the second largest contributor to foreign exchange earnings, with gold providing more than 80% of that income.

The funding and financial support furnished by the International Monetary Fund (IMF), International Bank for Reconstruction and Development (World Bank), and from various donor countries and development funds spurred revitalization of the mining sector and the highway and transport networks. These rehabilitation programs facilitated the export of bauxite and manganese and the import of necessary equipment for the mining sector and permitted the resumption of an almost completely stalled domestic commerce.

Aluminum production resumed with the rising water level at the Akosombo Dam and resulting hydroelectric power generation. Funding also was provided to rehabilitate the generating and distribution facilities of the electrical supply system. Gold still attracted the interest of most investors in the exploration, prospecting, refining, and rehabilitation programs. Attention also was paid to increased diamond production and to the marketing of diamonds within Ghana. Exploration for oil continued without promising discoveries. The oil refinery at Tema was to be rehabilitated, and its capacity to produce liquefied petroleum gas was doubled.

PRODUCTION AND TRADE

In the mining sector, production of bauxite, diamond, gold, and manganese ore increased 8%, 88%, 4%, and 14%, respectively, compared with that of 1984. While these were the main minerals produced and exported, gold provided most of the mining sector's contributions to foreign exchange earnings. The mining industry, second to cocoa as a source of foreign income, employed about 22,000 people, of which about 135 were expatriates.

The Government hoped to hold the 1985 budget deficit to 2% of the gross domestic product (GDP) despite expenditures increasing to $915 million[2], up 76%; revenues to $753 million, up 76.2%; and the deficit to $162 million, up 79.2%. The GDP was projected to rise 5.3% in 1985, and the relative prices of materials and commodities were restructured through exchange rate devaluation.

Ghana was provided considerable balance-of-payment support by the IMF, World Bank, and donor countries. The country was making a concerted effort to revitalize the mining sector after many years of neglect and stagnation. The IMF economic recovery program required a rehabilitation and maintenance program for the transport and highway network, the deterioration of which prevented the export of agricultural and mineral products as well as their internal distribution and compounded economic decline. In June, a project of the International Development Association (IDA), an affiliate of the World Bank, for $121.8

million was approved for such rehabilitation, of which $40 million was on IDA credit, $52.2 million would be Government financed, and $29.6 million would be financed by Japan and various development funds.

An extensive rehabilitation project was under way on the Kumasi-Takoradi (Western) railway line with the assistance of the World Bank and the Africa Development Bank. As the railway work progressed, transport of bauxite and manganese was facilitated as was the delivery of heavy machinery equipment and spare parts needed for the development and maintenance of the mines. The Government, with assistance from the United Nations Development Program (UNDP) and countries such as Bulgaria and Romania, undertook feasibility studies on reopening abandoned gold mines, such as Obenemasi and Konongo, and on opening a new mine to exploit the Kibi bauxite reserves.

IDA granted Ghana a $28 million credit to finance the rehabilitation of the generating and distribution facilities of its electricity supply, both hydroelectric and diesel. The deteriorated facilities severely restricted progress in mining and other fields. In addition to the IDA credit, funding was to be provided by the Italian Government, $10 million; the Electricity Corp. of Ghana, $4.9 million; and the Volta River Authority, $5.9 million, for a total of $48.8 million.

Mining companies, particularly Ashanti Goldfields Corp. (Ghana) Ltd. and the Ghana Bauxite Co., were granted export retention bonuses of about 40% of their export earnings, instead of the previous 25%, to be used for importing spare parts and materials and to pay their expatriate staffs. Repatriation of foreign investors' dividends and profits were streamlined and the tax system implemented to their advantage without monetary loss to the Government.

Table 1.—Ghana: Production of mineral commodities[1]

Commodity[2]	1981	1982	1983	1984[p]	1985[e]
Aluminum:					
Bauxite, gross weight ______ metric tons__	181,257	63,500	70,200	115,000	124,000
Metal, smelter, primary ______ do____	190,496	174,246	42,453	NA	47,500
Cement, hydraulic____ thousand metric tons__	396	292	290	290	342
Diamond:					
Gem[e] ______ thousand carats__	86	68	34	35	65
Industrial[e] ______ do____	750	616	306	311	585
Total ______ do____	836	684	340	346	650
Gold ______ thousand troy ounces__	341	331	276	287	299
Iron and steel: Steel, crude[e] _____ metric tons__	5,400	5,400	5,400	5,400	5,400
Manganese:					
Ore and concentrate, gross weight ___do____	233,100	159,900	173,000	268,700	307,000
Mn content ______ do____	89,240	63,960	69,216	107,480	123,000
Petroleum:					
Crude ______ thousand 42-gallon barrels__	NA	730	730	730	730
Refinery products:					
Gasoline ______ do____	2,230	2,070	2,150	1,460	
Jet fuel ______ do____	248	224	248	224	
Kerosene ______ do____	1,110	992	597	666	
Distillate fuel oil ______ do____	2,420	2,178	1,220	1,270	NA
Residual fuel oil ______ do____	2,090	1,805	2,630	2,120	
Other ______ do____	81	81	81	81	
Refinery fuel and losses ______ do____	316	273	257	216	
Total ______ do____	8,495	7,623	7,183	6,037	NA
Salt[e] ______ metric tons__	50,000	50,000	50,000	50,000	50,000
Silver, mine output, metal content thousand troy ounces__	17	17	14	14	14

[e]Estimated. [p]Preliminary. NA Not available.
[1]Table includes data available through July 28, 1986.
[2]In addition to the commodities listed, a variety of crude construction materials (clays, sand and gravel, and stone) are produced, but output is not reported, and available information is inadequate to make reliable estimates of output levels.

COMMODITY REVIEW

METALS

Aluminum.—Aluminum production resumed slowly in February as the water level at the Akosombo Dam rose and hydroelectric power generation at the Akosombo and Kpong power stations resumed. Ghana and the Volta Aluminum Co. formally signed an agreement that provided greater financial return to the Government on electric power generated at the dam from increased income tax, increased tolling fees for alumina processing, and the rescinding of the duty-free status of a number of imported items.

Rehabilitation of the Western Railway line permitted greater production and shipments of bauxite from the mine at Awaso. The mine, with its old equipment, had a capacity to produce 300,000 tons of bauxite per year. With the new machinery expected in 1986 from the United Kingdom, capacity could be increased to 500,000 tons per year.

The Aluworks Ghana rolling mill at Tema began rolling aluminum slabs into coils, sheet, and strip for local manufacture.

Gold.—The Canada Ghana Mining Group (CGMG) signed a $13.3 million agreement to manage the three State Gold Mining Corp. mines. The World Bank provided the loan. CGMG would reorganize and rehabilitate the underground mines at Prestea and Tarkwa and the alluvial dredging operation at Dunkwa. Ghanaian personnel also were to be trained to operate the mines within 3 to 5 years. Funding would be provided by the IDA and the Canadian International Development Agency.

Technical teams from UNDP and Bulgaria were expected to explore and to prospect around the Konongo and Obenemasi gold mines in the Ashanti Akin District, working toward reactivating the mines. West German geologists and chemists were exploring for gold in the Kejekyewere area of the Bibiani Range in southwestern Ghana. The work resulted from their survey for minerals in that region and was the outgrowth of a technical and economic agreement between Ghana and the Federal Republic of Germany, signed in 1975. The agreement provided for the survey (particularly for good mineralization) to establish geological parameters and indices useful for future exploration, for the training of Ghanaians in the scientific expertise and exploration to continue the project, and for the turnover of the equipment used in the project to the Government of Ghana. The third phase of the project was expected to start in 1986. The Federal Republic of Germany provided about $2 million for the endeavor.

The U.S.S.R. proposed reactivating the gold refinery, which had a capacity for refining 34 tons of gold per year. The World Bank provided a loan of $30 million toward financing the project.

The Government licensed a Ghanaian mineral prospecting company to explore, sample, analyze, and evaluate the feasibility of reactivating the abandoned Obuom Mines near Bosumtwi in the Ashanti Region. The work would be performed by the French Bureau de Recherches Géologiques et Minières. The cost of the 3-year project was estimated at $5 million.

Manganese.—Ghana reached an agreement with Geomin Intreprindere de Cooperare Economics of Romania to study manganese ore bodies in the Essikema-Western Region. If the reserves were economically viable, Geomin, in conjunction with the Ghana National Manganese Corp. (GNMC), would examine the feasibility of a joint operation. The agreement also covered the construction of a pilot plant to beneficiate low-grade manganese ores from the Nsuta-Wassaw area.

Negotiations were in progress between GNMC and the Fuller Co. of the United States for rehabilitating the nodulizing plant at Nsuta that had been built by Fuller in 1981 but never placed in operation.

INDUSTRIAL MINERALS

Cement.—The clinker grinding plants at Takoradi and Tema operated throughout 1985. The Government reduced the import of cement raw materials by 20% to encourage the use of domestic limestone by GHACEM Ghana Ltd. (GGL), the country's principal cement manufacturer. In 1984, imported Norwegian clinker and gypsum cost an estimated $7 million. The use of bauxite wastes had been suggested to GGL to reduce the cost of cement. In early 1985, the Government-approved price for a bag of cement was $7.66 but was selling at about $11.90 per 94-pound bag because of shortages.

Diamond.—The state-owned Ghana Consolidated Diamonds Ltd. commissioned its $12 million Birim River diamond project at Akyem Takorasi near Akwatia in the Eastern Region. Output was expected to reach 1 million carats per year for 15 years, based on reserves of 20 million carats.

The Government approved an agreement between the state-owned Diamond Marketing Corp. (DMC) and Scotia Diamond Co. Ltd. of London, United Kingdom. Under the agreement, Scotia would consign DMC polished diamonds every 6 months, in batches worth $50,000, to make jewelry for sale at home or abroad to generate foreign exchange. Scotia would receive payment for the gems as soon as they were sold. Unsold diamonds would be returned to Scotia after the 6-month period. DMC estimated a 10% profit on diamonds that were sold directly and a 15% profit on stones that were incorporated in jewelry. Scotia was selected because it was involved in setting up some of the financing for the rehabilitation of the industry.

MINERAL FUELS

The small oilfield in Saltpond was shut in and repairs were being made. Diamond Shamrock International Petroleum Co., a subsidiary of the Diamond Shamrock Corp. of the United States, signed a production sharing contract with the Government in 1985. The contract required 67 line miles of seismic surveys and the drilling of one wildcat during the first year of a 4-year exploration project. The contract covered a 649,000-acre block in the onshore Keta Basin on the southeastern coast of Ghana.

Oil exploration offshore Ghana was being funded by international loans and finance. To accelerate exploration, IDA granted Geophysical Services Inc. a contract for $11 million. The Petro-Canada International Assistance Co. was granted nearly $1.5 million by the Canadian Government for oil prospecting.

The Government of Ghana approved an agreement between the Ghana-Italian Petroleum Co. (GHAIP) and the Bureau d'Etudes Industrielle et de Cooperation de l'Institute Française du Petrole (BEICIP) of France to rehabilitate the refinery at Tema. BEICIP would be responsible for the engineering services and coordination of the project. GHAIP would be responsible for repairs, replacements, and the purchase of spare parts. Production of liquefied petroleum gas would be doubled, permitting its export to the ready markets in Benin and Togo.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Ghanaian cedis (C) to U.S. dollars at the rate of C1=US$0.019 (June 5, 1985), C1=US$0.018 (Aug. 12, 1985), and C1=US$0.017 (Oct. 4, 1985). Since the official exchange rate did not reflect the true value of the Ghanaian currency, the current value must be viewed cautiously.

The Mineral Industry of Greece

By Walter Steblez[1]

Greece continued to be an important European source of bauxite, chromium, magnesite, and nickel, as well as a producer of a wide variety of industrial minerals. Yearend preliminary statistics for the mineral industry indicated mixed results. The index for industrial production for the first 11 months of 1985 showed slight production increases in the petroleum, coal, and metallurgical sectors and a decline in the output of industrial minerals compared with the same period in 1984. The value of exported minerals and ores during the first 10 months of the year declined by about 14% compared with that of 1984. Economic stagnation continued in 1985. The overall economy grew by 1.5% and industrial production increased by only 1% to 2% compared with that of 1984; the net output of the country's mines essentially remained at the same level as that of 1984. The country's inflation rate rose to 25%, and the outflow of capital, owing to a loss of confidence by private investors in the economy, was estimated at $1.2 billion. The outflow of capital in the entire period from 1979 to 1984 had amounted to only $300 million. The total number of the country's unemployed in 1985 increased by 57% over the number of unemployed in 1984. A labor dispute early in the year resulted in a 2-week strike at Larco S.A.'s ferronickel smelting facility.

Important events in the mineral industry included (1) the signing of the final agreement with the U.S.S.R. to construct a 600,000-ton-per-year alumina plant near the Gulf of Corinth, (2) plans to increase the smelting capacity of ferrochrome to 100,000 tons per year and to mine and process new lead-zinc deposits at Molai, and (3) the discovery of new lignite deposits in the Peloponnese.

Government Policies and Programs.— The Government continued to promote state control of the economy and mineral industry. Although no state takeover in the minerals sector reportedly occurred in 1985, accusations of foreign currency transfer violations were leveled at the Titan Cement Co. S.A., Greece's second largest cement producer. Similar allegations were leveled at Heracles General Cement Co., the country's largest producer, prior to nationalization 2 years earlier. Also, Aluminium de Grèce S.A. (AG), a subsidiary of Pechiney of France, reported substantial financial losses during 1985 owing to increased electric power rates charged by the state-owned Public Power Corp. (PPC). Loss of profitability would mean takeover of this company by the state.

Greece's state petroleum monopoly was charged in violation of article 37 of the Treaty of Rome for failing to liberalize market conditions for members of the European Economic Community (EEC) after Greece's accession to this organization in 1981. The EEC stipulated that the Government of Greece must totally free the petroleum market by January 1, 1986, or be brought before the European Court for adjudication, and face possible compensatory penalties. Late in 1985, the Government of Greece drafted a new petroleum law that was designed, in part, to help adapt Greece's petroleum market to EEC standards.

PRODUCTION

The country's mining sector did not register a net production increase with respect to 1984. Apart from the impact of the general economic malaise on the mineral industry, a Balkan-wide drought caused power shortages and production downtimes at a number of facilities including Larco's ferronickel smelter.

Both the private and the public sector continued to have major functions in the management of the mineral industry. Although the Scalistiris Group (raw and dead-burned magnesite) came under Government management in 1984, major private companies, such as the Bodossakis Group (mixed sulfides and lead and zinc concentrates), the Eliopoulos Kyriacapoulos Group (barite, bauxite, bentonite, and perlite), AG (alumina, aluminum, and bauxite), Magnomin General Mining Co. S.A. (magnesite and dead-burned magnesite), and Titan Cement, continued to operate during the year.

State-owned operations included Asbestos Mines of Northern Greece S.A. (MABE), Aegean Metallurgical Industries S.A. (lead-zinc and refractories), Hellenic Industrial and Mining Co. of Laurium (lead), Heracles General Cement, Larco (nickel), Hellenic Ferroalloys S.A. (ferrochromium), PPC (lignite mining and electric power generation), and Public Petroleum Corp. (petroleum and natural gas). The Ministry of Energy and Natural Resources was the top Government agency responsible for exploration, mining, metallurgical, and energy developments.

Table 1.—Greece: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984[p]	1985[e]
METALS					
Aluminum:					
Bauxite, gross weight ____ thousand tons__	[r]3,218	[r]2,846	2,455	2,296	2,500
Alumina, gross weight __________do____	[r]494	[r]404	410	482	500
Metal:					
Primary ____________________	[r] [e]146,000	[e]135,000	136,181	136,244	[3]123,449
Secondary[e] ________________	7,000	7,000	2,000	2,000	2,000
Chromium: Chromite:					
Run-of-mine ore ________________	[r]40,411	[r]59,483	83,202	123,186	123,000
Marketable products:					
Direct-shipping ore[e] ______________	[r]4,000	[r]6,000	7,000	[r]11,000	11,000
Concentrate __________________	20,856	23,238	20,517	50,364	51,000
Copper, mine output, metal content _________	100	--	--	--	--
Iron and steel:					
Iron ore and concentrate, nickeliferous:[4]					
Gross weight _______ thousand tons__	1,272	516	1,343	1,929	1,900
Iron content _____________do____	547	221	572	810	800
Metal:					
Pig iron ______________do____	[r]44	[r]110	138	138	140
Ferrochromium[e] _______________	--	--	18,000	[3]32,974	35,000
Ferronickel[e] _________________	51,000	51,000	50,000	[r]53,000	55,000
Steel, crude ________ thousand tons__	909	[r]933	858	895	[3]985
Lead:					
Mine output, metal content[e] ___________	[r]23,000	19,000	20,000	[r]22,000	20,000
Metal, refined:[e 5]					
Primary ____________________	21,000	3,200	--	([6])	15,000
Secondary __________________	4,000	1,000	--	--	--
Manganese:					
Ore, crude:					
Gross weight ________________	[r]79,607	[r]51,150	40,140	28,170	30,000
Metal content ________________	[r]23,882	[r]15,345	12,042	8,451	8,500
Concentrate:					
Gross weight ________________	5,800	[r]5,600	4,636	5,447	5,500
Metal content ________________	2,842	[r]2,744	2,272	2,669	2,700
Nickel:					
Ni content of nickeliferous iron ore[7] _______	15,600	[e]5,000	[e]13,000	16,700	17,000
Ni content of alloys ______________	12,700	[e]4,500	12,858	15,829	16,000
Silver: Mine output, metal content thousand troy ounces__	1,945	1,582	1,797	1,800	1,700
Tin metal, secondary[e] ________________	45	40	40	40	40
Zinc:					
Mine output, metal content ___________	27,000	[e]20,400	[e]21,300	21,500	22,000
Metal including secondary _____________	416	NA	NA	NA	NA

See footnotes at end of table.

Table 1.—Greece: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984p	1985e
INDUSTRIAL MINERALS					
Abrasives, natural: Emery	e9,000	--	7,007	r e8,000	8,500
Asbestos:					
Ore ... thousand tons	599	1,562	2,490	3,766	3,800
Processed	r457	r17,016	31,811	45,376	48,000
Barite:					
Crude ore	r116,773	119,747	90,187	24,822	50,000
Concentrate	47,014	39,101	30,262	2,423	17,000
Cement, hydraulic ... thousand tons	r12,940	r12,860	14,196	13,521	13,500
Clays:					
Bentonite:					
Crude	311,947	e312,000	688,941	778,722	750,000
Processed	185,627	265,577	214,193	260,941	250,000
Kaolin:					
Crude	31,930	44,736	60,749	92,407	~70,000
Processed	2,103	5,260	6,032	10,376	8,000
Fluorspar, grade unspecified	292	e300	e300	300	300
Gypsum and anhydrite	629,489	685,883	690,000	690,000	690,000
Magnesite:					
Crude ... thousand tons	962	967	891	1,064	1,100
Dead-burned	273,366	285,572	251,692	316,119	320,000
Caustic-calcined	79,776	r80,930	113,026	121,227	125,000
Nitrogen: N content of ammonia	r233,998	r223,605	r e225,000	r225,000	225,000
Perlite:					
Crude	253,780	e245,000	206,882	274,360	270,000
Screened	131,750	151,271	151,601	177,571	177,000
Pozzolan (Santorin earth) ... thousand tons	r1,190	11,177	911	908	910
Pumice	r727,384	641,804	500,460	626,971	630,000
Pyrites, gross weight	162,001	115,976	143,518	164,949	165,000
Salt, all types ... thousand tons	131	r116	159	133	160
Silica (probably silica sand)e	28,000	28,000	1,908	r38,892	38,000
Sodium compounds:					
Carbonatee	r1,000	r1,000	r1,000	r1,000	1,000
Sulfate	r9,626	r7,408	r e8,000	r9,000	9,000
Stone: Marble ... cubic meters	216,412	e250,000	e260,000	e270,000	280,000
Sulfur:					
S content of pyrites ... thousand tons	r76	r55	67	78	78
Byproduct of petroleum ... do	7	8	5	5	5
Natural gase ... do	4	97	115	120	120
Total ... do	87	160	187	203	203
Talc and steatite	2,529	2,697	2,166	r e2,200	2,300
MINERAL FUELS AND RELATED MATERIALS					
Coal including briquets:					
Lignite ... thousand tons	27,107	26,843	30,580	31,576	32,000
Lignite briquets ... do	69	108	e120	120	120
Coke:					
Coke oven ... do	47	306	e300	300	300
Gashouse ... do	15	16	e15	15	15
Gas:					
Manufactured, gasworkse ... million cubic feet	12	12	15	15	15
Natural ... do	1,351	4,416	e5,000	6,756	7,000
Petroleum:					
Crude ... thousand 42-gallon barrels	1,538	7,618	e10,000	9,668	9,500
Refinery products:					
Gasoline ... do	13,277	14,952	e14,500	14,136	14,000
Jet fuel ... do	12,976	13,504	e13,000	11,696	12,000
Kerosene ... do	357	332	e300	217	200
Distillate fuel oil ... do	29,407	29,479	e29,000	28,378	28,000
Residual fuel oil ... do	45,841	41,878	e35,000	29,417	30,000
Lubricants ... do	618	687	e650	630	600
Other ... do	3,400	3,349	e3,400	3,852	4,000
Refinery fuel and losses ... do	3,465	4,969	e4,500	3,521	3,500
Total ... do	109,341	109,150	e100,350	91,847	92,300

eEstimated. pPreliminary. rRevised. NA Not available.

[1]Table includes data available through June 1986.

[2]In addition to the commodities listed, a variety of other crude construction materials (clays, sand and gravel, and stone) is produced, but output is not reported, and available information is inadequate to make reliable estimates of output levels. Cobalt is also produced and is included with "Nickel."

[3]Reported figure.

[4]Ni content is also reported under "Nickel."

[5]Includes antimonial lead and hard lead.

[6]Revised to zero.

[7]Includes Co content.

TRADE

Apart from the finalization of the alumina agreement with the U.S.S.R., the Greek-Soviet commercial agenda for 1985 included the start of negotiations on a proposed gas main project. A trade agreement with the U.S.S.R., signed in early 1985, called for a 70% increase of total Greek exports to the U.S.S.R. compared with that of 1984. Bauxite remained Greece's main mineral export to the U.S.S.R., but plans called for increased sales of metal products such as pipes and construction materials. Greece's mineral imports from the U.S.S.R. consisted largely of energy products; these were mainly coal and petroleum. In 1985, approximately 25% of Greece's total petroleum imports were supplied by the U.S.S.R.

Negotiations with Bulgaria continued on export terms concerning alumina, which would be produced at the prospective alumina plant at Itea, near the Gulf of Corinth. Both sides were close to an agreement late in the year. In midyear, Greece and Pakistan agreed on a pact that would supply 20 to 25 ships per year to Pakistani shipbreakers at prices slightly below market value.

Table 2.—Greece: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984	
			United States	Other (principal)
METALS				
Aluminum:				
Ore and concentrate thousand tons	1,411	1,374	--	U.S.S.R. 577; Romania 504; United Kingdom 141.
Oxides and hydroxides	110,500	208,500	--	Netherlands 125,500; Egypt 55,000; Sweden 16,000.
Ash and residue containing aluminum	--	77	--	United Kingdom 54; France 17.
Metal including alloys:				
Scrap	884	1,253	--	Belgium-Luxembourg 505; Netherlands 200; Japan 180.
Unwrought	50,085	48,451	--	Italy 27,941; France 14,871; Lebanon 3,975.
Semimanufactures	40,547	48,287	8,022	Saudi Arabia 18,500; West Germany 5,030.
Antimony: Ore and concentrate	--	60	--	All to France.
Chromium:				
Ore and concentrate	12,030	8,625	--	West Germany 7,360; United Kingdom 650; Spain 570.
Metal including alloys, all forms	185	821	--	All to Netherlands.
Columbium and tantalum: Metal including alloys, all forms, columbium (niobium)	--	20	--	All to West Germany.
Copper:				
Matte and speiss including cement copper	--	836	--	Belgium-Luxembourg 766; Netherlands 47.
Ash and residue containing copper	696	452	--	France 290; West Germany 95; Italy 67.
Metal including alloys:				
Scrap	1,263	503	--	Netherlands 161; Spain 134; West Germany 120.
Unwrought	274	221	--	Belgium-Luxembourg 167; United Kingdom 31; West Germany 22.
Semimanufactures	15,027	15,938	326	Italy 4,396; West Germany 3,658; Libya 2,001.
Iron and steel: Metal:				
Scrap	1,140	1,450	--	Italy 660; West Germany 376; Belgium-Luxembourg 362.
Ferroalloys:				
Ferrochromium	11,966	29,411	--	West Germany 8,280; Italy 7,465; United Kingdom 4,000.
Ferronickel	33,583	77,149	--	West Germany 44,053; United Kingdom 11,905; France 8,935.
Steel, primary forms	99,647	148,202	--	Japan 90,632; Italy 28,212; India 19,966.
Semimanufactures:				
Bars, rods, angles, shapes, sections	180,001	159,596	--	China 76,220; U.S.S.R. 19,108; Algeria 16,285.
Universals, plates, sheets	89,716	232,048	73,954	United Kingdom 32,322; Canada 15,461.

See footnotes at end of table.

Table 2.—Greece: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued				
Iron and steel: Metal —Continued				
Semimanufactures —Continued				
Hoop and strip	20,206	25,586	6,234	Syria 10,329; Cyprus 2,986.
Wire	1,390	561	--	Saudi Arabia 202; Libya 135; Cameroon 120.
Tubes, pipes, fittings	97,495	138,929	57,836	U.S.S.R. 34,815; Italy 23,250.
Castings and forgings, rough	215	201	--	West Germany 126; France 47; Sweden 22.
Lead:				
Ore and concentrate	36,800	33,706	--	Belgium-Luxembourg 12,500; Finland 10,000; U.S.S.R. 8,000.
Ash and residue containing lead	135	84	--	West Germany 46; Italy 23; Belgium-Luxembourg 15.
Metal including alloys:				
Scrap	--	179	--	West Germany 111; Italy 65.
Unwrought	--	2,000	--	Italy 1,000; Yugoslavia 1,000.
Semimanufactures	--	37	--	All to West Germany.
Magnesium: Metal including alloys, scrap	24	9	--	France 7; Belgium-Luxembourg 2.
Manganese:				
Ore and concentrate, metallurgical-grade	1,429	361	--	Yugoslavia 350; West Germany 11.
Oxides	3,377	--		
Metal including alloys, all forms	--	1,057	--	Italy 1,000; West Germany 37; Bulgaria 20.
Nickel:				
Matte and speiss	19	--		
Ash and residue containing nickel	403	--		
Metal including alloys:				
Scrap	590	21	--	All to Netherlands.
Unwrought	33	--		
Semimanufactures	306	763	--	Netherlands 745; West Germany 17.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	--	$404	--	All to West Germany.
Rare-earth metals including alloys, all forms	--	3	--	NA.
Selenium, elemental	--	1	--	NA.
Silver:				
Waste and sweepings[2] value, thousands	$202	$82	$22	Belgium-Luxembourg $33; Netherlands $21.
Metal including alloys, unwrought and partly wrought do.	$224	$2,798	--	Sweden $1,024; United Kingdom $771; West Germany $515.
Tin:				
Ash and residue containing tin	--	179	--	West Germany 115; Italy 64.
Metal including alloys:				
Scrap	--	3	--	All to Italy.
Unwrought	--	1	--	All to Belgium-Luxembourg.
Semimanufactures	1	2	--	All to Denmark.
Titanium: Metal including alloys, all forms	27	--		
Zinc:				
Ore and concentrate	57,500	39,450	--	France 25,000; Japan 10,000; Belgium-Luxembourg 2,450.
Matte	128	280	--	West Germany 220; Netherlands 60.
Ash and residue containing zinc	1,421	1,583	--	West Germany 707; Italy 605; United Kingdom 270.
Metal including alloys:				
Scrap	339	359	--	Italy 217; Austria 95; Belgium-Luxembourg 24.
Unwrought	26	183	--	West Germany 182.
Semimanufactures	20	2	--	All to Saudi Arabia.
Other:				
Ores and concentrates	100,556	65,350	--	Romania 32,306; Italy 20,544; France 3,500.
Oxides and hydroxides	99	--		
Ashes and residues	34,342	30,090	--	Malta 9,086; United Arab Emirates 8,000; Egypt 7,200.
Base metals including alloys, all forms	38	--		
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	349,400	454,948	241,995	United Kingdom 110,685; West Germany 49,654.

See footnotes at end of table.

Table 2.—Greece: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Abrasives, n.e.s. —Continued				
Dust and powder of precious and semi-precious stones including diamond value, thousands	$465	$446	$341	West Germany $70; Cyprus $35.
Grinding and polishing wheels and stones	37	69	1	Switzerland 36; Lebanon 7; Turkey 7.
Asbestos, crude	--	34,740	--	Japan 3,481; Iran 3,400; Bulgaria 3,280.
Barite and witherite	5,400	16,000	--	Kuwait 14,000; Egypt 2,000.
Cement thousand tons	7,886	7,025	--	Egypt 3,016; Saudi Arabia 2,045; Yemen (Sanaa) 309.
Chalk	1,371	3,083	--	Saudi Arabia 1,778; Cyprus 1,200; Bahrain 80.
Clays, crude:				
Bentonite	322,920	380,246	--	Canada 117,743; Italy 48,093; Sweden 35,355.
Chamotte earth	--	29	--	Libya 21; Saudi Arabia 7.
Kaolin	13,923	18,576	--	Yugoslavia 17,910; Israel 250; Cyprus 40.
Unspecified	18	103	--	Cyprus 87.
Diamond: Gem, not set or strung value, thousands	$21	--		
Diatomite and other infusorial earth	15	--		
Feldspar, fluorspar, related materials	1	--		
Fertilizer materials:				
Crude, n.e.s	--	580	--	All to Saudi Arabia.
Manufactured:				
Nitrogenous	40	6,875	--	United Kingdom 5,175; Cyprus 1,700.
Phosphatic	--	38	--	All to Saudi Arabia.
Potassic	--	22,739	--	China 15,000; Cyprus 7,739.
Unspecified and mixed	31,281	34,861	--	China 31,500; Saudi Arabia 3,347.
Graphite, natural	10	--		
Gypsum and plaster	38,951	392	--	Egypt 250; Cameroon 140.
Lime	262	580	--	All to Cameroon.
Magnesium compounds:				
Magnesite, crude	r25,069	24,931	--	Italy 18,544; United Kingdom 4,311; Netherlands 2,076.
Oxides and hydroxides	337,916	402,391	72,621	West Germany 75,630; Italy 43,924.
Mica: Worked including agglomerated splittings	(3)	15	--	West Germany 14.
Pyrite, unroasted	100	--		
Salt and brine	14	10	--	All to bunkers.
Sodium compounds, n.e.s.: Carbonate, manufactured	--	5	--	Do.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	45,180	42,667	36	Italy 10,221; West Germany 6,816; Egypt 5,249.
Worked	94,911	90,181	2,465	Saudi Arabia 56,853; Kuwait 12,372; West Germany 4,403.
Dolomite, chiefly refractory-grade	--	671	--	United Kingdom 510; Yugoslavia 161.
Gravel and crushed rock	12,016	59,191	--	Libya 58,631; Kuwait 500.
Quartz and quartzite	17	15,820	--	Norway 14,300; Italy 1,500.
Sand and gravel	--	71	--	All to bunkers.
Sulfur:				
Elemental, crude including native and byproduct	4,884	10,187	--	Romania 5,000; Egypt 3,000; Syria 1,250.
Dioxide	149	153	--	All to Cyprus.
Sulfuric acid	1,602	19,361	--	Turkey 18,300; Lebanon 398; Cyprus 268.
Talc, steatite, soapstone, pyrophyllite	566	174	--	All to Cyprus.
Vermiculite, perlite, chlorite	163,555	191,951	41,500	West Germany 67,963; United Kingdom 23,995.
Other:				
Crude	10,666	7,869	--	Jordan 3,300; France 1,810; Romania 750.
Slag and dross, not metal-bearing	28,592	18,963	--	France 14,700; Saudi Arabia 1,996; India 745.
MINERAL FUELS AND RELATED MATERIALS				
Carbon: Carbon black	--	20	--	Bahrain 10; Egypt 10.
Coal: Lignite including briquets	5,214	--		
Coke and semicoke	40	--		

See footnotes at end of table.

Table 2.—Greece: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum:				
Crude thousand 42-gallon barrels	--	2,527	--	All to France.
Refinery products:				
Liquefied petroleum gas do.	797	670	--	Syria 211; Cyprus 123; Lebanon 116.
Gasoline do.	1,980	3,838	1,416	France 964; Italy 460.
Kerosene and jet fuel do.	2,502	3,442	3,233	Lebanon 84; Switzerland 53.
Distillate fuel oil do.	919	842	451	France 206; Cyprus 57.
Lubricants do.	253	662	190	Italy 143; United Kingdom 120.
Residual fuel oil do.	3,295	4,451	163	United Kingdom 1,540; Italy 1,479; Turkey 257.
Bitumen and other residues do.	1	3	--	Cyprus 2.

[r]Revised. NA Not available.
[1]Table prepared by Jozef Plachy.
[2]May include other precious metals.
[3]Less than 1/2 unit.

Table 3.—Greece: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS				
Alkali and alkaline-earth metals:				
Alkali metals	--	6,197	5,485	West Germany 712.
Alkaline-earth metals	--	9	--	All from France.
Aluminum:				
Ore and concentrate	789	5,689	--	All from Italy.
Oxides and hydroxides	360	496	164	United Kingdom 148; West Germany 73; Austria 36.
Metal including alloys:				
Scrap	6	--		
Unwrought	2,119	6,474	--	West Germany 1,870; Sweden 1,601; Italy 1,090.
Semimanufactures	5,090	5,300	570	West Germany 1,550; United Kingdom 1,132; Italy 757.
Antimony:				
Oxides	31	--		
Metal including alloys, all forms	30	12	--	Belgium-Luxembourg 11; Italy 1.
Arsenic: Oxides and acids	33	78	--	France 65; Belgium-Luxembourg 10; Netherlands 3.
Beryllium: Metal including alloys, all forms	--	20	--	All from France.
Bismuth: Metal including alloys, all forms	2	2	1	Belgium-Luxembourg 1.
Cadmium: Metal including alloys, all forms	2	1	--	All from West Germany.
Chromium:				
Ore and concentrate	18,719	26,815	--	Albania 16,845; Finland 9,928.
Oxides and hydroxides	147	92	--	United Kingdom 54; West Germany 28; Italy 5.
Cobalt:				
Ore and concentrate	30	--		
Metal including alloys, all forms	3	5	1	Belgium-Luxembourg 2; West Germany 1.
Copper:				
Matte and speiss including cement copper	15,583	13,367	296	Zambia 6,116; Belgium-Luxembourg 2,375; Chile 1,374.
Oxides and hydroxides	55	65	--	Norway 29; Finland 12; Netherlands 12.
Sulfate	511	2,533	19	Poland 2,262; Italy 243.
Metal including alloys:				
Scrap	23	447	98	Chile 150; United Arab Emirates 120.
Unwrought	19,272	20,313	199	Zambia 8,458; Chile 7,265; Zaire 1,962.
Semimanufactures	3,132	3,469	18	France 1,356; West Germany 740; Belgium-Luxembourg 402.

See footnotes at end of table.

Table 3.—Greece: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Germanium: Metal including alloys, all forms	25	12	--	All from Hungary.
Gold: Metal including alloys, unwrought and partly wrought ___troy ounces	--	32,150	--	All from Switzerland.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite	186	21	--	All from Netherlands.
Metal:				
Scrap	520,380	327,570	89,229	U.S.S.R. 185,637; United Kingdom 21,696; Algeria 12,992.
Pig iron, cast iron, related materials	16,925	7,133	36	U.S.S.R. 4,161; Italy 1,016; Bulgaria 766.
Ferroalloys:				
Ferrochromium	38	35	--	West Germany 27; Greece 4; Sweden 4.
Ferromanganese	1,686	2,751	--	Portugal 1,687; West Germany 394; Belgium-Luxembourg 355.
Ferromolybdenum	3	9	--	All from West Germany.
Ferrosilicomanganese	4,271	5,924	--	Portugal 4,746; Norway 720; Belgium-Luxembourg 188.
Ferrosilicon	1,737	2,812	--	France 1,530; West Germany 738; Norway 441.
Silicon metal	429	423	--	France 357; Belgium-Luxembourg 44; West Germany 22.
Unspecified	395	278	--	France 242; Belgium-Luxembourg 20.
Steel, primary forms	1,097,207	830,075	--	Netherlands 326,490; France 208,647; United Kingdom 104,183.
Semimanufactures:				
Bars, rods, angles, shapes, sections	156,023	157,277	5	Czechoslovakia 29,907; Italy 28,476; Spain 16,970.
Universals, plates, sheets	222,409	207,375	5	France 48,232; West Germany 29,376; Japan 22,904.
Hoop and strip	29,013	22,193	--	Bulgaria 8,072; West Germany 5,576; Belgium-Luxembourg 3,126.
Rails and accessories	1,216	1,761	(2)	Yugoslavia 737; West Germany 579; Belgium-Luxembourg 170.
Wire	8,570	13,043	(2)	West Germany 2,130; Belgium-Luxembourg 2,127; Italy 1,826.
Tubes, pipes, fittings	27,356	30,293	55	West Germany 9,543; France 6,873; United Kingdom 2,835.
Castings and forgings, rough	1,524	1,961	1	Belgium-Luxembourg 1,028; Italy 485; France 267.
Lead:				
Ore and concentrate	--	8,531	--	Austria 2,951; Ireland 2,387; Peru 2,138.
Oxides	146	134	7	France 86; United Kingdom 15; Belgium-Luxembourg 13.
Metal including alloys:				
Scrap	--	101	--	All from Australia.
Unwrought	23,921	13,881	379	Australia 3,020; Yugoslavia 2,979; West Germany 1,751.
Semimanufactures	2,759	17	(2)	West Germany 4; Hungary 4; Italy 4.
Lithium: Oxides and hydroxides	2	--		
Magnesium: Metal including alloys:				
Scrap	21	14	--	All from Belgium-Luxembourg.
Unwrought	424	675	--	Norway 327; France 301; West Germany 47.
Semimanufactures	25	27	2	West Germany 18; France 6.
Manganese:				
Oxides	17	24	--	Spain 18; France 5.
Metal including alloys, all forms	17	50	--	All from France.
Mercury ___76-pound flasks	58	58	--	Italy 29.
Molybdenum: Metal including alloys, all forms	15	8	--	Ivory Coast 7; West Germany 1.
Nickel:				
Ore and concentrate	--	20	--	All from Denmark.
Matte and speiss	42	159	40	U.S.S.R. 60; United Kingdom 50.
Oxides and hydroxides	--	3	--	All from Norway.
Metal including alloys:				
Unwrought	100	72	(2)	Norway 22; Netherlands 18; Canada 14.
Semimanufactures	36	39	(2)	Austria 11; West Germany 10; Italy 8.

See footnotes at end of table.

Table 3.—Greece: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$889	$1,585	$373	Switzerland $796; West Germany $384.
Selenium, elemental	--	1	1	
Silicon, high-purity	80	89	--	All from France.
Silver: Metal including alloys, unwrought and partly wrought value, thousands	$3,464	$3,547	$20	Switzerland $1,420; West Germany $1,250; Netherlands $431.
Tin:				
Oxides	3	4	--	United Kingdom 3; Italy 1.
Metal including alloys:				
Unwrought	377	266	--	Malaysia 146; United Kingdom 51; Thailand 30.
Semimanufactures	19	18	2	West Germany 11; Denmark 1.
Titanium:				
Ore and concentrate	18	--		
Oxides	487	444	--	West Germany 236; France 141; Belgium-Luxembourg 65.
Metal including alloys, all forms	7	5	--	Italy 4; Japan 1.
Tungsten: Metal including alloys, all forms	1	4	(2)	Austria 3.
Uranium and thorium:				
Ore and concentrate value, thousands	$4	$7	--	All from Italy.
Metal including alloys, all forms, uranium	--	3	--	Do.
Vanadium:				
Ore and concentrate	--	2	--	NA.
Oxides and hydroxides	3	--		
Zinc:				
Oxides	405	521	(2)	France 154; West Germany 151; Netherlands 106.
Blue powder	--	9	--	Norway 4; West Germany 3.
Metal including alloys:				
Scrap	2	2	--	All from West Germany.
Unwrought	12,792	13,409	--	Belgium-Luxembourg 4,419; Netherlands 2,735; Zambia 2,255.
Semimanufactures	132	138	--	West Germany 57; Yugoslavia 20; Bulgaria 19.
Zirconium: Ore and concentrate	102	67	--	United Kingdom 57; Italy 10.
Other:				
Ores and concentrates	3,162	5,702	--	Albania 4,053; Italy 1,203; Australia 188.
Oxides and hydroxides	r37	22	--	West Germany 5; United Kingdom 4; Italy 3.
Base metals including alloys, all forms	--	1	--	All from Italy.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	12	62	57	West Germany 2; Austria 1.
Artificial:				
Corundum	297	325	--	West Germany 177; France 97; Italy 30.
Silicon carbide	846	511	--	West Germany 336; Italy 154.
Dust and powder of precious and semiprecious stones including diamond value, thousands	$5,131	$4,137	$79	West Germany $3,219; Belgium-Luxembourg $751.
Grinding and polishing wheels and stones	411	438	1	Italy 256; West Germany 56; East Germany 49.
Asbestos, crude	7,531	3,954	140	Republic of South Africa 2,407; Canada 824; Cyprus 490.
Barite and witherite	3,420	40	--	Turkey 16; West Germany 15; France 9.
Boron materials:				
Crude natural borates	341	100	100	
Elemental	--	15	--	All from France.
Oxides and acids	108	125	--	Belgium-Luxembourg 80; Italy 20; France 13.
Cement	6,682	614	90	Spain 299; Netherlands 96.
Chalk	481	165	--	France 53; Spain 41; United Kingdom 40.

See footnotes at end of table.

Table 3.—Greece: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Clays, crude:				
Bentonite	617	1,658	--	United Kingdom 873; Italy 663; West Germany 50.
Chamotte earth	1,468	166	--	United Kingdom 63; Czechoslovakia 20; Netherlands 20.
Kaolin	37,921	43,763	608	United Kingdom 33,828; Bulgaria 3,245; West Germany 1,665.
Unspecified	17,642	7,406	81	United Kingdom 4,943; Austria 489; West Germany 176.
Cryolite and chiolite	5	11	--	Denmark 10; United Kingdom 1.
Diamond:				
Gem, not set or strung value, thousands	$82	$175	$1	Belgium-Luxembourg $153; West Germany $14; United Kingdom $4.
Industrial stones do.	$251	$348	$2	West Germany $288; Belgium-Luxembourg $58.
Diatomite and infusorial earth	744	1,886	428	United Kingdom 757; Hungary 388; West Germany 93.
Feldspar, fluorspar, related materials:				
Feldspar	2,216	2,228	--	Norway 593; West Germany 542; Italy 526.
Fluorspar	6,024	4,986	--	Kenya 3,285; France 877; Mozambique 800.
Unspecified	5,682	5,222	--	Norway 5,204; France 18.
Fertilizer materials:				
Crude, n.e.s	83	129	--	Austria 99; Belgium-Luxembourg 30.
Manufactured:				
Ammonia	183,170	168,794	--	U.S.S.R. 142,549; Romania 8,071; Italy 5,815.
Nitrogenous	95,337	220,508	--	Italy 94,897; Romania 52,100; U.S.S.R. 31,795.
Potassic	5,607	44,817	--	Italy 20,934; West Germany 11,806; Belgium-Luxembourg 6,619.
Unspecified and mixed	3,642	9,374	133	West Germany 3,078; Tunisia 2,814; Ireland 1,400.
Graphite, natural	332	272	--	West Germany 126; Austria 72; Italy 20.
Gypsum and plaster	812	796	--	Italy 477; West Germany 313.
Iodine	1	1	--	All from Netherlands.
Kyanite and related materials	171	1,713	--	France 1,335; United Kingdom 378.
Lime	1	1,841	--	Spain 1,800; West Germany 41.
Magnesium compounds:				
Magnesite, crude	3,995	18	--	All from Yugoslavia.
Oxides and hydroxides	r3,144	10,018	1	Turkey 9,713; Austria 165; West Germany 60.
Mica:				
Crude including splittings and waste	139	263	--	Austria 216; India 18; Norway 12.
Worked including agglomerated splittings	2	6	--	Belgium-Luxembourg 3; United Kingdom 1.
Nitrates, crude	519	--		
Phosphates, crude	126,193	379,041	--	Senegal 196,194; Morocco 80,839; Israel 30,130.
Phosphorus, elemental	8	1	--	All from West Germany.
Pigments, mineral:				
Natural, crude	53	44	--	Denmark 22; Ireland 15; Cyprus 6.
Iron oxides and hydroxides, processed	1,389	1,381	(4)	West Germany 1,077; Spain 108; Italy 71.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$94	$186	$2	Thailand $152; West Germany $14; Brazil $6.
Synthetic do.	$46	$24	$1	West Germany $8; Thailand $5; Switzerland $2.
Pyrite, unroasted	67,452	76,044	--	Spain 60,437; Portugal 10,012; U.S.S.R. 5,590.
Salt and brine	16,635	35,681	--	Italy 34,630; France 845; West Germany 126.
Sodium compounds, n.e.s.: Carbonate, manufactured	24,021	27,995	--	Italy 10,595; Turkey 5,738; Bulgaria 4,161.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	1,014	1,177	--	Pakistan 459; France 180; Bulgaria 103.
Worked	282	254	--	Italy 96; Yugoslavia 60; West Germany 33.

See footnotes at end of table.

Table 3.—Greece: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Stone, sand and gravel —Continued				
Dolomite, chiefly refractory-grade	1,088	830	(2)	Italy 628; West Germany 151; Turkey 28.
Gravel and crushed rock	631	613	--	Spain 298; France 141; Belgium-Luxembourg 98.
Quartz and quartzite	32	361	--	France 254; United Kingdom 52; Yugoslavia 30.
Sand other than metal-bearing	87,705	62,128	1	Belgium-Luxembourg 35,469; Bulgaria 14,636; Yugoslavia 5,792.
Sulfur:				
Elemental:				
Crude including native and byproduct	43,294	82,617	13,223	Poland 39,910; France 24,309.
Colloidal, precipitated, sublimed	59	48	--	West Germany 40; United Kingdom 7.
Dioxide	2	1	--	All from Italy.
Sulfuric acid	44	48,009	(2)	Italy 28,577; Tunisia 12,851; France 3,664.
Talc, steatite, soapstone, pyrophyllite	1,738	2,067	1	Belgium-Luxembourg 450; Austria 432; Italy 297.
Other:				
Crude	645	722	--	Belgium-Luxembourg 270; Italy 201; France 80.
Slag and dross, not metal-bearing	549,421	338,175	--	Italy 277,018; West Germany 41,211; France 17,106.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	41	12	--	All from Denmark.
Carbon: Carbon black	4,991	5,938	1	Italy 5,171; West Germany 347; East Germany 117.
Coal:				
Anthracite and bituminous thousand tons	527	1,111	230	Republic of South Africa 247; Australia 205.
Briquets of anthracite and bituminous coal do	1	--		
Coke and semicoke do	50	73	--	Poland 38; Italy 18; Czechoslovakia 7.
Peat including briquets and litter	8,857	8,236	--	U.S.S.R. 5,301; Netherlands 1,619; West Germany 932.
Petroleum:				
Crude thousand 42-gallon barrels	82,151	74,507	--	Saudi Arabia 23,162; Libya 17,178; U.S.S.R. 11,943.
Refinery products:				
Liquefied petroleum gas do	21	24	(2)	Italy 19; France 4.
Gasoline do	427	595	(2)	Romania 458; Italy 54; Netherlands 43.
Mineral jelly and wax do	9	20	--	West Germany 11; Hungary 6.
Kerosene and jet fuel do	206	237	(2)	Italy 139; France 44; Kuwait 25.
Distillate fuel oil do	319	1,386	--	Romania 459; Bulgaria 439; U.S.S.R. 303.
Lubricants do	544	623	4	Italy 260; Netherlands 234; United Kingdom 33.
Residual fuel oil do	774	3,329	--	Iraq 2,446; Italy 459; Bulgaria 184.
Bitumen and other residues do	349	210	--	Spain 94; Yugoslavia 62; Albania 53.
Bituminous mixtures do	2	1	(2)	Mainly from Italy.
Petroleum coke do	299	349	307	U.S.S.R. 38; West Germany 4.

[r]Revised. NA Not available.
[1]Table prepared by Josef Plachy.
[2]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Aluminum and Bauxite.—At yearend, Greece and the U.S.S.R. signed the last document finalizing an agreement to build a $450 million alumina plant near Itea. The agreement provided for annual purchases of 330,000 tons of alumina by the U.S.S.R. The price would be based on a mix of U.S. and European prices and would be paid in hard currency. Construction of the plant started earlier in the year. The projected time of completion was to be about 51 months, and about 2,500 workers would be employed. The Soviet foreign trade organization Tsvetmetpromexport would provide $25 million in services that would include the engineering and design of the plant as well as overall construction supervision. The total value of Soviet investment in the project was to be about $160 million and would include equipment and services. U.S. and European companies would be chosen to provide from $30 to $40 million in equipment. Late in 1984, Kaiser Engineers and Constructors Inc. was designated as technical consultant for the planning stages of the project.

At yearend 1985, the management of AG, Greece's only aluminum producer, indicated that closure of the company was imminent due to low productivity, excessive rates for electric power, and high bauxite prices. The company claimed that losses for the year amounted to $2.4 million and that this trend would increase. The company's dispute with PPC over above contracted electric power rate increases was not resolved during the year. Moreover, the Government reportedly indicated an intent to nationalize the firm. Should AG close its operations, about 2,300 workers would be unemployed.

Chromite.—Hellenic Ferroalloys announced plans to expand ferrochromium smelting capacity from 45,000 to 100,000 tons per year. The planned expansion will be accompanied by increased mine output of chromite in northern Greece (Xeralivado) and the replacement of the 20-megawatt furnace with a 30-megawatt unit. The increased ferrochromium production would be designated for export. In 1985, Greece sold about 90% of ferrochromium output to the European market; increased production capacity would allow sales of about 25,000 to 30,000 tons per year of ferrochromium to North America and Japan.

Iron and Steel.—A marketing study was completed that confirmed the feasibility of constructing a 60,000-ton-per-year stainless steel plant. A detailed engineering study was to have been undertaken by Friedrich Krupp Hüttenwerke AG of the Federal Republic of Germany and completed by yearend. The Government was to make a final decision after the completion of the engineering report. Production would start no earlier than 1988, and the plant would use domestically produced ferroalloys.

Lead and Zinc.—Aegean Metallurgical Industries announced its intention to develop a mine with concentrator and auxiliary facilities at the lead-zinc and mixed sulfide ore deposit at Molai in the Peloponnese. The reserves at this deposit were measured at 2.8 million tons with an average lead and zinc content of 15%, and 50 grams of silver per ton. The annual capacity of the complex would be about 300,000 tons per year.

Manganese.—Reportedly, the production of battery-grade manganese dioxide at the Plavista Mine near Neokhori in Khalkidiki would be increased from 9,000 to 20,000 tons per year. According to the new owner, C. Christoforides Mining S.A., the installation of a grinding plant was planned to increase the salability of the product. The grade of the battery ore concentrate would be raised to about 75% from 72% by means of a newly installed heavy media separation unit.

The production of manganese carbonate ore with a 32% manganese content was also planned for metallurgical end use.

Nickel.—Reportedly, Larco's ferronickel smelter at Larymna experienced a number of setbacks that included a strike early in the year and a reduction of electric power owing to drought conditions that affected the Balkans. In February, one of the furnaces exploded, but production was resumed in March at a higher rate than in 1984.

INDUSTRIAL MINERALS

Greece remained a significant European producer and exporter of industrial minerals that included barite, bentonite, gypsum, magnesite, marble, perlite, and pumice. Early in the year, a comprehensive report was published on Greece's industrial minerals.[2] The report provided an overview of the entire industry's status and included statistical data by commodity.

Asbestos.—The Government-owned Asbestos Mines of Northern Greece S.A. produced three main grades of asbestos fiber at its Zidoni plant: MZ 41, MZ 52, and MZ 65; smaller amounts of other grades were also produced. Over 50% of the plant's 90,000-ton-per-year capacity was engaged during the year. About three-quarters of the asbestos production was exported.

Cement.—Declines in domestic consumption and in markets in the Middle East were reportedly the reasons for the drop in production in 1985. Titan Cement announced plans to increase exports to the U.S. market, and it was expected that the company would ship up to 700,000 tons to the United States by yearend.

Magnesite.—Mining Trading and Manufacturing Ltd. announced expansion plans at its 130,000-ton-per-year magnesite mining operation at Mantoudi in Euboea. The company began producing a lower grade calcined magnesite in early January that would raise the total production of this product from 10,000 to 30,000 tons per year. Additional plans were announced to increase output in the coarser 50- to 100-millimeter range from 70,000 to 110,000 tons per year and to completely modernize the Kymassi shaft kiln operation.

MINERAL FUELS

Coal.—Greece's Institute of Geology and Mineral Exploration discovered a 4-million-ton deposit of lignite in the Kalavryto area of the Peloponnese. Further exploration in the area was expected to uncover additional resources.

Petroleum and Natural Gas.—In the petroleum field, it was reported that the Public Petroleum Corp. was to begin oil exploration in the Gulf of Thermaikos in early summer. The area was one that was already producing petroleum. Three underwater drillings were planned for the year. Negotiations were begun between the Governments of Greece and the U.S.S.R. over the construction of a 750-kilometer gas pipeline from Bulgaria to Greece that would deliver Soviet natural gas. If finalized, the project would cost $1.5 billion and would supply up to 141 billion cubic feet of Soviet gas per year.

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[1]Foreign mineral specialist, Division of International Minerals.

[2]Industrial Minerals (London). Jan. 1985, pp. 19-39.

The Mineral Industry of Guinea

By Ben A. Kornhauser[1]

Aided by the International Monetary Fund (IMF) and the International Bank for Reconstruction and Development (World Bank), the Guinean economy was in transition from a centrally planned economy to a market economy. Halco Mining Inc. had started negotiations with the Government to reduce the levy on bauxite production to make Guinean ore competitive in the world market.

Chevaning Mining and Exploration Co. (CMC) of New York, in conjunction with the Government, was preparing to bring the Koron gold deposit on-stream in 1986. Exploration of its concession indicated considerable reserves that were minable at a relatively low cost per troy ounce. Although the diamond production of Aredor Guinea S.A. was much higher in 1985, diamond size and per carat price were lower than those of 1984 when production began.

Offshore oil prospecting was ready to continue, following resolution by the International Court at the Hague of the dispute over territorial waters offshore Guinea and Guinea-Bissau.

PRODUCTION AND TRADE

Mining, predominantly bauxite and diamonds, still dominated the industrial sector and contributed about 20% of the gross domestic product and 97% of foreign exchange earnings. The value of the reported minerals produced amounted to $579 million,[2] of which bauxite and related products contributed $465 million and diamonds contributed $14 billion. The economy was in transition from a centrally planned economy to a market economy with the aid of the IMF and the World Bank. To effect this transition, the Government devalued the currency over 1,400%, eliminated or reduced its role in internal and external trade, privatized national corporations, and reduced governmental control. However, Guinea faced serious balance of payments problems because its foreign debt at the end of 1985 was an estimated $1.75 billion, of which $1.5 billion was debt and $250 million was accumulated interest arrearages. Mineral resources, particularly the development of diamond and gold reserves, were expected to provide an immediate boost to the economy.

Guinea traded primarily with France, the United States, other Western and Eastern European countries, China, Japan, and the U.S.S.R. Brazil, a relatively new trading partner, was becoming an important supplier of petroleum products. France continued to provide about 30% of the country's imports, with the centrally planned economy countries of China, Eastern Europe, and the U.S.S.R. supplying about 25%. Imports from the United States totaled $27.6 million.

Table 1.—Guinea: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984[p]	1985[e]
Aluminum:					
Bauxite:					
Mine production:					
Wet basis	12,833	11,827	12,421	13,160	[3]13,100
Dry basis[4]	[r]12,000	[r]11,100	11,600	12,300	12,300
Shipments (dry basis):					
Metallurgical-grade bauxite	9,792	9,701	10,000	10,000	10,000
Calcined bauxite	98	98	100	130	[3]111
Alumina:					
Production	679	549	583	508	[3]580
Shipments	608	549	583	508	580
Diamond:					
Gem[e] thousand carats	12	10	23	34	105
Industrial[e] do	26	23	17	14	7
Total do	38	33	40	48	[3]112

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Includes data available through July 1985.
[2]In addition to the commodities listed, modest quantities of unlisted varieties of crude construction materials (clays, sand and gravel, and stone) presumably are produced, but output is not reported quantitatively, and available information is inadequate to make reliable estimates of output levels.
[3]Reported figure.
[4]Calculated, assuming 6.3% average moisture.

Table 2.—Guinea: Apparent exports of bauxite and alumina, by country[1]

(Metric tons)

Country	Bauxite		Alumina	
	1983	1984	1983	1984
Austria	18,872	20,294	--	--
Belgium-Luxembourg	297	--	--	--
Canada	614,095	154,106	--	--
France	749,824	544,189	59,650	14,080
Germany, Federal Republic of	863,200	1,468,265	22,691	192,635
Ireland	509,112	1,125,962	--	--
Italy	312,055	466,897	128,384	31,400
Netherlands	--	200	--	--
Spain	1,388,761	1,719,181	--	--
Switzerland	--	3,534	7,611	--
U.S.S.R.[e 2]	2,700,000	2,800,000	--	--
United States	3,600,246	3,659,128	12,768	--
Yugoslavia	115,528	139,936	88,920	81,091
Total	10,871,990	12,101,692	320,024	319,206

[e]Estimated.
[1]Table prepared by Virginia A. Woodson. Owing to a lack of official trade data published by the Government of Guinea, this table should not be taken as a complete presentation of Guinea's exports of bauxite and alumina. These data were gathered from various sources that include United Nations information and official trade data published by the partner trading countries. Table includes data available through Aug. 11, 1986.
[2]Metal Statistics 1974-84. Metallgesellschaft Aktiengesellschaft. 1985, Frankfurt am Main, Federal Republic of Germany.

COMMODITY REVIEW

METALS

Bauxite and Alumina.—In February, a Czechoslovakia-Guinea accord resulted in the shipment of 100,000 tons of bauxite from the U.S.S.R.-run Kindia Mine to Karametal Co. of Czechoslovakia. The first 50,000 tons served as payment for past Guinean debts. The remaining tonnage was included in a barter deal for Czech goods.

Negotiations started in late October between the Government and Halco regarding the price of bauxite from the Boke-Sangaredi Mine. Halco, a U.S.-based holding company, was owned 51% by Compagnie des Bauxites de Guinée and represented a consortium of eight major integrated aluminum producers. While bauxite markets remained stable, aluminum and alumina prices had dropped sharply for many months, with alumina priced at less than $100 per ton. The reported Guinean price of bauxite was up to $35 per ton f.o.b. and was believed to be the highest priced ore on the market. A reduction in the country's rates was expected to make Guinean ore more competitive in the world market with those of Australia and Brazil. The Halco negotiators wanted the levy of $13.13 per ton of bauxite to be reduced to allow their ore to be competitive.

Gold.—CMC completed its exploration and spent about $7 million in seeking gold on its 14,670-square-mile concession, particularly at Koron and Didi, two of its more promising prospects. The potential reserves for the concession were estimated at 16 million troy ounces of gold at an average grade of 0.074 troy ounce per 1.3 cubic yards. Minable reserves at the two areas were estimated at 400,000 troy ounces. Wright Engineers Ltd. of Canada did the feasibility studies. As a result, Société Aurifere de Guinée, which was owned 49% by the state and 51% by CMC, was to bring the Koron deposit on-stream in 1986. The annual production rate was expected to be 56,000 troy ounces, increasing eventually to 100,000 troy ounces, with operating costs of $80 to $130 per troy ounce. CMC was owned by Canada's Société Minière International du Quebec and Switzerland's Omnium de Participation Mobilieres S.A.

The Association for Research and Development of Keroussa Gold was established in 1985 for the research, development, and sale of gold and diamonds. This establishment followed the Government's decision to prohibit private gold and diamond development. The company was owned 50% by Guinea with the remainder by Al Baraka of Saudi Arabia. The Bureau de Recherches Géologiques et Minières of France was to manage the operation. The company would invest about $1 million in the first research phase, which was expected to last 2 years.

Iron Ore.—The 1984-85 feasibility study that was funded by the World Bank to determine the most economic means for developing the Mifergui-Nimba iron ore deposit concluded that an investment of $267 million was necessary for a 10-million-ton-per-year operation. The $500,000 study was performed by Sweden's Gränges International Mining AB and United States Steel Corp.'s U.S.S. Engineers & Consultants Inc. The study was submitted to the Mifergui-Nimba Co., which was 50% state-owned. The World Bank indicated that a further study was needed to assess the economic viability of the project, including marketing of the ore.

INDUSTRIAL MINERALS

The planned production rate of 250,000 carats per year at the diamond operations of Aredor Guinea in southeastern Guinea was not reached until yearend owing to technical problems with the ore treatment plant. About 94% of the output was gem diamonds, but increased production and better recovery brought the average diamond size down to 0.85 carat from 1.2 carats at the earlier production rate, a decrease of 30% in size. Prices also fell to $150 per carat from the $245 per carat received for the first sales, a decrease of 40% in price.

MINERAL FUELS

The International Court at the Hague resolved the dispute between Guinea and Guinea-Bissau regarding the ownership of their territorial waters where offshore oil prospecting had been done by a 50-50 partnership of the Union Texas Oil Co. of the United States and Guinea. The Court's arbitration panel divided sovereignty over the waters, enabling both countries to prospect for offshore oil.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Guinean sylis (S) to U.S. dollars at the average rate of S23=US$1.00. On the open market S350=US$1.00.

The Mineral Industry of Hungary

By Walter G. Steblez[1]

The production of most mineral commodities in Hungary declined in 1985, reflecting the overall slowdown in the country's economy. By yearend, national income was slightly below that of 1984; industrial production grew only 1% during this period instead of the 2.3% to 2.8% planned increase. Government minerals and energy programs had mixed results. Although some efficiency was achieved in the consumption of energy, total consumption increased beyond planned levels. However, the consumption of basic nonfuel materials declined, and modernization of production processes continued. The chief projects brought on-stream during the year were the Markushegy and Nagyegyhaza coal mines and the Fenyoefoe bauxite mine. Additional funds were also allocated to the petroleum and gas sectors.

Accomplishments in the sixth 5-year plan, ending in 1985, included the startup of the Bito II, Halimba III, and Fenyoefoe bauxite mines. Other projects to go on-stream during the period included the Many brown coal mine, the Testveriseg (Brotherhood) gas mainline, and the Paks nuclear reactor. Also, production capacity was increased at the Szekesfehervar aluminum plant to expand its range of aluminum semimanufactures. Overall output of the metallurgical sector reportedly declined by 7% during the 1981-85 period, but greater efficiencies were attained in the steel industry with the addition of new technology, such as the oxygen converter at the Dunaujvaros steelworks. Moreover, a number of unprofitable operations were taken out of production. At yearend 1985, Hungary's only iron mining operation at Rudabanya was discontinued owing to increasing financial losses.

Government Policies and Programs.—Despite some economic setbacks, the Government of Hungary planned to maintain a policy of industrial modernization and rationalization and to align production with the domestic and foreign market demands rather than with the past practices of rigid central planning. Major investment programs for the mineral industry were not announced for the seventh 5-year plan (1986-90), but general plan provisions allowed for slight production increases in the metallurgical industries in accordance with domestic and foreign market opportunities.

The 1986-90 plan called for an increase in the production of steel castings and forgings and an increase in the output of finished and semifabricated products made from nonferrous alloys. Bauxite production would be maintained at levels of the sixth 5-year plan by replacing exhausted mines with new workings. Coal mining was planned to increase, and coal would be used to a greater extent in electric power generation. The annual production of petroleum and natural gas would be maintained at about 13.5 million barrels and 247 billion cubic feet, respectively. There would also be a twofold increase in nuclear generated electricity by the end of the seventh 5-year plan period. Compared with that of 1985, planned industrial production was to increase by 14% to 17%. One-third of this increase would be provided by the mining and extracting industries; the balance, by the manufacturing sectors.

PRODUCTION

The production shortfalls of most of Hungary's mineral commodities were attributed to harsh winter weather and a decrease in market opportunities. A gradual but sustained outflow of workers from the mining sector continued to adversely affect its performance. Modest production increases were planned for 1986.

Table 1.—Hungary: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984[p]	1985[e]
METALS					
Aluminum:					
Bauxite, gross weight ------ thousand tons	2,914	2,627	2,917	2,994	2,815
Alumina, gross weight ---------- do	792	710	836	811	[3]801
Metal, primary	74,253	74,221	74,039	74,202	[3]73,832
Copper:					
Metal:[e]					
Smelter, secondary	100	100	100	100	100
Refined including secondary	12,000	12,200	12,500	12,800	12,800
Gold, mine output, metal content[e] thousand troy ounces	60	50	30	20	20
Iron and steel:					
Iron ore:					
Gross weight ------- thousand tons	422	467	441	383	[3]311
Iron content ---------- do	101	112	106	92	75
Metal:					
Pig iron:					
For steel industry ------ do	2,065	2,065	1,966	2,029	[3]2,007
For foundry use ------ do	128	116	81	68	[3]88
Total ------ do	2,193	2,181	2,047	2,097	[3]2,095
Ferroalloys:[e]					
Ferrosilicon	10,500	10,500	10,000	9,000	9,000
Silicon metal	2,000	2,000	2,000	2,000	2,000
Other	2,500	2,500	2,000	2,000	2,000
Total	15,000	15,000	14,000	13,000	13,000
Steel, crude ------- thousand tons	3,642	3,702	3,616	3,750	[3]3,647
Semimanufactures, rolled only -- do	2,816	2,853	2,815	2,953	[3]2,860
Lead:[e]					
Mine output, metal content	500	600	700	700	700
Metal, refined, secondary	100	100	100	100	100
Manganese ore:					
Run of mine:[4]					
Gross weight	121,965	150,035	103,580	115,885	[3]115,334
Metal content	[r]23,200	[r]28,500	20,000	22,000	22,000
Concentrate:					
Gross weight	71,000	83,000	59,000	67,000	65,700
Metal content	21,300	24,900	17,700	20,100	19,700
Zinc:[e]					
Mine output, metal content	1,800	1,500	2,400	2,300	2,200
Metal, smelter, secondary	600	600	600	600	600
INDUSTRIAL MINERALS					
Cement, hydraulic ------- thousand tons	4,635	4,369	4,243	4,145	[3]3,678
Clays:					
Bentonite:					
Raw	80,531	84,934	79,807	64,158	[3]59,853
Processed	52,515	54,014	56,850	45,759	[3]44,431
Kaolin:					
Raw	52,518	45,131	37,375	38,869	[3]29,038
Processed	7,024	7,109	7,874	8,303	[3]6,485
Lime, calcined ------- thousand tons	757	845	822	823	[3]798
Nitrogen: N content of ammonia ------ do	818	792	813	814	815
Perlite	95,190	89,975	93,503	102,060	102,000
Pyrites, gross weight[e]	7,000	7,000	7,000	7,000	7,000

See footnotes at end of table.

Table 1.—Hungary: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984[p]	1985[e]
INDUSTRIAL MINERALS —Continued					
Refractory materials, n.e.s.:					
Chamotte products thousand tons	162	158	166	164	170
Chrome magnesite products do.	42	40	48	38	50
Sand and gravel:					
Gravel thousand cubic meters	12,191	11,219	10,665	10,317	10,300
Sand:					
Common[e] do.	400	400	400	400	400
Foundry thousand tons	692	585	579	591	560
Sodium compounds:					
Hydroxide (caustic soda)	179,779	177,895	191,646	193,693	194,063
Sulfate[e]	11,000	11,000	11,000	10,000	10,000
Stone:					
Dimension, all types thousand tons	[r]8,317	[r]7,967	7,060	5,874	6,000
Dolomite do.	1,248	1,324	1,167	1,205	1,200
Limestone do.	8,565	8,367	8,081	7,695	7,500
Quartzite do.	33	26	14	22	20
Sulfur:					
From pyrite[e]	3,000	3,000	3,000	2,000	2,000
Byproduct, elemental, all sources	9,200	9,200	9,200	9,000	9,000
Total	12,200	12,200	12,200	11,000	11,000
Sulfuric acid	572,681	571,339	605,659	549,159	[3]520,177
Talc[e]	17,500	17,000	17,000	17,500	17,000
MINERAL FUELS AND RELATED MATERIALS					
Carbon black[e]	5,000	5,000	5,000	5,000	5,000
Coal:					
Bituminous thousand tons	3,066	3,039	2,827	2,573	[3]2,639
Brown do.	14,463	14,754	14,406	14,448	[3]14,016
Lignite do.	8,413	8,286	7,980	8,026	[3]7,387
Total do.	25,942	26,079	25,213	25,047	[3]24,042
Coke:					
Coke oven:					
Metallurgical do.	645	618	564	546	[3]492
Other[e] do.	170	170	170	160	160
Total do.	815	788	734	706	652
Gashouse[e] do.	180	180	170	160	160
Total coke do.	995	968	904	866	812
Fuel briquets do.	1,338	1,472	1,533	1,549	[3]1,722
Gas:					
Manufactured million cubic feet	18,000	17,834	15,362	14,232	14,500
Natural, marketed do.	212,276	234,524	229,899	244,060	[3]262,777
Natural gas liquids:					
Natural gasoline thousand 42-gallon barrels	3,700	3,700	3,800	3,900	3,800
Liquefied petroleum gas do.	3,500	3,500	3,500	3,500	3,500
Peat, agricultural use[e] thousand tons	70	70	70	70	70
Petroleum:					
Crude:					
As reported do.	2,024	2,027	2,004	2,007	[3]2,012
Converted thousand 42-gallon barrels	13,723	[r]13,743	13,587	13,607	[3]13,641
Refinery products:[5]					
Gasoline including naphtha do.	20,085	20,068	20,153	21,479	[3]22,644
Kerosene and other light distillates[e 6] do.	7,000	7,000	7,000	7,000	7,000
Distillate fuel oil do.	26,297	25,185	23,454	25,909	[3]24,506
Residual fuel oil do.	20,526	17,329	16,836	16,960	[3]16,970
Lubricants do.	1,000	1,000	1,000	1,000	1,000
Liquefied petroleum gas[e] do.	1,000	1,000	1,000	1,000	1,000
Asphalt and bitumen[e] do.	3,900	3,900	3,800	3,800	3,800
Paraffin and petrolatum[e] do.	250	250	250	250	250
Total do.	80,058	75,732	73,493	77,398	77,170

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through June 6, 1986.
[2]In addition to the commodities listed, diatomite, gypsum, and a variety of other crude construction materials such as common clays are produced, but available information is inadequate to make reliable estimates of output levels.
[3]Reported figure.
[4]18% to 20% Mn.
[5]Excludes refinery fuel and losses.
[6]Data derived by subtracting reported motor gasoline and white spirit data from reported light refinery products total.

TRADE

Most of Hungary's foreign trade objectives were met; the country showed a balance-of-payments surplus at yearend. However, imports grew faster and exports more slowly than planned, and the convertible currency trade surplus fell behind the planned level of 1984. A depressed aluminum market also resulted in reduced aluminum sales during the year; aluminum sales contributed about 20% of the country's convertible currency earnings.

Hungary was a net importer of most raw materials and fuels and, as in previous years, the U.S.S.R. was the predominant exporter of these commodities to Hungary. Major commercial agreements with the U.S.S.R. in 1985 included the renewal of the 1962 Hungarian alumina for Soviet aluminum barter deal, Hungarian participation in the construction of the Progress natural gas pipeline, and a 5-year commodity trade plan that would supply Hungary with up to 50% of its energy requirements through 1990.

Table 2.—Hungary: Apparent exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS				
Aluminum:				
Ore and concentrate[2]	431,033	430,587	--	Czechoslovakia 270,404; East Germany 140,064.
Oxides and hydroxides[2]	664,872	650,921	--	U.S.S.R. 335,802; Austria 134,980; Poland 125,886.
Ash and residue containing aluminum	690	739	--	All to West Germany.
Metal including alloys:[2]				
Scrap	6,498	8,226	--	Austria 4,314; Italy 2,360; West Germany 1,552.
Unwrought	57,882	72,511	99	East Germany 17,009; Poland 12,275; Bulgaria 10,315.
Semimanufactures	49,464	45,802	7,583	East Germany 7,956; Sweden 4,998.
Chromium:				
Ore and concentrate	3,275	4,138	--	All to Italy.
Oxides and hydroxides	67	46	10	Italy 30; Sweden 3.
Cobalt: Oxides and hydroxides	--	4	--	All to Sri Lanka.
Copper:				
Oxides and hydroxides	22	NA		
Sulfate	1,215	553	--	West Germany 245; Austria 188; France 120.
Ash and residue containing copper	19	21	--	All to West Germany.
Metal including alloys:				
Scrap	4,716	5,926	--	Austria 4,468; West Germany 1,245; Belgium-Luxembourg 82.
Unwrought	4,133	5,138	--	West Germany 4,489; Belgium-Luxembourg 512.
Semimanufactures	3,076	5,732	1,150	West Germany 2,095; Austria 1,730.
Gold: Metal including alloys, unwrought and partly wrought troy ounces	--	874	--	All to West Germany.
Iron and steel: Metal:				
Scrap	50,000	79,000	--	Italy 60,192; Austria 6,013; Switzerland 5,406.
Pig iron, cast iron, related materials[3]	4,800	20,900	--	NA.
Ferroalloys, unspecified	24	NA		
Steel, primary forms[2]	5,192	45,899	--	Turkey 32,232; West Germany 6,440; Yugoslavia 5,914.
Semimanufactures:				
Bars, rods, angles, shapes, sections[2]	693,529	792,348	197	U.S.S.R. 126,829; Iran 96,227; West Germany 87,151.
Universals, plates, sheets[2]	275,991	376,622	52,519	Austria 56,358; Italy 48,238.
Hoop and strip[2]	19,754	20,701	--	Yugoslavia 11,295; Czechoslovakia 2,814; U.S.S.R. 2,555.
Rails and accessories	33	97	--	Netherlands 76; West Germany 21.
Wire[2]	16,058	12,252	--	West Germany 3,256; U.S.S.R. 2,281; Lebanon 1,227.
Tubes, pipes, fittings[2]	66,136	84,756	40	Iran 17,427; U.S.S.R. 14,635; West Germany 8,886.
Castings and forgings, rough[2]	11,782	13,070	37	Poland 4,149; India 2,246; West Germany 2,025.

See footnotes at end of table.

Table 2.—Hungary: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued				
Lead:				
Ash and residue containing lead	1,124	793	--	West Germany 75; Denmark 42.
Metal including alloys:				
Scrap	2,288	2,068	--	West Germany 1,034; Austria 1,028.
Unwrought	284	351	--	All to Austria.
Magnesium: Metal including alloys, semimanufactures	--	17	16	Austria 1.
Manganese: Ore and concentrate, metallurgical-grade[2]	9,608	11,657	--	Czechoslovakia 11,550.
Molybdenum:				
Ore and concentrate	10	NA		
Metal including alloys, all forms	11	16	--	Yugoslavia 15; West Germany 1.
Nickel:				
Ash and residue containing nickel	--	21	--	All to Netherlands.
Metal including alloys:				
Scrap	95	100	--	West Germany 81; Austria 16.
Unwrought	--	317	--	Austria 297; Netherlands 20.
Semimanufactures	81	89	6	West Germany 69; Yugoslavia 6.
Platinum-group metals: Waste and sweepings ---- value, thousands	--	$3,380	--	All to West Germany.
Silver:				
Waste and sweepings ---- do	$4,152	$303	--	West Germany $298.
Metal including alloys, unwrought and partly wrought ---- do	$863	$778	--	West Germany $704; Austria $71.
Tin:				
Ash and residue containing tin	--	57	--	All to Denmark.
Metal including alloys:				
Unwrought	2	56	--	Austria 40; United Kingdom 16.
Semimanufactures	18	40	--	All to Denmark.
Tungsten: Metal including alloys, all forms	12	16	--	Yugoslavia 15; United Kingdom 1.
Zinc:				
Ore and concentrate	27	NA		
Matte	250	173	--	All to West Germany.
Ash and residue containing zinc	3,420	3,378	--	Do.
Metal including alloys:				
Scrap	1,079	738	--	West Germany 621; Austria 117.
Unwrought	40	16	--	All to Austria.
Semimanufactures	3	NA		
Other:				
Ores and concentrates	15	NA		
Oxides and hydroxides	11	4	4	
Ashes and residues	14,531	28,206	--	Austria 27,929; Italy 141.
Base metals including alloys, all forms	10	19	NA	Sweden 18; United Kingdom 1.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	478	992	442	West Germany 550.
Artificial: Corundum[2]	13,714	15,438	350	Austria 2,781; West Germany 2,330; Romania 2,182.
Grinding and polishing wheels and stones[2] --- value, thousands	$1,663	$2,996	$344	Romania $945; East Germany $686; Bulgaria $378.
Asbestos, crude	4,848	3,203	--	All to Belgium-Luxembourg.
Boron materials: Oxides and acids	20	NA		
Cement[2]	145,296	180,011	--	Yugoslavia 154,555; U.S.S.R. 24,266.
Chalk	--	50	--	All to West Germany.
Clays, crude:				
Bentonite[2]	16,382	12,920	--	East Germany 8,032; Poland 4,850.
Kaolin[2]	6,115	6,603	--	Czechoslovakia 5,280; West Germany 1,323.
Unspecified	--	200	--	All to Austria.
Cryolite and chiolite	50	200	--	All to Iceland.
Diamond:				
Gem, not set or strung value, thousands	$5,195	$91	--	Italy $71; Switzerland $18.
Industrial stones ---- do	$302	$660	--	Belgium-Luxembourg $505; Austria $155.
Diatomite and other infusorial earth	3,108	2,790	--	Austria 2,588; Italy 110; West Germany 82.
Feldspar, fluorspar, related materials	1,285	971	--	All to Switzerland.
Fertilizer materials:				
Crude, n.e.s	1,166	400	--	All to Austria.
Manufactured:				
Ammonia[2] -- thousand tons	69	66	--	Yugoslavia 58; Austria 6; Italy 2.
Nitrogenous[2] ---- do	1,191	1,519	--	Yugoslavia 122; West Germany 109; unspecified 1,178.
Phosphatic, P_2O_5 content[3] do	12	12	--	NA.

See footnotes at end of table.

Table 2.—Hungary: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Destinations, 1984: United States	Destinations, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Fertilizer materials —Continued				
Manufactured —Continued				
Unspecified and mixed	154	178	--	West Germany 101; Thailand 31; Denmark 26.
Gypsum and plaster	--	120	--	All to Austria.
Kyanite and related materials	96	NA		
Lime	--	29	--	All to Netherlands.
Magnesium compounds	11	27	--	France 21; Italy 6.
Mica:				
Crude including splittings and waste	--	40	--	All to West Germany.
Worked including agglomerated splittings	621	NA		
Pigments, mineral: Iron oxides and hydroxides, processed	--	1	--	All to Italy.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$15	NA		
Synthetic do	$2	$29	--	All to United Kingdom.
Pyrite, unroasted	9,989	NA		
Sodium compounds, n.e.s.: Carbonate, manufactured	[3]7,800	49	--	All to West Germany.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked[2]	14,487	16,756	--	U.S.S.R. 9,326; Czechoslovakia 1,480; Poland 1,302.
Worked	126	48	--	All to West Germany.
Dolomite, chiefly refractory-grade	11,745	18,194	--	Poland 18,139.
Gravel and crushed rock	4,150	29,586	--	United Kingdom 22,757; Yugoslavia 6,726.
Quartz and quartzite	29,158	19,956	--	All to Austria.
Sand:[2]				
Construction cubic meters	63,757	43,757	--	Czechoslovakia 39,090; U.S.S.R. 4,667.
Industrial	43,495	31,047	--	Yugoslavia 25,732; Austria 5,315.
Sulfur:				
Elemental:				
Crude including native and byproduct	13,196	12,101	--	Austria 11,481; West Germany 620.
Colloidal, precipitated, sublimed	192	NA		
Sulfuric acid[2]	52,687	47,867	--	Yugoslavia 41,608; Brazil 6,240.
Other:				
Crude[2]	88,757	75,800	--	Austria 23,337; East Germany 16,043; West Germany 10,864.
Slag and dross, not metal-bearing	689	328	--	All to Austria.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	10,989	9,636	--	All to Pakistan.
Carbon black	--	59	--	West Germany 54.
Coal:				
Anthracite and bituminous[3]	547	533	--	NA.
Briquets of anthracite and bituminous coal	1	1	--	All to Austria.
Lignite including briquets[2]	23	17	--	U.S.S.R. 16; Austria 1.
Gas, natural: Gaseous million cubic feet	383	368	--	All to Romania.
Peat including briquets and litter[2]	2,903	5,294	--	Austria 3,212; Yugoslavia 1,950.
Petroleum refinery products:				
Liquefied petroleum gas[2] thousand 42-gallon barrels	618	500	--	Italy 337; Yugoslavia 76; Austria 50.
Gasoline do	665	1,071	--	Austria 418; Poland 213; West Germany 137.
Mineral jelly and wax[2] do	255	311	3	West Germany 83; Italy 44; Morocco 39.
Kerosene and jet fuel do	204	490	--	Austria 462; Switzerland 28.
Distillate fuel oil do	2,871	4,468	--	Austria 1,846; Switzerland 1,687; West Germany 899.
Lubricants[2] do	519	411	--	Austria 214; Yugoslavia 68; Switzerland 47.
Residual fuel oil do	525	864	--	Yugoslavia 517; Austria 347.
Bitumen and other residues[2] do	655	622	([4])	Austria 286; Algeria 86; West Germany 85.

[p]Preliminary. NA Not available.
[1]Table prepared by Jozef Plachy. Owing to a lack of official trade data published by Hungary, this table should not be taken as a complete presentation of this country's mineral trade. Unless otherwise specified, these data were compiled from United Nations information and data published by the partner trade countries.
[2]Official Trade Statistics of Hungary.
[3]Statistical Yearbook of Members of the Council for Mutual Economic Assistance, Moscow, U.S.S.R.
[4]Less than 1/2 unit.

Table 3.—Hungary: Apparent imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS				
Aluminum:				
Ore and concentrate	1,092	1,496	--	West Germany 1,495.
Oxides and hydroxides	204	111	--	West Germany 100; France 11.
Metal including alloys:				
Unwrought[2]	163,000	163,320	--	All from U.S.S.R.
Semimanufactures[2]	4,997	4,529	4	East Germany 2,997; Czechoslovakia 398; Austria 343.
Antimony: Oxides	--	5	--	All from West Germany.
Bismuth: Metal including alloys, all forms	3	NA		
Chromium:				
Ore and concentrate	17,352	17,000	--	All from U.S.S.R.
Oxides and hydroxides	--	280	--	United Kingdom 279.
Cobalt:				
Ore and concentrate	18	NA		
Oxides and hydroxides	3	2	--	All from West Germany.
Copper:				
Sulfate[2]	3,450	3,569	--	All from U.S.S.R.
Metal including alloys:				
Scrap	5,338	6,285	--	Switzerland 2,803; Belgium-Luxembourg 1,770; West Germany 1,653.
Unwrought[2]	31,785	30,112	--	U.S.S.R. 13,430; Poland 8,370; Belgium-Luxembourg 1,870.
Semimanufactures	[2]12,121	[2]12,803	15	West Germany 1,354; undetermined 10,845.
Gold: Metal including alloys, unwrought and partly wrought ---troy ounces	1,770	1,511	--	All from Switzerland.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite[2] thousand tons	3,967	4,170	--	U.S.S.R. 3,955; Brazil 72; Canada 47.
Pyrite, roasted ---do	--	28	--	All from Yugoslavia.
Metal:				
Scrap	28,000	20,000	--	NA.
Pig iron, cast iron, related materials[2]	293,562	279,461	--	U.S.S.R. 241,669; Brazil 20,922; Algeria 15,209.
Ferroalloys:				
Ferrochromium[2]	9,098	8,801	--	U.S.S.R. 5,957; West Germany 838; Italy 585.
Ferromanganese[2]	39,980	37,794	--	U.S.S.R. 24,584; Norway 6,300; Spain 4,200.
Ferrosilicon[2]	6,654	6,373	--	U.S.S.R. 6,233; West Germany 140.
Silicon metal	--	1,860	--	Norway 1,100; Italy 760.
Unspecified	13,592	12,819	--	U.S.S.R. 10,282; Romania 500.
Steel, primary forms[2]	425,386	418,780	(3)	U.S.S.R. 391,056; Czechoslovakia 13,517; Albania 11,393.
Semimanufactures:				
Bars, rods, angles, shapes, sections[2]	170,146	182,968	--	U.S.S.R. 138,742; Poland 11,358; Spain 9,991.
Universals, plates, sheets[2]	369,211	337,646	43	U.S.S.R. 228,228; Czechoslovakia 16,172; Spain 14,872.
Hoop and strip[2]	10,014	11,009	6	West Germany 3,820; Czechoslovakia 3,632; Italy 1,155.
Rails and accessories	637	2,000	--	NA.
Wire[2]	34,420	34,159	2	Czechoslovakia 12,443; U.S.S.R. 4,019; West Germany 3,425.
Tubes, pipes, fittings[2]	81,053	74,089	12	Czechoslovakia 23,903; East Germany 13,128; West Germany 12,437.
Castings and forgings, rough[2]	11,353	15,376	1	Poland 7,910; Yugoslavia 4,836; Italy 637.
Lead:				
Oxides	1,096	792	--	West Germany 433; France 182; United Kingdom 177.
Metal including alloys:				
Unwrought[2]	11,930	9,343	--	U.S.S.R. 5,924; Sweden 898; Bulgaria 697.
Semimanufactures	31	15	--	West Germany 12; United Kingdom 3.
Lithium: Oxides and hydroxides	18	NA		
Magnesium: Metal including alloys:				
Unwrought	53	160	--	Italy 120; Yugoslavia 40.
Semimanufactures	23	15	--	All from West Germany.
Manganese:				
Ore and concentrate, metallurgical-grade[2]	343	340	--	Netherlands 240; Finland 80.
Oxides	5	NA		

See footnotes at end of table.

Table 3.—Hungary: Apparent imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Mercury 76-pound flasks	261	1,740	--	All from Netherlands.
Molybdenum:				
Ore and concentrate	--	18	--	Do.
Metal including alloys, all forms	25	11	--	All from Japan.
Nickel:				
Matte and speiss, Ni content	190	687	--	All from Cuba.
Oxides and hydroxides	8	NA		
Metal including alloys:				
Unwrought	55	5	--	All from United Kingdom.
Semimanufactures	78	109	--	United Kingdom 54; West Germany 24; Sweden 12.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$4,629	$4,251	--	West Germany $3,743; Japan $413; United Kingdom $89.
Silver: Metal including alloys, unwrought and partly wrought do	$12,291	$5,123	--	West Germany $4,919; Sweden $154; Austria $24.
Tin: Metal including alloys:				
Scrap	--	5	--	All from United Kingdom.
Unwrought[2]	2,038	1,654	--	Brazil 627; Bolivia 110; undetermined 851.
Semimanufactures	7	16	--	Netherlands 12; United Kingdom 2.
Titanium:				
Ore and concentrate	2,179	2,719	--	West Germany 1,976; Netherlands 743.
Oxides	2,145	1,889	--	United Kingdom 960; Belgium-Luxembourg 500; West Germany 378.
Metal including alloys, all forms	4	NA		
Tungsten:				
Ore and concentrate	139	NA		
Metal including alloys, all forms	12	12	(3)	Japan 10; United Kingdom 2.
Zinc:				
Oxides	2,648	3,162	--	Austria 1,012; France 793; Yugoslavia 765.
Metal including alloys:				
Unwrought[2]	26,904	27,995	--	Yugoslavia 5,019; U.S.S.R. 4,181; Bulgaria 3,119.
Semimanufactures	[2]5,892	[2]5,796	--	West Germany 705; Belgium-Luxembourg 200; undetermined 4,838.
Zirconium: Ore and concentrate	4,727	4,343	--	Italy 3,638; Netherlands 401; West Germany 304.
Other:				
Ores and concentrates[2]	8,252	9,996	--	Cuba 6,317; Australia 1,205; Switzerland 995.
Oxides and hydroxides	101	1,979	--	Austria 1,763; Sweden 185; Netherlands 16.
Ashes and residues	--	32	--	All from Austria.
Base metals including alloys, all forms	41	27	2	Belgium-Luxembourg 15; France 6.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	82	30	--	West Germany 21; Italy 9.
Artificial:				
Corundum[2]	1,451	1,627	(3)	France 873; West Germany 348; Czechoslovakia 127.
Silicon carbide	1,056	873	--	All from Italy.
Dust and powder of precious and semiprecious stones including diamond value, thousands	$305	$47	--	Switzerland $31; Belgium-Luxembourg $14.
Grinding and polishing wheels and stones[2] do	$5,604	$10,732	$384	U.S.S.R. $3,257; Austria $2,487; West Germany $2,026.
Asbestos, crude[2]	37,603	35,097	129	U.S.S.R. 31,581; Botswana 2,492; Greece 737.
Barite and witherite	19,037	16,269	--	Yugoslavia 13,700; West Germany 2,538.
Boron materials:				
Crude natural borates	--	1,030	--	Netherlands 990; France 40.
Elemental	--	40	--	All from France.
Oxides and acids	3,513	3,222	--	U.S.S.R. 1,288; France 1,274; Italy 660.
Bromine[2]	597	630	--	Israel 350; East Germany 149; U.S.S.R. 131.

See footnotes at end of table.

Table 3.—Hungary: Apparent imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Cement[3]	875,040	845,438	--	U.S.S.R. 508,528; East Germany 155,012; Czechoslovakia 111,950.
Chalk	1,952	1,705	--	Austria 1,299; France 357; Switzerland 25.
Clays, crude:				
Chamotte earth[3]	73,219	72,822	--	Czechoslovakia 68,916; Israel 2,097; Poland 1,194.
Fire clay	14,808	NA		
Kaolin[3]	40,232	60,843	408	Austria 33,052; Czechoslovakia 12,380; East Germany 11,292.
Unspecified[3]	62,948	88,695	72	Czechoslovakia 58,411; Poland 19,788; East Germany 4,948.
Diamond:				
Gem, not set or strung value, thousands	$384	$354	$8	Switzerland $197; Belgium-Luxembourg $123; Austria $26.
Industrial stones do.	$637	$878	--	Belgium-Luxembourg $728; West Germany $61; Austria $57.
Diatomite and other infusorial earth	2,954	2,477	--	Iceland 1,702; Austria 412; Italy 225.
Feldspar, fluorspar, related materials	3,961	2,039	--	Norway 945; Italy 402; Yugoslavia 338.
Fertilizer materials: Manufactured:				
Ammonia	2	737	--	Poland 729; Belgium-Luxembourg 5.
Nitrogenous, N_2 content[3]	257,189	322,371	--	U.S.S.R. 307,099; Netherlands 8,610; West Germany 3,570.
Phosphatic, P_2O_5 content[3]	145,715	156,599	18,731	Yugoslavia 29,217; U.S.S.R. 29,181; Romania 25,154.
Potassic, K_2O content[3]	566,491	509,066	--	U.S.S.R. 378,579; East Germany 123,497.
Unspecified and mixed[3]	113,687	115,632	10,773	Yugoslavia 60,285; U.S.S.R. 44,558.
Graphite, natural	1,030	590	--	Austria 380; West Germany 164; Italy 25.
Gypsum and plaster[3]	79,940	87,973	--	East Germany 70,544; Romania 16,872.
Iodine[3]	(5)	35	--	U.S.S.R. 32; Japan 3.
Kyanite and related materials	40	NA		
Lime[3]	53,806	41,221	--	Yugoslavia 23,717; Czechoslovakia 17,393.
Magnesium compounds[3]	98,312	91,467	--	Czechoslovakia 76,804; Austria 5,615; U.S.S.R. 5,293.
Mica:				
Crude including splittings and waste	12	137	--	United Kingdom 123; France 12.
Worked including agglomerated splittings	47	38	--	Switzerland 16; Austria 15; West Germany 4.
Phosphates, crude[3]	648,830	645,820	--	U.S.S.R. 472,451; Morocco 103,841; Algeria 69,528.
Pigments, mineral: Iron oxides and hydroxides, processed	2,613	3,223	--	West Germany 2,977; Italy 211; Netherlands 19.
Potassium salts, crude[3]	2,906	--		
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$38	$62	--	Switzerland $52; Austria $9.
Synthetic do.	$71	$267	--	West Germany $180; Belgium-Luxembourg $45; Switzerland $41.
Pyrite, unroasted[3]	80,067	4,174	--	All from Albania.
Salt and brine[3]	572,569	578,011	--	Romania 416,861; U.S.S.R. 92,023; Poland 52,911.
Sodium compounds, n.e.s.:				
Carbonate, manufactured[3]	182,678	197,834	--	Bulgaria 121,837; Romania 57,043; East Germany 14,188.
Sulfate, manufactured	255	NA		
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked[3]	57,206	17,119	--	Bulgaria 5,511; Cuba 4,124; Romania 2,988.
Worked	182	1,242	--	Yugoslavia 742; Italy 212; Netherlands 182.
Dolomite, chiefly refractory-grade	94	81	--	Austria 51; West Germany 30.
Gravel and crushed rock	9,550	12,562	7	Austria 7,774; Yugoslavia 2,229; Italy 2,225.
Quartz and quartzite	1,951	2,233	--	West Germany 1,884; Netherlands 321.
Sand other than metal-bearing[3]	135,035	125,790	100	Czechoslovakia 99,307; East Germany 13,889.

See footnotes at end of table.

Table 3.—Hungary: Apparent imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Sulfur:				
Elemental:				
Crude including native and byproduct[2]	174,692	168,066	--	Poland 136,899; U.S.S.R. 31,036.
Colloidal, precipitated, sublimed	1	3	--	All from West Germany.
Dioxide	336	NA		
Sulfuric acid[2]	194	958	--	West Germany 740; Bulgaria 197; Austria 21.
Talc, steatite, soapstone, pyrophyllite	2,253	1,723	--	Austria 1,222; Italy 490.
Other:				
Crude	65,981	69,020	421	Czechoslovakia 16,725; Bulgaria 14,166; Austria 12,188.
Slag and dross, not metal-bearing	645	NA		
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	61	74	--	Austria 64; West Germany 10.
Carbon:[2]				
Carbon black	989	2,461	10	U.S.S.R. 809; East Germany 260.
Gas carbon	21,304	21,076	--	U.S.S.R. 20,685; West Germany 391.
Coal:[2]				
Anthracite and bituminous thousand tons	1,756	1,610	--	U.S.S.R. 812; Poland 438; Czechoslovakia 347.
Briquets of anthracite and bituminous coal do	516	589	--	East Germany 556; Poland 33.
Lignite including briquets do	--	7	--	All from Yugoslavia.
Coke and semicoke[2] do	863	831	--	Yugoslavia 462; Czechoslovakia 188; Poland 139.
Gas, natural: Gaseous[2] million cubic feet	143,762	134,847	--	U.S.S.R. 134,124.
Petroleum:				
Crude[2] thousand 42-gallon barrels	65,601	65,116	--	U.S.S.R. 50,568; Libya 7,277; Iran 5,974.
Refinery products:				
Liquefied petroleum gas do	330	209	--	U.S.S.R. 188; Austria 14.
Gasoline[2] do	921	856	--	Yugoslavia 507; U.S.S.R. 250; Albania 97.
Mineral jelly and wax[2] do	8	11	--	U.S.S.R. 9; Netherlands 1.
Kerosene and jet fuel[2] do	1,267	1,240	--	U.S.S.R. 936; East Germany 116; Bulgaria 23.
Distillate fuel oil[2] do	4,142	5,645	--	U.S.S.R. 5,545; United Kingdom 100.
Lubricants[2] do	127	151	(3)	U.S.S.R. 112; Belgium-Luxembourg 11; Netherlands 7.
Residual fuel oil[2] do	1,197	1,559	--	U.S.S.R. 1,350; United Kingdom 140.
Bituminous mixtures do	1	1	--	All from Austria.
Petroleum coke do	44	55	--	Norway 49; West Germany 6.

[p]Preliminary. NA Not available.
[1]Table prepared by Jozef Plachy. Owing to a lack of official trade data published by Hungary, this table should not be taken as a complete presentation of this country's mineral trade. Unless otherwise specified, these data were compiled from United Nations information and data published by the partner trade countries.
[2]Official Trade Statistics of Hungary.
[3]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Aluminum and Bauxite.—The chief event in the bauxite mining industry was the completion and official opening of the Fenyoefoe bauxite mine in Fejér. The mine was planned to produce 650,000 tons of bauxite per year: 450,000 tons from underground and 200,000 tons from opencast workings. The deposit was expected to last 40 years at this production level. Most of the bauxite mined at the Fenyoefoe Mine will be processed at the Almasfuezitö alumina plant. Also, the Csordakut and Nagyegyhaza Mines, belonging to the Tatabanya coal mining enterprise, began producing bauxite in 1985. The bauxite deposits at these mines were found below coal and limestone seams. Approximately 150,000 tons of bauxite was produced at Nagyegyhaza from opencast operations. Production would reach 350,000 tons in 1986, and beginning in 1987, mining would start underground with output increasing to about 500,000 tons per year. Bauxite produced at the Nagyegyhaza Mine was also to be processed at the Almasfuezitö alumina plant.

The industry continued to experience a labor shortage; over 200 workers per year have sought employment in other branches of the economy. Reportedly, there were few replacements owing to fewer benefits provided to bauxite miners compared with those in other mining activities, as well as to very difficult working conditions.

In late 1985, Hungary and the U.S.S.R. renegotiated the provisions of the 1962 alumina-aluminum agreement. The previous agreement called for annual Hungarian shipments of 336,000 tons of alumina to the U.S.S.R. in exchange for 165,000 tons of aluminum. The U.S.S.R. appeared to have been favored under the provisions of the new agreement, which called for Hungarian deliveries of 530,000 tons of alumina in exchange for 205,000 tons of aluminum. The provisions of the agreement stipulated shipments of higher grade, coarser grained material to the U.S.S.R. On balance, aluminum sales decreased during the year owing to an oversupplied world market. The country planned to produce about 2,700,000 tons of bauxite, 880,000 tons of alumina, and 180,000 tons of aluminum semimanufactures in 1986.

Iron and Steel.—Hungary's oldest operating mine as well as the country's only domestic producer of iron ore, the Rudabanya Mine, closed at yearend owing to sustained financial losses. Production at this facility had declined from about 800,000 tons per year in the 1960's to about 400,000 tons in 1985. The quality of the ore declined over the years to the point of making beneficiation costs too high. The labor force was transferred to nearby quarries that were to produce gypsum and dolomite.

Work continued on the construction of a coking battery at the Dunaujvaros iron and steel works; the startup of this unit was scheduled for late 1986. The industry continued to be adversely affected by an unfavorable world steel market. Despite this situation, plans to continue to streamline the industry were maintained with the aim of increasing exports to market economy trading partners.

Lead and Zinc.—Mining continued at the Gyongyosoroszi Mine in the Matra Mountains. Lead and zinc concentrates were mostly exported. However, this operation, like the one at Rudabanya, was reportedly sustaining losses and would be subject to reorganization in 1986.

Manganese.—Over 110,000 tons of oxidic ore was mined in 1985. Early in the year, results from a pilot plant operation indicated that electrothermic ferromanganese could be produced from sintered ore mined at Urkut. The alloy would have a manganese content of 70% and a phosphorus content of 0.45%, but lack of industrial experience was cited as the main obstacle in starting production.

Tungsten.—In a major commercial transaction with Mongolia, the Hungarian foreign trade organization, Wolframinvest, was to begin mining a tungsten deposit at Tsogaan-davaa, about 50 miles from the Mongolian capital of Ulan Bator. Mine and concentrator development was scheduled for completion in 1988. Hungary would receive 87.5% of the tungsten concentrate from this facility, or about 450 tons per year; 250 tons would be designated for domestic consumption, and the balance would be exported. The facility would produce about 3,000 tons of powder in the first 10 years of operation.

INDUSTRIAL MINERALS

Hungary continued to produce a variety of industrial minerals—bentonite, kaolin, perlite, and zeolite—at mining operations in the Tokaj Mountains. Production of these commodities met most of the country's domestic as well as export needs. Perlite from the Palhaza Mine was processed and marketed as an expanded product.

MINERAL FUELS

Coal.—Coal production declined during the year owing to adverse weather conditions, startup delays, and growing labor shortages. Planned output for 1986 was set at 24,000,000 tons. New mines brought onstream during 1985 included the Markushegy, Nagyegyhaza, and Lenecsehegy Mines. The Markushegy Mine, with a rated output of 1.6 million tons of brown coal per year, would raise production to 2.4 million tons by 1989.

Natural Gas and Petroleum.—Petroleum and natural gas production in 1985 was maintained at about the same level as that of 1984. Part of Hungary's commercial agreement with the U.S.S.R. for 1986 called for additional deliveries of natural gas to Hungary. As compensation for the increase, Hungary was to participate in the Yamburg natural gas pipeline construction project that was to be extended to the western border of the U.S.S.R.

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[1]Foreign mineral specialist, Division of International Minerals.

The Mineral Industry of Iceland

By Richard H. Singleton[1]

Little change occurred in Iceland's metals and minerals industries during 1985. Minerals production continued to be led by the aluminum and ferrosilicon industries, both of which were power intensive, consuming approximately one-half of the country's electrical power. These industries were dependent on imported alumina, silica, and coke or coal. Output of aluminum decreased by about 9% after having peaked in 1984. Prospects for attracting further power-intensive industries including aluminum, silicon, and ferroalloys decreased because of limited projected markets coupled with domestic policy disagreements regarding future ownership and governmental control of these industries.

Iceland's gross national product (GNP) increased slightly in 1985 to $2.5 billion.[2] Inflation and foreign debt were major economic problems. The cost-of-living index increased by an estimated 32%, a slightly higher rate than that of 1984. Net external debt remained at above 60% of GNP. The annualized Government deficit increased significantly to an estimated 15% of collected revenues. However, unemployment remained at only about 1%.

The United States remained Iceland's largest foreign market, receiving about one-quarter of its total export value, and the high value of the dollar hence benefited Iceland's economy. On the other hand, the U.S. share of Iceland's imports decreased to about 6%, because of more competitive prices of European goods.

PRODUCTION

Production of aluminum and ferrosilicon, nearly all for export, decreased somewhat, as did cement, all of which was consumed domestically. Output of diatomite and pumice, also dependent on export markets, increased slightly. Salt production increased significantly in 1985 but not nearly enough to satisfy internal needs.

Table 1.—Iceland: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984	1985[p]
Aluminum metal, primary[2]	73,600	75,200	76,077	80,359	73,403
Cement, hydraulic[3] thousand tons	122	124	115	118	117
Diatomite	19,840	24,965	25,501	27,265	29,388
Iron and steel:					
Ferrosilicon	33,612	[r]41,545	51,008	60,976	60,328
Scrap	NA	3,922	10,882	NA	7,136
Nitrogen: N content of ammonia[e]	7,000	[r]7,000	[r]7,000	7,000	7,532
Pumice	33,945	[r]18,700	45,000	55,000	56,000
Salt	50	100	500	950	1,350
Sand:					
Calcareous, shell thousand cubic meters	114	120	125	115	100
Basaltic cubic meters	5,000	5,300	5,500	4,000	5,500
Silica dust[3] [4]	[r]5,309	4,200	[r]8,326	7,221	7,873
Stone, crushed:					
Rhyolite	21,000	20,500	20,400	20,000	25,755
Scoria thousand cubic meters	--	--	[e]10	11	[e]10

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through June 27, 1986.
[2]Ingot and rolling billet production.
[3]Sales.
[4]Byproduct of ferrosilicon.

TRADE

Aluminum and ferrosilicon continued to be Iceland's major mineral exports in 1984. Shipments of aluminum ingot and billet decreased 25% to 80,000 tons whereas exports of ferrosilicon increased 16% to about 57,000 tons, 14% of which was exported to the United States. Exports of pumice increased 25% to about 57,000 tons. Petroleum products continued to lead, in value, the country's imports, followed by alumina and steel and lesser amounts of coal, coke, fertilizers, and quartz. Imports of coal increased 46% to about 55,000 tons, more than one-third of which was U.S. anthracite. Imports of coke increased 29% to about 41,000 tons.

Table 2.—Iceland: Exports of selected mineral commodities[1]

(Metric tons)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
Abrasives, n.e.s.: Natural: Corundum, emery, pumice, etc	45,328	56,533	338	Norway 19,213; West Germany 15,754; Denmark 7,657.
Aluminum: Metal including alloys, unwrought	106,904	79,928	--	Switzerland 19,380; United Kingdom 14,670; West Germany 11,037.
Diatomite and other infusorial earth	24,508	26,486	--	West Germany 7,374; Denmark 2,956; Czechoslovakia 2,161.
Iron and steel: Metal:				
Scrap	10,268	9,784	--	Republic of Korea 2,904; Spain 1,976; Japan 1,673.
Ferroalloys: Ferrosilicon	49,238	57,252	8,026	West Germany 31,032; Japan 12,083.
Stone, sand and gravel: Dimension stone, crude and partly worked	7	7,154	7,154	
Other: Base metals including alloys, scrap	614	471	--	Netherlands 233; Denmark 132; West Germany 97.

[1]Table prepared by David J. Ellis.

Table 3.—Iceland: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides	144,483	147,509	--	Australia 147,503; United Kingdom 4.
Metal including alloys:				
Unwrought	33	31	--	United Kingdom 21; Netherlands 10.
Semimanufactures	1,021	1,107	11	West Germany 222; Switzerland 184; Norway 152.
Chromium: Oxides and hydroxides	8	2	--	Mainly from West Germany.
Copper: Metal including alloys:				
Scrap	--	280	--	All from West Germany.
Unwrought	4	3	--	Mainly from Denmark.
Semimanufactures	161	213	11	West Germany 82; Sweden 64; United Kingdom 19.
Gold: Metal including alloys, unwrought and partly wrought value, thousands	$106	$126	$47	Republic of South Africa $23; Switzerland $18.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite	12,531	15,647	--	All from Norway.
Metal:				
Scrap	--	3	--	All from West Germany.
Pig iron, cast iron, related materials	537	286	11	France 198; Norway 50; Sweden 25.
Ferroalloys	20	--		
Steel, primary forms	1,230	904	--	Sweden 410; West Germany 302; Netherlands 122.
Semimanufactures:				
Bars, rods, angles, shapes, sections	19,147	20,168	27	Norway 5,577; Sweden 5,297; Spain 3,085.
Universals, plates, sheets	11,710	12,274	--	Belgium-Luxembourg 2,900; Sweden 2,359; West Germany 1,867.
Hoop and strip	575	647	2	Denmark 197; Belgium-Luxembourg 90; United Kingdom 83.
Rails and accessories	15	68	--	Denmark 32; United Kingdom 28; Norway 3.
Wire	286	191	([2])	Belgium-Luxembourg 119; Finland 13; Netherlands 13.
Tubes, pipes, fittings	6,904	6,696	5	West Germany 1,855; Netherlands 1,568; United Kingdom 1,020.
Castings and forgings, rough	149	88	--	Belgium-Luxembourg 52; Denmark 14; West Germany 11.
Lead:				
Oxides	17	16	--	West Germany 13; Sweden 3.
Metal including alloys:				
Unwrought	155	46	--	All from Denmark.
Semimanufactures	13	15	([2])	West Germany 11; Denmark 3.
Magnesium: Metal including alloys, unwrought	41	10	--	All from Norway.
Mercury 76-pound flasks	6	3	--	NA.
Nickel: Metal including alloys, semimanufactures kilograms	800	800	NA	Denmark 600.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$152	$143	$10	Switzerland $99; Netherlands $29.
Silver: Metal including alloys, unwrought and partly wrought do	$99	$117	$3	West Germany $46; Sweden $25; United Kingdom $21.
Tin: Metal including alloys:				
Unwrought kilograms	400	100	--	All from Denmark.
Semimanufactures	6	8	--	Denmark 6; United Kingdom 1.
Titanium: Oxides	648	724	--	West Germany 324; United Kingdom 324; Norway 75.
Zinc:				
Oxides	9	6	--	United Kingdom 4; Denmark 1.
Metal including alloys:				
Unwrought	73	63	--	Norway 48; Belgium-Luxembourg 9; West Germany 6.
Semimanufactures	r9	41	--	France 28; Norway 5; United Kingdom 5.
Other: Base metals including alloys, all forms	20	10	([2])	Netherlands 9.

See footnotes at end of table.

Table 3.—Iceland: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984	
			United States	Other (principal)
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	3	21	--	Sweden 8; Italy 4; Denmark 2.
Grinding and polishing wheels and stones	28	30	([2])	West Germany 12; Sweden 4; United Kingdom 3.
Asbestos, crude	4	2	1	West Germany 1.
Barite and witherite	127	144	--	West Germany 119; Denmark 15; United Kingdom 10.
Cement	7,456	209	--	Denmark 139; Belgium-Luxembourg 37; United Kingdom 30.
Chalk	321	363	--	Norway 127; France 94; United Kingdom 71.
Clays, crude	348	447	37	United Kingdom 222; Netherlands 117.
Cryolite and chiolite	2,406	1,450	--	Denmark 1,250; Hungary 200.
Diamond:				
Gem, not set or strung value, thousands	$32	$37	--	Belgium-Luxembourg $25; West Germany $8.
Industrial stones do	$8	$3	--	Mainly from Belgium-Luxembourg.
Feldspar, fluorspar, related materials	([2])	1	--	All from Denmark.
Fertilizer materials: Manufactured:				
Ammonia	3,168	6,843	--	Norway 6,827; Denmark 11.
Nitrogenous	2,691	84	--	Norway 63; Denmark 18.
Phosphatic	1,809	1,902	--	All from Sweden.
Potassic	11,033	10,360	--	East Germany 10,351.
Unspecified and mixed	31,035	25,883	1	Netherlands 20,355; Norway 5,100.
Graphite, natural	5	15	--	United Kingdom 14.
Gypsum and plaster	8,183	5,173	--	Sweden 5,106; Norway 29; United Kingdom 15.
Lime	516	521	--	United Kingdom 392; West Germany 98; Denmark 22.
Mica: Crude including splittings and waste	13	12	--	Norway 11.
Pigments, mineral: Iron oxides and hydroxides, processed	29	34	--	Denmark 22; United Kingdom 4; West Germany 2.
Salt and brine	80,733	43,797	1	Spain 43,889; West Germany 2,535; United Kingdom 738.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	1,126	1,656	--	East Germany 1,207; West Germany 202; United Kingdom 195.
Sulfate, manufactured	91	96	--	West Germany 50; Sweden 25; Denmark 18.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	111	600	--	Norway 464; China 50; Italy 23.
Worked	172	424	--	Italy 238; Portugal 130; West Germany 27.
Dolomite, chiefly refractory-grade	289	263	--	Norway 247; Sweden 15.
Quartz and quartzite	86,207	103,247	32	Norway 85,844; Spain 11,660; Sweden 5,678.
Sulfur: Sulfuric acid	353	381	--	Norway 310; Denmark 33; United Kingdom 19.
Talc, steatite, soapstone, pyrophyllite	105	118	3	Norway 104; United Kingdom 6; Denmark 4.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	5	18	--	Denmark 14; Netherlands 4.
Coal:				
Anthracite	32,551	37,670	19,941	United Kingdom 8,462; East Germany 4,404.
Bituminous	5,006	17,152	--	Australia 7,270; United Kingdom 6,517; Norway 3,360.
Coke and semicoke	31,686	40,878	--	Norway 26,897; United Kingdom 12,071; East Germany 1,899.
Peat including briquets and litter	114	177	--	Sweden 118; Finland 44; Denmark 15.

See footnotes at end of table.

Table 3.—Iceland: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum refinery products:				
Liquefied petroleum gas thousand 42-gallon barrels	13	12	(2)	Netherlands 11.
Gasoline do	817	829	--	U.S.S.R. 568; Portugal 204.
Mineral jelly and wax do	3	3	(2)	United Kingdom 1.
Kerosene and jet fuel do	375	450	--	Netherlands 449.
Distillate fuel oil do	1,430	1,532	--	U.S.S.R. 917; Portugal 361; Netherlands 254.
Lubricants do	45	48	(2)	Netherlands 14; United Kingdom 13.
Residual fuel oil do	920	773	--	All from U.S.S.R.
Bitumen and other residues do	44	74	--	Sweden 48; United Kingdom 17.
Bituminous mixtures do	19	3	(2)	Sweden 1; United Kingdom 1.
Petroleum coke do	--	(2)	--	All from Netherlands.

[r]Revised. NA Not available.
[1]Table prepared by David J. Ellis.
[2]Less than 1/2 unit.

COMMODITY REVIEW

METALS

The Government continued to promote further development of power-intensive industries in Iceland and attempted to establish contacts with companies seeking locations for production of aluminum, ferroalloys, magnesium, and silicon. Preliminary discussions were held between the Government's committee on Power-Intensive Industries and various large aluminum firms concerning the construction of a second Icelandic aluminum plant at Eyjafjordur in northern Iceland. Planned annual plant capacity was 150,000 to 200,000 tons. Talks continued with Swiss Aluminium Ltd., owner of Iceland's only aluminum plant, regarding a possible 50% expansion to about 135,000 tons per year. Discussions began with The Rio Tinto Zinc Corp. PLC to build a 25,000-ton-per-year silicon metal plant at Reydharfjordhur in eastern Iceland.

The project for construction of Iceland's first steel mill was stalled following withdrawal of Government support for the venture. The Government was to have had a 40% interest in the project. The Government's withdrawal was apparently made on the basis of an insufficient projected market. Purchase of the bar rolling mill from Sweden was canceled, and the mill was sold to a U.S. firm.

INDUSTRIAL MINERALS

Cement.—Sementsverksmidja Rikisins, the Government-owned cement works at Akrones, was constructed in the late 1950's and in 1985 supplied more than 90% of Iceland's needs. The calcitic component of the cement was dredged seashells. No limestone occurs in Iceland. Raw materials mined locally on land were crushed argillaceous rhyolite and basaltic sands. Another ingredient, a high-silica dust, was purchased as a byproduct from Iceland's ferrosilicon plant at nearby Grundartangi. The gypsum component was imported. Three types of cement, pozzolan, ordinary portland, and high-early-strength portland, were produced. Total production during the past 3 years, through 1985, was about 8% below that of the previous 3-year period.

Scoria.—Scoria was mined over the past 3 years, including 1985, at a rate of about 10,000 cubic meters per year. Shipments were made to Canada and the United States for ornamental use in gardens and to simulate charcoal in gas barbecue grills.

MINERAL FUELS

Estimates of Iceland's future hydroelectric energy requirements decreased as prospects for attracting power-intensive industries diminished. Work continued on the

Blanda hydroelectric plant but at a slower pace. The scheduled Blanda startup was extended by about 3 years to approximately 1991.

Iceland has no significant resources of mineral fuels. Space heating has been primarily by geothermal steam or hot water. Petroleum products were imported for the fishing fleet, and coal was imported for the aluminum and ferrosilicon industries.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Icelandic krona (IKr) to U.S. dollars at the rate of IKr42=US$1.00.

The Mineral Industry of India

By Gordon L. Kinney[1]

India has a widely varying geology, from some of the oldest Precambrian rocks in the world to areas of the youngest of unconsolidated sediments in actively forming river deltas. As such, there are occurrences of nearly all common mineral commodities. However, commercial quantities of minerals are limited, both in distribution and in quantity. Most known mineral resources are localized in the Precambrian terrain of peninsular India, but of 1.8 million square kilometers, 500,000 square kilometers of the Precambrian basement is covered by thick layers of volcanic rock where conventional mineral exploration is not possible. In the coming decades, exploration strategies are to be increasingly oriented toward deeply buried ores.

The present minerals availability outlook for common minerals is as follows:

1. The group of minerals for which India can be considered self-sufficient for the long term are barite, bauxite, china clay, chromite, steam coal, dolomite, gypsum, iron ore, cement-grade limestone, mica, talc, and titanium.
2. Minerals available in commercial quantities but with marginally sufficient reserves over the long term are fire clay, metallurgical coal, copper, kyanite, lead, flux-grade limestone, magnesite, manganese, sillimanite, and zinc.
3. Minerals of limited availability are cobalt, columbium, molybdenum, nickel, platinum, potash, sulfur, tantalum, tin, and tungsten.

Domestic petroleum and natural gas deposits supply a large part of India's present needs but the long-term outlook for large discoveries is only fair. With India's huge and growing population, its oil and gas needs are certain to expand at a relatively good pace. It therefore appears doubtful that India will become self-sufficient in petroleum in the long term.

Fiscal year (FY) 1985[2] was the first year of the seventh 5-year plan (1985-90). Faced with fiscal constraints, India's mineral development programs call for maximizing production from existing facilities; completing ongoing projects such as the aluminum complex in Orissa, the long delayed expansion of Bhilai and Bokaro steel plants, the first shore-based integrated steel plant (Vishakhapatnam); and insulating existing facilities from power shortages by providing captive facilities. The seventh plan outlay for the minerals sector was $7 billion.[3]

Several Government agencies continued exploration programs in various parts of the country and for various commodities. An Indian Bureau of Mines project in the State of Jammu and Kashmir identified large deposits of graphite, gypsum, and lignite. Lignite reserves of 75 million tons were identified in Baramulla District. Over 32 million tons of gypsum was found at Kangan and Kaurapani in addition to previous discoveries at Assar, Buniyar, and Ramban. The graphite discoveries were in the Baramulla and Doda Districts. The Jammu and Kashmir Geology and Mining Department was to begin an investigation for copper, lead, and zinc at Buniyar and Sair Sindu. Refractory-grade bauxite, borax, magnesite, and crude sulfur deposits were also being investigated in the State.

More than 10 million tons of graphite have been identified near Nagappuzha and Vadavukode in the Ernakulam District of Kerala. The State Ministry of Industry was studying the feasibility of building a 2,000-ton-per-year graphite mine and processing plant.

A mineralized belt crossing the Bolangir, Kalahandi, and Sambalpur Districts of

Orissa contained 4.3- to 8.6-meter-thick graphite bands containing 30% free carbon. The graphite layers ranged from 3 to 18 meters deep. Additional drilling will be required for adequate assessment of the deposit.

The Geological Survey of India (GSI) continued an extensive program of mapping and mineral exploration. Exploration for coal resulted in finding new beds or extending known beds in 21 coalfields in Andhra Pradesh, Bihar, Madhya Pradesh, Maharashtra, and Orissa. Several substantial beds were located with very favorable coal-to-overburden stripping ratios—more than 4 to 1 for one deposit and 1 to 1 for several others. In the Talcher and Ib River Fields in Orissa, deposits of 49-, 33-, and 22-meter thicknesses were discovered at depths ranging from 48 to 115 meters. An estimated 3.5 billion tons of new coal resources were found between October 1984 and September 1985. Priority was given to searching for coking coal, of which 156 million tons was discovered.

Exploration for additional lignite reserves continued in Rajasthan and Tamil Nadu. In Tamil Nadu, six new boreholes had 6- to 11-meter-thick seams of lignite at depths between 63 and 122 meters at Neyveli. Four holes intersected lignite in the Burhur area of Pondicherry—an extension of the Neyveli deposits.

Exploration for metallic minerals was also under way in a number of States. GSI, working in the Bamnia block of the Banera-Bhinder mineralized belt of Rajasthan located a series of mineralized zones of 8% to 10% of combined lead and zinc totaling 40 meters in thickness. The potential was favorable enough for the area to be assigned to Mineral Exploration Corp. Ltd. (MEC) for detailed exploration. Narrow, high-grade lead-zinc-copper veins were identified in the Baranthia-Khurd area of Pali District, Rajasthan. Pali District also yielded some positive indications of tungsten. A resource of 3.4 million tons of 0.6% tungsten was identified in the Agargaon area of Maharashtra State. An estimated 18 million tons of 0.15% tin has been discovered in the Bhiwani District of Haryana. This was in addition to the cassiterite-bearing pegmatites under study for several years in the Bastar area of Madhya Pradesh. GSI has been examining gold occurrences on a priority basis in a number of locations in addition to the traditional goldfields of southern India. Seven States, mostly in the north, have yielded spot assays having up to 17 grams of gold per ton. The most favorable discovery, however, was in the old Chigargunta Goldfield in Andhra Pradesh where a relatively shallow vein nearly 4 meters thick assayed 16 grams of gold per ton.

The Department of Ocean Development was formed in July 1981 and has been conducting extensive surveys in the Indian Ocean. The first phase of the survey was completed during FY 1985, covering more than 3 million square kilometers of the central Indian Ocean. Two minesites, each having an area of 150,000 square kilometers, were identified. An application has been filed by India with the United Nations for registration of one of the sites. The preparatory commission for the International Seabed Authority has determined that there was no overlapping of the area identified in India's application. The two sites have an estimated 30 million tons of cobalt, copper, and nickel. Research and development was being carried out in several Government laboratories for the commercial exploitation of these deposits. Airlift, hydraulic, and bucket mining systems have been tested at moderate depths and a manned submersible vessel was under consideration.[4]

PRODUCTION

During recent years, India has produced about 60 different minerals. The value of nonfuel minerals production rose from $482 million in 1983 to $631 million in 1984 and further to $672 million in 1985.[5] The mineral value increase followed a general upward trend in industry production of 6.5% for 1985. The principal factors contributing to the growth included improved industrial relations as worker-days lost to strikes were nearly one-half the 1984 rates; improved movement of railroad freight; and increased availability of industrial input following liberalization of Government import policies.

India was an important world producer of 18 minerals, chief of which were barite, cement, chromite, coal, iron ore, kyanite, sheet mica, nitrogen fertilizer, rare earths, and titanium minerals. Domestic production of oil and natural gas was extremely important to the Indian economy but not a large factor on the world scene. Petroleum production rose marginally in 1985 and was unlikely to rise significantly over the next several years.

Electric power shortages continued to be serious and contributed to losses in mineral production again as in recent years, but to a lesser degree. This was in part because of a concerted program to increase electric power output by building new plants and by improving the maintenance and efficiency of many of the existing plants. Also, past severe shortages have forced several major mineral and metal producers to install captive power facilities.

Table 1.—India: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984	1985[p]
METALS					
Aluminum:					
Bauxite, gross weight thousand tons	1,923	1,854	1,923	1,994	2,121
Alumina, gross weight[e] do.	500	500	450	560	560
Metal, primary	212,844	216,679	203,559	268,520	260,010
Cadmium metal	113	131	131	148	194
Chromium: Chromite, gross weight	334,681	339,196	422,000	423,000	560,000
Copper:					
Mine output, metal content	25,200	24,000	37,774	44,132	45,892
Metal, primary:					
Smelter	25,743	32,585	[3]35,469	40,536	32,460
Refinery:					
Electrolytic (cathode)	24,036	25,632	28,368	32,580	28,020
Fire refined	1,171	1,153	[e]1,000	[e]1,000	[e]1,000
Total	25,207	26,785	29,368	33,580	29,020
Gold metal, smelter troy ounces	79,875	71,935	70,158	65,234	58,771
Iron and steel:					
Iron ore and concentrate:					
Gross weight thousand tons	41,354	40,902	38,800	41,026	42,545
Iron content do.	25,888	25,605	24,289	25,682	26,633
Metal:					
Pig iron do.	9,474	9,600	9,086	9,382	9,835
Ferroalloys:					
Ferrochromium	31,905	[r]41,625	[r] [3]58,691	[3]55,578	66,497
Ferromanganese	205,571	[r]157,884	[r] [3]153,556	[3]121,829	163,438
Ferrosilicochromium	4,339	4,527	[r] [3]2,464	[3]3,892	12,499
Ferrosilicon	60,354	[r]40,253	[r] [3]47,267	[3]50,802	39,478
Other	9,074	[r] [e]10,400	[3]3,072	[3]32,181	13,763
Steel, crude:					
Steel ingots thousand tons	10,300	10,628	10,216	[3]10,261	10,962
Steel castings do.	[e]80	87	89	[3]84	92
Total do.	10,380	10,715	10,305	10,345	11,054
Semimanufactures[3] do.	6,600	[4]6,565	[4]6,511	[4]6,967	[4]7,841
Lead:					
Mine output, metal content	15,320	16,640	25,700	24,839	27,085
Metal, refined:					
Primary	14,325	14,413	14,960	15,246	15,567
Secondary	11,081	8,780	6,596	[e]10,000	[e]10,000
Total	25,406	23,193	21,556	[3]25,246	[3]25,567
Manganese ore and concentrate, gross weight thousand tons	1,526	[r]1,490	1,320	1,081	1,240
Rare-earth metals: Monazite concentrate, gross weight[e]	3,704	4,000	4,000	4,000	4,000
Selenium kilograms	4,104	5,351	3,684	[e]4,000	[e]4,000
Silver, mine and smelter output thousand troy ounces	555	463	469	862	816
Titanium concentrates, gross weight:					
Ilmenite	162,514	[3]152,938	[3]134,476	[e]140,000	[3]143,000
Rutile	6,710	[3]5,782	[3]5,500	[e]6,000	[3]6,800
Tungsten, mine output, metal content	18	25	15	21	28
Zinc:					
Mine output, concentrate:					
Gross weight	52,876	52,839	77,594	85,260	87,082
Metal content	29,082	29,060	40,350	44,335	45,283
Metal:					
Primary	57,434	52,571	53,268	55,753	70,947
Secondary[e]	200	200	200	200	200
Total	57,634	52,771	53,468	55,953	71,147

See footnotes at end of table.

Table 1.—India: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984	1985[p]
METALS —Continued					
Zirconium concentrate: Zircon, gross weight	12,400	10,483	11,395	[e]12,000	14,800
INDUSTRIAL MINERALS					
Abrasives, natural, n.e.s.:					
Corundum, natural	1,292	1,355	714	442	498
Garnet	3,176	5,429	3,349	[e]3,000	5,917
Jasper	3,356	2,139	5,418	[e]5,000	5,078
Asbestos	24,515	26,761	24,873	25,450	30,183
Barite	353,362	325,368	323,000	446,000	579,742
Bromine, elemental[e]	350	350	350	350	350
Cement, hydraulic thousand tons	20,760	22,498	25,400	29,030	33,050
Chalk	85,309	87,057	91,146	[e]80,000	114,964
Clays:					
Ball clay	118,635	114,782	137,917	[e]135,000	236,625
Diaspore	6,099	5,802	6,361	[e]6,000	9,605
Fire clay	791,105	769,495	657,000	602,000	592,047
Kaolin:					
Direct salable, crude thousand tons	392	531	553	504	[e]585
Processed do	114	[e]100	[e]100	116	[e]110
Total do	506	[e]631	[e]653	620	695
Other do	80	[e]80	[e]80	[e]80	100
Diamond:					
Gem[e] thousand carats	14	11	12	13	14
Industrial[e] do	2	2	2	2	2
Total do	16	13	14	15	16
Feldspar	59,395	44,854	41,837	39,943	46,101
Fluorspar:					
Concentrates:					
Acid-grade	13,346	12,407	[e]11,000	[e]12,000	[e]11,107
Metallurgical-grade	5,374	5,710	4,590	[e]5,000	[e]5,000
Total	18,720	18,117	[e]15,590	[e]17,000	16,107
Other fluorspar materials, graded	4,185	6,785	6,993	4,232	[e]4,000
Gem stones excluding diamond:					
Agate including chalcedony pebble	1,476	1,062	502	[e]1,000	750
Emerald, crude carats	1,000	--	--	--	--
Garnet kilograms	1,539	2,249	735	[e]2,000	2,399
Graphite[5]	72,796	52,376	39,567	38,986	27,337
Gypsum	947,663	970,365	1,039,000	1,378,000	1,260,369
Kyanite and related materials:					
Andalusite	146	536	2,573	2,700	504
Kyanite	38,283	33,951	38,307	37,024	30,472
Sillimanite	10,254	13,066	7,928	13,377	17,095
Lime[e]	400,000	400,000	400,000	500,000	500,000
Magnesite	453,410	407,071	434,072	414,029	417,412
Mica:[6]					
Exports:					
Block	1,184	[e]1,100	[e]1,100	[e]1,100	[e]1,200
Film and book for M cuttings	348	[e]200	[e]200	[e]200	[e]250
Splittings	3,313	[e]4,000	[e]3,000	[e]3,000	[e]4,000
Scrap	6,475	[e]8,000	[e]7,000	[e]7,000	[e]11,000
Powder	11,646	[e]5,000	[e]4,000	[e]4,000	[e]4,700
Manufactured	420	[e]300	[e]500	[e]500	[e]1,000
Total	23,386	[e]18,600	[e]15,800	[e]15,800	22,150
Domestic use, all forms[e]	3,000	3,000	3,000	3,000	3,500
Total mica	26,386	[e]21,600	[e]18,800	[e]18,800	25,650
Nitrogen: N content of ammonia[3] thousand tons	3,193	3,469	[r]3,565	3,975	4,324
Phosphate rock including apatite	[r]565,277	[r]631,082	687,907	892,000	929,098
Pigments, mineral, natural: Ocher	79,631	84,789	88,633	107,852	108,549
Pyrites, gross weight	57,598	55,853	63,621	44,238	17,744
Salt:					
Rock salt thousand tons	4	4	4	5	4
Other do	8,928	7,308	7,008	7,723	9,875
Total do	8,932	7,312	7,012	7,728	9,879
Sodium carbonate	613,000	586,800	744,329	830,863	813,600

See footnotes at end of table.

Table 1.—India: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984	1985[p]
INDUSTRIAL MINERALS —Continued					
Stone, sand and gravel:[7]					
Calcite	21,167	19,101	[e]20,000	[e]20,000	26,049
Dolomite thousand tons	1,955	2,133	2,264	2,277	2,217
Limestone do.	30,873	33,462	36,965	45,483	48,070
Quartz and quartzite do.	282	332	[e]300	[e]300	259
Sand:					
Calcareous do.	685	669	598	570	706
Other do.	[e]1,400	1,254	1,018	[e]1,200	2,349
Slate	9,187	4,770	3,461	[e]5,000	5,529
Sulfur:					
Content of pyrites	23,039	22,341	25,448	17,695	7,098
Byproduct:					
From metallurgical plants[e]	92,000	100,000	110,000	115,000	120,000
From oil refineries	4,170	5,189	3,906	[e]5,000	305
Total[e]	119,209	127,530	139,354	137,695	127,403
Talc and related materials:					
Pyrophyllite	38,420	43,602	59,042	84,159	53,741
Steatite (soapstone)	329,149	300,338	294,000	333,576	329,192
Vermiculite	3,624	2,068	2,411	1,953	1,805
Wollastonite	15,940	20,725	16,557	[e]20,000	26,040
MINERAL FUELS AND RELATED MATERIALS					
Coal:					
Bituminous thousand tons	124,900	128,225	136,261	145,800	149,259
Lignite do.	5,500	6,675	7,342	7,500	7,774
Total do.	130,400	134,900	143,603	153,300	157,033
Coke:[e]					
Coke oven and beehive do.	12,000	12,000	12,000	12,000	13,000
Gashouse do.	100	100	100	100	100
Other, soft do.	50	50	50	50	100
Total do.	12,150	12,150	12,150	12,150	13,200
Gas, natural:					
Gross million cubic feet	[3]136,067	140,000	210,550	[e]211,000	[e]220,000
Marketable[8] do.	[3]75,820	85,180	100,860	114,420	133,561
Petroleum:					
Crude thousand 42-gallon barrels	116,712	149,811	184,440	204,943	219,132
Refinery products:					
Gasoline do.	22,691	[e]24,000	27,100	[e]26,000	[e]29,000
Kerosene and jet fuel do.	22,529	[e]25,000	27,900	[e]27,000	[e]30,000
Distillate fuel oil do.	74,555	[e]80,000	87,200	[e]84,000	[e]88,000
Residual fuel oil do.	46,307	[e]49,000	53,600	[e]51,000	[e]52,000
Lubricants do.	2,849	[e]3,000	3,200	[e]3,000	[e]3,000
Other do.	42,176	[e]43,000	43,600	[e]42,000	[e]44,000
Refinery fuel and losses do.	13,594	[e]16,000	20,200	[e]19,000	[e]20,580
Total do.	224,701	[e]240,000	262,800	[e]252,000	266,580

[e]Estimated. [p]Preliminary. [r]Revised.

[1]Table includes data available through Sept. 24, 1986.

[2]In addition to the commodities listed, other clays (bentonite, common clays, and fuller's earth), other gem stones (aquamarine, ruby, and spinel), and uranium are also produced, but output is not reported, and available information is inadequate to make reliable estimates of output levels. In 1975, production of 6,514 metric tons of uranium ore containing about 3 metric tons of U_3O_8 was reported from two mines, which was only a part of total national production. Reported production of sand and gravel and stone are clearly only partial figures and exclude a number of types of stone; the amounts reported are inadequate to provide sufficient aggregate for production of concrete from domestically produced and consumed cement, nor do they provide for other supplies of aggregate for road metal and other construction uses.

[3]Data are for fiscal year beginning Apr. 1 of that stated.

[4]Excludes production from steel miniplants.

[5]India marketable production is 10% to 20% of mine production.

[6]Data supplied here (exports plus domestic use) are provided in lieu of officially reported production because the latter figures are evidently incomplete. Officially reported production figures are as follows, in metric tons: 1981—12,729; 1982—12,961; 1983—7,364; 1984—7,171, and 1985—6,965.

[7]Partial figures; for details, see footnote 2.

[8]Includes reinjected gas.

TRADE

The balance-of-trade deficit increased 79% over the FY 1984 figure to $7 billion. This resulted partly from a decline in petroleum exports since Indian refineries have developed the capacity to process domestic petroleum and, despite this, an increase in petroleum imports to meet the growing demand. Nonoil imports also grew significantly.

The Government has liberalized its economic policy to help the economy. The new policy has created new trade and investment opportunities. Consistent with national priority, imports of products not manufactured in India or that are in short supply are permitted, especially high technology and capital goods if they contribute to products that can be exported or substituted for imports. Foreign investment was being encouraged when it complied with India's development objectives, involved the transfer of technology needed by India, or generated exports. The policy was being liberally interpreted because joint ventures to manufacture consumer products for domestic sales have been approved. The normal ceiling for foreign investment was 40% equity. However, 100% foreign ownership was permitted in a totally export-oriented enterprise.

Mineral exports reached a new record high. Iron ore exports were 30 million tons in FY 1985, the level projected for FY 1989. Some Kudremukh Mine iron ore concentrates were sold to some buyers, which provided much-needed financial assistance. Barite exports were helped by lower shipments from China. Cut and polished diamond exports were valued at $1.1 billion, an all-time record high. The cost of rough diamond imports was $861 million during FY 1985.

India produced about two-thirds of the world's sheet mica and exported most of it. Mica export values increased substantially in 1983 and 1984 but only marginally in 1985. The U.S.S.R. generally has bought 60% of the mica.

COMMODITY REVIEW

METALS

Aluminum.—The National Aluminium Co. Ltd. (NALCO) has opened the first phase of the huge aluminum complex under construction in Orissa State near India's eastern coast. A commissioning ceremony was held at the end of November for the 2.4-million-ton-per-year Panchpatmalli bauxite mine.[6] The mine has indicated reserves of 317 million tons at a cutoff grade of 40% alumina and a maximum of 5% silica content. Average ore body thickness was more than 14 meters. The overburden in the fully mechanized mine was to be broken by ripping with bulldozers. To reduce blasting costs, the ore is to be blasted using ammonium nitrate and fuel oil slurry mixed onsite, the first mine in India to adopt this system. Ore will be loaded by front-end loaders equipped with steel-chain beadless tires to reduce replacement costs, also used for the first time in India.

The longest conveyor belt in the world with horizontal curves is to move the ore 15 kilometers from the mine to the alumina plant at Damanjodi. The belt was designed to handle 1,800 tons per hour. Work on the alumina refinery and the aluminum smelter continued toward a planned late 1986 or early 1987 completion.

NALCO was installing twin 9.5-ton-per-hour Properze aluminum rod lines to produce over 100,000 tons per year of electric conductor-grade rod and also conductor- and mechanical-grade alloys, partly for export. The plant will be the largest aluminum rod facility in the world.

The Bharat Aluminium Co.'s (BALCO) 600,000-ton-per-year bauxite open pit development at Gandhamardan was behind schedule and over budget because of infrastructure delays and land acquisition and environmental problems. Neither the local tribal population nor the environmentalists wanted the large forest tracts cut down. The plan, however, included a complete reforestation of the area after the deposit is mined. The May 1985 completion has now been set back to late 1987.[7] If the project is delayed further, BALCO may face a problem in near-term availability of bauxite.

Meanwhile, BALCO has continued construction of a 67.5-megawatt captive powerplant at Korba. The plant was to use 1.8 million tons of coal per year from Western Coalfields Ltd.'s 2-million-ton-per-year Dipka open pit. The Dipka Mine was sanctioned by the central Government at a cost of $46 million and will employ over 1,000 persons.[8]

After more than 7 years of negotiations, Tsvelmetprom-Export of the U.S.S.R. and NALCO have reportedly signed a contract for the first stage of the Andhra Pradesh bauxite development. The project consists of a 2.3-million-ton-per-year bauxite mine, a 65-kilometer railroad to the Port of Vishakhapatnam, and loading facilities at the port. The U.S.S.R. is to prepare the feasibility study for the mine and unloading equipment, while India is to do the same for the railroad, remaining port facilities, and other infrastructure. The bauxite would be exported to the U.S.S.R. The second stage would consist of expanding the mine to 4 million tons per year and constructing a 600,000- to 800,000-ton-per-year alumina plant. The major problems have been financing and the proportion of bauxite and alumina the Soviet Union would receive. The Soviet Union has preferred as much bauxite as possible, whereas India would prefer selling the much higher valued alumina.[9]

Federal Government policy changes were made during 1985 covering export regulations. New regulations permit the export of bauxite through the Government-owned Minerals and Metals Trading Corp. Plans were to export up to 400,000 tons of 45% to 53% alumina-content bauxite during FY 1985. India has preferred to export value-added alumina in past years.

During May to November, the import duty on aluminum was reduced from 80% ad valorem to 25% ad valorem. The reduction was made to make aluminum available to user industries at a reasonable cost.

India currently produces less aluminum than it consumes, resorting to imports to fill the gap. This condition should change dramatically when the 218,000 tons of new capacity comes on-line with the completion of the NALCO project. The new capacity was expected to give India a considerable surplus, some presumably for export. Indian aluminum industry officials, however, are concerned that Indian aluminum cannot be made competitive with the world market. Indian electric power costs are reportedly the highest in the world, and raw material costs are also high. India's annual per-capita consumption of aluminum was 0.4 kilogram in 1984 compared with 4 kilograms for most countries and 27 kilograms for the United States.

Both industry and Government were studying ways to increase domestic consumption if export prices are not competitive. The Indian railroads were considering importing aluminum railroad coal cars to study their economics. If economical, they could emerge as a large use for the surplus aluminum. The lightweight cars have been found to be efficient and economical in other countries.

Electric power shortages caused loss of production again during 1985. NALCO and India Aluminium Co. Ltd. (INDAL) were the hardest hit by shortages resulting in very low-capacity utilization and high costs. Because of the power shortage, INDAL was compelled to export 60,000 tons of alumina to the U.S.S.R. INDAL's Belgaum (Karnataka) and Hirakud (Orissa) smelters operated at their lowest levels ever. The Hirakud smelter was shut down for 2 months for lack of power.

Chromium.—India's annual chromite production increased steadily since 1980 from 320,000 tons to over 500,000 tons in 1985 despite poor world economic conditions during some of the period. The trend was expected to continue because of a mine expansion in Karnataka. Mysore Minerals Ltd., a Karnataka government company, operated two open pit and one underground chromite mines and a beneficiation plant in the Hassan District of Karnataka. The relatively narrow veins in the two open pits were being mechanized because the overburden ratio has increased with the depth of mining. Production at these mines was expected to increase 45% to 80,000 tons per year. The company's Byrapur Mine, India's only underground chromite mine, would not be affected.[10]

During FY 1985, India became the seventh nation to produce chromium metal electrolytically. The plant, built in Rourkela by Indian Chrome Metals Private Ltd., used a 28-cell system adopted by the Central Electrochemical Research Institute, Karaikudi. The Institute chose the electrolytic over the aluminothermic process because of the higher purity product. Capacity of the plant was 35 tons per year or nearly one-third of India's demand in 1985. Most of the metal was slated for special welding electrodes. India currently uses little chromium metal for special steels or superalloys.[11]

OMC Alloys Ltd., owned by Orissa Mining Corp. Ltd. (OMC), started operation in November of its charge chrome plant in Bamnipol, Orissa. The plant has a 35-megawatt-ampere furnace with a capacity of 50,000 tons per year. The plant has been completed for nearly 1 year but electric power shortages delayed its commissioning. OMC Alloys' plant was designed to have a 25% better electrical efficiency than most charge chrome plants. Plans were to produce charge chrome at 3,000 to 3,500 kilowatt hours (kW•h) per ton of product. Outokumpu Oy of Finland supplied the technology for the plant.

It was also reported that OMC planned to apply for authorization from the central Government to build a second ferrochromium plant in the Bamnipol region. A coal-fired powerplant would probably be required for approval of the plan in light of Orissa's deficiency in electric power.

The Regional Research Laboratory at Bhubaneswar, Orissa, which has been studying the exploitation of low-grade chromite for several years, planned to set up a 25-ton-per-day sintering plant to demonstrate a chromite agglomeration process developed in collaboration with a firm in the Federal Republic of Germany. Much of the low-grade chromite must be reduced to a fine size for beneficiation, and the new sintering process was believed to be less expensive than either briquetting or pelletizing.

Copper.—The Malanjkhand Copper Project (MCP) of Hindustan Copper Ltd. (HCL) nearly reached design capacity during 1985. About 1.8 million tons of ore was mined containing 22,000 tons of copper. The $100 million open pit was designed on the basis of 59 million tons of ore at 1.2% copper. HCL has continued drilling to delineate additional ore below the open pit. Depending on the elevation chosen for cutoff, 526 million to 790 million tons of ore grading 0.83% copper have been proved. The substantial increase in reserves has increased the possibilities of a much larger scale operation; consequently, a major feasibility study was to be started. A technical evaluation committee was reviewing 35 proposals submitted by consultancy and engineering companies. Four companies will be invited to submit detailed proposals for a 2-year study estimated to cost $1.7 million. A further 3 years would be required for design and construction if a favorable recommendation is submitted. The outcome of the study was expected to have a major impact on MCP and copper production in India. Production of copper was about two-thirds of consumption with the difference imported.

The proposed expansion of the Khetri copper smelter has been dropped. It appeared that significant savings would be made if a new smelter was built at Malanjkhand, saving the excessive cost of transporting the concentrate more than 900 kilometers by highway to Khetri. During 1985, some MCP concentrates were shipped to the Republic of Korea and Japan for toll smelting and refining, which proved far more profitable for HCL than treating the concentrate at Khetri.[12]

Production costs at Malanjkhand were reportedly higher than world prices of copper. The question has arisen on the amount the Indian Government would be willing to pay for copper self-sufficiency by subsidizing the development of the copper industry, including Malanjkhand. Electric power shortages at Khetri have limited copper production for many years. Two 10-megawatt, gas turbine-powered generators were delivered from Sweden and were scheduled to begin operating by yearend. When these units are in operation, captive power capacity at Khetri will be 46 megawatts, enough to fully power the complex.[13]

Gold.—To reduce the losses of Government-owned Bharat Gold Mines Ltd. (BGML), the Finance Ministry decided to revise the gold pricing formula. The Government has been paying BGML a price based on the London Metal Exchange (LME) gold price. With the proposed formula, BGML would be paid the domestic price of gold. BGML has been paid 135% of the average LME price of the preceding month or the average Indian market price, whichever was less. Since the LME price has always been lower, and also lower than BGML's cost of production, BGML has sustained losses almost since its inception in 1972. Losses have increased lately as production from the deep, 100-year-old mine decreased because of lower ore grade. The new pricing formula, when implemented, should reduce BGML's losses. The only economic justification for continuing production was to earn foreign exchange—the mining costs are in rupees while gold has a hard currency value.[14]

Despite the losses in mining, exploration for new gold deposits by both State and Federal Government geologists continued. Gold deposits of relatively high grade have been found at Kundarkocha in the Singhbhum District, 40 kilometers from Jamshedpur, Bihar. Processing tests by MEC have indicated a recoverable grade of 10 to 15 grams of gold per ton at Kundarkocha by BGML.

Iron Ore and Pellets.—Kudremukh Iron Ore Co. Ltd. (KIOCL) has had problems of underutilization of capacity since 1980 when Iran canceled its contract to purchase 150 million tons of concentrates over a 20-year period. The company has operated at about 20% capacity and has sought new purchasers for its concentrate. To produce a more marketable product than the fine-grained filter cake, KIOCL built a 3-million-ton-per-year pellet plant at Mangalore. The plant, built with Romanian aid, began test runs at yearend and was scheduled for commissioning in April 1986. The plant was designed to produce direct-reduced iron (DRI)-quality pellets. KIOCL has received trial orders for the pellets from China, Hungary, Indonesia, and Malaysia. Bahrain, China, Czechoslovakia, and Western Europe have also contracted for concentrate during FY 1985 and FY 1986. To date, orders have not reached the 5-million-ton-per-year break-even point of the 7.5-million-ton KIOCL complex.

The chances of sales to Iran, the original customer for the Kudremukh mining complex, appear to be very slight. Iran has two major high-grade iron ore mines under development, and purchases of foreign concentrate appear unlikely.[15]

KIOCL has conducted research on the possibility of selective flocculation for the recovery of iron from the concentration plant tailings. The results indicated that a concentrate containing 63% iron can be recovered economically from tailings containing at least 25% iron with a 60% recovery factor. At full capacity, the tailings can be generated at the rate of 2,000 tons per hour while processing 22 million tons of ore per year. The research was significant since selective flocculation alone was not known to have produced commercially usable concentrate.[16]

Tata Iron and Steel Co. Ltd. (TISCO) has been conducting research to reduce aluminum contamination during iron ore beneficiation. The company has reportedly developed a process that will reduce aluminum content by 50%. Management has tentatively sanctioned a plant with a capacity of 1 million tons of iron ore fines per year at its captive Noamundi Mine. Excessive alumina in the furnace feed forms a high-viscosity slag hindering furnace operation.[17]

Iron and Steel.—Because of its large population and iron ore and coal reserves, India has the potential to be one of the world's top five steel producers. It was between 14th and 17th place in 1985 world production depending on the phase of the steelmaking cycle. India had the lowest per-capita consumption of steel of any major producing country. Steel production costs have gone from one of the lowest in the world two decades ago to probably the highest in 1985. A former Minister of Steel identified some problems of the last three decades including mistakes in technology choice, poor management and personnel policies, underutilization of capacity, and poor product quality. To these can be added chronic power shortages, Government levies, high energy and wage costs, and high product prices. Prices during FY 1979-83 rose 78% to 150% depending on the product.[18]

The Steel Authority of India Ltd. (SAIL) has incurred large financial losses in past years resulting from high overhead costs and poor productivity. SAIL's five integrated plants averaged 67% capacity utilization for salable steel in FY 1983, improved to 73% in FY 1984, and continued increasing during 1985. Some plants continued to operate at 50% or lower capacity. The TISCO plant in Jamshedpur, India's only private integrated steel mill, has operated well over design capacity for several years.

SAIL and the central Government have been working for several years to improve performance of the major plants. These efforts have resulted in increased capacity utilization. Also, SAIL has reported an operating profit for the second straight year after sizable losses before that.

The Government's seventh 5-year plan allocated $6.6 to $7.0 billion for capital investment in the steel industry. This plan fell far short of a Government working group recommendation of $10.7 billion. SAIL was expected to get $3.3 billion to $3.7 billion of the total. A large part of these funds was to be used for continuing the expansion of the Bhilai and Bokaro plants. These plants were being modernized and expanded from 2.5 to 4.0 million tons each and are due to be completed by 1988. The work was to be fully funded and completed as soon as practical. Part of the work will be a computerization of production facilities at a cost of $150 million. SAIL was to devote the remaining funds to modernizing the Burnpur, Durgapur, and Rourkela plants. The priority for the seventh plan was to modernize existing plants rather than construct new blast furnace-based integrated plants.

The program posed a significant problem for SAIL because the work at the Burnpur, Durgapur, and Rourkela plants hinge on the availability of partial foreign funding, including the International Bank for Reconstruction and Development (World Bank). SAIL was reportedly negotiating with Japan for a $500 million loan for the Burnpur plant. India was seeking help from the World Bank for the Rourkela plant. A decision on the Rourkela financing was not likely until mid-1986. The Federal Republic of Germany was also interested in participating in the Rourkela project. Several countries have expressed interest in the Durgapur plant's modernization. The plant was built in the 1950's with British financial and technical assistance, which appeared to give the United Kingdom an advantage in the modernization negotiations because of its familiarity with the plant. The scope of the project was expected to depend on the amount of foreign funding.[19]

The major projects at these three plants were as follows: (1) improved facilities to upgrade quality control at the iron mines; (2) new facilities at the steel plants for blending and screening of ore; (3) improved coal washeries to produce higher quality coking coal; (4) increased capacity of sinter plants; (5) improvements in the functioning and control of blast furnaces; (6) addition of coal dust injection and slag granulation equipment; (7) replacement of Bessemer and open-hearth furnaces with oxygen converters and continuous casting; (8) introduction of new technology; and (9) installation of auxilliary equipment to balance the operations in the rolling mill and the oxygen and captive powerplants.

The only new integrated steel mill under construction in India was the Vishakhapatnam steel plant on the east coast. The Government allocation for the much-delayed plant was increased from $180 million in 1984 to $575 million in 1985. The increase was one-half of the amount requested by the Steel Ministry to continue full-scale construction. Because of the paucity of funding and slippage of the construction timetable, the Government decided near the end of FY 1985 to scale down the project. The original 3.4-million-ton raw steel annual capacity was to be cut to 3.0 million tons, the construction of the universal beam mill was to be dropped or postponed, and modifications were to be made in the second melting shop while the hot metal output was to be unchanged with the construction of two 3,200-cubic-meter blast furnaces. The original plan was to build two oxygen steel melting shops in two stages having five 130-ton converters. Instead, a single melting shop with three 150-ton converters was to be built. Finished steel was thereby cut from 3.0 to 2.7 million tons per year while salable pig iron increased from 215,000 to 570,000 tons per year. The changes resulted in a savings of $1.2 billion on the plant cost. The new plant was projected to have lower operating costs because it will employ 15,000 workers compared with 60,000 workers at the 4-million-ton Bhilai steel plant. The revised schedule called for completion of the first-stage plant in 1988 and the entire project by June 1990.

The second-stage expansion and modernization program of SAIL's Alloy Steel Plant in Durgapur has fallen behind schedule by almost 2 years, and a serious cost overrun has exacerbated the construction problems. The capacity of the plant was being increased from 160,000 to 260,000 tons per year. Continuous casting, vacuum oxygen decarbonization (VOD), and vacuum arc degassing (VD) equipment was being installed to upgrade the variety and quality of the alloys produced.

Salem Steel Ltd.'s proposal to double its plant's capacity has been approved by the Government. A second Sendzimer mill is to be installed raising cold-rolled stainless steel sheet capacity to 70,000 tons per year. The plant operated over 80% capacity during FY 1984 and had exceeded each monthly plan through November 1985. The plant had been operating at an excessive loss because of a high import tax on its hot-rolled coil imports. The plant began receiving some hot-rolled stainless steel coil from Rourkela in 1984, which lowered costs and increased sales.

A liberal Government policy has permitted the private sector to install additional capacity of 1.7 million tons for electric furnaces, rerollers, and sponge iron DRI units. In addition to the two operating units for sponge iron in Andhra Pradesh and Orissa, several new sponge iron units were either under construction or expected to be installed soon. TISCO has developed an indigenous direct-reduction process using a rotary kiln and low-quality coal for making sponge iron. The 90,000-ton-per-year plant was under construction in the Keonjhar District of Orissa and was to operate under the name of Ipitata Sponge Iron Ltd. It was expected to begin operating in 1986.

Lurgi Corp. of Frankfurt, Federal Republic of Germany, has begun site work on a $63 million project at Chandil, near Jamshedpur in Bihar State. The Bihar Sponge Iron Ltd. plant has a capacity of 150,000 tons per year of DRI suitable for direct charging to electric arc furnaces. Construction was scheduled to take 30 months.

A second plant was planned for Bihar State. India's Birla Jute and Industries Ltd. was expected to construct a 40,000-ton-per-year plant at Patratu, Hazaribagh. The $15 million plant would use the Kinglor Metor process, and its output was to be dedicated to the nearby mill of Bihar Alloy Steels Ltd. as a substitute for imported scrap.[20]

West Bengal, Madhya Pradesh, Maharashtra, and Karnataka were also in line for DRI plants in the near future. The largest proposed plant was a 500,000-ton-per-year plant near KIOCL's Mangalore pellet plant on the west coast. These plant outputs would improve the raw material supply to the ministeel plants, which depend largely on imported scrap.

The chronic lack of public capital for steel expansion has forced the Government to modify its policy and seek steel capacity increases in small- and medium-size plants owned by the private sector. A development council, formed to promote this expansion, was to be headed by the Steel Secretary and will comprise representatives from Government departments and steel organizations.

In FY 1985, India's minimills increased their output by 500,000 tons to 2.7 million tons. The upward trend was likely to continue because a number of new minimills were under construction or well along in planning. India's Birla Group companies have proposed seven new small mills totaling at least 1.3 million tons annually. Mukang Iron and Steel Ltd. was doubling its raw steel capacity to 270,000 tons per year by converting two 30-ton electric furnaces to ultrahigh power operation using Badische Stahlwerke AG technology.

Work began on site preparation for a DRI-based minimill at Bhandara in Maharashtra. The 50-ton electric furnace and three-strand continuous caster were to be supplied by a 150,000-ton-per-year, coal-fired DRI plant. The DRI plant was to use the West German-developed Codir process.[21]

Orissa's first ministeel plant began operating in Dhinkanal under the name IPI-Steel Ltd. in August. Ispat Profiles Ltd. in Poona, Maharashtra, was to build a 13,000-ton-per-year melting shop and section mill claimed by the company to be the first in India capable of making H-beams. Rathi Alloys and Steel Ltd. in Alwar, Rajasthan, has applied for a license to add a cold-rolled strip mill to its VOD-VD plant, which already had a hot-rolled strip mill. Usha Alloys and Steel Ltd. planned to double the billet capacity of its Adityapur plant from 50,000 to 100,000 tons per year.

All of the minimills were faced with the problem of increased cost of raw material and lower finished product prices. An increase in power costs in most States coupled with a rise in the price of ferroalloys, graphite electrodes, and refractories has added $20 to $24 per ton to production costs. The ministeel industry asked the Government to reduce the import duties on scrap to increase competitiveness. Government officials, however, would like to reduce scrap imports to conserve foreign currency and would prefer more DRI capacity to utilize domestic raw materials.

Lead and Zinc.—Beginning in July the Vishakhapatnam zinc smelter was to begin using zinc concentrate from the Rajpura-Dariba Mine in Rajasthan. Vishakhapatnam had been producing zinc ingots from imported concentrate.

Geologists from Hindustan Zinc Ltd. (HZL) have discovered a lead deposit near Dhukonda in the Guntur District of Andhra Pradesh. The ore graded 6% lead and was 200 meters nearer the surface and of a higher grade than the ore being mined nearby at Bandalamotu. The reserves were only 460,000 tons but had a more regular occurrence than the Bandalamotu deposit. HZL believed the deposit can be economically exploited.

State geologists from Uttar Pradesh have found large lead deposits at Prithipura Nayakhera in Jhansi District. The discovery was considered significant because of a similar deposit reported earlier at Bhupura, 9 kilometers west of the new deposit.[22]

There was still no Government decision on the construction of a lead and zinc mine and smelter at Rampura-Agucha in the Bhilwara District of Rajasthan. The ore from the proposed mine was urgently needed to reduce the high costs of lead and zinc imports, which were 35,000 and 55,000 tons, respectively, in FY 1984, and forecast to be 53,000 and 73,000 tons, respectively, by FY 1989. Government approval depended on HZL's ability to raise enough capital from external sources, domestic borrowing, and bond issues to finance the project. The 60-million-ton deposit averages 13.9% zinc and 1.57% lead and can be mined as an open pit. The project should be economically viable, but the lack of financing was apparently the reason for delaying the project.

Magnesium.—Tamil Nadu Chemical Products Ltd. was planning the construction of a commercial magnesium metal plant at Valinokham in Ramanathapuramapalli District. A modular design electrolytic cell has been developed by the Central

Electrochemical Research Institute that uses 14 to 15 kW•h per kilogram of metal produced compared with 22 to 23 kW•h in previous designs. The plant was to have 10 to 12 cells for a total capacity of 600 tons per year, or about one-half of India's 1985 demand. Raw material for the cells was to be obtained from commercial saltpan bitterns concentrated to a specific gravity of 1.33 in a separate evaporation pan. Start of construction depends on Tamil Nadu Chemical's need to finance $3.3 million of the $4.9 million cost. The Defense Metallurgical Research Laboratory in Hyderabad has a 100-ton-per-year magnesium plant to convert byproduct magnesium chloride into metal in its titanium metal plant.[23]

Nickel.—Plans for a ferronickel plant in Orissa were progressing. The Industrial Promotion and Investment Corp. of Orissa Ltd. (IPICOL) has procured a letter of intent from involved Government agencies to develop a 15,000-ton-per-year plant near Cuttack. The plant would be built adjacent to Industrial Development Corp. of Orissa's Jaipur Road ferrochromium plant. Land, electric power, and transportation were available at the site, saving considerable site development costs. IPICOL was likely to transfer the letter of intent to Orissa Industrial Development.

The plant was expected to start operating on imported concentrate. However, IPICOL, under a United Nations program, reportedly tested the domestic nickel ore from the nearby Sukinda deposits in a laboratory in Norway for amenability to rotary kiln-electric smelting to produce ferronickel. The operation was satisfactory and no foaming or boiling was observed despite the high iron oxide content of the slag. By selective reduction, 20% nickel-grade ferronickel was produced with high nickel recovery.[24] A pilot plant using the Sukinda ore and a different reduction system was tried during the 1970's but was not economical.

Tin.—A 2-ton-per-year pilot plant tin smelter has been built by the Madhya Pradesh State Mining Corp. Ltd. at Uria, 5 kilometers from Raipur, for less than $1 million. The plant was based on technology developed by the Bhabha Atomic Research Center of Trombay. Tin ore found in Bastar near the Madhya Pradesh and Orissa border would be tested in the pilot plant. Heretofore, the manually panned Bastar concentrate had been smuggled out of the area. Recently, the Government began buying the concentrate from natives at $1.50 per pound. The Bastar tin slag also contained up to 12% tantalum, 12% zircon, and 2% columbium, all of which will be recovered, if possible. The demonstration plant has been successful, and output was expected to be increased to 10 to 12 tons per year after further trials. A second plant may be constructed in Jagdalpur, 70 kilometers north of Bastar. Madhya Pradesh State Mining has developed a small, essentially hand-operated, commercial mine. There are several small and shallow ore sites, each close to a parent pegmatite body. The ore occurrence therefore is inconsistent, making it difficult to mechanize and expand mine production.

MEC has reported a major tin deposit at Tosham in the Bhiwani District of Haryana State. The deposit was discovered in the 1970's while GSI was prospecting for copper. MEC began detailed work in December 1984 and estimated reserves at 8 million tons grading 0.1% tin. Plans were to complete 7,000 meters of drilling in 24 holes and 1,500 meters of trenching by yearend 1985.[25]

Titanium.—India was to begin production soon of high-quality titanium metal at the Defense Metallurgical Research Laboratories in Hyderabad. The plant was to produce a wide range of titanium and titanium-alloy products by the magnesiothermic process and was to have a capacity of 2,000 kilograms of sponge per day. India thus would become the sixth country to produce titanium metal commercially. The Government-owned company, Mishra Dhatu Nigam in Hyderabad, has fabrication facilities for titanium, but its operation was based on imports of primary metal.

Other Metals.—Petrological studies of core samples from the Tosham tin discovery in Haryana State have revealed the presence of copper indium sulfide. This was the first discovery of indium in India. Indium is finding increasing applications in the electrical and electronics industries and other specialized high-technology applications.

Madras Aluminium Co. (MALCO) has reportedly developed a process for commercial production of gallium arsenide in India having a purity of 99.6%. Attempts have been made to reduce zinc contamination from 1,000 to 100 parts per million to improve purity. Once the contamination problem is solved, MALCO planned to begin commercial production.

The expected gallium availability was 100 kilograms per year from a 10,000-ton-per-year alumina plant, or at India's present rate of aluminum production, 4 to 5 tons of gallium per year.

INDUSTRIAL MINERALS

Cement.—An Indian cement industry official claimed that India was self-sufficient in process technology and had the ability to fabricate the principal equipment for all cement manufacturing processes. The Government predicted that by the end of the seventh 5-year plan (March 1990) cement demand would be met by indigenous production. Installed capacity would rise to 62 million tons by 1990 against a demand projection of 49 million tons and an output of 50 million tons.[26]

A change in the Government's cement pricing policy in 1983 has resulted in improved capacity utilization and a substantial increase in licensing of new capacity. To prevent uncontrolled growth of the cement industry and bottlenecks in the transportation system, the Government proposed that no new plant licenses be awarded for 2 years. If the proposal is approved, the policy would be reviewed in early 1987. Proposals submitted by January 1, 1985, would be covered under previous regulations.

Instead of new plants, expansions of existing plants where infrastructure was already in place was being encouraged. Expansions included adoption of technological improvements such as conversion from a wet to a dry process, introduction of precalciners, and adoption of environmental controls to reduce dust loss.[27]

There were a number of major cement plant projects under way, some of which were to have been completed in 1985. Jaypee Rewa Cement Ltd.'s 3,000-ton-per-day plant in Rewa District of Madhya Pradesh was to be in operation by mid-1985. Chettinad Cement Corp. Ltd. was replacing old wet-process kilns with a single large, lignite-fired, dry-process kiln, which was scheduled for completion at yearend 1987. Ambuja Cements Pvt. Ltd. expected to have its 1,800-ton-per-day plant at Ambujanagar in production by mid-1985. Priyadarshini Cement Ltd. was also to start production in mid-1985 at its 1,500-ton-per-day plant in Nalgonda District of Andhra Pradesh. The following companies were installing 3,000-ton-per-day and higher capacity kilns: Andhra Cement Co. Ltd. at Durga, Avarpur Cement Ltd. in Chanda, Cement Corp. of Gujarat Ltd. at Morasa, India Cements Ltd. at Sankarnagar, and Nodi Cement Ltd. at Bhatapara. At least 18 other projects of lower capacity were under way or recently completed.[28]

Fertilizer Materials.—Production of fertilizers increased 15% in FY 1984 owing to a significant improvement in capacity utilization. This was brought about by an easing of infrastructural constraints and improved efficiency. Capacity utilization increased from 67% to 74% for nitrogen and 67% to 89% for phosphate. The trend in higher production continued in FY 1985 aided partly by the completion at Thai-Vaishet of the first Bombay High natural gas-based ammonia-urea complex.

India ranked fourth in the world in production and consumption of nitrogen and phosphatic fertilizers. It was also a major importer of fertilizer raw materials and finished fertilizer. Because of the huge cost of imports, India has been increasing capacity as fast as economic conditions allow. A number of large projects were under way or to be started. Krishak Bharati Cooperative's plant at Hazira in Gujarat was comprised of two 1,350-ton-per-day ammonia units and four 1,100-ton-per-day urea plants. It was completed in 1985 but was awaiting the completion of a gas pipeline for its fuel and feedstock.

The Government has formed a high-level committee to monitor the progress of six gas-based fertilizer plants being constructed along the 1,700-kilometer Hazira-Bejaipur-Jagdishpur pipeline. The committee was to be responsible for reviewing the status of the plants as well as resolving logistical problems, particularly for equipment, materials, and supplies. Indian suppliers of domestic equipment were advised that if deliveries were not made on time, the equipment would be imported.[29]

An important development was starting construction of plants in Sawai Madhopur, Rajasthan, and in Jagdishpur, Uttar Pradesh. Preliminary work on the plants at Babrala and Shahjahanpur in Uttar Pradesh was begun, and work on the Bijaipur plant in Madhya Pradesh and the Aonla plant in Uttar Pradesh was well along. Each of the six plants was to have a capacity of 1,350 tons of ammonia per day and 2,200 tons of urea per day. The plants were scheduled to be operational by 1990.[30]

Mica.—Various trade industry organizations have been pressing the Government and its Mica Trading Corp. (MITCO) for complete deregulation of mica exports. According to the trade groups, the present processed-mica export policy has caused a decline in mine production and exports to centrally planned economy countries. The export duty at yearend ranged from 15% to 40%. The trade organization claimed that a relaxation of controls on mica exports could result in earnings of $82 million by FY 1990.

During the controversy, MITCO was strengthening its foothold in the mica industry by building various facilities to manufacture mica products. These included a silvered mica and mica capacitor plant, a 3,000-ton-per-year micronized mica powder facility, a 900-ton-per-year mica paper plant, and a wet-ground mica powder plant. The micronized mica powder facility, completed in 1983, was still operating on a trial basis. The first phase of the mica paper plant was delayed and was expected to be completed in early 1986. MITCO was also preparing a detailed project report for a $2.6 million research and development center for mica. The center would work on developing new mica products and applications.[31]

Mineral Sands.—Indian Rare Earths Ltd. continued work on its 100,000-ton-per-year synthetic rutile plant using technology supplied by Benelite Corp. of the United States. Commissioning of the plant has been delayed several times. The dredging and concentrating equipment has been completed for some time. The plant was the final component of the $100 million Orissa Mineral Sands Complex near Ganjam on the Bay of Bengal. The dredge was to mine 2.8 million tons of raw sand per year with a planned yield of 200,000 tons of ilmenite per year, 30,000 tons of sillimanite (doubling recent Indian production), 10,000 tons of rutile, 4,000 tons of monazite, and 2,000 tons of zircon. All of the ilmenite has been dedicated to the synthetic rutile plant.

An estimated 20 million tons of mineral sands has been located along the coast between Vishakhapatam and Bhimilipatnam. The minerals occur at depths up to 20 meters and are situated about 19 kilometers from the coast.

Sulfur.—Pyrites, Phosphates, and Chemicals Ltd. conducted detailed exploration and process testing on the Saladipura pyrite deposits in Rajasthan. Pyrite reserves were estimated to be 120 million tons of 23% to 25% sulfur. A feasibility report for a 240-ton-per-day sulfuric acid plant and 30,000-ton-per-year single superphosphate plant was being prepared. A $5.3 million pilot plant was also being considered for recovering elemental sulfur from the Saladipura pyrites.

MINERAL FUELS

Coal.—Production was a record high 157 million tons in FY 1985, and a target of 167 million tons was set for FY 1986. However, labor problems were a factor in Coal India Ltd.'s (CIL) planning as the issue of how much mechanization should be allowed in new mining projects. The suggestion was made that in new opencast mines, the overburden should be removed by mechanized equipment to improve efficiency, while the coal should be mined by manual labor to reduce unemployment. The suggestion affected Government plans to greatly increase coal production and raise the productivity of 0.64 ton per worker-shift. Even in the mechanized opencast mines of Central Coalfields Ltd. (CCL) productivity was barely 1.5 tons per worker-shift.

CIL continued with long-term plans to greatly increase coal production by the end of the century. In some cases, development plans were hampered by outside factors. For example, coal production by Eastern Coalfields Ltd. has been severely affected by electric power shortages. About 1.2 million tons of coal was lost during April-August 1985 because power availability was only two-thirds of demand.

One of the major developments was revamping the Jharia Coalfield. It was proposed to be divided into 9 opencast mining blocks and 21 underground mining blocks. Planned production from the opencast blocks was to be 16,000 to 36,000 tons per day. Five of the blocks were expected to be in production by 1990. Production from the underground blocks would range from 3,000 to 7,000 tons per day. The underground mines scheduled for production soon were Katras-Gaslitand, Kherkhari-Dharmaband, Madhuband-Bhalgora, Pootkee-Balihari, and Tasra.

Nine new coal washeries were to be constructed for the high-ash coking coal from the new mines in Jharia Coalfield. The washeries were planned to be operational in several stages and were to have a capacity of 42 million tons of raw coal per year.

The Government approved two new coal companies as subsidiaries of CIL. The companies were Northern Coalfields Ltd. and South Eastern Coalfields Ltd. and were formerly part of CCL and Western Coalfields, respectively.

In other developments, CCL planned to double its growth rate to 16.4% during the seventh 5-year plan period. Plans were to increase production from 38 million to 70 million tons by FY 1989. CCL planned capital expenditures of $1 billion during the seventh plan. Among major mines to be completed were the Jayant (10.0 million tons per year), Bina (4.5 million tons per year), and Kakri (2.5 million tons per year) in the Singrauli area of Madhya and Uttar Pradesh; the Jagannath (2.0 million tons per year) and Bharatpur (3.5 million tons per year) in the Talchur area of Orissa; and the Sel Dhori opencast (2.2 million tons per year) in Bihar. Major mines to be started during the seventh plan were the Latadia (4.0 million tons per year) and Nigahi (4.2 million tons per year) in Singrauli, the Kalinga West (7.0 million tons per year) and Anant (4.5 million tons per year) in Orissa, and the Piparwar (5.0 million tons per year) in north Karanpura in Bihar.[32]

The central Government sanctioned an investment of $46 million for the Dipka opencast coal mine of Western Coalfields. The mine is to supply 2 million tons per year by 1988 to meet the requirements of the captive powerplant of BALCO at Khorba. The Dipka Mine is west of the Gevra opencast mine, which was under construction.

The huge Neyveli Lignite Corp. in Tamil Nadu commissioned the first 210-megawatt generator of the second thermal powerplant at the minesite in Neyveli. Both the byproduct fertilizer and briquetting plants had record-high production in 1985. Also, 75 million tons of lignite was discovered at Shali Ganga Nichahama in the Barramulla District of Jamma and Kashmir. This was the largest lignite deposit outside the Neyveli Mine deposit.

The Oil and Natural Gas Commission (ONGC) was considering the development of in situ coal gasification technology to exploit a vast coal formation discovered in Kabol, Gujarat, while drilling for oil. The coal was too deep to be mined economically by conventional means. The coal reserves at Kabol were estimated to be 65 billion tons and are between 700 and 1,700 meters deep.[33]

Petroleum and Natural Gas.—The Government announced in December that it would reorganize ONGC. The objective was to strengthen the regional field operations. Each of ONGC's three onshore regions would have an executive director responsible for exploration, drilling, and production of oil and gas. Each region would have its own working capital and performance budgets and targets. ONGC's offshore area, including Bombay High, would be treated as a separate region with an executive director. A coordinator would also be appointed to oversee exploration and development of gas in all four regions. The responsibility of the Gas Authority of India Ltd. would be limited to transmission and marketing of gas.[34]

Oil production rose from 10 million to 29 million tons during 1980-85 as India produced nearly 70% of its crude oil requirements compared with 30% in 1980. The combination of no major discoveries during the 1980's and rising oil demand has eliminated hopes of oil self-sufficiency by 1990. Invitations to world oil companies for a third round of exploration could be adversely affected by the steep drop in world oil prices.[35]

In 1986, India will celebrate the first decade of production from the Bombay High Oilfield, which accounted for 66% of its production. The oilfield is 200 kilometers northwest of Bombay and had reserves of 2.4 billion barrels. To reduce oil imports, the Government encouraged rapid exploitation of Bombay High, which provided most of the oil production increase in the 1980's. The gains made may have jeopardized the field's long-term potential by over development. Water injection has already been used in the northern part of the field. A similar program, costing $780 million, was being planned for the southern area. The program could be postponed because of lower world oil prices.

ONGC's extensive exploration has resulted in some encouraging finds recently after many years of disappointment. Oil and gas were discovered onshore at Gandhar in the Cambay Basin of Gujarat about 80 kilometers west of Baroda. Confirmation drilling was under way with three drills, and according to ONGC, limited production would begin in mid-1986. Another promising discovery was made in the Tapti Structure offshore Gujarat. ONGC was planning delineation drilling where the discovery well tested 3,400 barrels of oil per day and 8 million cubic feet of gas per day. ONGC also reported a small discovery of oil and gas in the onshore part of the Cauvery Basin in Thanjavur District of Tamil Nadu. Modest production of oil was to begin by the end of FY 1985.

Small oil and gas strikes having commercial potential were also reported in Assam and Tripura of far northeast India. Oil India Ltd. has contracted for deep-water drilling off the Andaman Islands. Two wells were to be drilled in 350-meter-deep water where the bottom gradients were steep. A third shallow-water well was to be drilled by Oil India.

India's exploration and development program was to cost a record high $12.8 billion in the seventh 5-year plan compared with $8.5 billion in the sixth plan. Major oil discoveries were needed to reduce the oil import cost of $3.8 billion in 1985.

The most important recent construction contract was awarded for a pipeline at the beginning of FY 1986. After several years of negotiation, a contract to build the 1,700-kilometer gas pipeline from Hazira to Jagdishpur in Uttar Pradesh was awarded to a consortium of Spie Capag S.A. of France and Toyo Engineering Corp. and Nippon Kokan K.K. of Japan. Bechtel Corp. of the United States was selected to be the engineering consultant. The $570 million pipeline will transport Bombay High gas to six fertilizer, three power, and two liquid petroleum gas plants. The project was to cost $4 billion and ranked as one of India's most expensive civil construction projects of the seventh plan period.[36]

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[1]Physical scientist, Division of International Minerals.
[2]The Indian fiscal year begins on Apr. 1 of that stated.
[3]Where necessary, values have been converted from Indian rupees (Rs) to U.S. dollars at the rate of Rs12.20=US$1.00.
[4]Department of Ocean Development, New Delhi. Annual Report 1985-86. P. 5.
[5]U.S. Embassy, New Delhi, India. State Dep. Airgram A-21, July 22, 1986, p. 2.
[6]Mining Journal (London). V. 306, No. 7846, Jan. 3, 1986, p. 4.
[7]Engineering and Mining Journal. V. 187, No. 3, Mar. 1986, p. 9.
[8]The New Sketch. V. 45, No. 20, July 15, 1985, p. 21.
[9]Minerals & Metals Review (Bombay). V. 11, No. 9, Sept. 1985, p. 12.
[10]Industrial Minerals (London). No. 211, Apr. 1985, p. 37.
[11]India News. V. 25, No. 2, Apr. 7, 1986, p. 8.
[12]Mining Journal (London). V. 305, No. 7829, Sept. 6, 1985, p. 195.
[13]International Mining. V. 2, No. 7, July 1985, p. 58.
[14]U.S. Embassy, New Delhi, India. State Dep. Telegram 26676, Oct. 1985, p. 1.
[15]Metal Bulletin (London). No. 7008, Aug. 2, 1985, p. 26.
[16]Mining Engineering. V. 37, No. 11, Nov. 1985, p. 1312.
[17]Iron and Steel Review. V. 29, Nos. 6 and 7, Nov.-Dec. 1985, p. 9.
[18]Metal Bulletin (London). No. 6957, Jan. 29, 1985, p. 7.
[19]———. No. 7079, Apr. 22, 1986, p. 24.
[20]———. No. 7073, Mar. 27, 1986, p. 29.
[21]———. No. 7044, Dec. 10, 1985, p. 29.
[22]Page 15 of work cited in footnote 9.
[23]Minerals & Metals Review (Bombay). V. 12, No. 1, Jan. 1986, p. 35.
[24]Transactions of the Indian Institute of Metals. V. 38, No. 3, June 1985, pp. 241-247.
[25]Mining Journal (London). V. 305, No. 7822, July 19, 1985, p. 45.
[26]Rock Products. V. 89, No. 4, Apr. 1986, p. 64.
[27]Fortnightly Journal of Industry and Commerce. V. 23, No. 12, June 15, 1986, p. 57.
[28]Work cited in footnote 26.
[29]Fertilizer International. No. 213, Oct. 17, 1985, p. 18.
[30]Embassy of India, Washington, DC. Commercial Bulletin. V. 11, No. 10, May 15, 1986, p. 3.
[31]U.S. Embassy, New Delhi, India. State Dep. Telegram 30476, Dec. 1985, p. 1.
[32]The New Sketch. V. 45, No. 28, Sept. 1985, p. 10.
[33]U.S. Embassy, New Delhi, India. State Dep. Telegram 19685, Aug. 1985, p. 1.
[34]Petroleum News. V. 16, No. 11, Feb. 1986, p. 15.
[35]Petroleum Economist. V. 53, No. 7, July 1986, p. 251.
[36]Asian Wall Street Journal. V. 10, No. 151, Apr. 8, 1986, p. 1.

The Mineral Industry of Indonesia

By John C. Wu[1]

Despite continued adverse conditions in the world's crude oil and metal markets, Indonesia remained the largest producer and exporter of liquefied natural gas (LNG), the 11th largest producer of crude petroleum, the 3rd largest producer of tin ore, and the 5th largest producer of nickel ore in the world. Indonesia continued to make substantial progress in mining copper, coal, and gold and in producing primary aluminum, cement, fertilizer materials, and iron and steel.

The mineral fuels sector remained the dominant factor in Indonesia's mineral industry and a major driving force of the Indonesian economy. Its output accounted for about 20% of Indonesia's gross domestic product (GDP) and 70% of Indonesia's export earnings. However, the output of crude oil continued to be limited by the production quotas set by the Organization of Petroleum Exporting Countries (OPEC) and reduced exports resulting from overpricing of Indonesian crude oil. The output of natural gas, however, reached a new record high because of increased utilization for production of LNG. Coal exploration and development activities continued with two new contracts signed in 1985; production of coal reached another record high but was much below the originally planned level because of the delay in completing the Bukit Asam Mine expansion. As a result, Indonesia was forced to import considerable amounts of coal from Australia to feed its newly completed Suralaya powerplant in West Java.

Exploration of oil and gas remained slow because of the depressed world oil markets. However, four new production-sharing contracts were signed by Indonesia with foreign oil companies from Canada, Japan, the Netherlands, and the United States in 1985. Kodele Energy Co. Ltd. (Kodeco) of the Republic of Korea, one of the foreign contractors, announced discovery of two additional oilfields, estimated to have reserves of 100 million barrels of oil each, near the Madura Oilfield discovered in 1984 offshore Madura, East Java. As a result of continued oil and gas exploration, six significant oil and gas deposits were discovered by foreign contractors operating in the Natuna Sea, onshore and offshore Sumatra, and offshore West Java. During 1985, Indonesia was expected to drill 233 exploratory wells and committed to spend $873 million[2] for oil and gas exploration.

In the metallic minerals sector, mining of copper at the Ertsberg Mine in Irian Jaya by Freeport Indonesia Inc. (FI) reached a record high, as did mining of nickel at the Soroako Mine in South Sulawesi. To increase gold production, a new joint venture project of Indonesia and Australia started gold mining at the Lebong Tandi, north of Bengkulu in southwest Sumatra. Indonesia also signed four new contracts with Australian mining companies for gold exploration and development in Kalimantan.

Because of continued export control by the International Tin Council (ITC) and a drastic drop in tin prices after the October crisis in world tin markets, mine production of tin declined to about 22,000 tons. However, P.T. Tambang Timah (P.T. Timah), the largest tin producer in Indonesia, announced that it would not lay off its workers but planned to shift some workers to its subsidiaries. P.T. Timah reportedly planned to raise its output of tin in 1986 with commissioning of its large offshore dredge, *Singkep I*, operating off Karimum and Kundar Islands. Indonesia also brought on-stream its first tin plating plant with an annual capacity of 130,000 tons of tinplate at Cilegon, West Java.

In the mineral processing sector, production of primary aluminum by P.T. Indonesia Asahan Aluminum (IN-ALUM) at Kuala Tanjung in North Sumatra was near full capacity with 90% of its output being exported to Japan. Production of direct-reduction iron (DRI) and steel products by P.T. Krakatau Steel (P.T. Krakatau) at Cilegon, West Java, achieved a new record high of 1.1 million tons of DRI, 793,000 tons of steel slab and billets, and 638,000 tons of steel mill products.

As a result of improved quality and aggressive marketing of its iron and steel products, P.T. Krakatau reported a net profit of $30 million for the first time since 1979, when its integrated operation began. Production of cement and fertilizer materials continued to increase with the cement industry's capacity being expanded to 17.4 million tons per year and the urea fertilizer industry's capacity to 4.5 million tons per year.

The growth of the Indonesian economy, as measured by GDP, was lower in 1985 than in 1984, as the output and exports of crude oil declined in 1985. According to an estimate by the International Monetary Fund, Indonesia's GDP in 1981 constant dollars grew 3% compared with 6.5% in 1984. The main contribution to the continuing growth of the Indonesian economy came from increased output of LNG and refined petroleum products. Indonesia's GDP in current dollars was estimated at about $80 billion compared with $79.9 billion in 1984. The inflation rate, as measured by the change in the Consumer Price Index, dropped to 4% compared with 9% in 1984.[3]

Despite a 14% decline in export earnings to $19 billion, total imports of goods also declined 29% to $10 billion. As a result, a $9 million trade surplus was expected in 1985. Exports of oil and gas in 1985 were estimated to drop 23.5% to $8.9 billion, of which about $3.8 billion was LNG. In addition, export earnings from other mineral commodities including bauxite, coal, copper concentrate, granite, manganese ore, nickel ore, and tin ore totaled $180 million. Export earnings from processed mineral commodities including primary aluminum, cement, fertilizer materials, iron and steel products, nickel matte, and refined tin totaled $680 million in 1985.[4]

PRODUCTION

The depressed world markets of crude oil and tin continued to hit hard on Indonesia's oil and tin industries. As a result of production quotas imposed by OPEC on crude oil output and imposition of ITC's export quotas on tin, production of crude oil and tin dropped to their lowest levels since 1973. However, production of most other metallic and industrial minerals continued to increase or remained steady.

In the mineral fuels sector, the output of coal and natural gas both reached record highs at 1.9 million tons and 1.6 trillion cubic feet, respectively, while the output of crude petroleum (excluding condensate) averaged 1.2 million barrels per day.

In the metallic sector, production of copper, gold, and silver by FI and production of nickel matte by P.T. International Nickel Indonesia (P.T. Inco) both broke their previous record highs. However, production of bauxite, gold, nickel ore, and silver by P.T. Aneka Tambang (P.T. Antam) was at a lower level than that of 1984, owing to the low prices for bauxite and nickel ore and to declining ore grade for gold mining. Production of tin reached a new low because of ITC export controls and the October tin crisis.

In the mineral processing sector, production of aluminum by IN-ALUM was near capacity with most output being exported to Japan. Production of iron and steel by P.T. Krakatau using imported iron ore from Brazil and Sweden also reached a record high owing to increased exports and domestic sales resulting from improved quality and aggressive marketing. Production of ferronickel reached 23,000 tons because of increased exports to Japan. Production of cement rose slightly from that of 1984 despite a 45% increase in the industry's capacity to 17.4 million tons per year. Indonesia became self-sufficient in urea fertilizer when output reached 3.7 million tons. Production of triple superphosphate also reached a new record high at 1 million tons. Production of LNG from the Arun plant in Aceh, North Sumatra, and the Badak plant in Bontang, East Kalimantan, was at full capacity.

Table 1.—Indonesia: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984	1985[p]
METALS					
Aluminum:					
Bauxite, gross weight ____ thousand tons__	1,203	700	778	1,003	830
Metal, primary	--	32,532	114,766	198,960	216,820
Copper, mine output, metal content	62,516	75,116	78,608	82,509	88,724
Gold, mine output, metal content[2] _ troy ounces__	[r]54,241	71,878	[r]76,888	78,677	83,533
Iron and steel:					
Iron sand, dry basis	86,626	144,493	132,887	82,997	130,930
Metal:					
Ferroalloys, ferronickel	19,884	21,501	20,708	22,774	23,789
Steel, crude	500,000	500,000	800,000	1,000,000	1,200,000
Manganese ore	[r]10,330	17,894	8,318	12,267	942
Nickel:					
Mine output, metal content[3]	48,850	45,882	49,378	47,604	48,836
Metallurgical products:					
Matte: Nickel content	19,940	13,748	18,288	22,815	24,946
Ferronickel: Nickel content	4,703	5,010	4,855	4,826	4,802
Silver, mine output, metal content thousand troy ounces__	830	1,134	1,135	1,121	1,175
Tin:					
Mine output, metal content	35,391	33,806	[r]26,554	23,223	22,413
Metal	[r]32,519	29,755	28,390	22,467	20,418
INDUSTRIAL MINERALS					
Asbestos[e]	5,000	25,000	25,000	25,000	25,000
Cement, hydraulic________ thousand tons__	6,844	7,501	8,187	8,858	9,817
Clays, kaolin powder	80,904	77,207	59,628	83,414	90,160
Diamond:[e]					
Industrial__________ thousand carats__	12	12	22	22	22
Gem ____________do____	3	3	5	5	5
Total ____________do____	15	15	27	27	27
Iodine ____________ kilograms__	25,360	28,920	25,297	24,970	[e]25,000
Nitrogen: N content of ammonia	920,213	1,027,600	1,150,400	1,658,200	[e]1,230,000
Phosphate rock	7,846	5,031	5,573	1,917	[e]3,000
Salt, all types__________ thousand tons__	[r]267	[r]1,258	[r]618	370	[e]600
Stone:					
Granite ____________do____	1,811	2,130	2,405	1,583	1,534
Limestone[4] ____________do____	8,749	11,002	12,073	11,314	12,059
Marble__________ square meters__	28,842	28,970	24,374	16,108	9,699
Quartz	155,730	977,289	372,216	541,827	678,800
Sulfur, elemental[5]	951	1,144	2,769	4,999	[e]5,000
MINERAL FUELS AND RELATED MATERIALS					
Asphalt rock, bitumen content	276,498	330,842	533,188	471,239	450,633
Coal __________ thousand tons__	399	588	648	1,458	1,958
Gas, natural:					
Gross__________ million cubic feet__	1,123,720	1,111,928	1,186,362	1,521,450	1,580,012
Marketed ____________do____	720,258	926,150	1,032,321	1,386,051	1,450,451
Natural gas liquids: Propane and butane[e] thousand 42-gallon barrels__	15	14	14	14	16
Petroleum:					
Crude including field condensate ____do____	584,838	[r]488,189	490,483	516,990	483,659
Refinery products:					
Gasoline ____________do____	17,015	13,385	12,980	21,879	17,618
Jet fuel ____________do____	--	8	2,760	4,923	795
Kerosene ____________do____	24,052	18,947	31,669	39,141	37,246
Distillate fuel oil ____________do____	17,850	14,714	37,522	43,935	45,184
Residual fuel oil ____________do____	14,343	14,131	66,596	67,160	36,367
Lubricants ____________do____	--	525	487	93	1,263
Liquefied petroleum gas ________do____	448	373	471	674	2,101
Paraffin wax ____________do____	143	103	76	32	79
Naphtha ____________do____	([6])	465	19,074	14,736	15,458
Unfinished oils requiring further processing ____________do____	39,188	26,355	2,405	1,032	21,178
Unspecified ____________do____	1,962	5,623	5,657	3,678	7,767
Refinery fuel and losses ________do____	3,443	4,654	5,169	2,251	7,779
Total ____________do____	118,444	99,283	184,866	199,534	192,835

[e]Estimated. [p]Preliminary. [r]Revised.

[1]Table includes data available through Aug. 5, 1986.

[2]Includes Au content of copper ore and output by Government-controlled operations. Gold output by operators of so-called People's mines is not available but may be as much as 30,000 troy ounces per year.

[3]Includes a small amount of cobalt that is not recovered separately.

[4]Data represent limestone used for cement production. Excludes considerable amounts of limestone produced by enterprises under local jurisdictions for building materials, for crushed rock to be used as aggregate, and to burn for lime.

[5]Sulfur produced by other than the Frasch process.

[6]Less than 1/2 unit.

TRADE

According to the Central Bureau of Statistics, Indonesia's merchandise trade balance remained steady with a trade surplus of $7.6 million for the first 11 months of 1985. Overall export earnings dropped 13.6% to $17.1 billion, mainly owing to a decline in export earnings from crude petroleum, while imports of goods and merchandise dropped more drastically by 54.2% to $9.5 billion because of reduced imports of electrical equipment, machinery, and transport equipment. Of the total export earnings, crude petroleum, petroleum products, and LNG accounted for 69%, while machinery, electrical equipment, and transport equipment accounted for 48% of imports.

During the first 11 months of 1985, exports of petroleum, petroleum products, and LNG were valued at $7.7 billion, $737.2 million, and $3.3 billion, respectively. Reduced export earnings from crude petroleum in 1985 reportedly were due to reduced exports to Japan and overpriced Indonesian crude oil in the world market; earnings from LNG increased owing to increased export volume to Japan.

Exports of major mineral commodities during the first 11 months of 1985 were as follows: bauxite, 599,500 tons valued at $8.6 million; coal, 1 million tons valued at $32.2 million; copper ore and concentrate, 184,100 tons valued at $103 million; granite, 1 million tons valued at $6.9 million; manganese, 25,700 tons valued at $0.9 million; nickel ore, 534,000 tons valued at $14.2 million; and tin ore and concentrate, 3,300 tons valued at $6 million. Exports of processed mineral products were aluminum ingots, 197,900 tons valued at $219.7 million; cement, 811,200 tons valued at $18.8 million; fertilizer, 359,000 tons valued at $50 million; nickel matte, 48,900 tons valued at $107.4 million; and tin metal, 20,000 tons valued at $231.7 million.

Imports of major industrial materials and capital goods during the first 11 months of 1985 were as follows: machinery and electrical equipment, $2.5 billion; chemical products, $1.4 billion; mineral products, $1.3 billion; base metal products, $1.3 billion; and transport equipment, $831 million.

Based on total value of two-way trade, Japan, the United States, Singapore, and European Economic Community countries remained the major trade partners of Indonesia. The United States accounted for 17% of Indonesia's imports and 22% of Indonesia's exports.

Table 2.—Indonesia: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS				
Aluminum:				
Ore and concentrate	786,311	944,332	--	All to Japan.
Metal including alloys:				
Scrap	--	433	--	Japan 233; Taiwan 200.
Unwrought	90,712	135,017	--	Japan 135,000.
Semimanufactures	1,912	2,297	--	Japan 1,120; Philippines 499; Singapore 450.
Copper:				
Ore and concentrate	229,053	188,428	--	Japan 179,139; Republic of Korea 9,289.
Metal including alloys, all forms	863	473	--	Singapore 236; Hong Kong 234.
Iron and steel: Metal:				
Scrap	1,016	962	--	Japan 800; Singapore 162.
Pig iron, cast iron, related materials	119,941	69,557	--	Japan 43,998; India 25,559.
Steel, primary forms	(2)	20,098	--	All to Thailand.
Semimanufactures:				
Bars, rods, angles, shapes, sections	--	10,365	--	Philippines 5,500; Hong Kong 4,865.
Tubes, pipes, fittings	70	268	--	All to Singapore.
Lead:				
Ore and concentrate	700	850	--	All to Japan.
Metal including alloys, semimanufactures	6	1,254	--	Japan 788; Singapore 333.
Manganese: Ore and concentrate[3]	27,670	26,260	--	Japan 16,960; Taiwan 9,300.
Nickel:				
Ore and concentrate	514,972	579,284	--	All to Japan.
Matte and speiss	46,010	49,848	--	Japan 40,711; Netherlands 7,343.

See footnotes at end of table.

Table 2.—Indonesia: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued				
Tin:				
Ore and concentrate	1,342	2,789	--	Malaysia 2,008; United Kingdom 781.
Metal including alloys:				
Scrap	--	70	--	Japan 35; Singapore 35.
Unwrought	24,950	22,568	--	Singapore 13,848; Netherlands 5,490; Italy 1,375.
Semimanufactures	18	63	--	All to Japan.
Zinc:				
Ore and concentrate	1,294	933	--	Do.
Oxides	--	35	--	All to Australia.
Metal including alloys:				
Scrap	400	682	--	Singapore 303; Japan 290.
Semimanufactures	36	123	--	Japan 73; Singapore 50.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	178	1,128	34	Hong Kong 1,061.
Grinding and polishing wheels and stones	242	317	--	Hong Kong 307.
Barite and witherite	5,807	762	--	Singapore 751.
Cement	198,350	389,800	--	Bangladesh 248,570; Singapore 58,812.
Clays, crude:				
Bentonite	9,928	5,184	--	Singapore 3,007; Thailand 2,177.
Kaolin	3,796	10,921	--	Taiwan 9,305; Japan 1,507.
Unspecified	100	210	--	Singapore 192.
Fertilizer materials: Manufactured:				
Ammonia	25,909	178,555	--	India 106,910; Taiwan 25,917; Republic of Korea 23,624.
Nitrogenous	328,547	217,908	--	Malaysia 101,419; Philippines 74,567.
Phosphatic	14,500	44,401	--	Bangladesh 19,700; Hong Kong 18,100.
Iodine	2	28	--	France 13; Netherlands 9.
Phosphates, crude	1,106	550	--	All to Taiwan.
Pigments, mineral: Iron oxides and hydroxides, processed	21	--		
Salt and brine	330	50	--	All to Singapore.
Sodium compounds, n.e.s.: Sulfate, manufactured	2,100	11,582	--	Thailand 4,712; Singapore 3,593; Republic of Korea 1,921.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked thousand tons	1,358	1,339	--	All to Singapore.
Worked	1	125	--	Japan 86; Singapore 36.
Gravel and crushed rock	304	597	--	Singapore 560.
Quartz and quartzite	28,385	28,200	--	All to Japan.
Sand other than metal-bearing thousand tons	20,596	19,022	--	Mainly to Singapore.
MINERAL FUELS AND RELATED MATERIALS				
Coal:				
Anthracite	251,810	136,420	--	Malaysia 92,820; Japan 17,700.
Bituminous	172,648	745,924	--	Japan 295,898; Malaysia 274,736; Taiwan 60,768.
Gas, natural, liquefied thousand tons	9,919	14,340	--	All to Japan.
Petroleum:				
Crude thousand 42-gallon barrels	380,166	374,228	96,529	Japan 165,463; Singapore 31,334.
Refinery products:				
Liquefied petroleum gas do	4,095	8,097	1,542	Japan 4,308; Singapore 914; Thailand 910.
Kerosene and jet fuel do	11	9	--	NA.
Distillate fuel oil do	82	631	204	Italy 230; Australia 186.
Lubricants do	(2)	13	--	NA.
Residual fuel oil do	32,029	39,175	8,833	Japan 28,751.

NA Not available.
[1]Table prepared by Audrey D. Wilkes.
[2]Less than 1/2 unit.
[3]Includes manganiferous iron ore and concentrate.

Table 3.—Indonesia: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS				
Alkali and alkaline-earth metals	51	177	--	Mainly from Japan.
Aluminum:				
Ore and concentrate	146	164	--	All from Japan.
Oxides and hydroxides	182,417	398,824	127	Australia 250,382; Japan 140,435; West Germany 2,749.
Metal including alloys:				
Scrap	1	4	2	Singapore 2.
Unwrought	20,067	17,183	1,607	Australia 5,690; Canada 1,612.
Semimanufactures	26,765	20,682	332	Japan 5,634; Singapore 3,437; West Germany 2,131.
Arsenic:				
Ore and concentrate kilograms	235	--		
Oxides and acids	34	64	--	Belgium-Luxembourg 28; West Germany 16; Singapore 10.
Chromium:				
Ore and concentrate	21	46	--	Japan 32; Australia 14.
Oxides and hydroxides	562	694	47	Japan 212; United Kingdom 180; West Germany 90.
Cobalt: Oxides and hydroxides	95	276	(2)	Canada 252; Japan 16.
Copper:				
Matte and speiss including cement copper	641	10	--	All from United Kingdom.
Sulfate	321	433	(2)	Japan 98; West Germany 80; Taiwan 58.
Metal including alloys:				
Scrap	475	--		
Unwrought	16,968	17,803	6	Zambia 8,202; Japan 3,721; Chile 2,734.
Semimanufactures	7,942	7,787	1,017	Japan 3,629; West Germany 934.
Gold: Metal including alloys, unwrought and partly wrought thousand troy ounces	14	48	--	United Kingdom 32; Switzerland 16.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite	127,999	198,460	--	Sweden 180,496; Australia 16,075; Malaysia 1,878.
Pyrite, roasted	60,450	1,268,438	--	Sweden 1,140,046; Brazil 128,392.
Metal:				
Scrap	257,889	243,121	48,915	Hong Kong 69,275; Singapore 33,174.
Pig iron, cast iron, related materials	87,694	95,612	1,003	Pakistan 59,591; Brazil 25,360; Hong Kong 5,457.
Ferroalloys:				
Ferrochromium	24	61	--	Taiwan 56; Japan 4.
Ferromanganese	7,437	20,727	--	Australia 13,555; Mozambique 2,325; Republic of South Africa 2,288.
Ferromolybdenum kilograms	200	1,500	--	All from Belgium-Luxembourg.
Ferrosilicon	8,444	7,769	(2)	Mozambique 2,361; Philippines 1,422; Republic of South Africa 1,131.
Unspecified	1,447	2,108	(2)	Taiwan 1,040; Mozambique 562; Japan 218.
Steel, primary forms[3]	158,471	81,743	42	Republic of Korea 54,765; Netherlands 6,998; West Germany 4,982.
Semimanufactures:				
Bars, rods, angles, shapes, sections	241,621	240,275	2,063	Japan 208,871; Taiwan 11,986; Republic of Korea 7,237.
Universals, plates, sheets[3]	1,147,563	171,887	12,384	Japan 92,943; Australia 21,501; Republic of Korea 11,766.
Hoop and strip[3]	24,362	14,029	137	Japan 9,874; Republic of Korea 2,186; Australia 661.
Rails and accessories	27,607	NA		
Wire	11,604	NA		
Tubes, pipes, fittings	266,037	NA		
Castings and forgings, rough	10,184	12,184	1,288	Taiwan 4,326; Japan 2,710.
Lead:				
Oxides	1,220	875	281	Mexico 234; Australia 183.
Metal including alloys:				
Scrap	321	54	--	All from North Korea.
Unwrought	12,717	14,410	64	Australia 12,120; Japan 688; Malaysia 540.
Magnesium: Metal including alloys:				
Unwrought	36	142	3	Norway 123; Australia 16.
Semimanufactures	29	35	13	Norway 18; Taiwan 2.

See footnotes at end of table.

Table 3.—Indonesia: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Manganese:				
Ore and concentrate	2,889	1,545	--	Singapore 1,400; China 145.
Oxides	18,322	14,317	(3)	Singapore 11,108; Japan 2,782; Belgium-Luxembourg 267.
Mercury ..... 76-pound flasks	642	323	1	West Germany 295; China 20.
Molybdenum: Metal including alloys, all forms ..... kilograms	363	312	9	Netherlands 277; Belgium-Luxembourg 26.
Nickel:				
Matte and speiss	--	170	--	All from Australia.
Metal including alloys:				
Unwrought	76	7	(3)	Mainly from Japan.
Semimanufactures	1,778	1,421	20	Republic of Korea 560; West Germany 217; Canada 185.
Platinum-group metals: Metals including alloys, unwrought and partly wrought:				
Platinum ..... troy ounces	1,833	96	64	Australia 32.
Unspecified ..... do	8,616	32	31	Australia (3).
Rare-earth metals including alloys, all forms	12	35	3	Japan 24.
Silver: Metal including alloys, unwrought and partly wrought ..... troy ounces	9,726	9,340	--	West Germany 3,215; Switzerland 3,215; Japan 2,910.
Tin: Metal including alloys:				
Oxides	4	--		
Metal including alloys, all forms	1,127	321	69	Japan 184; Singapore 34.
Titanium: Oxides	14,087	12,076	2,882	Japan 5,232; Australia 1,615.
Tungsten: Metal including alloys, all forms ..... kilograms	81,555	1,933	229	Sweden 580; Netherlands 529; Japan 265.
Uranium and/or thorium:				
Oxides and other compounds	211	210	--	France 180; China 30.
Metal including alloys, all forms	48	24	--	China 15; Japan 3.
Vanadium: Oxides and hydroxides	29	15	12	West Germany 3.
Zinc:				
Oxides	521	163	7	Republic of Korea 68; Hong Kong 30; West Germany 26.
Metal including alloys:				
Scrap	432	120	--	All from Singapore.
Unwrought	68,937	45,080	(3)	Australia 36,405; Canada 5,744; Japan 1,748.
Semimanufactures	1,559	875	90	Australia 249; Japan 110; Norway 104.
Other:				
Ores and concentrates:				
Of base metals	3,030	11,796	2	Malaysia 9,728; China 1,500; Australia 535.
Of precious metals	802	151	150	Taiwan 1.
Ashes and residues	988	(3)	(3)	
Base metals including alloys, all forms	96	97	2	Australia 38; Taiwan 21; Singapore 10.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	418	541	74	Japan 344; Netherlands 42.
Artificial: Silicon carbide[4]	116	145	(3)	Belgium-Luxembourg 54; Czechoslovakia 28; France 25.
Grinding and polishing wheels and stones	2,030	3,191	12	China 1,875; Taiwan 480; Japan 432.
Asbestos, crude	15,095	10,963	127	Canada 6,786; China 306; Singapore 260.
Barite and witherite	74,316	60,457	999	Thailand 45,745; Singapore 8,048.
Boron materials:				
Crude natural borates	21	2	--	All from West Germany.
Oxides and acids	698	725	629	France 43; China 30.
Bromine ..... kilograms	2	9	1	United Kingdom 8.
Cement	691,190	70,546	1,788	Singapore 24,963; Japan 18,756; Philippines 10,263.
Chalk	23	624	8	Taiwan 600; West Germany 16.
Clays, crude:				
Bentonite	24,185	25,542	14,165	Australia 8,259; Thailand 908.
Kaolin	20,347	29,956	13,948	Japan 6,242; United Kingdom 3,326.
Unspecified	5,876	1,310	63	Singapore 653; Japan 288; France 106.
Cryolite and chiolite	6,661	1,730	(3)	Mainly from Japan.

See footnotes at end of table.

Table 3.—Indonesia: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Diatomite and other infusorial earth	1,188	1,075	754	West Germany 56; Singapore 40.
Feldspar, fluorspar, related materials	7,230	13,523	--	China 8,799; Japan 2,897; Thailand 650.
Fertilizer materials:				
Crude, n.e.s	2,957	392	3	West Germany 302; Netherlands 60.
Manufactured:				
Ammonia	31	83	41	Japan 23; Singapore 10.
Nitrogenous	425,077	292,210	55,072	Romania 43,287; United Kingdom 29,216.
Phosphatic	227,321	38,196	1	United Arab Emirates 18,800; Turkey 10,000; West Germany 5,500.
Potassic	254,913	276,430	325	Canada 137,029; Jordan 57,000; U.S.S.R. 14,051.
Unspecified and mixed	6,288	12,935	638	Belgium-Luxembourg 5,100; West Germany 4,927; Republic of Korea 2,250.
Graphite, natural	161	98	--	Taiwan 48; China 45.
Gypsum and plaster	356,155	384,301	20	Australia 223,523; Thailand 154,699; West Germany 2,346.
Iodine	54	11	--	United Kingdom 8; West Germany 2.
Kyanite and related materials	--	4	2	Japan 2.
Lime	849	557	5	Japan 201; West Germany 167; Malaysia 104.
Magnesium compounds: Magnesite	3,955	3,691	--	Japan 2,653; China 592; Taiwan 442.
Mica:				
Crude including splittings and waste	547	704	205	India 195; Taiwan 118.
Worked including agglomerated splittings	152	83	10	Taiwan 27; China 23; Japan 16.
Nitrates, crude	5,090	10,340	--	Belgium-Luxembourg 9,680; West Germany 600; Chile 60.
Phosphates, crude	361,759	636,509	123,603	Jordan 326,600; Morocco 82,771.
Pigments, mineral:				
Natural, crude	538	672	128	Singapore 289; China 250.
Iron oxides and hydroxides, processed	3,730	4,251	137	West Germany 1,408; China 1,167; Japan 626.
Potassium salts, crude	588	--		
Precious and semiprecious stones other than diamond: Synthetic --- value, thousands	--	$15	--	Japan $13.
Pyrite, unroasted	--	12	--	All from Japan.
Salt and brine	943	1,060	97	Singapore 451; China 160.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	88,779	125,365	88,915	Kenya 12,700; West Germany 10,387.
Sulfate, manufactured	6,723	5,880	802	Taiwan 3,451; Republic of Korea 802.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	393	2,020	8	Malaysia 1,200; China 600; West Germany 87.
Worked	3,273	3,132	12	Taiwan 1,130; China 765; Italy 689.
Dolomite, chiefly refractory-grade	4,072	6,978	--	Japan 4,278; United Kingdom 1,400; Taiwan 1,200.
Gravel and crushed rock	1,580	628	132	France 202; New Zealand 146.
Limestone other than dimension	160	2	--	Mainly from Singapore.
Quartz and quartzite	130	296	--	France 101; Taiwan 100; Japan 40.
Sand other than metal-bearing	17,406	4,400	1,625	Malaysia 1,219; Singapore 652.
Sulfur:				
Elemental:				
Crude including native and byproduct	3,122	1,974	(4)	Singapore 920; Republic of Korea 715; Taiwan 275.
Colloidal, precipitated, sublimed	102,564	212,487	--	Canada 157,672; Singapore 27,410; Guatemala 15,552.
Dioxide	12	14	--	Italy 13.
Sulfuric acid	1,826	7,497	72	Japan 7,008; Singapore 386.
Talc, steatite, soapstone, pyrophyllite	20,304	17,291	50	China 11,292; Taiwan 2,960; Republic of Korea 1,530.
Other:				
Crude	5,708	2,061	47	Republic of Korea 600; Japan 474; West Germany 311.
Slag and dross, not metal-bearing	3,109	3,741	2,042	Japan 879; Singapore 616.

See footnotes at end of table.

Table 3.—Indonesia: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	8,143	4,176	1,275	Singapore 2,199; Japan 369.
Carbon black	27,108	34,572	217	Australia 12,754; Saudi Arabia 6,633; Taiwan 3,719.
Coal:				
Anthracite	256	81	2	Japan 76.
Bituminous	676	144	--	Mainly from Thailand.
Briquets of anthracite and bituminous coal	43	55	--	All from Singapore.
Lignite including briquets	612	278	194	Netherlands 38; Singapore 31.
Coke and semicoke	24,199	42,899	15,227	Japan 14,993; Taiwan 8,737.
Gas, natural: Liquefied kilograms	5	45	25	Singapore 20.
Peat including briquets and litter do.	16,200	10	--	All from Singapore.
Petroleum:				
Crude thousand 42-gallon barrels	22,709	39,648	--	All from Saudi Arabia.
Partly refined do.	1,289	512	8	Saudi Arabia 192; Singapore 157; Netherlands 76.
Refinery products:				
Liquefied petroleum gas do.	12	1	(2)	NA.
Gasoline do.	16,039	603	(2)	Mainly from Singapore.
Mineral jelly and wax do.	549	407	1	Singapore 339; China 32; West Germany 12.
Kerosene and jet fuel do.	22,760	[5]9,949	2	Singapore 9,947.
Distillate fuel oil do.	10,199	4,667	(2)	Mainly from Singapore.
Lubricants do.	707	284	107	Singapore 150.
Nonlubricating oils do.	270	195	25	Australia 76; Singapore 46.
Residual fuel oil do.	14,860	15,348	--	Singapore 15,049; Australia 204; Philippines 95.
Bitumen and other residues do.	1,424	1,161	100	Singapore 843; Taiwan 193.
Bituminous mixtures do.	20	13	1	Singapore 10.
Petroleum coke do.	(2)	168	86	Japan 82.

NA Not available.
[1]Table prepared by David J. Ellis.
[2]Less than 1/2 unit.
[3]1984 figures are incomplete owing to insufficient data.
[4]Includes boron carbide.
[5]Includes 32,700 barrels of white spirit.

COMMODITY REVIEW

METALS

Aluminum and Bauxite.—Production of bauxite by P.T. Antam from the southern part of Bintan Island and the nearby islands of Kelong, Dendang, and Keyang decreased to a monthly average of 74,000 tons from 83,600 tons in 1984 owing to reduced Japanese demand for bauxite. Exports of bauxite to Japan dropped to 750,000 tons from 992,000 tons in 1984. The export-grade bauxite on Bintan Island reportedly will be depleted within 4 to 6 years.

Production of primary aluminum by IN-ALUM at Kuala Tanjung in North Sumatra was near full capacity. During the past 4 years, the Asahan smelter produced 557,415 tons of primary aluminum, of which 90% was exported to Japan, 20,000 tons was marketed domestically, and the remainder was exported to other countries.

Because of declining primary aluminum prices on the world market, IN-ALUM reportedly suffered a loss of $47 million during 1984-85. According to industry sources, the break-even cost at the Asahan smelter has been estimated at $1,700 per ton, while primary aluminum prices had dropped to about $1,000 per ton in late 1985 from a peak of $2,000 per ton in 1982. Average export prices of Asahan aluminum were $1,352 per ton in 1982, $1,425 per ton in 1983, $1,516 per ton in 1984, and $1,110 per ton for the first 11 months of 1985.

In late 1984, an agreement on a pricing formula for aluminum exports to Japan was reached between IN-ALUM and five Japanese partners. The formula was based on the London Metal Exchange (LME) price minus 2.5% with a base price of $1,220 per ton f.o.b. Indonesia effective until June 1985. After June, another agreement was reached between the two parties for exports to Japan during June 1985 to March 1986. This new pricing formula reportedly was based entirely on the LME price.[5]

IN-ALUM announced an expansion project for another hydroelectric power station and to increase its aluminum smelter capacity to 400,000 tons per year from 225,000 tons per year in mid-1985. However, because of low primary aluminum prices on the world market, the company reportedly shelved expansion plans indefinitely. The plan to build a 600,000-ton-per-year alumina plant on Bintan Island reportedly was also being postponed because of financial constraints.

Copper.—Production of copper by FI at the Gunung Bijih (Ertsberg) Mine in Irian Jaya reached another record high in 1985. The average production rose to 14,270 tons per day of ore from 13,500 tons per day of ore in 1984, with most of the output being mined from the underground Ertsberg East Mine. The output of copper concentrate rose 23% to 233,000 tons containing 88,724 tons of copper, 76,000 troy ounces of gold, and 1.11 million troy ounces of silver. FI exports most of its copper concentrate to Japan. Its export earnings were valued at $128.8 million compared with $114.3 million in 1984.

Despite low copper prices, FI was able to increase its net earnings from copper by 54% to $8.3 million in 1985 mainly because of continuing efforts to lower unit costs of production by increasing mining rates and mill throughput. According to the company's annual report, FI remained one of the lowest cost copper producers in the world. Its earnings break-even point was estimated at 58 cents per pound with credits for gold and silver values contained in the concentrate.[6]

To augment copper reserves, FI continued exploration. Exploration at the Ertsberg East Mine area was to be accelerated when copper prices improve. As of December 1985, FI's estimates of proved and probable ore reserves at the Ertsberg and Ertsberg East ore bodies were 39.6 million tons averaging 2.2% copper.

In June, Freeport-McMoRan Inc. of the United States, which owned 81% of FI, reportedly increased its equity holding in FI to 85%.

Gold and Silver.—Production of gold and silver by P.T. Antam from the Cikaret, Cikebo, Cipicung, Cirotan, Hatemi, and Lebak-Sembada workings in South Banten, West Java, decreased to 6,800 and 63,500 troy ounces, respectively. However, production of gold and silver recovered from copper ore by FI at the Ertsberg Mine continued to increase and reached 76,000 and 1.11 million troy ounces, respectively, in 1985.

In November, P.T. Lusang Mining, a joint venture firm established in 1984 by Bengkulu Minerals Pty. Ltd. of Australia and P.T. Lebong Tandai (P.T. Lebong) of Indonesia, started gold mining at the Lebong Tandai Mine, about 87 kilometers north of Bengkulu, Sumatra. According to a company official, the Lebong Tandai Mine was expected to produce 18,000 troy ounces of gold and 35,000 troy ounces of silver in its first year of operation, and gradually increase to 26,000 troy ounces of gold when it reaches full capacity in 1988. P.T. Lebong was the first among the nine gold exploration and development contracts awarded by the Government in 1984 to come on-stream. The joint venture firm is 70% owned by Bengkulu Minerals and 30% by P.T. Lebong. Development costs were estimated at $425 million. The gold deposits were estimated to have 360,000 tons of ore averaging 0.3 troy ounce of gold and 2.6 troy ounces of silver per ton. The ore body is 1.6 kilometers deep and 14.4 kilometers long.[7]

Gold exploration in Indonesia intensified as four more foreign contractors from Australia were awarded prospecting rights. Westralian Gold Mines Ltd. of Australia reportedly acquired a 93% interest in the mineral rights to explore and develop an alluvial gold deposit in Western Kalimantan. Australis Mining N.L. of Australia bought a 28.5% interest in old gold workings at Buduk, West Kalimantan. Abaleen Minerals N.L. of Australia reached joint venture agreements with two Indonesian firms, P.T. Ara Tutut and P.T. Kolindo Utama Raya, to develop an old alluvial gold deposit in the Woyla River area of Sumatra and another alluvial gold deposit on the Marisa River in Sulawesi Utara. Pelsart Resources N.L. and Jason Mining Ltd. of Australia also reached an agreement with Indonesia's P.T. Yunawati Perdana to explore the Kasongan gold deposits in Central Kalimantan.

Iron and Steel.—Production of iron sands by P.T. Antam from the Cilacap area on the south coast of Central Java recovered to an average monthly rate of 11,000 tons from 7,000 tons in 1984. Domestic demand for iron sands by the cement industry continued to grow, while annual exports of iron sands to Japan remained stagnant between

10,000 and 12,000 tons.

Permission for an iron sands development project reportedly was awarded to a consortium of Davy McKee Corp. of the United Kingdom and Lurgi GmbH of the Federal Republic of Germany by the Indonesian Development Agency. The iron sand reserves at Kulonprogo and Bantul along the southern coast of Java were estimated at 12.5 million tons; their quality reportedly is similar to that of the New Zealand deposits. The two firms planned to invest $350,000 in equipment and infrastructures to process the iron sands into pellets for sale to P.T. Krakatau, the Indonesia state-owned steelmaker.[8]

The construction of the 8,000-ton-per-year pilot iron smelter at Sindang Sari near Bandar Lampung in South Sumatra, originally scheduled for completion in August 1984, was completed, and commercial operation was expected to begin in April. Distribution of pig iron produced by the plant was to be handled by P.T. Krakatau.

P.T. Krakatau reported a profit for the first time since its integrated operations began in 1979. According to the company's chief executive, sales of steel rose 43% to $290 million, including $31 million from exports. As a result of increased sales, an estimated profit of $30 million was recorded. Improved quality and competitive prices of Krakatau's iron and steel products and aggressive marketing were cited as important factors for increased sales in the domestic and world markets.

According to the company and local press reports,[9] Krakatau's iron and steel mill capacities and output in 1984-85 were as follows, in thousand metric tons:

Plant	Capacity	Output	
		1984	1985
Direct-reduction	2,000	736	1,060
Slab steel	1,100		391
		581	
Billet steel	500		402
Hot-strip mill	1,000	[1]241	[1]360
Wire rod mill	200	104	173
Bar mill	150	58	105
Section mill	45	NA	NA
Cold wire drawing	18	NA	NA

NA Not available.
[1]Represents output of hot-rolled coils.

Of the total DRI produced in 1985, 203,000 tons was marketed as sponge iron. Krakatau exported 116,000 tons of iron and steel products valued at $31 million. Exports of DRI were mainly to China and India; wire rods to China; steel bars to India and Saudi Arabia; hot-rolled coils to Malaysia, the Philippines, Singapore, and Thailand; and steel plates to Japan, the United Kingdom, and the United States. Raw material requirements for Krakatau's DRI plant, mostly iron ore pellets, were imported principally from Brazil and Sweden. Although Indonesia produced iron sands along the southern coast of Java, the quality of domestically produced iron ore could not meet the requirements of the DRI plant.

Despite the expansion of the iron and steel industry, Indonesia continued to import 1 million tons of steel, principally from Japan and the Republic of Korea, to meet one-third of domestic demand for steel, which was estimated at 3.1 million tons in 1985.

Construction of the $800 million cold-rolling strip mill with a capacity of 850,000 tons per year in Cilegon, West Java, was 70% completed. P.T. Cold Rolling Mill Indonesia will be the operator of the mill when it comes on-stream in the first quarter of 1987. According to P.T. Krakatau, the company was planning to construct a 350,000-ton-per-year seamless pipe mill adjacent to Krakatau's Cilegon Works in West Java.

Nickel.—Output of nickel ore by P.T. Antam from its mines at Pomalaa in southeast Sulawesi and on Gebe Island in North Moluccas dropped to below 1 million tons for the first time in 10 years. Production of nickel ore had been declining since 1983 as nickel prices in the world market remained soft. However, mine output and smelter production of nickel matte by P.T. Inco from its Soroako nickel complex in South Sulawesi continued its upward trend to meet the steady Japanese demand for nickel-sulfate matte, despite a further weakening of nickel price in 1985.

Production of nickel ore and ferronickel by P.T. Antam was estimated at 960,000 tons and 23,000 tons, respectively. To upgrade the nickel content of ore exported to Japan, P.T. Antam reportedly was producing more ore from its mine on Gebe Island. To increase production of ferronickel and reduce production costs at its Pomalaa ferronickel plant, P.T. Antam reportedly asked Sumitomo Metal Mining Co. Ltd. of Japan to conduct feasibility studies to raise ferronickel output capacity to 25,000 tons per year from 20,000 tons per year and to switch its oil-based powerplant to coal.

In June, Ni-Cal Technology Ltd., a subsidiary of Ni-Cal Developments Ltd. of Canada, signed a letter of intent with P.T. Antam to establish a joint venture for building and operating a $40 million nickel and cobalt laterite processing plant on Gebe Island. Ni-Cal Technology was to provide the technology for nickel-cobalt acid leaching after completion of a feasibility study based on an 850-ton-per-day plant in 1986.

Production of nickel matte by P.T. Inco from the Soroako nickel complex reached another record high. Production of nickel in matte rose to 25,000 tons from 23,000 tons in 1984. Exports of nickel matte to Japan also increased to 23,554 tons from 22,987 tons in 1984. However, export prices declined to $1.81 per pound from $2.08 per pound in 1984. As a result, export earnings dropped to $94 million from $106 million in 1984. According to industry sources, the 1985 production of nickel in matte was about 4,500 tons below the planned level of 29,500 tons owing to a temporary shutdown of the company's No. 2 electric furnace at the Soroako smelter in May. Because of a high debt and further softening of nickel prices in the world market, P.T. Inco incurred a net loss of $39 million compared with $37 million in 1984.

Tin.—Mine production of tin dropped to below 23,000 tons for the first time since 1978 because of the ITC's export controls and the October tin crisis in the world markets that resulted from the collapse of the ITC's buffer stock operations owing to a lack of funds. Despite the continuing decline in its tin production, Indonesia remained the second largest tin producer, accounting for 14% of the Western World production.

According to Indonesia's Department of Mining and Energy, tin production in Indonesia by company and area for 1983-84 was as follows, in metric tons:

Company and area	1983	1984
P.T. Tambang Timah:		
Bangka Island	13,893	11,333
Belitung Island	4,514	4,044
Singkep Island	1,506	2,200
Bangkinang, Sumatra	40	31
P.T. Koba Tin: Koba, Bangka Island	5,253	4,215
P.T. Broken Hill Pty. Indonesia: Kelapa Kampit, Belitung Island	649	473
P.T. Riau Tin Mining: Tujuh Riau Island	698	927
Total	26,553	23,223

In 1985, tin production was estimated at 22,400 tons, of which 75% was produced by P.T. Timah, 19% by P.T. Koba Tin, 4% by P.T. Riau Tin Mining, and 2% by P.T. Broken Hill Pty. Indonesia. Peleburan Timah Indonesia, a tin smelter of P.T. Timah at Mentok on Bangka Island, produced 21,400 tons of refined tin compared with 22,500 tons in 1984. According to P.T. Timah, the state-owned tin company that distributed all tin produced in Indonesia, total exports of tin were about 22,000 tons valued at $247 million.

Despite a drastic drop in world tin prices after the October tin crisis, P.T. Timah had no plans to lay off its 29,500 workers; some workers reportedly would be relocated to the company's richer ore deposits, and some would be shifted to the company's subsidiaries, such as the oxygen and kaolin processing plants. In May, P.T. Timah commissioned a new large offshore dredge, *Singkep I*. The $28 million dredge was the company's fourth large bucket dredge; the other three dredges, *Bangka II, Bima,* and *Belitung I,* were commissioned in 1979-81. *Singkep I* reportedly was operating in the offshore areas of Karimum and Kundar Islands.

In May, P.T. Broken Hill reportedly sold its equity in an underground tin mine at Kelapa Kampit on Belitung Island to Preussag AG of the Federal Republic of Germany. According to Preussag officials, the company would undertake further exploration near the minesite to augment the reserves. Tin production by Preussag from Kelapa Kampit reportedly was to be marketed by its subsidiary, Amalgamated Metal Corp., which owned a 50.6% interest in Datuk Keramat Smelting of Malaysia, a tin smelter at Georgetown on Penang Island offshore the west coast of Malaysia.

In September, Indonesia's first tin-plating plant at Cilegon, West Java, came onstream. Construction of the plant was started in October 1983, taking 2 years to complete at a cost of $96 million. The 130,000-ton-per-year tin-plating plant is owned and operated by P.T. Pelat Timah Nusantara (P.T. Latinusa), a joint venture of P.T. Timah, P.T. Krakatau, and P.T. Nusantara Ampera Bakit. The first two of these state-owned companies supply raw materials, tin, and steel, and the third provides most of the capital for the plant. The plant used the Ferrostan electrotinning process under license from United States Steel Corp. of the United States. The products of P.T. Latinusa were marketed through a sole agent, P.T. Kemasinti Nusabakit, Jakarta, Indonesia.

INDUSTRIAL MINERALS

Cement.—Despite a slowdown in construction, Indonesia's cement industry continued to grow. According to the Indonesia Cement Association, the cement industry's installed capacity increased 41% to 17.4 million tons per year with 10 cement companies operating by yearend. However, cement production increased only 11% to 9.8 million tons, mainly because of a slowdown in construction and tight competition in the overseas market. Cement output was equivalent to 72% of the industry's 13.6-million-ton-per-year operating capacity.

In 1985, P.T. Semen Tonasa brought onstream its Tonasa III cement plant with an annual capacity of 590,000 tons per year at a cost of $98.8 million in Pangkep regency of South Sulawesi. P.T. Indocement Group, the country's largest cement producer, reportedly expanded its annual capacity to 7.5 million tons per year in West Java. P.T. Semen Cirebon, a new cement company, reportedly commissioned a 1.2-million-ton-per-year cement plant at Cirebon in West Java.

P.T. Semen Kupang, the operator of Indonesia's only cement miniplant, with an annual capacity of 120,000 tons at Kupang, Nusa Tenggara, on Timor Island, reportedly suffered large losses since it began operation in April 1984. According to local press reports, the company suffered a $1.8 million loss in 1984 and was expecting a further loss of $3.5 million in 1985 because of marketing difficulties. P.T. Semen Kupang produced 50,000 tons in 1984 and 100,000 tons in 1985.

Exports of cement rose to 881,000 tons from 390,000 tons in 1984 despite lower cement prices in 1985. Indonesia's major cement exporters were P.T. Indocement, P.T. Semen Andalas Indonesia, and P.T. Semen Padang. Most cement exports went to Bangladesh, Singapore, China, and India, in that order. Domestic consumption of cement was 9 million tons with Java accounting for 62%; Sumatra, 22%; Sulawesi, 7%; Kalimantan, 4%; and other areas, 5%.

In June, the Government of Indonesia reportedly acquired a 35% interest in P.T. Indocement valued at about $330 million. According to Government officials, cement is considered a strategic commodity for Indonesia's development, and the acquisition was made to prevent a monopoly in the cement market and to maintain price stability and smooth supply for domestic consumption.[10]

Fertilizer Materials.—Indonesia became self-sufficient in urea fertilizer as its production reached 3.7 million tons with an annual capacity of 4.5 million tons following commission of the Iskandar Muda urea plant in Aceh, North Sumatra, in March. Production of urea was by P.T. Pupuk Sriwijaya in Palembang, South Sumatra; P.T. Pupuk Kujan in Tjikampek (Cikampek), West Java; P.T. Pupuk Kaltimantan Timur in Bontang, East Kalimantan; and P.T. Asean-Aceh Fertilizer, and P.T. Iskandar Muda Fertilizer Corp., both at Lhokseumawe in Aceh.

Production of triple superphosphate and ammonium sulfate by P.T. Petrokimia Gresik at Gresik near Sarabaja in East Java was 1 million tons and 304,110 tons, respectively. The company stopped production of diammonium phosphate fertilizer in 1985 because of the termination of a Government subsidy.

According to Government sources, the 1985 domestic demand for urea, triple superphosphate, and ammonium sulfate was 3 million, 1.2 million, and 433,000 tons, respectively. Indonesia's exports of urea were 500,000 tons. However, most potassic-base compound chemical fertilizers as well as raw materials for production of triple superphosphate were imported from the Federal Republic of Germany, Jordan, Morocco, and Tunisia.[11]

P.T. Asean-Aceh, which completed its first full year of operation in 1984, reported a profit of $14.1 million with an output of 548,000 tons of urea, or 96% of capacity. Of the output, 260,000 tons was for domestic consumption, and the remainder was shipped to Malaysia, 100,000 tons; and the Philippines and Thailand, 188,000 tons. The 1985 production was estimated at 547,350 tons.

The country's newest urea plant, construction of which was started in 1982 by P.T. Iskandar Muda, was completed and brought on-stream in March. The $335 million plant, built next to P.T. Asean-Aceh, was financed by Indonesia State Bank, Import-Export Bank of Japan, and the state-owned P.T. Pupuk Sriwijaya. The plant was designed by Toyo Engineering Corp. of Japan, but construction and management were by Rekayasa Industrial Development Co. of Indonesia.

P.T. Pupuk Kaltimantan, which operated two production units—Kaltim I and Kaltim

II—at Bontang in East Kalimantan, was expected to start construction of its third unit, Kaltim III, with a daily capacity of 1,000 tons of ammonia and 1,725 tons of urea in Bontang by yearend; completion was scheduled for 1989. P.T. Pupuk Kaltimantan produced 496,000 tons of ammonia, of which 232,000 tons was further processed into urea and 264,000 tons was marketed as ammonia. Production of urea was estimated at 400,000 tons for 1985. Most production reportedly was by Kaltim II because Kaltim I was under rehabilitation, which was expected to be completed in October 1986. According to a company official, after completion of Kaltim III, P.T. Pupuk Kaltimantan will have a capacity of 1.7 million tons of urea and 330,000 tons of ammonia per year.[12]

Another ammonia plant with a capacity of 1,500 tons per day was planned to be built in South Sulawesi to utilize natural gas in the Sengkang, Wajo regency of South Sulawesi. Construction of the $265 million ammonia plant and a $112 million gas exploration program were expected to start in 1986 and be completed in 1989.

MINERAL FUELS

Coal.—Coal production by two state-owned coal mining companies continued to increase. P.N. Tambang Batubara, which operated the Ombilin Mine in West Sumatra, produced 770,750 tons compared with 583,580 tons in 1984, mainly from the Tanah Hitam deposit. P.T. Tambang Batubara Bukit Asam, which operated the Bukit Asam Mine in South Sumatra, produced 720,300 tons compared with 501,074 tons in 1984, mainly from the Maura Tiga deposit.

Four other private coal companies—C.V. Fajar Bumi Sakti, C.V. Baiduri Enterprise, P.T. Kitadin Corp., and P.T. Tanito Harum—produced about 323,000 tons compared with 384,000 tons in 1984 from their operations in the Lou Buah, Loa Bukit, Tenggarong, and Embelut areas, about 60 kilometers southwest of Samarinda, East Kalimantan. P.T. Arutmin Indonesia, a joint venture of Utah Exploration Inc. and Atlantic Richfield Co. of the United States, reportedly was expected to produce 60,000 tons from its concession area during the trial operation for the Suralaya powerplant in West Java.

Indonesia exported 1 million tons of coal valued at $37 million. The main buyers of Indonesian coal were Malaysia, Japan, and the Republic of Korea. Domestic consumption of coal was mainly by powerplants, cement plants, tin mining and smelting, nickel mining and smelting, and the iron and steel industry. However, because of further delays in completing the Bukit Asam coal expansion project, Indonesia reportedly imported 440,000 tons of Australian coal in 1985 to feed the first and second power generating units of the Suralaya powerplant in West Java.[13]

The Bukit Asam Mine, which was still undergoing expansion, reportedly commissioned new equipment including coal crushers, dredges, and other processing machinery for the open pit. However, according to local press reports, the 450-kilometer railway from Tanjungenim near the Bukit Asam Mine to Tarahan was still under rehabilitation, and construction of the Tarahan port on the southern tip of Sumatra reportedly was experiencing problems in laying foundations for coal crushing units, coal car dumpers, and other equipment. The completion of the Tarahan terminal was expected by the end of 1986. During 1985, 20,000 tons per month of Bukit Asam's coal was shipped to the Suralaya powerplant by barge from Kertapati.

In August, a new type of 30-year production-sharing contract was signed between P.T. Tambang Batubara and P.T. Allied Indo Coal (AIC) for mining coal in an 8.44-square-kilometer area in Parambahan, near the Ombilin Mine in West Sumatra, where 16 million tons of coal reserves had been proven. Under the new terms, AIC was required to give 20% of its coal output to P.T. Tambang Batubara and to pay taxes, dividends, and royalties to the Government after production was started. However, P.T. Tambang Batubara was to retain the right to market AIC's 80% share of production. AIC was expected to develop a small open pit and to begin production at the rate of 500,000 tons per year in the second half of 1986.[14] AIC is owned 60% by Allied Indonesia's Coalfields Pty. Ltd., 20% by Transfield Coal Pty. Ltd. of Australia, and 20% by P.T. Mitra Abadi Sakti of Indonesia.

To develop coal deposits in Kalimantan, another production-sharing contract was signed in November between P.T. Tambang Batubara and P.T. Chung Hua Overseas Mining Development of Taiwan for mining coal in a 1,503-square-kilometer area of Block VIII, near Banjarmasin in South Kalimantan. Under the contract, P.T. Chung Hua Overseas Mining Development is responsible for all costs and risks of marketing but was required to give 13.5% of its output to P.T. Tambang Batubara.[15]

Petroleum and Natural Gas.—Indonesia celebrated the 100th anniversary of its petroleum industry in October. Production of crude oil was at the lowest level since 1973 owing to the continued imposition of production quotas by OPEC and the reduction in exports. The output of crude oil (excluding condensate) for the first 5 months averaged 1.2 million barrels per day. The output dropped to under 1 million barrels per day in June, then recovered to 1.2 million barrels per day in the second half of 1985 with a capacity of 1.5 million barrels per day. The 1985 output averaged 1.18 million barrels per day compared with 1.28 million barrels per day in 1984.

Despite the slump in the crude oil sector, the output of natural gas increased further to 1.6 trillion cubic feet from 1.5 trillion cubic feet in 1984, owing to increased utilization of natural gas as raw material for production of LNG and urea and as fuel for manufacturing steel and cement.

Crude oil was produced by Indonesia's state-owned PERTAMINA, LEMIGAS, and 14 foreign oil companies under production-sharing contracts with PERTAMINA. P.T. Caltex Pacific Indonesia (CPI) remained the largest crude oil producer, accounting for 41.8% in 1985, followed by Total Indonésie, 13.2%; Atlantic Richfield Indonesia, 13.0%; PERTAMINA, 6.7%; Independent Indonesia American Petroleum Co., 6.4%; and Union Texas Co., 5.2%. The remainder was produced by LEMIGAS and nine other contractors. Natural gas was produced mainly by Mobil Oil Indonesia and Roy M. Huffington Co.

As a result of further softening of oil prices, exploration declined further in 1985. According to industry sources, the number of exploratory wells drilled declined to 233 from 241 in 1984 with the exploration budget being reduced to $873 million from $932 million in 1984.[16] However, PERTAMINA, signed four production-sharing contracts with foreign companies. A joint venture of Unocal Corp. (80%) and Katy Industry Inc. (20%) of the United States was expected to spend $43 million over the next 6 years for exploration of oil and gas in the Teweh block of Central Kalimantan. Sceptre Resources Ltd. of Canada was committed to spend $64 million over the next 6 years for exploration offshore Bunyu Island off East Kalimantan. Japan Petroleum Exploration was committed to spend $32 million during the first 3 years and $1 million per year the following 3 years jointly with PERTAMINA for oil exploration and development onshore and offshore Gebang in North Sumatra. A joint venture of Diamond Shamrock Netherlands Petroleum B.V. (60%) of the Netherlands and Promet Energy Ltd. (40%) of Malaysia was expected to spend $60 million over the next 6 years for oil exploration onshore and offshore Aru Island near Irian Jaya.

Kodeco of the Republic of Korea, which signed a production-sharing contract with PERTAMINA in 1981 for joint exploration and development of oil and gas offshore Madura, north of Sepulu Island in East Java, reportedly discovered two more commercially feasible oil and gas reservoirs in the West Madura seabed, about 30 to 40 kilometers north of the previously discovered KE 2 Oilfield. Oil reserves of the two new deposits—KE 6-3 and KE 7—were estimated to be 100 million barrels each. The KE 2 Field, discovered in 1984 and having 22 million barrels of oil reserves, began production in September at a rate of 15,000 barrels per day from eight wells. The KE 3 Field, also discovered in 1984 and having 400 billion cubic feet of natural gas, was expected to produce 100 million to 150 million cubic feet of natural gas per day in early 1987. Kodeco planned to invest $100 million for developing the KE 3 Gasfield.[17]

During the year, several other significant oil and gas deposits were discovered. An oil and gas deposit was discovered by Marathon Petroleum Indonesia on the Kakap block offshore in the Natuna Sea about 700 kilometers north of Jakarta. A gasfield was discovered by Arco Indonesia off the north coast of Bali, and an oil and gas deposit was found in Jatibarang, offshore Cirebon in West Java. An oil and gas deposit was discovered by Asamera Oil Indonesia Ltd. at the Corridor block in South Sumatra. An oil and gas deposit was discovered by P.T. Stanvac Indonesia in the Jene-1, 160 kilometers west of Palembang in South Sumatra. CPI discovered a new oil find in Riam Province of Central Sumatra.

Construction of Indonesia's sixth LNG train under the Arun-III project in Lhokseumawe in North Aceh reportedly was 45% completed and was scheduled for completion in November 1986. Production of LNG by the sixth train, which will have annual capacity of 1.3 million tons, was expected to begin in early 1987 for export to the Republic of Korea.

[1]Economist, Division of International Minerals.

[2]Where necessary, values have been converted from Indonesian rupiahs (Rp) to U.S. dollars at the rate of Rp1,110=US$1.00.

[3]U.S. Embassy, Jakarta, Indonesia. Indonesia: Economic Trend Report—Cerp 0004. State Dep. Airgram A-28, Nov. 22, 1985.

[4]Indonesia Central Bureau of Statistics (Jakarta). Monthly Statistical Bulletin. Feb. 1986, pp. 66-80.

[5]IBA Review. Jan.-Mar. 1985, p. 6.

Metals Week. July 22, 1985, p. 8.

[6]Freeport-McMoRan Inc. 1985 Annual Report. Pp. 26, 60.

[7]American Metal Market. V. 94, No. 36, Feb. 21, 1986, p. 6.

The Asian Wall Street Journal. V. 10, No. 68, Nov. 17, 1985, p. 17.

[8]Metal Bulletin (London). No. 6985, May 10, 1985, p. 2.

[9]ANTARA News Bulletin (Jakarta). Jan. 8, 1986, p. A8.

P.T. Krakatau Steel (company brochure).

[10]The Asian Wall Street Journal. V. 9, No. 210, July 4, 1985, p. 1.

Business News (Jakarta). Dec. 4, 1985, p. 3.

[11]The Asian Wall Street Journal. V. 10, No. 74, Dec. 12, 1985, p. 17.

Business News (Jakarta). June 14, 1985, p. 4.

[12]ANTARA News Bulletin (Jakarta). Sept. 30, 1985, p. A5.

[13]International Coal Report. No. 140, Jan. 31, 1986, p. 20.

[14]———. No. 130, Aug. 30, 1985, p. 12.

U.S. Embassy, Jakarta, Indonesia. State Dep. Telegram 14091, Aug. 23, 1985.

[15]———. State Dep. Telegram 19190, Nov. 2, 1985.

[16]———. State Dep. Telegram 06296, Apr. 12, 1985.

[17]ANTARA News Bulletin (Jakarta). Feb. 1, 1985, p. A4; Feb. 15, 1985, p. A5.

The Mineral Industry of Iran

By Michael D. Fenton[1]

As in recent years, the Iran-Iraq war appeared to significantly influence the Iranian economy, including the mineral resources sector. Oil production of nearly 810 million barrels accounted for 80% to 95% of Government revenue and about 95% of foreign exchange, and Iran achieved a significant rate of export. However, oil exports were hampered by decreasing prices of light crudes, inefficient barter arrangements, and startup problems on the Kharg Island-Sirri Island tanker shuttle. Therefore, oil revenues were less than expected. Iran also reported that exports of chromite, copper, lead, and zinc were double those of 1984, but decreasing commodity prices probably resulted in revenues that did not meet expectations. There were also small but significant gains in the production of cement and coal, and there was reported progress toward increased refinery and pipeline construction.

PRODUCTION AND TRADE

In gas reserves, Iran was first in the Middle East, with 13 billion cubic meters, and second in the world to the U.S.S.R., but it produced only 20% of the total gas exported in the region. Proved oil reserves were upgraded from 51 billion barrels to 69 billion barrels. This reserve was recoverable without the use of secondary recovery techniques. Oil in place was estimated to be 341 billion barrels.

Iran's total average oil exports were 1.8 million barrels per day (bbl/d), but shipments briefly fell as low as 200,000 bbl/d. Iran's Parliament had projected oil revenue in the Iranian year 1985 (March 21, 1985-March 20, 1986) to be $20 billion,[2] but it was only about $15.4 billion. As a result of the war and falling oil revenue, Iran's total imports were expected to fall to $13.5 million in 1985 from $15.3 million in 1984 and $19 million in 1983.

Almost all of Iran's oil sales were based on barter and countertrading, and an aggressive sales effort was successful in raising Iran's production. Iran had countertrade agreements with the following companies and countries: Talbot Motor Co. of the United Kingdom for car kits; Azienda Generali Italiana Petroli S.p.A. (AGIP) of Italy for powerplant equipment; Syria for chemicals, food, and textiles; Thailand for rice; Turkey for chemicals, industrial equipment, machinery, metals, plastics, and textiles; Brazil for soya products, sugar, and steel; India for iron ore and manufactured goods; and Japan, Pakistan, and Sweden for manufactured goods. Additional sales were made to Bulgaria, Ghana, Malta, and Portugal. Iran also sold oil through increasingly popular "netback" deals, whereby prices were determined cargo-by-cargo according to prices of refined products realized by the end-user buyer. Buyers included Shell Oil Co., British Petroleum Ltd., Amerada Hess Corp., and Texaco Inc.

With its biggest refinery at Abadan still in war-caused ruins, Iran did not have sufficient refining capacity to meet its domestic demand for fuel oil, gasoline, and kerosene, even though its remaining refineries were operating 30% above capacity, particularly at Isfahan and Tabriz. Iran continued to have crude oil refined in Yemen (Aden) and Singapore to provide the needed products. Iranian refineries were reported to have a potential capacity of

750,000 bbl/d. The oil ministry was planning to significantly increase refining capacity by the early 1990's by constructing five new 200,000-bbl/d refineries, one per year.

The war continued to affect the cement industry by generally contributing to economic confusion and inhibiting the supply of spare parts. Nevertheless, Iran was able to increase its cement production slightly. Capacity was estimated to be 14 to 16 million tons per year.

Total resources of coal in the Elborz, Kerman, and Tabas areas were reported to be 2,189 million tons; proved reserves in the Kerman and Elborz areas were 282 million tons. Production by the National Iranian Steel Co. (NISCO) of 1.3 million tons of coal from the Kerman area was about 60% of total production; the remaining 40% was from the mines in the Elborz area. The Tabas deposit was being explored, and no production was reported.

Table 1.—Iran: Estimated production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984	1985
METALS					
Aluminum metal, primary ingot	[3]12,500	[3]45,000	[3]39,400	[3]42,400	[3]42,000
Chromium: Chromite, gross weight	30,000	40,000	50,000	50,000	50,000
Copper:					
Mine output, metal content	2,000	[3]43,000	[3]65,000	[r]60,000	60,000
Metal:					
Smelter	800	[r]18,000	[r]18,000	[r]50,000	40,000
Refined	[r]1,000	1,000	[3]10,000	[r]10,000	12,000
Iron and steel:					
Iron ore, gross weight thousand tons	600	750	850	850	850
Metal:					
Pig iron do.	500	600	700	700	700
Steel, crude do.	1,200	1,200	1,400	1,200	1,200
Lead, mine output, metal content	20,000	25,000	[r]20,000	[r]20,000	20,400
Molybdenum, mine output, metal content	--	--	500	500	500
Zinc, mine output, metal content	35,000	[3]40,000	[r]30,000	[r]30,000	36,000
INDUSTRIAL MINERALS					
Barite	75,000	80,000	85,000	90,000	90,000
Cement, hydraulic thousand tons	8,000	9,500	10,000	10,500	11,000
Clays:					
Bentonite	10,000	11,000	10,000	10,000	10,000
Fire clay	40,000	50,000	45,000	45,000	45,000
Kaolin	100,000	110,000	100,000	100,000	100,000
Feldspar	2,000	2,500	2,600	2,500	2,500
Gypsum thousand tons	[3]5,987	5,000	5,500	5,000	5,000
Lime do.	500	550	650	650	650
Magnesite	4,000	5,000	5,000	5,000	5,000
Nitrogen: N content of ammonia	200,000	26,000	28,800	21,400	326,000
Pigments, mineral, natural	500	500	600	600	600
Salt, rock thousand tons	600	700	750	750	750
Sodium compounds: Caustic soda	10,000	12,000	12,500	12,000	12,000
Stone, sand and gravel:					
Limestone thousand tons	11,000	14,000	12,000	12,000	12,000
Marble do.	200	200	225	200	200
Silica do.	200	200	220	200	200
Travertine do.	100	100	150	150	150
Strontium minerals: Celestite	5,000	4,500	4,600	4,600	4,600
Sulfates, natural:					
Aluminum-potassium sulfate (alum)	3,000	3,000	2,500	12,000	12,000
Sodium sulfate (mineral not specified)	10,000	10,000	12,000	12,000	12,000
Sulfur:					
Native thousand tons	50	--	20	30	30
Byproduct of petroleum and natural gas do.	6	10	25	30	30
Total do.	56	[r]10	45	60	60
Sulfuric acid do.	70	100	150	200	200
Talc	200	250	225	200	200
MINERAL FUELS AND RELATED MATERIALS					
Coal thousand tons	600	700	[3]980	1,000	1,300
Coke do.	350	350	400	400	400
Gas, natural:					
Gross million cubic feet	[r]221,461	[r]230,280	236,891	360,000	360,000
Marketed do.	[r]210,000	[r]254,000	314,000	468,000	468,000
Natural gas liquids, unspecified thousand 42-gallon barrels	2,000	3,000	3,200	3,400	3,400

See footnotes at end of table.

Table 1.—Iran: Estimated production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984	1985
MINERAL FUELS AND RELATED MATERIALS —Continued					
Petroleum:					
Crude[4] ______ thousand 42-gallon barrels__	r485,493	r795,360	892,200	r798,257	809,429
Refinery products:					
Gasoline ________do____	NA	NA	NA	71,400	NA
Kerosene ________do____				69,300	
Distillate fuel oil ________do____				211,300	
Residual fuel oil ________do____				193,500	
Other ________do____				72,500	
Total[r] ________do____	626,600	658,700	624,000	618,000	NA

[r]Revised. NA Not available.
[1]Reported data are for years beginning Mar. 21 of that stated, except those for natural gas and petroleum, which are for regular calendar years. Table includes data available through July 11, 1986.
[2]In addition to the commodities listed, other types of crude construction materials (such as common clays, sand and gravel, and other varieties of stone) are produced, but output is not reported, and available information is inadequate to make reliable estimates of output levels.
[3]Reported figure.
[4]Excludes petroleum reinjected into fields.

Table 2.—Iran: Apparent exports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS				
Chromium: Ore and concentrate _____	575	--		
Copper:				
Ore and concentrate ________	8,054	21,877	--	All to Japan.
Metal including alloys, semimanufactures ________	184	--		
Iron and steel: Metal:				
Scrap ________	300	452	--	Japan 394; Singapore 30; West Germany 28.
Semimanufactures:				
Bars, rods, angles, shapes, sections	131	--		
Universals, plates, sheets _____	--	1	--	All to United Kingdom.
Tubes, pipes, fittings ________	533	--		
Lead: Ore and concentrate ________	600	9,697	--	All to Italy.
Mercury ________ 76-pound flasks__	--	139	--	All to West Germany.
Nickel: Metal including alloys, unwrought ________	28	--		
Platinum-group metals: Waste and sweepings _____ value, thousands__	$133	$60	--	All to Netherlands.
Silver:				
Ore and concentrate[2] _____do____	$331	--		
Waste and sweepings[2] _____do____	$2	$114	--	All to United Kingdom.
Metal including alloys, unwrought and partly wrought _ troy ounces__	6,430	--		
Titanium: Ore and concentrate ______	1,550	--		
Zinc:				
Ore and concentrate ________	15,295	8,767	--	Japan 8,500; Yugoslavia 267.
Metal including alloys, unwrought __	938	--		
Other:				
Ores and concentrates ________	--	21,877	--	All to Japan.
Ashes and residues ________	--	497	--	All to Austria.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Dust and powder of precious and semiprecious stones including diamond value, thousands__	$174	$59	--	All to Switzerland.
Grinding and polishing wheels and stones ________	--	27	--	Do.
Diamond:				
Gem, not set or strung value, thousands__	--	$49	$49	
Industrial stones ________do____	--	$60	--	Do.
Fertilizer materials:				
Crude, n.e.s ________	--	4,134	--	Italy 2,755; Japan 1,379.
Manufactured, phosphatic ________	--	84,054	--	All to Tunisia.

See footnotes at end of table.

Table 2.—Iran: Apparent exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Precious and semiprecious stones other than diamond: Natural value, thousands	$22	$254	$27	Switzerland $143; United Kingdom $84.
Salt and brine	136	30	--	All to Oman.
MINERAL FUELS AND RELATED MATERIALS				
Petroleum:				
Crude thousand 42-gallon barrels	661,104	583,531	21	Japan 98,379; Italy 62,805; Netherlands 62,495.
Refinery products:				
Liquefied petroleum gas do	--	8	--	All to Italy.
Gasoline do	1,576	569	--	Netherlands 302; United Kingdom 145; West Germany 68.
Kerosene and jet fuel do	1	1,100	--	Japan 1,095.
Distillate fuel oil do	7	193	--	Singapore 187.
Residual fuel oil do	3,563	1,533	(3)	Italy 690; Turkey 553; Yugoslavia 250.

[1]Table prepared by Virginia A. Woodson. Owing to a lack of official trade data published by Iran, this table should not be taken as a complete presentation of Iran's mineral exports. These data are compiled from trade statistics of individual trading partners.
[2]May include platinum-group metals.
[3]Less than 1/2 unit.

Table 3.—Iran: Apparent imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS				
Aluminum:				
Ore and concentrate	1,649	--		
Oxides and hydroxides	1,802	1,249	--	Netherlands 674; West Germany 503.
Metal including alloys:				
Scrap	--	76	38	United Kingdom 38.
Unwrought	32,154	9,219	--	West Germany 5,128; Yugoslavia 2,999.
Semimanufactures	39,361	18,157	2	Turkey 8,158; West Germany 4,788; Belgium-Luxembourg 1,579.
Cadmium: Metal including alloys, all forms kilograms	999	--		
Chromium: Oxides and hydroxides	3	52	--	Japan 51.
Cobalt:				
Oxides and hydroxides	1	2	--	All from West Germany.
Metal including alloys, all forms	3	1	--	All from Sweden.
Copper: Metal including alloys:				
Scrap	214	18	--	All from United Kingdom.
Unwrought	4,517	3,923	--	Japan 3,414; West Germany 267.
Semimanufactures	54,558	30,617	3	West Germany 13,748; Turkey 3,870; Sweden 3,580.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite	--	15	--	All from Netherlands.
Metal:				
Scrap	--	150	--	All from Turkey.
Pig iron, cast iron, related materials	37,580	16,318	--	Canada 15,000; West Germany 642.
Ferroalloys:				
Ferrochromium	148	70	--	All from Japan.
Ferromanganese	6,630	1,468	--	Norway 808; Belgium-Luxembourg 330; West Germany 320.
Ferromolybdenum	10	--		
Ferrosilicon	1,301	1,771	--	Norway 1,686; Switzerland 25.
Silicon metal	--	3,061	--	Italy 1,722; Norway 1,339.
Unspecified	79,325	215	--	Norway 200.

See footnotes at end of table.

Table 3.—Iran: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984	
			United States	Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal —Continued				
Steel, primary forms	691,292	290,326	--	Turkey 117,834; West Germany 62,814; Japan 44,574.
Semimanufactures:				
Bars, rods, angles, shapes, sections	1,004,219	101,897	--	West Germany 44,639; Belgium-Luxembourg 14,538; Japan 10,311.
Universals, plates, sheets	1,550,401	458,745	--	Japan 352,751; Belgium-Luxembourg 47,229; Austria 17,367.
Hoop and strip	75,736	61,884	--	Japan 26,327; West Germany 25,405; Belgium-Luxembourg 5,183.
Rails and accessories	11,215	2,551	--	Italy 2,119; United Kingdom 432.
Wire	49,667	24,151	--	West Germany 6,558; Japan 6,150; Belgium-Luxembourg 5,816.
Tubes, pipes, fittings	305,265	301,618	2,761	Turkey 140,164; West Germany 90,324; Japan 57,077.
Castings and forgings, rough	4,658	4,876	--	Italy 3,690; West Germany 1,044.
Unspecified	59,422	--		
Lead:				
Oxides	163	218	--	West Germany 118; Belgium-Luxembourg 100.
Metal including alloys:				
Scrap	--	26	--	United Kingdom 21; West Germany 5.
Unwrought	2,006	12,520	--	Australia 7,999; Belgium-Luxembourg 2,617.
Semimanufactures	350	56	--	Belgium-Luxembourg 33; United Kingdom 10; West Germany 7.
Magnesium: Metal including alloys:				
Unwrought	--	2	--	West Germany 1; Japan 1.
Semimanufactures	89	70	([2])	United Kingdom 58; Switzerland 12.
Manganese:				
Ore and concentrate, metallurgical-grade	2,988	3,818	--	Singapore 3,211; Netherlands 507.
Oxides	100	29	--	Japan 17; United Kingdom 12.
Mercury 76-pound flasks	93	--		
Molybdenum:				
Ore and concentrate	8	--		
Metal including alloys, all forms value, thousands	$220	$26	--	Netherlands $24; Switzerland $2.
Nickel: Metal including alloys:				
Unwrought	298	29	--	United Kingdom 19; West Germany 10.
Semimanufactures	145	309	--	Austria 188; West Germany 71; United Kingdom 30.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$2,141	$940	--	Japan $884; West Germany $56.
Silver: Metal including alloys, unwrought and partly wrought do	$2,360	$2,156	--	West Germany $1,396; United Kingdom $389.
Tin: Metal including alloys:				
Unwrought	78	242	--	United Kingdom 224; West Germany 13.
Semimanufactures	39	64	--	United Kingdom 43; West Germany 13.
Titanium:				
Ore and concentrate	500	2,000	--	All from Netherlands.
Oxides	1,154	235	--	West Germany 216; United Kingdom 19.
Metal including alloys, semimanufactures	--	1	--	All from West Germany.
Tungsten:				
Ore and concentrate	1	--		
Metal including alloys, all forms	2	[3]4	--	Belgium-Luxembourg 3; United Kingdom 1.
Zinc:				
Oxides	378	374	--	United Kingdom 322; Belgium-Luxembourg 52.
Blue powder	--	60	--	All from West Germany.

See footnotes at end of table.

Table 3.—Iran: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Zinc —Continued				
Metal including alloys:				
Unwrought	5,793	8,935	--	Belgium-Luxembourg 4,258; West Germany 2,646; Italy 1,620.
Semimanufactures	1,619	9	--	United Kingdom 6; Italy 3.
Other:				
Ores and concentrates	508	--		
Oxides and hydroxides	1,897	366	--	Sweden 335; United Kingdom 28.
Base metals including alloys, all forms	1,087	21	--	United Kingdom 20.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	252	5	--	West Germany 3; United Kingdom 2.
Artificial: Corundum	106	90	--	West Germany 67; Japan 23.
Dust and powder of precious and semiprecious stones excluding diamond value, thousands	$1,721	$1,408	--	Switzerland $1,376; United Kingdom $32.
Grinding and polishing wheels and stones	3,788	2,805	--	West Germany 988; Italy 580; United Kingdom 324.
Asbestos, crude	7,607	19,411	--	Canada 10,016; Italy 1,693.
Barite and witherite	--	3	--	All from West Germany.
Boron materials:				
Crude natural borates	101	--		
Oxides and acids	888	1,736	--	Turkey 1,735.
Cement	87,002	14,056	--	Turkey 6,596; Italy 4,226; West Germany 1,015.
Chalk	100	1,740	--	All from United Kingdom.
Clays, crude:				
Chamotte earth	10,000	--		
Kaolin	4,800	--		
Unspecified	3,727	636	--	Turkey 577; Belgium-Luxembourg 53.
Diamond:				
Gem, not set or strung carats	15	8	--	All from United Kingdom.
Industrial stones value, thousands	$1,998	$1,797	--	Switzerland $1,383; Belgium-Luxembourg $413.
Diatomite and other infusorial earth	369	192	--	Japan 90; Italy 66; Yugoslavia 14.
Feldspar, fluorspar, related materials	40	--		
Fertilizer materials: Manufactured:				
Ammonia	13	45	--	West Germany 35; United Kingdom 10.
Nitrogenous	284,968	25,088	--	All from West Germany.
Phosphatic	320	--		
Potassic	9	135	--	United Kingdom 109; West Germany 26.
Unspecified and mixed	123,149	21,009	20,989	Switzerland 20.
Graphite, natural	510	8	--	All from West Germany.
Gypsum and plaster	5	61	--	Italy 31; United Kingdom 18.
Iodine	3	--		
Magnesite, crude	1,428	3,580	--	All from Turkey.
Mica:				
Crude including splittings and waste	--	25	--	All from West Germany.
Worked including agglomerated splittings	2	17	--	Japan 14; West Germany 2.
Pigments, mineral:				
Natural, crude	341	--		
Iron oxides and hydroxides, processed	1,411	1,120	--	West Germany 938; Japan 102.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$141	--		
Synthetic do	--	$1	--	All from Austria.
Quartz crystal, piezoelectric kilograms	52	--		
Salt and brine	179	110	--	West Germany 108.
Sodium and potassium compounds, n.e.s.:				
Carbonate, manufactured	24,554	83	--	West Germany 45; United Kingdom 24.
Sulfate, manufactured	998	190	--	All from Japan.

See footnotes at end of table.

Table 3.—Iran: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	24	808	--	Italy 786; United Kingdom 22.
Worked	162	151	--	Italy 147.
Dolomite, chiefly refractory-grade	5	--		
Gravel and crushed rock	100	700	--	West Germany 670.
Limestone other than dimension	14	--		
Quartz and quartzite	468	69	--	Belgium-Luxembourg 36; Turkey 17.
Sand other than metal-bearing	11	10,010	--	United Kingdom 8,954; Sweden 1,000.
Sulfur:				
Elemental:				
Crude including native and by-product	182	59	--	Japan 32; West Germany 27.
Colloidal, precipitated, sublimed	5	52	--	United Kingdom 49.
Dioxide	--	76	--	All from West Germany.
Sulfuric acid	130	105	--	West Germany 80; Italy 19.
Talc, steatite, soapstone, pyrophyllite	75	63	--	All from West Germany.
Other: Crude	695	700	--	United Kingdom 605; West Germany 95.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	667	20	--	All from West Germany.
Carbon black	652	779	--	West Germany 655; Sweden 57; Turkey 56.
Coal:				
Anthracite and bituminous	247,453	818,141	--	Trinidad and Tobago 385,475; Australia 383,475; West Germany 49,006.
Lignite including briquets	--	35	--	All from United Kingdom.
Coke and semicoke	5,577	--		
Petroleum:				
Crude thousand 42-gallon barrels	9	--		
Refinery products:				
Liquefied petroleum gas do	2	(2)	--	Mainly from Austria.
Gasoline do	2,607	863	1	Singapore 810; United Kingdom 33.
Mineral jelly and wax do	16	14	--	West Germany 6; United Kingdom 4.
Kerosene and jet fuel do	18,069	9,012	--	Singapore 5,276; United Kingdom 1,394; Netherlands 1,091.
Distillate fuel oil do	10,894	2,409	--	Singapore 1,815; Italy 445.
Lubricants do	527	753	1	Italy 235; Belgium-Luxembourg 204; West Germany 146.
Residual fuel oil do	5	168	--	Netherlands 167.
Bitumen and other residues do	3	13	--	United Kingdom 12.
Bituminous mixtures do	13	1	--	Mainly from United Kingdom.
Petroleum coke do	21	36	--	All from West Germany.

[1]Table prepared by Virginia A. Woodson. Owing to a lack of official trade data published by Iran, this table should not be taken as a complete presentation of Iran's mineral imports. These data are compiled from trade statistics of individual trading partners.
[2]Less than 1/2 unit.
[3]Excludes unreported quantity valued at $42,000 exported by the Netherlands.

COMMODITY REVIEW

METALS

Aluminum.—Work continued on the expansion of the aluminum refinery at Arak from 45,000 to 120,000 tons per year. This project was originally planned as early as 1976 and was to have been finished in 1981. Bauxite was imported from Australia and India.

Planning continued for the new aluminum smelters at Bandar Abbas, in southern Iran. The capacity and cost were expected to be 120,000 tons per year and $250 million, respectively. Construction completion of the smelters was scheduled for 1991, when domestic demand for aluminum was expected to reach about 240,000 tons per year.

Copper.—The National Copper Industries of Iran's Sar Cheshmeh copper mining complex in Kerman Province operated at only

25% of capacity as a result of labor and spare parts shortages and an accident in which furnace-lining bricks collapsed into the molten metal. Although repairs were being made, a new copper smelting furnace, having a capacity of 750 tons per day, was commissioned. The older No. 1 furnace produced 140,000 tons during its life of 4 years. The company was actively searching in foreign markets for mechanical, instrument, and metallurgical engineers, and others with experience in mineral processing and metal refining.

The mine began operations in December 1981 with about 450 million tons of reserves, and the smelter began in 1982 with a capacity of about 158,000 tons per year. The refinery started in 1984, and full capacity, including 800,000 tons per year of sulfuric acid, was expected to be reached by 1986. Mine production in 1985 was 11,000 to 12,000 tons per day; over 9 million tons of 1.12% copper ore had been mined since 1981.

Kobe Steel Ltd. of Japan was awarded a $40 million contract by the Industrial Development and Renovation Organization to build a copper rolling mill near Kerman, 800 kilometers southeast of Tehran and about 200 kilometers northeast of Sar Cheshmeh. In 1987, capacity was expected to be 35,300 tons per year of copper and copper alloy sheets and strips. Kobe was to provide design and production expertise, equipment, and training for Iranian technicians.

Iron and Steel.—Detailed engineering and design work was almost finished, and construction was about to begin on the $250 million iron mine at Gol-e-Gohar, 140 miles southeast of Kerman. The mine will produce 5 million tons per year of magnetite concentrates for the Mubarakeh steelworks. Gränges International Mining AB of Sweden was under contract to NISCO.

Production of iron ore was to start soon at the new Chadormelo Mine in Yazd at an initial rate of 2.5 million tons per year that would increase to 6 million tons per year. Proven reserves were 350 million tons.

The Indian-Iranian joint venture, Kudremukh Iron Ore Co. Ltd., which was to produce iron ore concentrates and pellets for Iran's steel industry, was asked by Iran to repay immediately $225 million that was borrowed from Iran. Iran placed an order to buy 4.5 million tons of concentrates.

The Italian builder, Società Italiana Inipianti S.p.A., reported that progress on NISCO's Mubarakeh steelworks was behind schedule and that it probably would not be finished before 1990. Only 60% of the equipment had been shipped, including eight 180- to 200-ton electric arc furnaces and rolling mills worth $1.35 billion; 50% of the foundation work was completed, and 35% of the structural steelwork was in place at the works, situated 70 kilometers from Isfahan. Kobe was scheduled to ship equipment for the 3.2-million-ton-per-year direct-reduction plant for the works.

The Mubarakeh steelworks is situated far beyond the Iran-Iraq war zone, but NISCO's Ahwaz steelworks, about 60 kilometers from Iraq, was severely damaged by two Iraqi bombing attacks. At least one of six electric arc furnaces was damaged, and production of pipe for a proposed 400-kilometer pipeline was affected.

Iran indicated a desire for technicians from the U.S.S.R. to return to the Isfahan steelworks. Earlier aerial bombing by Iraq caused the Soviets to leave.

Lead and Zinc.—Construction of the proposed lead and zinc smelter at Zanjan was scheduled to begin in 1986. The purchase of equipment and technology was negotiated for the complex, which will produce 60,000 tons per year of lead and 40,000 tons per year of zinc by 1987. Reserves at Zanjan were estimated at 2.6 million tons of lead and 7 million tons of zinc.

Molybdenum.—The Sar Cheshmeh molybdenum recovery circuit continued to produce concentrates that contained about 50% molybdenum, a high-copper content, and recoverable rhenium. The circuit had a capacity of 4,000 tons per year. Concentrates will be exported until a roaster for metal production is built.

Precious Metals.—Gold and silver production was forecast to reach 16,000 troy ounces per year and 14 tons per year, respectively, when smelting furnaces at Sar Cheshmeh go into production in 1986 or 1987.

Two small mines in the Muteh area of Isfahan Province were producing 75,000 tons per year of gold ore. A gold recovery plant at Muteh was being planned where 200 tons per day of ore would yield 10,000 troy ounces of gold annually.

INDUSTRIAL MINERALS

Cement.—The new Ourmia Cement Co. plant was scheduled for completion in 1987. It will have a 2,300-ton-per-day precalciner kiln, a Tirax raw mill, and two Unidan cement mills supplied by F. L. Smidth of Denmark.

Construction continued on the Daman industrial limekiln of Iranshahr, which was the first of its type in Iran. The plant included 100-ton crushers, a 1,400-cubic-meter depot, a fully automatic 100-ton double lime furnace, three spherical hammer mills, a 500-kilowatt generator, and a 500-ton silo.

Fertilizer Materials.—The Shiraz Fertilizer Complex was scheduled to begin production in 1985. Construction began in 1977, but political unrest caused suspension of work for over 18 months, beginning in 1979. The plant will produce 326,000 tons per year of nitrogen in ammonia (ICI process), 228,000 tons per year of nitrogen in urea (Stami-carbon process), 198,000 tons per year of nitric acid (Grande Paroisse process), and 74,000 tons per year of ammonium nitrate (Kaltenbach process). The estimated cost was $460 million.

The Iranian National Petroleum Co. was planning to build a plant that would produce 366,000 tons per year of nitrogen in ammonia and 262,000 tons per year of nitrogen in urea.

Razi Chemical Co. was planning to begin construction in 1986 on an 800-ton-per-day diammonium phosphate plant at Bandar Khomeini. Technology was to be provided by Didier Engineering Co. of the Federal Republic of Germany.

MINERAL FUELS

Coal.—Eastern Alborz Coal Co. produced 263,500 tons of unprocessed coal from the Shahrud Mines, Semnan Province, during 1984. This production of about 950 tons per day, an increase of 13.7% over that of 1983, provided 12% to 15% of the coal requirements of the Isfahan steel mill complex. Production should be increased by 1990 to 360,000 tons per year. Coal reserves were estimated at 7.5 million tons.

The largest coal mine, Papedana in the Kerman Basin, produced about 2,000 tons per day in 1985. Coal was mined by hand and shipped by rail or road to steelworks and other consumers over 470 miles away.

The Ganu Mine, Semnan Province, was in its first year of production. Reserves of good-quality coking coal intended for the steel and sugar industries were about 500,000 tons. This mine was significant because most Iranian coal was not of good coking quality, and 100,000 to 200,000 tons of coking coal was imported each year from the Federal Republic of Germany and Australia for blending with Iranian coal.

Gas.—Iran continued to increase gas production from an estimated 360 billion cubic feet toward a goal of nearly 1,700 billion cubic feet per year by the year 2000. At that time, 10,000 miles of main grid pipeline and 17,000 miles of distribution lines may be in place, and about $1.2 billion was expected to be spent in 1985 on this program.

The Iranian National Gas Co. had four gas pipeline projects in the design phase: the 225-mile, 30-inch Raght-to-Neka line; the 156-mile, 30-inch Astara-to-Tabriz line via Arbabil, Sarab, and Bostanabad, first phase of the Northwest project; the 170-mile, 30-inch Delijan-to-Hamadan line, first phase of the West project; and the 94-mile, 30-inch Saveh-to-Tehran spur line to support the existing 30-inch line supplying Tehran.

In the West project, the cities of Arak, Malayer, and Hamaden would be connected to the gas network via a 30-inch pipeline that would branch from the country's first main pipeline near the Delijan-Qom station. Contractors were being sought for this project.

Iran indicated a desire to exploit gas reserves in the Caspian region jointly with the U.S.S.R.

Petroleum.—*Production.*—Production of crude oil for 1985 was about 809.4 million barrels, up slightly from that of 1984. Onshore capacity reached 3.2 million bbl/d, and offshore capacity was 270,000 bbl/d.

Refining.—A 200,000-bbl/d refinery was being built at Arak, and a second was planned to be built in Ilam Province.

Transportation.—By yearend 1985, over 50 major air raids by Iraq on Iran's Kharg Island put as many as 12 of 14 loading berths out of action. Nevertheless, because Kharg was designed to load about 6.5 million bbl/d, Iran was still able to export 1.5 to 2 million bbl/d. Kharg Island, about 25 miles off the southwest coast of Iran, had a tank farm capable of storing up to 18 million barrels of oil. As much as 90% of all exports originated from Kharg.

Faced with intense Iraqi air attacks against tankers traveling to and loading at Kharg, Iran continued to transfer, in as many as 12 vessels, light and heavy crudes to the Sirri Island terminal, which is situated near the Strait of Hormuz, 550 miles southwest of Kharg, and to a lesser extent to Lavan Island, 110 miles northwest of Sirri. In addition to the 3.5 million barrels of storage capacity on Sirri, three ultralarge crude carrier (ULCC) tankers, holding as much as 392,000 deadweight tons (dwt) each, were chartered for additional storage. The Sirri terminal was capable of handling 500,000 to 600,000 bbl/d of crude oil exports. Lavan Island was of limited use because it could accommodate ships having only a maximum size of 220,000 dwt; Sirri could handle ULCC vessels of over 300,000 dwt. Iran was also forced to reduce oil prices to encourage tanker owners to risk the run to and from Kharg Island.

In addition to the shuttle of crude oil to Sirri Island, Iran attempted to avoid war damage by installing bomb-resistant, single-buoy moorings (SBM) between Kharg and Ganaweh on the coast, 40 miles to the northeast. This alternative oil export facility was planned to comprise six SBM—five at Ganaweh and one on the western side of Kharg. These SBM would have a capacity of 300,000 to 400,000 bbl/d. The SBM were provided by the Dutch company Smit International Marine Services.

Iran was also attempting to establish a $500 million, 400-kilometer twin pipeline from Gurreh, the pumping station for the Kharg terminal, to Asaluyeh, which would allow Iran to export 1.5 million bbl/d of oil without using the Kharg terminal. When Kharg was operating normally, the lines would transfer gas from the offshore Pors Field near Asaluyeh to the Ahwaz Oilfields northwest of Gurreh for secondary recovery operations. Each of the two 42-inch lines would have a capacity of 1 million bbl/d. At Asaluyeh, a new export terminal would be built, including 8 million barrels of storage capacity and SBM for loading. Alternatively, ULCC's would be moored at Asaluyeh and nearby Bushehr for storage and loading oil into tankers. A plan to extend the pipeline 800 kilometers to Jask, on the coast outside the Strait of Hormuz, was also studied, but the estimated total cost was thought by the Iranian Government to be too high.

Iran was also considering a 92-kilometer line from Gachsaran Oilfield 60 kilometers northeast of Gurreh to the IGAT-2 gasline. Crude oil would be pumped in this 56-inch-diameter line to floating terminals at Taheri on the coast, 50 kilometers northwest of Asaluyeh.

Proposed oil and gas pipelines between Iran and the Turkish Mediterranean coast would cost about $14 billion. The oil line would have a capacity of 1.5 million bbl/d and would cost about $3 billion. The 50-billion-cubic-meter gas line would supply gas to Europe via Turkey, Greece, and southern Italy.

Petrochemicals.—Iran's National Petrochemical Co. (NPC) awarded to Technipetrol of Italy and Kineties Technology International (KTI) of the Netherlands the contract for preliminary engineering and planning of the $1.5 billion petrochemical complex at Arak, situated 250 kilometers southwest of Tehran. Feedstocks would be from Iran's seventh oil refinery planned at Shazand, near Arak, which would have a capacity of 10 million tons per year. Phase 1 (1986-89) would produce, among other products, 240,000 tons per year of ethylene, 150,000 tons per year of polyvinyl chloride, 90,000 tons per year of propylene, and 80,000 tons per year of benzene. Phase 2 would produce 50,000 tons per year each of acrylonitrile, ethylene glycol, ethylene oxide, and other products. Technipetrol would also build the ethylene plant, based on light naphtha, raffinate, recycled ethane, and propane. KTI would supply furnaces for the cracker.

The problem-plagued Iran-Japan Petrochemical Complex construction project at Bandar Khomeini on the gulf coast was stopped again when the Iranian Parliament rejected an agreement between the NPC and the Japanese consortium, Iran Chemical Development Co. (ICDC), to resume construction. Rejection was on the grounds that the terms were not in Iran's best interest. ICDC then agreed to reschedule a $349 million loan; the repayment period was extended from 1987 to 1992.

Two other plants were scheduled for construction at Kerman and Neki.

Uranium.—The Atomic Energy Organization announced the discovery of 5,000 tons of high-grade uranium ore at Saghand in Yazd Province. Mine development was planned for completion within 2 years.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Iranian rials (Rls) to U.S. dollars at the rate of Rls91.05=US$1.00.

The Mineral Industry of Iraq

By George A. Morgan[1]

Crude petroleum production and exports remained the bulwark of Iraq's economy in 1985. Further expansion of crude oil production was under way, and natural gas utilization by domestic industry was increasing.

Major pipeline and railroad projects were completed and others were under way or planned, primarily to ensure shipment of crude petroleum industry products. The closure of export terminals in the Persian Gulf due to the war with Iran had led to dependence on overland transport routes.

Iraq was plagued by foreign debt due to war expenditures and the drop in the value of crude oil sales brought on by lower worldwide prices. The necessity of building new pipelines, highways, and railroads to ensure export routes also led to heavy expenditures. Total foreign debt was unknown, but an estimated $9.2 billion was covered by foreign export credit agencies, while another $6 billion owed to Western firms was not so secured. Debt rescheduling was requested of the Federal Republic of Germany, India, and Japan. A number of contractors elected to receive payment in crude oil.

PRODUCTION AND TRADE

Official production data for mineral commodities were unavailable, and detailed foreign trade had not been reported for a number of years. Exports were estimated at $11.8 billion in 1985, and $10.6 billion in 1984.[2] Imports were estimated at $12 billion and $11.2 billion for the same years, respectively. Daily output of crude oil in 1985 was about 1.4 million barrels, of which about 200,000 barrels were for local demand, 350,000 barrels were exported through Saudi Arabia, 820,000 barrels were exported through Turkey, and about 90,000 barrels of products were exported by truck via Jordan and Turkey. Completion of new pipeline projects through Saudi Arabia and Turkey were expected to lead to total daily production of about 3 million barrels by midyear 1987.

Table 1.—Iraq: Production of mineral commodities[1]

Commodity[2]	1981	1982	1983	1984[p]	1985[e]
METALS					
Iron and steel:					
Sponge iron ... metric tons	[e]40,000	[e]40,000	--	--	--
Steel, crude ... do	[e]45,000	[e]45,000	--	--	--
INDUSTRIAL MINERALS					
Cement, hydraulic[e] ... thousand metric tons	5,600	5,600	5,600	8,000	8,000
Gypsum[e] ... do	170	170	170	300	300
Nitrogen:[e]					
N content of ammonia ... do	80	80	80	[r]80	60
N content of urea ... do	50	50	50	60	60
Phosphate rock ... do	[e]50	363	[e]1,199	1,000	1,000
Salt[e] ... do	80	80	80	80	70
Sulfur, elemental:[e]					
Native, Frasch ... do	200	300	300	500	500
Byproduct ... do	40	40	40	70	70
Total ... do	240	340	340	570	570
MINERAL FUELS AND RELATED MATERIALS					
Gas, natural:[e]					
Gross ... million cubic feet	401,173	400,000	400,000	400,000	450,000
Marketed[3] ... do	62,154	60,000	60,000	60,000	80,000
Natural gas liquids:[e]					
Natural gasoline ... thousand 42-gallon barrels	400	400	400	400	400
Propane and butane ... do	990	1,000	1,000	1,000	1,000
Petroleum:					
Crude ... do	326,000	[e]310,000	400,000	437,800	520,900
Refinery products ... do	75,000	[e]75,000	100,000	110,000	110,000

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Includes data available through June 1, 1986.
[2]In addition to the commodities listed, lime and a variety of crude construction materials (clays, sand and gravel, and stone) are also produced, but output is not reported, and available information is inadequate to make reliable estimates of output levels.
[3]Includes reinjected, if any.

COMMODITY REVIEW

INDUSTRIAL MINERALS

Cement.—A cement loading system valued at $15.5 million was to be built at the Kerbala cement works near Muthanna. Construction was to be done by Bhagheeratho Engineering Co. of India.

A bulk handling system valued at $17 million was also to be installed at the Upper Euphrates cement works owned by the Iraqi Cement Public Enterprise at Kubaissa. The plant had a capacity of 2 million tons of cement per year, and is linked to the Baghdad-Akashat-Qaim railroad via a 30-kilometer branch line. The project involved laying an unspecified amount of railroad track and installing loading equipment for both bagged and bulk cement and for the unloading of fuel oil. Completion was planned for 1988 by Enka Teknik of Turkey. An operation and maintenance contract valued at $17 million for the cement plant was renewed for 2 years with Associated Cement Co. and Tata Export Ltd., both of India. The plant employed 500 people and was to export about 1 million tons of cement to Egypt.

Enka Teknik, which commissioned a 1-million-ton-per-year addition to the Badush cement works for the State Enterprise for Cement in Nineveh, was to provide technical management and operation and maintenance for an additional year. Technical management of cement works at Taslouja and Fallouja, with annual capacities of 2 million tons and 200,000 tons, respectively, was also awarded to Enka Teknik.

Fertilizers.—Iraq's three mixed fertilizer plants at Khor-al-Zubair and Basrah were out of commission owing to war hostilities with Iran. Construction on a fourth plant commenced at Baiji in 1985. Bids for a fifth plant for the State Organization for Industrial Design and Construction, valued at over $400 million, were received from six construction groups. The plant would be built near Sharqat, 40 kilometers south of Mosul in north-central Iraq. Daily capacity would be 1,000 tons of ammonia and 1,750 tons of urea.

Phosphate.— Phosphate was produced at Akashat and shipped to the fertilizer complex at Al-Qaim. Exports of triple superphosphate totaled 34,000 tons in 1983 and 130,000 tons in 1984. Diammonium phosphate exports were 20,000 tons in 1984.

MINERAL FUELS

Oilfield development, gas separation, and overland transportation systems for moving mineral fuels, both for internal use and for export, were major aspects of the petroleum industry. Also, plant, equipment needs, and costs for an additional crude petroleum refinery were under study.

Natural Gas.—Long-term natural gas utilization plans included supplying 18 new power stations and cement works from 5 oil and gas fields. Several projects were under way to utilize associated gas, as nearly all gas production was with crude oil. Gathering pipelines have been built in both the northern and southern oilfields. A 550-kilometer gas pipeline from the southern oilfield of West Qurna to Mussayib, 80 kilometers south of Baghdad, would supply gas to a 1,200-megawatt powerplant under construction by Hyundai Engineering and Construction Co. of the Republic of Korea. The Soviet firms Tsvetmetproexport and Technoexport were contracted to build the pipeline and develop the oilfield, respectively, using Western technology.

Construction was under way on underground storage reservoirs near Basrah. A reservoir for liquefied petroleum gas (LPG) was completed in 1985. Proposals were made for a $250-million gas processing plant for the West Qurna Field northwest of Basrah with an annual capacity of about 150 billion cubic feet of natural gas. LPG plants existed at Baiji, Kirkuk, and Rumaila.

A 900-kilometer gas pipeline from Kirkuk to Zubair was planned to allow shipment of butane, natural gasoline, and propane recovered in extraction and separation plants operating on associated gas from the Kirkuk, Bai Hassan, and Jambur Oilfields. Construction of two additional pipelines, financed by Kuwait, to transport gas 250 kilometers from the Rumaila Field in southern Iraq to Kuwait commenced in late 1985. Shipment of 400 million cubic feet per day was planned to begin about midyear 1986. A natural gas liquids (NGL) plant, to be built at Ratawi, northwest of Basrah, was delayed owing to postponement of development of the West Qurna Oilfield. Capacity of the plant would be 5,400 million cubic meters per year of combined NGL, and construction would be by the U.S.S.R. using Western technology and equipment.

Petroleum.—*Production.*—A Chinese drilling team completed three development wells, each to 3,000 meters depth, in the Zubair Oilfield in southern Iraq.

Construction of a 630-kilometer crude oil pipeline from Zubair to pump station 3 on the Saudi Arabia Petroline in Saudi Arabia was completed in September 1985. Capacity was 500,000 barrels per day, with throughput at yearend at about 350,000 barrels per day. Its commissioning completed phase one of the Iraq Pipeline Trans Saudi Arabia (IPSA-1) program at a cost of about $800 million. Phase two of IPSA (IPSA-2) was an independent 48-inch and 56-inch crude oil pipeline, owned by Iraq, extending 920 kilometers from pump station 3 on the Saudi Arabia Petroline to an independent terminal 20 kilometers south of Yanbu on the Red Sea. Capacity would be 1.6 million barrels per day of mainly Basrah light crude. About 180 kilometers of pipe was supplied to Iraq by Japanese companies, and installation was under way in mountainous terrain by Arabian-American Oil Co. of Saudi Arabia and its contractors, the Mannesmann AG of the Federal Republic of Germany and Saipem S.p.A. of Italy.

Work on a new crude oil pipeline paralleling the existing Baghdad to Turkey line commenced in November and was planned for completion in April 1987. The existing pumping stations would be used, and the combined capacity of the two lines would be about 1.5 million barrels per day.

Refining.—The Czechoslovakian firm Technoexport was contracted to study the feasibility of a new oil refinery to process heavy crude oil from the East Baghdad Field.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Iraqi dinars (ID) to U.S. dollars at the rate of ID0.309=US$1.00.

The Mineral Industry of Ireland

By Richard H. Singleton[1]

Ireland continued to be a significant producer of barite, lead, and zinc. The alumina and steel industries, both relatively new industries in Ireland, each continued to operate at a loss, the former mainly because of high costs of labor and electrical power and the latter primarily because of high energy costs and low product prices.

Ireland's economic growth slowed further, to a 0.5% increase in real gross national product (GNP), mainly because of a slower growth in the export of industrial products, particularly in the high technology sector. The budget deficit remained at about $1.5 billion, approximately 8% of GNP. Unemployment increased by nearly one-tenth to 17.5%. The consumer price index increased 5.5% compared with 8.5% in 1984.

PRODUCTION

Significant increases occurred in the production of steel and lime while downturns occurred in alumina and ammonia and continued in coal.

Table 1.—Ireland: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984	1985[p]
METALS					
Alumina ---- thousand tons--	--	--	66	653	555
Copper, mine output, metal content ----	3,500	1,600	--	--	--
Iron and steel: Steel, crude ---- thousand tons--	32	55	[e]136	152	[e]200
Lead, mine output, metal content ----	28,800	36,200	33,600	37,200	34,600
Silver, mine output, metal content thousand troy ounces--	596	352	309	279	276
Zinc, mine output, metal content ----	120,300	167,200	186,000	206,100	191,600
INDUSTRIAL MINERALS[2]					
Barite ---- thousand tons--	274	266	199	220	214
Cement, hydraulic ---- do----	1,938	1,580	1,486	1,377	1,457
Gypsum ---- do----	359	371	352	325	304
Lime ----	46,100	46,500	[e]50,000	67,900	84,800
Magnesia[3] ---- thousand tons--	77	71	65	1	4
Nitrogen: N content of ammonia ---- do----	291	371	294	371	330
Pyrites ----	25,600	13,800	--	--	--
Sand and gravel[4] ---- thousand tons--	5,400	6,497	[e]6,500	6,714	6,749

See footnotes at end of table.

Table 1.—Ireland: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984	1985[p]
INDUSTRIAL MINERALS[2] —Continued					
Stone and other quarry products:					
Limestone[4] thousand tons	9,721	11,831	[e]11,000	10,598	9,337
Other[4 5] do	3,040	3,126	[e]3,000	2,665	2,411
Sulfur: S content of pyrites[3]	11,250	6,200	--	--	--
MINERAL FUELS AND RELATED MATERIALS					
Coal: Anthracite and bituminous thousand tons	70	63	75	70	57
Gas, natural: Marketed million cubic feet	49,087	71,800	77,500	82,200	85,200
Peat:					
For agricultural use thousand tons	81	95	[e]95	96	96
For fuel use:					
Sod peat[6] do	1,584	1,680	[e]1,650	1,643	1,107
Milled peat[7] do	3,774	3,599	[e]5,000	6,291	1,521
Total do	5,358	5,279	[e]6,650	7,934	2,628
Peat briquets do	340	406	[e]400	410	486
Petroleum refinery products:					
Gasoline, motor thousand 42-gallon barrels	1,581	969	2,669	2,610	2,628
Jet fuel do	56	--	--	--	--
Distillate fuel oil do	1,410	1,164	2,798	3,103	3,238
Residual fuel oil do	2,158	1,292	2,957	3,050	3,170
Naphtha do	--	8	42	94	162
Refinery fuel and losses do	224	232	312	376	376
Total do	[r]5,429	[r]3,665	[r]8,778	9,233	9,574

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through Aug. 15, 1986.
[2]Ireland also produces significant quantities of synthetic diamond and is the major overseas supplier of this material to the United States. However, output is not quantitatively reported, and available general information is inadequate to make reliable estimates of output levels.
[3]Based on exports.
[4]Excludes output by local authorities and road contractors.
[5]Includes clays for cement production, fire clay, granite, marble, rock sand, silica rock, and slate.
[6]Includes production by farmers and by Bord Na Mona.
[7]Includes milled peat used for briquet production.

TRADE

Imports of bauxite continued to increase in 1984, the last year for which data were available, as did exports of alumina. Imports of platinum-group metals continued to increase while exports continued to decrease. Imports of tin continued to increase as did exports of tin scrap. Imports of manganese concentrate continued to increase as did exports of zinc concentrate.

Exports of peat continued to increase in 1984 as did imports of sulfuric acid.

Table 2.—Ireland: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS				
Alkali and alkaline-earth metals: Alkali metals	5	23	NA	NA.
Aluminum:				
Ore and concentrate	4,553	--		
Oxides and hydroxides	31,667	654,077	3	United Kingdom 336,657; Netherlands 93,347; Norway 89,323.
Metal including alloys:				
Scrap	4,246	4,123	--	United Kingdom 2,263; Netherlands 855; West Germany 640.
Unwrought	2,537	1,099	2	United Kingdom 1,064; Netherlands 17.
Semimanufactures	1,724	1,007	14	United Kingdom 868; West Germany 94.
Cadmium: Metal including alloys, all forms	20	--		
Chromium:				
Oxides and hydroxides	1	7	--	All to West Germany.
Metal including alloys, all forms	--	10	--	All to United Kingdom.
Cobalt: Metal including alloys, all forms	41	88	74	United Kingdom 10; West Germany 3.
Copper:				
Ore and concentrate	360	--		
Sulfate	97	63	--	All to United Kingdom.
Metal including alloys:				
Scrap	8,051	8,897	--	Netherlands 2,368; United Kingdom 1,702; West Germany 1,166.
Unwrought	530	903	--	West Germany 427; Netherlands 335; Belgium-Luxembourg 46.
Semimanufactures	803	1,749	677	United Kingdom 355; Belgium-Luxembourg 280.
Gold: Waste and sweepings value, thousands	$440	$550	--	United Kingdom $347; West Germany $183.
Iron and steel:				
Iron ore and concentrate, excluding roasted pyrite	23	--		
Metal:				
Scrap	21,264	42,972	40	United Kingdom 35,179; Belgium-Luxembourg 4,520; Spain 1,210.
Pig iron, cast iron, related materials	49	404	--	United Kingdom 268; Netherlands 19; unspecified 80.
Ferroalloys:				
Ferromanganese	184	129	--	All to Belgium-Luxembourg.
Ferrosilicon	20	--		
Silicon metal	14	--		
Unspecified	25	9	--	All to United Kingdom.
Steel, primary forms	241	678	--	United Kingdom 359; Malta 272.
Semimanufactures:				
Bars, rods, angles, shapes, sections	100,442	128,258	95	United Kingdom 49,443; West Germany 22,439; Netherlands 21,272.
Universals, plates, sheets	5,796	5,273	1	United Kingdom 4,537; West Germany 603.
Hoop and strip	1,050	908	6	United Kingdom 595; Italy 215.
Rails and accessories	2,178	758	--	United Kingdom 495; Belgium-Luxembourg 263.
Wire	969	1,636	1	United Kingdom 1,537; West Germany 38.
Tubes, pipes, fittings	4,232	5,752	1	United Kingdom 5,092; West Germany 179; Kuwait 82.
Castings and forgings, rough	59	98	(2)	United Kingdom 47; Netherlands 22.
Lead:				
Ore and concentrate	59,606	61,114	5,500	France 19,766; Spain 14,112; West Germany 6,877.
Oxides	41	1	--	All to United Kingdom.
Ash and residue containing lead	267	369	--	United Kingdom 350; Netherlands 19.
Metal including alloys:				
Scrap	2,995	5,107	--	Belgium-Luxembourg 2,053; Netherlands 1,834; West Germany 920.
Unwrought	177	294	(2)	United Kingdom 271; Norway 20.
Semimanufactures	2,542	4,109	--	United Kingdom 3,610; Malaysia 397; Denmark 61.

See footnotes at end of table.

Table 2.—Ireland: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued				
Lithium: Oxides and hydroxides	36	--		
Magnesium: Metal including alloys:				
Scrap	8	42	--	Netherlands 31; Italy 11.
Unwrought	3	--		
Semimanufactures	10	1	1	
Manganese: Oxides	8,286	22	--	All to United Kingdom.
Nickel:				
Matte and speiss	20	--		
Ash and residue containing nickel	4	1	--	Do.
Metal including alloys:				
Scrap	51	149	114	United Kingdom 35.
Unwrought	108	59	56	United Kingdom 3.
Semimanufactures	181	291	28	Switzerland 98; West Germany 61; United Kingdom 42.
Platinum-group metals:				
Waste and sweepings value, thousands	$18	NA		
Metals including alloys, unwrought and partly wrought troy ounces	29,900	13,343	--	All to United Kingdom.
Silver:				
Waste and sweepings[3] value, thousands	$1,310	$701	$3	West Germany $434; United Kingdom $264.
Metal including alloys, unwrought and partly wrought troy ounces	94,073	950,764	--	United Kingdom 832,132.
Tin: Metal including alloys:				
Scrap	765	1,374	2	Belgium-Luxembourg 849; United Kingdom 517.
Unwrought	161	7	--	All to Netherlands.
Semimanufactures	15	89	--	United Kingdom 80; Netherlands 9.
Titanium:				
Oxides	15	8	--	All to United Kingdom.
Metal including alloys, all forms	3	3	--	Do.
Tungsten: Metal including alloys, all forms	15	5	([illegible])	United Kingdom 4.
Zinc:				
Ore and concentrate	356,219	403,706	--	Belgium-Luxembourg 134,052; France 73,588; Italy 42,991.
Oxides	29	90	11	West Germany 40; United Kingdom 37.
Ash and residue containing zinc	263	425	--	Belgium-Luxembourg 221; West Germany 204.
Metal including alloys:				
Scrap	95	112	--	West Germany 60; United Kingdom 52.
Unwrought	228	246	--	United Kingdom 245.
Semimanufactures	56	66	--	United Kingdom 62; Switzerland 3.
Other:				
Oxides and hydroxides	119	32	--	All to United Kingdom.
Ashes and residues	67	67	--	Do.
Base metals including alloys, all forms	--	20	--	Do.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	2	12	--	United Kingdom 9; Norway 3.
Artificial:				
Corundum	--	8	--	All to United Kingdom.
Silicon carbide	20	18	--	Do.
Dust and powder of precious and semiprecious stones including diamond kilograms	2,491	4,859	1,292	Japan 1,249; Belgium-Luxembourg 584.
Grinding and polishing wheels and stones	41	38	13	United Kingdom 10; Singapore 5.
Asbestos, crude	176	197	--	All to United Kingdom.
Barite and witherite	227,148	221,558	52,755	United Kingdom 73,640; Norway 43,090.
Cement	90,669	82,414	--	United Kingdom 80,402.
Chalk	12	--		
Clays, crude	789	805	--	United Kingdom 182; unspecified 623.
Diatomite and other infusorial earth	10	1	--	All to United Kingdom.
Fertilizer materials:				
Crude, n.e.s	7,094	5,036	--	Do.

See footnotes at end of table.

Table 2.—Ireland: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Fertilizer materials —Continued				
Manufactured:				
Ammonia	96,736	95,266	--	Spain 64,353; United Kingdom 20,743; Belgium-Luxembourg 8,020.
Nitrogenous	215,770	69,503	--	All to United Kingdom.
Phosphatic	--	42	--	Do.
Potassic	2,413	1,260	--	All to France.
Unspecified and mixed	48,363	77,587	--	All to United Kingdom.
Graphite, natural	(²)	5	(²)	United Kingdom 4.
Gypsum and plaster	41,175	51,539	--	All to United Kingdom.
Lime	2,227	3,450	--	United Kingdom 3,445; Malta 4.
Magnesium compounds:				
Magnesite	--	31	--	All to United Kingdom.
Oxides and hydroxides	65,176	619	--	Do.
Mica, all forms	16	20	--	Do.
Phosphates, crude	465	294	--	United Kingdom 292.
Phosphorus, elemental	--	7	--	All to United Kingdom.
Pigments, mineral: Iron oxides and hydroxides, processed	21	--		
Precious and semiprecious stones other than diamond:				
Natural ----- value, thousands	$55	$51	--	Switzerland $26; West Germany $12; United Kingdom $7.
Synthetic ----- do	--	$3	--	All to United Kingdom.
Salt and brine	685	1,042	--	United Kingdom 1,003.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	140	527	--	All to United Kingdom.
Sulfate, manufactured	108	NA		
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	908	1,809	--	United Kingdom 729; Belgium-Luxembourg 602; Netherlands 459.
Worked	3,629	7,152	6,023	United Kingdom 1,071; Netherlands 37.
Dolomite, chiefly refractory-grade	20	--		
Gravel and crushed rock	334,204	415,115	--	United Kingdom 364,843; West Germany 47,692.
Limestone other than dimension	1,063	758	--	United Kingdom 739; Netherlands 19.
Quartz and quartzite	368	230	--	United Kingdom 208; West Germany 19.
Sand other than metal-bearing	6,662	7,068	--	United Kingdom 7,035.
Sulfur:				
Elemental: Crude including native and byproduct	68	39	--	All to United Kingdom.
Sulfuric acid	77	1,510	--	Netherlands 1,413; United Kingdom 58; Saudi Arabia 39.
Talc, steatite, soapstone, pyrophyllite	297	22	--	United Kingdom 21.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	125	289	--	All to United Kingdom.
Carbon black	204	430	80	Netherlands 264; United Kingdom 66.
Coal:				
Anthracite	1,605	6,574	--	All to United Kingdom.
Bituminous	3,261	18,622	--	Do.
Lignite including briquets	179	186	--	Do.
Gas, manufactured	50	32	--	Do.
Peat including briquets and litter	168,163	192,505	54	United Kingdom 174,117; France 8,407; Netherlands 4,240.
Petroleum refinery products:				
Liquefied petroleum gas 42-gallon barrels	53,604	72,546	--	United Kingdom 72,314; West Germany 139.
Gasoline ----- do	12,486	74,486	--	Netherlands 62,254; United Kingdom 12,155.
Mineral jelly and wax ----- do	1,251	1,251	8	Netherlands 575; United Kingdom 291; France 157.
Kerosene and jet fuel ----- do	23	--		
Distillate fuel oil ----- do	18,493	85,797	--	All to United Kingdom.
Lubricants ----- do	18,046	18,179	15	United Kingdom 16,017; West Germany 843; France 768.
Residual fuel oil ----- do	2,772,178	3,017,293	--	United Kingdom 2,957,966; Norway 59,327.

See footnotes at end of table.

Table 2.—Ireland: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum refinery products —Continued				
Bitumen and other residues 42- gallon barrels	6,151	25,282	--	United Kingdom.
Bituminous mixtures do	430	1,594	--	Do.
Petroleum coke do	--	1,183	--	Do.

NA Not available.
[1]Table prepared by Margaret M. Chauncey.
[2]Less than 1/2 unit.
[3]May include other precious metals.

Table 3.—Ireland: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS				
Alkali and alkaline-earth metals:				
Alkali metals	28	23	--	United Kingdom 21; Netherlands 1.
Alkaline-earth metals	[r]1	15	--	All from United Kingdom.
Aluminum:				
Ore and concentrate	562,997	1,126,985	--	Guinea 1,125,962; China 1,002.
Oxides and hydroxides	18,026	3,148	222	United Kingdom 2,627; Netherlands 175; France 40.
Ash and residue containing aluminum	73	5	--	All from United Kingdom.
Metal including alloys:				
Scrap	339	160	2	United Kingdom 149; Netherlands 8.
Unwrought	2,002	3,065	4	Spain 1,203; Norway 934; United Kingdom 851.
Semimanufactures	27,380	32,178	904	United Kingdom 16,677; West Germany 5,087; France 3,375.
Chromium:				
Ore and concentrate	3,275	3,803	--	Republic of South Africa 3,763; United Kingdom 40.
Oxides and hydroxides	128	141	1	West Germany 82; United Kingdom 43; Denmark 15.
Metal including alloys, all forms	65	98	1	United Kingdom 94; France 2.
Cobalt:				
Oxides and hydroxides	4	7	6	United Kingdom 1.
Metal including alloys, all forms	92	103	96	United Kingdom 5; West Germany 1.
Copper:				
Matte and speiss including cement copper	1	6	--	All from West Germany.
Sulfate	1,792	1,114	--	U.S.S.R. 735; Belgium-Luxembourg 186; United Kingdom 143.
Ash and residue containing copper	1,058	442	--	Netherlands 315; Belgium-Luxembourg 110.
Metal including alloys:				
Scrap	286	484	--	United Kingdom 446; West Germany 37.
Unwrought	131	275	([2])	United Kingdom 168; West Germany 106.
Semimanufactures	18,149	20,525	331	United Kingdom 10,158; Belgium-Luxembourg 2,957; Sweden 1,864.
Gold:				
Waste and sweepings value, thousands	$6	$21	--	Mainly from United Kingdom.
Metal including alloys, unwrought and partly wrought do	[r]$5,433	$3,604	NA	NA.
Iron and steel:				
Iron ore and concentrate including roasted pyrite	479	21	--	All from Netherlands.
Metal:				
Scrap	70,294	87,580	--	United Kingdom 87,494; West Germany 15.
Pig iron, cast iron, related materials	751	1,245	1	United Kingdom 1,116; Sweden 89; West Germany 15.

See footnotes at end of table.

Table 3.—Ireland: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal —Continued				
Ferroalloys:				
Ferrochromium	8	12	--	All from Sweden.
Ferromanganese	1,348	891	--	France 400; Norway 400; West Germany 78.
Ferromolybdenum	1	3	--	All from United Kingdom.
Ferrosilicomanganese	296	1,035	--	United Kingdom 735; Norway 300.
Ferrosilicon	508	232	--	All from United Kingdom.
Silicon metal	166	182	--	Sweden 51; Italy 36; United Kingdom 36.
Unspecified	r25	16	--	United Kingdom 15; Spain 1.
Steel, primary forms	4,206	3,238	1	United Kingdom 2,137; France 473; West Germany 358.
Semimanufactures:				
Bars, rods, angles, shapes, sections	118,602	123,412	193	United Kingdom 69,103; Spain 11,441; Sweden 7,174.
Universals, plates, sheets	122,008	136,199	143	United Kingdom 69,397; France 11,204; Finland 8,331.
Hoop and strip	12,872	20,377	31	United Kingdom 14,363; West Germany 4,129; Belgium-Luxembourg 984.
Rails and accessories	8,188	9,328	--	West Germany 7,552; United Kingdom 1,725; Belgium-Luxembourg 44.
Wire	20,038	18,860	33	United Kingdom 7,341; France 4,112; West Germany 2,044.
Tubes, pipes, fittings	51,782	63,157	324	United Kingdom 32,007; France 4,542; Belgium-Luxembourg 4,466.
Castings and forgings, rough	2,931	2,442	55	United Kingdom 819; West Germany 712; France 166.
Lead:				
Oxides	2,061	2,284	--	United Kingdom 2,254; West Germany 20.
Metal including alloys:				
Scrap	3,918	4,700	--	United Kingdom 4,619; Belgium-Luxembourg 81.
Unwrought	973	2,204	--	France 1,888; United Kingdom 292; Belgium-Luxembourg 20.
Semimanufactures	514	382	(2)	Belgium-Luxembourg 241; United Kingdom 122; West Germany 16.
Magnesium: Metal including alloys:				
Scrap	5	--		
Unwrought	80	91	--	Norway 90.
Semimanufactures	155	106	--	United Kingdom 99; West Germany 6.
Manganese:				
Ore and concentrate, metallurgical-grade	21,152	28,072	2	Ghana 27,602; Brazil 197; Netherlands 171.
Oxides	324	301	22	Belgium-Luxembourg 138; United Kingdom 79; Spain 54.
Metal including alloys, all forms	24	23	--	All from United Kingdom.
Mercury 76-pound flasks	12,474	32	--	United Kingdom 20.
Nickel:				
Ore and and concentrate	--	5	--	All from Australia.
Matte and speiss	5	--		
Oxides and hydroxides	2	2	--	All from Canada.
Ash and residue containing nickel	--	28	--	All from United Kingdom.
Metal including alloys:				
Scrap	4	1	--	Do.
Unwrought	142	220	5	U.S.S.R. 127; United Kingdom 87.
Semimanufactures	293	675	214	United Kingdom 303; West Germany 66.
Platinum-group metals: Metals including alloys, unwrought and partly wrought troy ounces	27,842	40,157	NA	United Kingdom 6,334.
Rare-earth metals including alloys, all forms	1	13	--	All from United Kingdom.
Selenium, elemental	1	9	--	Do.
Silicon, high-purity	17	1	--	Do.
Silver:				
Waste and sweepings[3] value, thousands	$1	$1	--	Do.
Metal including alloys, unwrought and partly wrought troy ounces	182,970	369,833	--	United Kingdom 300,130.

See footnotes at end of table.

Table 3.—Ireland: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Tellurium, elemental and arsenic	4	10	--	All from United Kingdom.
Tin:				
Oxides	25	11	--	Do.
Metal including alloys:				
Unwrought	38	57	--	United Kingdom 56.
Semimanufactures	146	319	1	United Kingdom 165; West Germany 150.
Titanium:				
Ore and concentrate	136	878	299	Netherlands 540; United Kingdom 38.
Oxides	2,290	3,419	2	United Kingdom 1,396; Norway 833; West Germany 621.
Metal including alloys, semimanufactures	68	60	33	Japan 19; United Kingdom 5.
Tungsten: Metal including alloys, all forms	7	13	5	West Germany 6; United Kingdom 1.
Uranium and thorium: Metal including alloys, all forms	--	46	46	
Zinc:				
Oxides	939	1,167	--	United Kingdom 1,006; Belgium-Luxembourg 86; West Germany 37.
Blue powder	130	--		
Ash and residue containing zinc	--	69	--	West Germany 36; United Kingdom 18; Belgium-Luxembourg 15.
Metal including alloys:				
Scrap	184	310	--	United Kingdom 270; Canada 40.
Unwrought	1,939	1,442	--	United Kingdom 430; Belgium-Luxembourg 400; Netherlands 398.
Semimanufactures	120	452	3	United Kingdom 234; Canada 86; West Germany 72.
Zirconium:				
Ore and concentrate	21	--		
Metal including alloys, all forms	12	--		
Other:				
Ores and concentrates	161	985	--	China 944; Belgium-Luxembourg 20; Netherlands 20.
Oxides and hydroxides	160	181	--	United Kingdom 66; Italy 61; West Germany 53.
Base metals including alloys, all forms	r2	7	--	West Germany 5; United Kingdom 1.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	240	200	(3)	United Kingdom 158; Norway 20; Italy 16.
Artificial:				
Corundum	76	110	--	West Germany 109.
Silicon carbide	115	276	--	Norway 246; France 22; United Kingdom 7.
Dust and powder of precious and semiprecious stones including diamond kilograms	2,172	3,499	3,375	Belgium-Luxembourg 15.
Grinding and polishing wheels and stones	407	521	21	West Germany 212; United Kingdom 99; Austria 59.
Asbestos, crude	4,729	5,687	--	Republic of South Africa 3,815; Canada 1,085; Cyprus 778.
Barite and witherite	366	423	--	United Kingdom 307; West Germany 20; Netherlands 20.
Boron materials:				
Crude natural borates	1,363	608	400	Netherlands 208.
Elemental	20	14	--	All from United Kingdom.
Oxides and acids	144	102	--	France 100; West Germany 1.
Bromine	16	24	--	All from United Kingdom.
Cement	111,969	99,650	(3)	United Kingdom 53,244; Spain 23,144; East Germany 18,164.
Chalk	2,950	4,416	--	United Kingdom 3,535; France 712; West Germany 129.
Clays, crude:				
Bentonite	1,000	1,625	5	United Kingdom 1,535; Netherlands 21.
Chamotte earth	7,761	9,080	--	Spain 6,110; France 2,950.
Kaolin	6,355	7,910	20	United Kingdom 7,792; Spain 56.
Unspecified	r6,684	8,560	50	United Kingdom 6,404; China 1,884.
Cryolite and chiolite	(3)	1	--	All from Denmark.
Diatomite and other infusorial earth	453	329	257	United Kingdom 26; Spain 20; Denmark 18.

See footnotes at end of table.

Table 3.—Ireland: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984 United States	Sources, 1984 Other (principal)
INDUSTRIAL MINERALS —Continued				
Feldspar, fluorspar, related materials:				
Feldspar	115	176	--	United Kingdom 104; Republic of South Africa 54.
Fluorspar	11	8	--	All from United Kingdom.
Unspecified	6,207	6,241	--	Norway 5,518; United Kingdom 723.
Fertilizer materials:				
Crude, n.e.s	2,493	2,438	--	All from United Kingdom.
Manufactured:				
Ammonia	17,110	801	--	Netherlands 358; United Kingdom 303; West Germany 129.
Nitrogenous	222,279	252,385	([3])	Netherlands 81,398; Belgium-Luxembourg 54,980; Spain 35,196.
Phosphatic	133,482	165,696	48,687	Netherlands 43,708; Sweden 29,619.
Potassic	303,191	332,815	--	West Germany 169,267; Canada 54,161; East Germany 51,865.
Unspecified and mixed	476,514	594,926	26,581	United Kingdom 214,661; Netherlands 78,435; France 74,710.
Graphite, natural	19	22	19	West Germany 2; United Kingdom 1.
Gypsum and plaster	4,912	5,107	491	United Kingdom 4,007; Spain 306.
Iodine	54	55	--	Switzerland 36; United Kingdom 19.
Kyanite and related materials	132	218	17	United Kingdom 201.
Lime	1,236	1,240	--	United Kingdom 1,207; West Germany 33.
Magnesium compounds:				
Oxides and hydroxides	40,042	43,931	490	United Kingdom 17,381; China 7,289; Greece 4,042.
Other	220	148	--	West Germany 92; United Kingdom 36.
Mica:				
Crude including splittings and waste	168	241	31	United Kingdom 198; West Germany 8.
Worked including agglomerated splittings	81	2	1	United Kingdom 1.
Nitrates, crude	16	33	--	All from United Kingdom.
Phosphates, crude	3,405	7,369	--	Morocco 4,707; West Germany 1,780; France 630.
Phosphorus, elemental	27	12	--	All from United Kingdom.
Pigments, mineral: Iron oxides and hydroxides, processed	1,966	2,391	33	West Germany 2,008; United Kingdom 233; Spain 58.
Precious and semiprecious stones other than diamond:				
Natural ----- value, thousands	$240	$294	$35	Switzerland $116; United Kingdom $107.
Synthetic ----- do.	$14	$382	$339	Japan $22; Switzerland $12.
Salt and brine	79,218	90,400	3	United Kingdom 51,352; Spain 17,740; West Germany 15,596.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	17,659	7,818	6	United Kingdom 5,395; Netherlands 1,345; Poland 1,070.
Sulfate, manufactured	582	NA		
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	2,863	4,090	--	Republic of South Africa 2,170; United Kingdom 739; France 615.
Worked	6,048	7,120	18	Italy 3,126; Canada 2,252; United Kingdom 523.
Dolomite, chiefly refractory-grade	2,512	1,752	--	United Kingdom 1,136; Netherlands 558.
Gravel and crushed rock	247,357	274,785	--	United Kingdom 274,159; France 462.
Limestone other than dimension	16,537	20,989	--	All from United Kingdom.
Quartz and quartzite	368	317	([3])	Portugal 220; Belgium-Luxembourg 40.
Sand other than metal-bearing	100,329	122,947	125	United Kingdom 94,216; Belgium-Luxembourg 25,789.
Sulfur:				
Elemental:				
Crude including native and byproduct	493	271	39	United Kingdom 109; West Germany 106.
Colloidal, precipitated, sublimed	90	47	--	West Germany 30; United Kingdom 15.
Dioxide	580	653	--	Sweden 566; United Kingdom 87.
Sulfuric acid	64,319	76,837	21	Norway 36,754; United Kingdom 19,796; Belgium-Luxembourg 18,950.

See footnotes at end of table.

Table 3.—Ireland: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Talc, steatite, soapstone, pyrophyllite	2,725	2,414	2	United Kingdom 906; China 683; Italy 342.
Vermiculite, perlite, chlorite	3,387	3,790	7	United Kingdom 2,037; Netherlands 1,746.
Other:				
Crude	[r]3,353	3,278	52	Italy 1,835; France 769; West Germany 210.
Slag and dross, not metal-bearing	2,795	3,175	18	Belgium-Luxembourg 2,559; Netherlands 510; United Kingdom 70.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	2,534	3,990	20	United Kingdom 3,728; Trinidad and Tobago 180.
Carbon black	6,228	8,051	10	United Kingdom 4,014; Finland 2,836; Netherlands 450.
Coal:				
Anthracite thousand tons	58	42	--	Republic of South Africa 14; Belgium-Luxembourg 8; West Germany 7.
Bituminous do.	1,368	1,352	224	Poland 754; United Kingdom 289.
Lignite including briquets do.	15	24	--	West Germany 14; East Germany 9.
Coke and semicoke do.	7	8	--	West Germany 4; Belgium Luxembourg 2.
Gas, manufactured	11	13	--	United Kingdom 12.
Peat including briquets and litter	707	870	6	United Kingdom 831; France 18.
Petroleum:				
Crude thousand 42-gallon barrels	7,797	8,525	--	All from United Kingdom.
Refinery products:				
Liquefied petroleum gas do.	1,713	1,518	(2)	United Kingdom 1,285; Netherlands 168; Norway 51.
Gasoline do.	6,140	5,356	(2)	United Kingdom 5,272; France 83.
Mineral jelly and wax do.	28	32	1	United Kingdom 26; West Germany 4.
Kerosene and jet fuel do.	2,512	2,574	--	United Kingdom 2,105; U.S.S.R. 452; France 16.
Distillate fuel oil do.	6,820	6,723	(2)	United Kingdom 5,594; U.S.S.R. 820; France 307.
Lubricants do.	331	386	12	United Kingdom 315; West Germany 43.
Residual fuel oil do.	7,641	8,636	--	United Kingdom 4,031; France 1,577; Netherlands 1,538.
Bitumen and other residues do.	572	616	--	United Kingdom 565; Spain 27; Netherlands 23.
Bituminous mixtures do.	44	35	(2)	United Kingdom 25; Italy 8.
Petroleum coke do.	98	146	146	

[r]Revised. NA Not available.
[1]Table prepared by Jozef Plachy.
[2]Less than 1/2 unit.
[3]May include other precious metals.

COMMODITY REVIEW

METALS

Aluminum.—The new Aughinish alumina plant, jointly owned by Alcan Aluminium Ltd. and Billiton Aluminium Ireland Ltd., continued to operate at a loss in 1985. Discussions were held with the Government regarding lower prices for electrical power and a guaranteed supply of natural gas to replace the expensive oil used for calcining the product. A world oversupply of alumina capacity caused a lowering of prices. The plant operated at an average of about two-thirds capacity.

Steel.—The Irish Parliament voted $24 million[3] in state aid to the troubled Government-owned Irish Steel Ltd., following worker's acceptance of job cuts and a wage freeze. Partial foreign private ownership was being sought as the plant continued to operate at a loss.

INDUSTRIAL MINERALS

Barite.—The small barite mine at Clonakilty in County Cork was closed. It had operated 2 years after its latest reopening in 1983.

Gypsum.—Irish Gypsum PLC received Government permission to surface mine gypsum at Knocknacran in County Monaghan. Reserves, adequate for about 20 years, were expected to replace those of the Drumgoosat underground mine, which was expected to be depleted by 1985.

MINERAL FUELS

British Petroleum Development Ltd. (BP) announced in June 1985 that an encouraging gas find had been made in well 48/18-1 in the Celtic Sea 14 miles off the south coast of Ireland near the Kinsale Field, at a total depth of about 4,500 feet, including 295 feet of water. Gulf Oil (Ireland) Ltd. found oil in a wildcat well in block 50/6, about 30 miles off the south coast at a total depth of 7,750 feet in 240 feet of water. Both finds required extensive evaluation before they could be considered commercially viable.

Only six wells were drilled in Irish waters during the year. Response to the second round of exploration offered early in 1984 had been limited until the Government offered, in June 1985, more attractive rules to improve the profitability of marginal fields, whereby royalties and state participation would be reduced in accordance with a profitability indicator. Awards were announced in October for the Third Offshore Licensing Round, including 15 blocks in the Celtic Sea and St. George's Channel off the eastern coast, as well as 7 blocks in the Porcupine Basin about 100 miles west of Ireland in about 1,200 feet of water. BP was the sole operator in the Porcupine Basin. Operators in the other areas included the U.S. firms Continental Oil Co., ARCO Oil & Gas Co., and Texas Eastern Corp.; the British firms Total Oil Marine Ltd., BP, and Britoil PLC; and the Irish firm Bula Ltd. The strongest interest appeared to be to search for gas in the Celtic Sea in blocks 48 and 49.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Irish pounds (£) to U.S. dollars at the rate of £1=US$1.08, the average for 1985.

The Mineral Industry of Israel

By Ben A. Kornhauser[1]

The mineral industry of Israel continued to be based primarily on phosphate rock and the products derived from the brines of the Dead Sea. These sectors were planning multiyear programs to expand their capacities and to develop more profitable end products. Most of the expansion was expected to be financed internally. Israel Chemical Ltd. (ICL) purchased the Federal Republic of Germany's fertilizer producer, K. G. Wilhelm Stodiek Dunger GmbH, providing ICL with a consumer for its potash and phosphate rock and a sales market for fertilizers.

The United States and Israel signed the first two-way Free Trade Area (FTA) Agreement between the United States and any country. The FTA Agreement was expected to expand commerce between these two nations during the agreement's 10-year implementation period.

A 40-hour test of liquid coal at the Negev Phosphates Ltd. (NPL) plant was successful. NPL planned to produce liquid coal on-site to replace the 40,000 tons of No. 6 fuel oil now burned annually. Coaliquid Inc. of Louisville, Kentucky, a subsidiary of McDonnell Douglas Corp., developed the process.

PRODUCTION AND TRADE

The Israeli economy showed signs of improvement in 1985. The increase in exports of goods and services countered the drop in domestic demand and was responsible for the growth in the gross national product, which grew at the rate of 2%. Inflation subsided to 185% in 1985 from a record high 445% in 1984. Israel's overall external debt, which included the Government, the banking system, and the private sector, totaled $23.4 billion, of which $3.45 billion was short term.[2] The balance-of-payments account apparently had a $500 surplus, partially the result of U.S. assistance. By December, reserves reached $3.19 billion after dropping below $2 billion during the year. The overall commodity trade deficit at yearend was $2 billion, compared with $2.5 billion in 1984. Commercial exports grew 8.6% to $6.1 billion, of which industrial exports were $4.29 billion, a 7% increase, and agricultural exports were $447 million, a 10% decrease, compared with those of 1984.

On June 11, the United States signed its first two-way FTA Agreement with Israel or any country, which became effective in September. The agreement was expected to expand commerce between the two countries by lowering custom duties and nontariff barriers to trade and eliminating them within 10 years. The FTA Agreement could enable the United States to use Israel as an offshore base to penetrate the European Common Market and to provide convenient access to African markets.

Israel's major trading partners remained the United States and the European Economic Community countries. Israel's trade with the Eastern Europe fell in 1985, with imports decreasing $46 million or about 40%, and exports decreasing $51 million or about 17%, compared with those of 1984. A $5 million positive trade balance remained. On the other hand, the import and export trade of the United Kingdom and the United States with Israel increased in 1985. British imports decreased $10 million or 2%, and exports increased $54 million or 10% compared with 1984, leaving Israel with a negative trade balance of $131 million. U.S. imports increased $287 million or 27%, while U.S. exports decreased $81 million or 5%, leaving Israel with a negative trade balance of $327 million in nonmilitary trade. France's trade with Israel amounted to $306 million, a decrease of 5% in exports, and $261 million, an increase of 18% in imports, compared with 1984, for a positive trade balance. Economic ties between Israel and China were established and involved a myriad of projects including solar energy, advanced technology equipment, and machines.

Israel paid an average price of $25.54 per barrel of oil compared with $27.38 per barrel in 1984, a savings of more than $80 million.

The controversial $1.5 billion Mediterranean-to-Dead Sea power canal project was terminated, mainly owing to its marginal feasibility in the light of lower oil prices. The project embodied a 66-mile canal and an 800-megawatt powerplant to use the 1,300-foot drop to the Dead Sea to generate hydroelectric power. About $18 million had been spent on feasibility studies and construction of a test section of the tunnel.

In fiscal year 1985, sales of the Dead Sea Bromine Group of ICL amounted to nearly $140 million, about 17% above that of 1984.

Phosphate rock production reached a new high of 4.08 million tons, a 23% increase over that of 1984. The main importers of Israeli phosphate rock, in descending order of tonnage, were the Netherlands, France, Italy, Turkey, the Federal Republic of Germany, and Romania.

Table 1.—Israel: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984[p]	1985[e]
METALS					
Copper, oxide (80%-90% Cu):[e]					
Gross weight	NA	4,200	4,200	3,500	--
Metal content	NA	3,500	3,500	2,900	--
Iron and steel: Steel, crude[e]	120,000	120,000	150,000	200,000	150,000
INDUSTRIAL MINERALS					
Bromine:					
Elemental	44,019	70,000	70,000	90,700	100,000
Compounds	32,248	50,500	50,500	65,300	70,000
Cement, hydraulic (from domestic clinker) thousand tons	2,361	2,189	2,058	2,064	2,195
Clays:					
Bentonite	12,581	12,000	6,838	12,000	12,000
Flint clay	9,133	25,000	9,108	9,000	9,000
Kaolin	37,299	12,000	26,844	27,000	27,000
Other	2,926	35,000	18,274	19,000	19,000
Gypsum	42,700	42,000	42,000	42,000	42,000
Lime	80,000	50,000	41,000	50,000	50,000
Nitrogen: N content of ammonia	42,700	49,300	53,400	57,500	57,500
Phosphate rock, beneficiated thousand tons	2,372	2,171	2,969	3,312	4,076
Potash, K_2O equivalent do.	839	1,004	1,000	1,100	1,100
Salt, marketed (mainly marine)	132,250	148,200	145,000	145,000	150,000
Sand:					
Glass sand	62,700	65,000	61,000	61,000	61,000
Other (for building industry) thousand tons	4,100	4,000	4,300	4,300	4,300
Sodium and potassium compounds: Caustic soda	34,553	29,346	30,974	28,501	[3]31,248
Stone:					
Crushed thousand cubic meters	5,000	6,000	4,500	6,000	6,000
Dimension, marble	14,000	17,000	12,000	13,000	13,000
Sulfur:					
Byproduct from petroleum[e] thousand tons	10	10	10	10	10
Sulfuric acid do.	182	154	171	189	[3]178
MINERAL FUELS AND RELATED MATERIALS					
Gas, natural, marketed million cubic feet	13,420	7,000	6,300	2,400	2,400
Peat[e] thousand tons	20	20	20	20	20
Petroleum:					
Crude thousand 42-gallon barrels	116	100	92	365	[3]365
Refinery products:					
Gasoline do.	8,240	8,810	9,410	8,830	8,800
Kerosene and jet fuel do.	5,710	5,930	5,560	5,256	5,300
Distillate fuel oil do.	10,500	11,700	11,600	9,640	9,600
Residual fuel oil do.	16,800	23,800	22,500	19,300	19,000
Lubricants do.	NA	NA	NA	NA	NA
Other do.	2,290	2,450	2,580	2,250	2,200
Refinery fuel and losses do.	2,180	2,640	2,580	2,260	2,300
Total do.	45,720	55,330	54,230	47,536	47,200

[e]Estimated. [p]Preliminary. NA Not available.

[1]Table includes data available from the Apr. 1986 monthly Bulletin of Statistics, Israel Central Bureau of Statistics, v. 38, No. 4, Jerusalem; and the Israel Geological Survey.

[2]In addition to the commodities listed, Israel reportedly had the capacity to produce 71 tons of U_3O_8 per year, but official data are not reported, and available information is inadequate to make reliable estimates of actual output levels.

[3]Reported figure.

COMMODITY REVIEW

METALS

Iron and Steel.—United Steel Mills Ltd. in Haifa alternated operating one of two electric arc furnaces using local scrap for the charge. Halum, a subsidiary on United's property, collected and prepared the scrap for melting. Production of 100,000 tons per year of bar and rod, which was competitive with imported materials, was limited by the current maximum scrap iron collection. As more automobiles are scrapped, annual production was expected to increase. In September, a rod and wire mill started to produce bolts, fencing, nails, and springs, for which a 60,000-ton market was believed to exist. The Hamegader plant at Kiriat Gan operated only one shift and imported steel billets to produce about 50,000 tons per year.

At Haifa, one crew operated one arc furnace continuously for 200 heats, rebricking a second furnace for use when the operating furnace was down for repairs. Management had requested permission from Koor Industries, a Government holding company, to update one of the electric arc furnaces. The proposal was to incorporate water-cooled sides and roof, bottom tapping, and supplemental oxy-fuel burners to assist melting, to produce cleaner steel, and to limit firebrick erosion. Later, better computer-controlled transformers and feeding devices were to be added. The more rapid and efficient melting would enable the production of 60 tons of steel every 2 hours, from tap-to-tap time, or 11 to 12 heats in 24 hours. Current tap-to-tap time was 3 hours or 7 to 8 heats per 24 hours.

INDUSTRIAL MINERALS

Bromine.—The Dead Sea Bromine Group of ICL planned to expand during the next 5 years to double its production and sales to an estimated $277 million a year. The program was aimed at expanding extractive capacity for steadily growing foreign sales and to stress the development of more profitable bromine compounds. A major portion of the expansion was expected to be financed by undistributed profits and internal reserves.[3]

Fertilizer Materials.—*Phosphorus.*—NPL was developing a new 165-square-kilometer phosphate field at Sde Zohar where phosphate rock mining was expected to begin in 1990.

Rotem Fertilizers Ltd., a subsidiary of ICL, operated at a full capacity of 120,000 tons of phosphoric acid and 200,000 tons of fertilizer per year at its $130 million expanded plant at Arad.

ICL purchased K. G. Wilhelm Stodiek, a West German fertilizer producer, with plants in Kaarst and Lohne in the northern part of the Federal Republic of Germany. Stodiek then operated under the name Stodiek Dunger GmbH. The purchase was ICL's third European subsidiary, the others being Guilini Chemie GmbH in the Federal Republic of Germany and Amsterdam Fertilizers BV in the Netherlands. Stodiek gave ICL control of a 140,000-ton-per-year complex of fertilizer plants (ammonium superphosphate), a 9,000-ton-per-year phosphorus pentoxide (P_2O_5) single superphosphate plant at Lohne, and an 8,000-ton-per-year P_2O_5 single superphosphate plant at Kaarst, both in the northern part of the Federal Republic of Germany. The acquisition should provide ICL a guaranteed output of 25,000 to 30,000 tons of potash per year and up to 70,000 tons of phosphate rock per year.[4]

Phosphate rock production reached 4.08 million tons, a 23% increase over that of 1984, and had an average P_2O_5 content of 29.5%. Domestic consumpton amounted to 42% of production, an increase of 20% over that of 1984. Europe, primarily Western Europe, consumed 84% of Israeli phosphate rock exports, and of these exports to Europe, Turkey purchased 13%. The major customers, in thousand tons, were the Netherlands, 548; France, 488; Italy, 320; Turkey, 303; the Federal Republic of Germany, 191; and Romania, 137.

Potash.—ICL developed a method for purifying potassium chloride from Dead Sea brines to a quality suitable for pharmaceutical uses. Facilities at Bromine Compounds Ltd., after slight modification, were suitable for making the product. A separate pharmaceutical production facility was under consideration owing to the great world demand for medical-grade potassium chloride.[5]

The Dead Sea Works Ltd. (DSW), a member of ICL, had closed its 200,000-ton-per-year flotation potash plant in April owing to large stocks and the depressed world fertilizer market. At yearend, DSW's potash stocks were equal to about 4 months' production.

DSW expected to invest $346 million over the next 5 years, mainly from the company's profits, for the following purposes: $66 million to raise the height of solar pond dams, $136 million to increase potash production by 500,000 tons per year, and $80 million for a new plant to produce a downstream potash product. Reduced manpower, resulting from increased production and more mechanization and attention raised net profits appreciably.[6]

Work on the covered conveyor belt from Sdom at the Dead Sea to the Nahal Zin railhead line was proceeding well under the design and construction of Cable Belt Ltd. of the United Kingdom. The conveyor would haul up to 800 tons of loose potash per hour, climbing 2,300 feet in about 7-1/2 miles of the total 11-mile conveyor length. The system was expected to be completed at only $36 million instead of the original estimate of $38 million, mainly because the cost of necessary leased heavy earthmoving equipment was lower than expected. Cable Belt was to receive $20 million. The remaining cost of the project was allocated to loading and unloading facilities, including secondary conveyors, at Sdom and Tsefa and was to be built by Israel. The belt was expected to be in operation in 1986.

ICL was planning to start a $1 billion expansion program that would run at least to 1990. The program involved (1) expansion of DSW potash capacity from 2 million to 3 million tons per year, (2) expansion of NPL's phosphate rock production from 3 million to 5 million tons per year, (3) doubling of Rotem Fertilizers P_2O_5 and downstream fertilizers capacity, (4) installation of two potassium sulfate plants with a capacity of 300,000 tons per year, and (5) doubling of Dead Sea Periclase's magnesium oxide capacity.

MINERAL FUELS

Coal and Energy.—A 100,000-ton shipment of El Cerrejón Basin coal from the North Zone in Colombia was delivered in June. It was unclear whether Israel would continue to import Colombian coal, because a proposed countertrade ran into difficulties. Originally, Israel was to buy $200 million of Colombian coal in exchange for $300 million of Israeli products. Coal imports increased 43% over that of 1984 to 3.26 million tons in 1985 and came from the following countries: the Republic of South Africa, 2.17 million tons; Australia, 574,000 tons; the United States, 421,000 tons; and Colombia, 100,000 tons.

Liquid coal was burned successfully in a 40-hour test at the NPL plant. The plant expected to produce enough liquid coal onsite to replace 40,000 tons of No. 6 fuel oil consumed annually. Coaliquid developed the process. The final product was a mixture of coal (50%), No. 6 fuel oil (40%), and water (10%). The liquid coal cost 12% to 15% less than oil, and equipment changes were not prohibitive.

Oil Shale.—An experimental facility at Energy Resources Development Ltd. (PAMA) for producing oil from oil shale was dedicated in November. The facility could be expanded into a $17 million plant to generate electricity from oil shale. However, PAMA's technology might not be economical in light of the drop in oil prices. Israel's Negev oil shale was soft, crumbly, and easier to process than that found in the United States.

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[1]Physical scientist, Division of International Minerals.
[2]Where necessary, values have been converted from Israeli shekels (I) to U.S. dollars at the average rate of I193.28=US$1.00 for 1984 and I189=US$1.00 for 1985.
[3]Israel Business (Haifa). No. 413, Dec. 1985, p. 7.
[4]Phosphorous & Potassium. No. 135, Feb. 1985, p. 33.
[5]———. Jan.-Feb. 1985, p. 11.
[6]The Jerusalem Post (Jerusalem). Nov. 11, 1985, p. 6.

The Mineral Industry of Italy

By Roman V. Sondermayer[1]

Domestic production of a large number of minerals and fuels was modest by world standards. By importing large quantities of raw mineral materials and crude oil, Italy remained an important producer of processed minerals. Some of the industrial minerals were the most significant minerals produced in Italy. Their share in world production totals were as follows: pumice, about 50%; feldspar, 29%; cement and bentonite, 5%; and asbestos, fluorspar, and magnesite, 3% to 4% each.

The performance of the mineral industry was disappointing during 1985. The overall minerals industry production index was 1.5% lower than that of 1984, thus confirming that the slight improvement of results in 1984 did not reflect a change in the decline of the mineral industry. Metallic minerals registered a decline of 23%.

Principal events related to the mineral industry included startup of a new electrogalvanizing plant by Nuova Italsider S.p.A., commissioning of a new pressure pouring slab caster at the Campi steelworks, beginning of production in a new zinc electrolytic plant at Porto Vesme, and final approval by Parliament of the plan to reactivate the Sulcis coal mines.

PRODUCTION

The Government controlled most of the minerals industry, through Ente Nazionale Idrocarburi (ENI) and its affiliates, Società per Azioni Minero-Metallurgiche (SAMIM) and Azienda Generali Italiana Petroli S.p.A. (AGIP); Finanziaria Siderurgica S.p.A. (Finsider) with its subsidiaries Nuova Italsider, Dalmine S.p.A., Acciaieria Piombino, and Nuova Sias; and the Government-owned potash companies. The principal privately owned companies were Società Mineraria e Metallurgica di Pertusola S.A. (Pertusola) in lead and zinc, Acciaierie Ferriere Lombarde Falck in steel, and major foreign oil and gas companies.

Table 1.—Italy: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984	1985[p]
METALS					
Aluminum:					
Bauxite	19,000	23,010	23,000	--	--
Alumina	786,357	698,329	465,671	607,274	555,319
Metal:					
Primary	273,845	232,861	195,694	230,207	221,055
Secondary	250,000	242,000	278,000	283,000	283,000
Antimony:					
Mine output, metal content	696	339	--	244	495
Metal, total	792	1,047	720	1,121	1,039
Bismuth metal	15	28	23	26	54
Cadmium metal, smelter	489	475	385	452	538
Copper:					
Mine output, metal content	748	138	1,538	875	130
Metal, refined, all kinds	23,700	19,600	31,200	39,000	45,000
Iron and steel:					
Iron ore and concentrate:[2]					
Gross weight ____ thousand tons	123	3	(3)	--	--
Iron content ____ do.	50	1	(3)	--	--
Metal:					
Pig iron ____ do.	12,260	11,537	10,341	11,628	11,658
Ferroalloys:					
Blast furnace, spiegeleisen	(3)	(3)	(3)	(3)	--
Electric furnace:					
Ferromanganese[4]	[r]72,602	[r]74,310	[r]62,341	50,476	[e]55,000
Silicomanganese	54,563	58,118	37,244	72,779	[e]50,000
Ferrosilicon	55,144	63,947	51,913	71,157	[e]60,000
Silicon metal[e]	15,000	15,000	14,000	14,000	[e]14,000
Ferrochromium	10,333	36,541	11,429	12,265	[e]12,000
Other	12,252	11,552	42,219	50,755	[e]40,000
Total	219,894	259,468	219,146	271,432	[e]231,000
Steel, crude ____ thousand tons	24,777	23,981	21,674	24,061	23,744
Semimanufactures:					
Wire rod ____ do.	1,935	2,098	2,027	2,027	2,256
Sections ____ do.	7,812	6,909	6,874	6,874	7,135
Plates and sheets ____ do.	6,453	5,021	8,409	5,836	5,062
Hoop and strip ____ do.	781	593	461	461	526
Railway track material ____ do.	216	240	234	234	280
Ingots, semimanufactures, solids for tubes ____ do.	1,276	903	957	948	1,198
Other ____ do.	1,276	1,784	1,515	1,524	1,383
Total ____ do.	19,749	17,548	20,477	17,904	17,840
Castings and forgings ____ do.	783	614	453	435	326
Cold rolled sheet ____ do.	2,646	2,595	3,892	2,573	2,610
Seamless tubes ____ do.	1,094	1,010	753	753	872
Lead:					
Mine output, metal content	21,300	16,187	23,561	20,883	15,621
Metal, refined:					
Primary	35,556	36,360	36,955	37,558	29,538
Secondary	97,400	97,300	[r]89,400	102,900	95,000
Magnesium metal, primary	10,800	9,943	7,687	7,491	7,863
Manganese, mine output:					
Gross weight	8,756	8,727	7,205	9,582	8,621
Metal content	2,614	2,618	2,215	2,875	2,586
Mercury metal ____ 76-pound flasks	7,527	4,612	--	--	--
Silver metal ____ thousand troy ounces	1,768	1,791	2,361	1,554	2,301
Zinc:					
Mine output, metal content	43,906	39,601	42,944	42,288	45,438
Metal, primary	180,903	158,560	155,893	169,672	215,644
INDUSTRIAL MINERALS					
Asbestos	137,086	116,410	139,054	147,272	136,006
Barite	177,005	180,022	139,090	107,128	127,226
Bromine[e]	600	600	500	500	600
Cement, hydraulic ____ thousand tons	41,553	39,728	39,216	37,782	36,677

See footnotes at end of table.

Table 1.—Italy: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984	1985[p]
INDUSTRIAL MINERALS —Continued					
Clays, crude:					
Bentonite thousand tons	277	237	297	309	299
Refractory excluding kaolinitic earth do.	270	254	284	332	400
Fuller's earth do.	5	7	20	30	30
Kaolin do.	74	53	[r]53	53	60
Kaolinitic earth do.	31	[r]29	25	25	26
Diatomite[e]	25,000	20,000	25,000	28,000	30,000
Feldspar	428,485	783,411	826,856	985,573	1,116,375
Fluorspar:					
Acid-grade	128,838	134,127	102,910	110,330	95,450
Metallurgical-grade	35,397	32,822	74,760	77,931	56,762
Total	164,235	166,949	177,670	188,261	152,212
Graphite, all grades	3,535	3,210	2,299	--	--
Gypsum thousand tons	[5]1,544	1,335	1,388	1,264	1,261
Lime, hydrated and quicklime do.	2,307	2,167	2,021	2,242	2,122
Nitrogen: N content of ammonia do.	1,207	1,046	1,060	1,210	1,217
Perlite[e]	85,000	80,000	75,000	80,000	80,000
Pigments, mineral: Iron oxides, natural[e]	900	800	900	800	850
Potash, crude salts:					
Gross weight thousand tons	1,418	1,406	1,674	1,481	1,701
K_2O equivalent do.	142	146	184	162	205
Pumice and related materials:					
Pumice and pumiceous lapilli[e] do.	[5]609	750	700	650	600
Pozzolan[e] do.	[5]5,509	5,500	5,000	5,500	5,000
Pyrite, all types, gross weight do.	681	667	646	443	690
Salt:					
Marine, crude[e] do.	[5]964	1,000	1,100	1,000	1,000
Rock and brine do.	3,610	3,605	3,454	3,255	3,175
Sodium and potassium compounds:					
Caustic soda	8,484	9,000	9,000	8,000	8,500
Sodium carbonate[e] thousand tons	95	90	85	90	90
Sodium sulfate[e] do.	90	85	90	80	80
Stone, marble in blocks, all kinds[e 6] do.	2,100	2,000	1,900	2,000	2,100
Strontium minerals: Celestite	6,697	3,272	414	([3])	4,611
Sulfur:					
Gross weight of ore thousand tons	96	88	41	20	5
Recovered as elemental and in compounds:					
Elemental from ore do.	20	10	9	8	1
S content of pyrites do.	261	269	271	192	280
Byproduct, oil refining[e] do.	25	10	10	10	10
Byproduct, other sources[e] do.	205	200	200	190	190
Total do.	511	489	490	400	481
Talc and related materials	163,390	163,970	158,974	142,727	129,614
MINERAL FUELS AND RELATED MATERIALS					
Asphalt and bituminous rock, natural	100,000	85,838	93,306	91,988	88,700
Carbon black[e]	170,000	160,000	150,000	160,000	150,000
Coal: Lignite thousand tons	1,958	1,913	1,737	1,806	1,892
Coke, metallurgical do.	8,071	7,335	6,419	6,920	7,377
Gas, natural: Marketed million cubic feet	495,944	512,377	458,930	488,650	503,058
Natural gas liquids thousand 42-gallon barrels	[r]302	[r]430	[r]383	383	360
Petroleum:					
Crude do.	10,532	11,881	14,961	15,635	16,024
Refinery products:					
Liquefied petroleum gases do.	22,132	21,518	22,132	21,286	19,964
Gasoline, all kinds do.	129,116	132,693	125,732	123,522	124,617
Naphtha do.	28,490	24,738	24,269	22,876	27,175
Jet fuel do.	9,208	8,312	7,880	8,664	9,400
Kerosene do.	21,901	23,405	18,933	18,514	17,042
Distillate fuel oil do.	189,230	181,822	172,288	171,557	169,499
Residual fuel oil do.	249,017	212,793	190,322	173,466	146,087
Lubricants do.	6,356	([7])	([7])	([7])	([7])
Other do.	39,781	39,326	41,300	40,957	43,988
Refinery fuel and losses do.	45,806	48,151	46,167	48,631	36,735
Total do.	741,037	692,758	649,023	629,473	594,507

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through Aug. 8, 1986.
[2]Excludes pelletized iron oxide derived from pyrite.
[3]Revised to zero.
[4]Includes blast furnace ferromanganese.
[5]Reported figure.
[6]In addition to marble, Italy produced a large variety of stone. Production was not reported.
[7]Included with "Other" refinery products.

TRADE

During 1984, the latest year for which complete data were available, Italy had a negative trade balance in minerals, fuels, and related products, as in almost every year since the end of World War II.

Imports of minerals, including fuels, totaled $31,900 million or about 39% of the total country's purchases abroad.[2] Fuels accounted for about 72% of mineral imports and 28% of total imports. Crude petroleum, the largest imported commodity, valued at $13,250 million, accounted for about 41% of minerals import value and 16% of total import value. Exports of minerals, including fuels, totaled $15,500 million or approximately 21% of total exports. Products of the iron and steel industry and petroleum refined products each accounted for approximately 20% of the value of mineral exports and 4% of total exports.

Table 2.—Italy: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS				
Alkali and alkaline-earth metals:				
Alkali metals	1,462	137	1	Switzerland 93; Argentina 20; Yugoslavia 13.
Alkaline-earth metals	28	25	--	All to France.
Aluminum:				
Ore and concentrate	5,053	12,287	--	Turkey 6,228; Greece 4,910; Austria 800.
Oxides and hydroxides	174,335	325,125	85	Netherlands 162,730; Norway 136,202; Tunisia 24,500.
Ash and residue containing aluminum	7,208	6,814	630	West Germany 3,589; France 1,680; Spain 497.
Metal including alloys:				
Scrap	5,721	3,894	57	West Germany 2,010; France 811; Belgium-Luxembourg 128.
Unwrought	41,282	32,238	2,086	West Germany 9,174; United Kingdom 3,739; France 3,156.
Semimanufactures	117,525	119,961	13,201	West Germany 26,094; France 22,723.
Antimony:				
Ore and concentrate	27	126	--	All to Austria.
Oxides	617	650	49	West Germany 485; United Kingdom 106.
Metal including alloys, all forms	51	34	--	West Germany 21; Yugoslavia 10.
Arsenic: Metal including alloys, all forms	6	18	NA	Egypt 16.
Beryllium:				
Oxides and hydroxides value, thousands	$3	--		
Metal including alloys, all forms	15	3	--	Argentina 2; West Germany 1.
Bismuth: Metal including alloys, all forms	6	22	--	United Kingdom 21.
Cadmium: Metal including alloys, all forms	504	148	--	U.S.S.R. 80; France 28; Netherlands 20.
Cesium and rubidium: Metal including alloys, all forms	12	9	--	Argentina 3; Greece 3; Portugal 3.
Chromium:				
Ore and concentrate	680	678	--	Austria 263; Switzerland 135; Greece 80.
Oxides and hydroxides	29,488	37,212	--	United Kingdom 37,172.
Metal including alloys, all forms	30	40	10	West Germany 25; United Kingdom 3.
Cobalt:				
Ore and concentrate	--	44	--	All to Hungary.
Oxides and hydroxides	8	27	--	Mexico 25.
Metal including alloys, all forms	35	81	--	West Germany 39; France 12; United Kingdom 8.
Columbium and tantalum:				
Ash and residue containing columbium and tantalum	65	--		
Metal including alloys, all forms:				
Columbium (niobium)	(2)	(2)	--	All to Hong Kong.
Tantalum	14	1	--	Mainly to West Germany.

See footnotes at end of table.

Table 2.—Italy: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984 United States	Destinations, 1984 Other (principal)
METALS —Continued				
Copper:				
Ore and concentrate	1,970	8,860	--	Spain 7,567; France 866; Greece 400.
Matte and speiss including cement copper	2,890	1,060	--	Spain 1,043.
Oxides and hydroxides	1,580	1,199	--	West Germany 452; France 251; Spain 229.
Sulfate	4,761	5,147	432	France 1,403; West Germany 877; Austria 522.
Ash and residue containing copper	7,432	5,889	--	West Germany 3,480; Austria 1,580; Belgium-Luxembourg 242.
Metal including alloys:				
Scrap	20,305	13,174	35	West Germany 9,639; France 1,766; Belgium-Luxembourg 1,067.
Unwrought	13,282	14,880	93	United Kingdom 8,795; France 1,211; Yugoslavia 721.
Semimanufactures	109,279	111,762	7,111	France 30,130; West Germany 19,585; Austria 7,343.
Gallium: Metal including alloys, all forms	14	54	3	Belgium-Luxembourg 40; France 10.
Germanium: Metal including alloys, all forms	5	21	20	Finland 1.
Gold:				
Waste and sweepings value, thousands	$55	$384	$29	Switzerland $227; France $109.
Metal including alloys, unwrought and partly wrought troy ounces	87,290	98,125	16,911	Switzerland 22,602; United Kingdom 21,188; France 14,211.
Hafnium: Metal including alloys, all forms	--	(2)	--	All to France.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite	87	678	--	Tunisia 600; Albania 40.
Pyrite, roasted	28,679	45,051	--	France 36,067; Israel 7,277; Switzerland 1,343.
Metal:				
Scrap	17,560	19,424	--	West Germany 8,034; France 7,760.
Pig iron, cast iron, related materials	33,165	20,196	1,514	Turkey 3,910; Switzerland 3,276; West Germany 1,808.
Ferroalloys:				
Ferrochromium	23,101	20,082	1,905	France 6,697; West Germany 5,833; Austria 2,550.
Ferromanganese	1,392	319	--	Yugoslavia 145; West Germany 76; France 74.
Ferromolybdenum	4	764	--	Austria 480; Netherlands 191; France 64.
Ferronickel	1	1	--	All to Yugoslavia.
Ferrosilicochromium	395	81	--	West Germany 34; Venezuela 25; France 22.
Ferrosilicomanganese	5,360	11,561	543	France 9,079; West Germany 1,169; Switzerland 429.
Ferrosilicon	6,966	14,004	122	West Germany 7,843; France 2,175; Turkey 1,250.
Silicon metal	6,108	13,288	468	West Germany 3,928; Japan 1,780; Iran 1,722.
Unspecified	5,231	8,710	356	France 1,766; Romania 1,418; United Kingdom 1,033.
Steel, primary forms thousand tons	982	994	92	Turkey 151; France 131; Greece 119.
Semimanufactures:				
Bars, rods, angles, shapes, sections do	2,527	2,490	25	West Germany 839; France 611; U.S.S.R. 191.
Universals, plates, sheets do	1,501	1,696	146	U.S.S.R. 441; France 313; West Germany 190.
Hoop and strip do	111	155	3	France 36; West Germany 24; U.S.S.R. 21.
Rails and accessories do	39	24	(2)	Egypt 9; Switzerland 6; Congo 3.
Wire do	104	136	12	France 35; West Germany 21; Switzerland 11.
Tubes, pipes, fittings do	1,899	2,268	420	U.S.S.R. 835; West Germany 195.
Castings and forgings, rough do	49	54	2	Yugoslavia 13; West Germany 7; France 4.

See footnotes at end of table.

Table 2.—Italy: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued				
Lead:				
Ore and concentrate	21,023	30,906	8,590	Spain 12,641; Austria 4,981.
Oxides	1,660	1,463	--	Romania 1,000; U.S.S.R. 350; Ecuador 42.
Ash and residue containing lead	14,832	10,221	--	France 5,444; Belgium-Luxembourg 4,143.
Metal including alloys:				
Scrap	1,168	320	--	France 261; West Germany 59.
Unwrought	5,896	8,805	416	Turkey 2,648; Yugoslavia 1,980; Libya 1,407.
Semimanufactures	718	307	1	Libya 128; Yugoslavia 76; Saudi Arabia 45.
Lithium: Oxides and hydroxides	12	25	--	United Kingdom 22; West Germany 2.
Magnesium: Metal including alloys:				
Scrap	1,463	1,186	260	West Germany 731; Switzerland 102.
Unwrought	7,378	5,336	162	West Germany 2,501; Belgium-Luxembourg 829; Austria 782.
Semimanufactures	528	294	([2])	France 171; Belgium-Luxembourg 58; West Germany 30.
Manganese:				
Ore and concentrate, metallurgical-grade	1,009	1,918	--	Netherlands 997; France 582; West Germany 274.
Oxides	206	98	--	Belgium-Luxembourg 58; Uruguay 20.
Metal including alloys, all forms	18	31	--	Cuba 15; West Germany 12; France 4.
Mercury 76-pound flasks	11,020	2,378	--	West Germany 1,508; Netherlands 638.
Molybdenum:				
Ore and concentrate	298	--		
Metal including alloys:				
Scrap	122	--		
Unwrought	1	42	NA	France 38.
Semimanufactures	27	7	2	Austria 3.
Nickel:				
Matte and speiss	294	24	--	France 23.
Oxides and hydroxides	54	20	20	
Ash and residue containing nickel	386	185	--	West Germany 100; United Kingdom 49; India 36.
Metal including alloys:				
Scrap	165	169	--	West Germany 117; Belgium-Luxembourg 20; Switzerland 12.
Unwrought	713	141	([2])	Netherlands 75; United Kingdom 22; France 18.
Semimanufactures	776	1,117	--	Switzerland 286; France 141; West Germany 129.
Platinum-group metals:				
Waste and sweepings value, thousands	$18	$13	--	All to Belgium-Luxembourg.
Metal including alloys, unwrought and partly wrought thousand troy ounces	165	3,096	33	Spain 2,985; West Germany 35; United Kingdom 21.
Rare-earth metals including alloys, all forms	43	34	--	Yugoslavia 20; Switzerland 7; West Germany 2.
Rhenium: Metal including alloys, all forms	2	3	--	All to France.
Selenium, elemental	6	4	--	West Germany 3; Netherlands 1.
Silicon, high-purity	220	196	69	Japan 105; China 10; West Germany 5.
Silver:				
Waste and sweepings value, thousands	$52	$2	--	Mainly to West Germany.
Metal including alloys, unwrought and partly wrought thousand troy ounces	4,270	2,611	NA	Switzerland 1,862; United Kingdom 383.

See footnotes at end of table.

Table 2.—Italy: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued				
Tin:				
Ore and concentrate	26	--		
Oxides	179	185	1	Spain 53; United Kingdom 32; France 30.
Ash and residue containing tin	542	139	--	United Kingdom 133; France 4.
Metal including alloys:				
Scrap	57	94	--	United Kingdom 57; Netherlands 16; West Germany 12.
Unwrought	460	141	--	United Kingdom 69; Netherlands 23; West Germany 15.
Semimanufactures	165	95	6	Netherlands 22; United Arab Emirates 12; Yugoslavia 8.
Titanium:				
Ore and concentrate	536	990	--	Yugoslavia 906; Switzerland 9.
Oxides	2,273	1,931	486	South Korea 848; Yugoslavia 241.
Metal including alloys:				
Scrap	23	73	--	United Kingdom 46; West Germany 25.
Unwrought	67	22	--	West Germany 11; United Kingdom 11.
Semimanufactures	94	105	--	West Germany 38; India 13; Switzerland 10.
Tungsten:				
Ash and residue containing tungsten	--	30	--	West Germany 26; Austria 4.
Metal including alloys:				
Scrap	27	41	--	West Germany 26; Belgium-Luxembourg 6.
Unwrought	24	44	--	West Germany 38; Belgium-Luxembourg 3.
Semimanufactures	34	15	1	West Germany 6; Austria 3; Switzerland 2.
Uranium and thorium:				
Ore and concentrate	155	158	--	Cyprus 62.
Metal including alloys, all forms:				
Uranium	--	2	--	All to West Germany.
Thorium	--	1	--	All to France.
Vanadium:				
Ore and concentrate	--	56	--	All to Hungary.
Oxides and hydroxides	96	14	--	West Germany 10; Algeria 3; Spain 1.
Ash and residue containing vanadium	1,956	2,534	72	West Germany 2,462.
Metal including alloys:				
Scrap	9	1	--	All to Canary Islands.
Unwrought	4	6	--	All to West Germany.
Semimanufactures	([3])	--		
Zinc:				
Ore and concentrate	4,320	18,938	--	Yugoslavia 9,333; Austria 9,002.
Oxides	4,569	6,168	1	West Germany 2,835; France 2,119; Hungary 563.
Blue powder	620	489	1	West Germany 175; France 147; Belgium-Luxembourg 24.
Matte	68	1,164	--	Austria 980; Spain 81; West Germany 79.
Ash and residue containing zinc	15,030	8,919	--	Sweden 3,147; West Germany 2,383; United Kingdom 2,089.
Metal including alloys:				
Scrap	3,278	3,755	--	West Germany 3,638; France 44; Japan 36.
Unwrought	35,796	45,137	10,494	China 7,133; Netherlands 5,554.
Semimanufactures	2,093	1,232	19	France 325; Saudi Arabia 310; West Germany 297.
Zirconium:				
Ore and concentrate	5,062	5,112	--	Hungary 3,638; Yugoslavia 593; Argentina 174.
Metal including alloys:				
Scrap	4	37	--	West Germany 35; Spain 2.
Unwrought	([3])	([3])	--	All to France.
Semimanufactures	57	4	--	All to Albania.
Other:				
Ores and concentrates	1,242	424	--	France 98; Spain 72; Venezuela 37.
Oxides and hydroxides	492	122	20	West Germany 31; Netherlands 22.
Ashes and residues	19,062	19,662	--	France 8,843; Spain 4,458; West Germany 2,254.
Base metals including alloys, all forms	35	64	4	Belgium-Luxembourg 41; France 17.

See footnotes at end of table.

Table 2.—Italy: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	129,330	71,727	440	United Kingdom 35,421; Algeria 22,655; West Germany 4,381.
Artificial:				
Corundum	2,623	4,325	31	Bulgaria 1,180; Austria 849; France 797.
Silicon carbide	8,240	9,430	42	West Germany 2,493; France 1,404; Bulgaria 1,163.
Dust and powder of precious and semiprecious stones including diamond kilograms	483	66	12	Portugal 36; Switzerland 5.
Grinding and polishing wheels and stones	23,116	26,824	983	West Germany 2,554; France 2,551; Saudi Arabia 2,091.
Asbestos, crude	61,164	57,659	--	West Germany 15,804; France 5,700; Japan 5,699.
Barite and witherite	46,831	9,609	499	Norway 3,500; Libya 2,818; Ivory Coast 1,400.
Boron materials:				
Crude natural borates	1,281	309	--	Cyprus 200; Yugoslavia 82; West Germany 24.
Elemental	12	20	--	NA.
Oxides and acids	15,197	19,062	2,102	West Germany 4,287; Japan 4,184; Czechoslovakia 1,971.
Bromine	10	18	--	Pakistan 13; France 2; Switzerland 2.
Cement	589,351	521,977	193	Algeria 152,183; Libya 151,802; Switzerland 108,381.
Chalk	4,997	3,083	--	West Germany 2,497; Yugoslavia 251; Switzerland 243.
Clays, crude:				
Bentonite	40,798	38,144	--	France 18,257; Iraq 4,361; Sweden 3,080.
Chamotte earth	2,572	3,629	--	Tunisia 3,300; Switzerland 327.
Kaolin	19,981	33,918	62	France 24,728; Syria 3,236.
Unspecified	2,713	7,516	334	Syria 4,383; Switzerland 534; Tunisia 422.
Cryolite and chiolite	56	139	--	Yugoslavia 75; Switzerland 23; France 22.
Diamond:				
Gem, not set or strung carats	2,054	1,230	--	Belgium-Luxembourg 462; Switzerland 295.
Industrial stones do	9,300	56,510	--	NA.
Diatomite and other infusorial earth	3,231	3,003	--	Austria 1,158; Yugoslavia 343; Switzerland 338.
Feldspar, fluorspar, related materials:				
Feldspar	36,431	35,469	--	Switzerland 15,524; West Germany 13,981; Saudi Arabia 972.
Fluorspar	61,064	70,801	48,150	West Germany 9,724; France 6,202.
Unspecified	542	1,164	--	Greece 955.
Fertilizer materials:				
Crude, n.e.s	22,586	24,973	--	France 11,340; Switzerland 3,538; Saudi Arabia 2,508.
Manufactured:				
Ammonia	46,775	91,170	--	Israel 38,439; Greece 20,708; Turkey 12,460.
Nitrogenous	901,631	854,465	65,500	Turkey 211,637; India 164,328; Greece 111,425.
Phosphatic	710	362	(2)	Austria 201; Kuwait 60; Malta 51.
Potassic	87,324	129,887	--	Algeria 49,560; Japan 20,450; Greece 18,625.
Unspecified and mixed	581,426	532,938	(2)	China 168,908; France 68,675; West Germany 56,711.
Graphite, natural	2,743	5,481	35	Austria 4,213; France 898; West Germany 123.
Gypsum and plaster	12,167	14,306	--	Switzerland 9,056; Sweden 3,101.
Iodine	1	3	--	West Germany 2; Denmark 1.
Kyanite and related materials	46	802	--	Syria 694; Spain 49; Netherlands 24.
Lime	35,936	40,472	--	Switzerland 37,170; France 1,539.
Magnesium compounds:				
Magnesite	r1,134	946	2	Netherlands 689; Spain 205.
Oxides and hydroxides	r66,629	127,684	12	West Germany 30,403; Austria 27,255; Spain 16,151.
Other	r38	--		

See footnotes at end of table.

Table 2.—Italy: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Mica:				
Crude including splittings and waste	498	556	--	West Germany 169; Libya 124; Belgium-Luxembourg 104.
Worked including agglomerated splittings	23	40	--	France 20; Yugoslavia 6; Spain 5.
Nitrates, crude	195	50	--	All to West Germany.
Phosphates, crude	398	773	--	Yugoslavia 418; Switzerland 167; France 86.
Pigments, mineral:				
Natural, crude	285	209	19	Romania 50; Netherlands 43; Somalia 20.
Iron oxides and hydroxides, processed	5,502	7,682	36	France 2,509; West Germany 1,471; United Kingdom 659.
Potassium salts, crude	4	--		
Precious and semiprecious stones other than diamond:				
Natural kilograms	2,521	12,756	272	West Germany 5,500; United Kingdom 446.
Synthetic do.	401	1,377	--	Saudi Arabia 40.
Pyrite, unroasted	3,626	5,005	520	West Germany 2,657; France 683; Austria 618.
Quartz crystal, piezoelectric kilograms	60	8	5	Spain 3.
Salt and brine	262,584	314,781	--	Sweden 86,079; Greece 52,455; Netherlands 50,276.
Sodium compounds, n.e.s.: Carbonate, manufactured	17,165	46,912	8	Israel 22,275; Greece 10,724; Turkey 8,334.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked thousand tons	485	494	19	West Germany 70; Saudi Arabia 54; France 43.
Worked do.	1,504	1,707	150	West Germany 481; Saudi Arabia 390; Switzerland 88.
Dolomite, chiefly refractory-grade do.	37	48	--	France 23; Switzerland 15; Algeria 1.
Gravel and crushed rock do.	745	839	1	Kuwait 131; Switzerland 121; Saudi Arabia 85.
Limestone other than dimension do.	1	4	--	Austria 3; Switzerland 1.
Quartz and quartzite do.	28	28	--	Switzerland 13; France 6; Libya 1.
Sand other than metal-bearing do.	15	13	([2])	Switzerland 5; Libya 2; Saudi Arabia 1.
Sulfur:				
Elemental:				
Crude including native and byproduct	7,298	4,714	22	Libya 2,252; France 1,309; Yugoslavia 567.
Colloidal, precipitated, sublimed	65	82	--	Israel 25; Czechoslovakia 20; United Kingdom 20.
Dioxide	430	238	--	Yugoslavia 100; Belgium-Luxembourg 50; Switzerland 36.
Sulfuric acid	20,785	68,310	--	Turkey 34,366; Greece 29,805.
Talc, steatite, soapstone, pyrophyllite	49,546	41,863	5,175	West Germany 13,013; France 9,095; United Kingdom 3,705.
Vermiculite, perlite, chlorite	57,226	59,880	--	United Kingdom 45,789; France 11,907.
Other:				
Crude	10,078	12,425	--	Switzerland 3,881; Romania 2,830; France 2,650.
Slag and dross, not metal-bearing	632,214	582,076	--	Greece 524,241; Austria 29,788; Yugoslavia 19,196.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	6,498	3,948	--	Nigeria 3,030; France 511.
Carbon:				
Carbon black	r4,622	2,367	2	Yugoslavia 1,187; West Germany 800.
Gas carbon	51,174	59,080	1,389	Yugoslavia 14,446; Austria 11,405; Turkey 9,825.
Coal:				
Anthracite	3,867	5,147	--	France 3,024; West Germany 1,882.
Bituminous	1,367	6,557	--	Malta 6,000.
Briquets of anthracite and bituminous coal	11	321	--	Switzerland 108; Austria 86.
Lignite including briquets	29	35	--	Austria 19; West Germany 16.

See footnotes at end of table.

Table 2.—Italy: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Coke and semicoke	347,867	523,489	68,800	Romania 140,698; Hungary 79,133; Austria 48,567.
Gas, natural: Gaseous million cubic feet	2	1	--	Mainly to Denmark.
Peat including briquets and litter	214	299	--	West Germany 108; Saudi Arabia 63.
Petroleum:				
Crude thousand 42-gallon barrels	1,641	1,430	--	West Germany 1,296; France 134.
Refinery products:				
Liquefied petroleum gas do.	3,193	2,792	352	France 1,009; Tunisia 296; Egypt 292.
Gasoline do.	34,500	32,505	6,804	France 9,344; Libya 3,932.
Mineral jelly and wax do.	454	1,387	874	Netherlands 477; West Germany 26.
Kerosene and jet fuel do.	9,685	11,413	300	Greece 3,664; Egypt 1,472; Iran 1,033.
Distillate fuel oil do.	24,542	14,225	18	Libya 4,460; Saudi Arabia 2,097; Tunisia 1,226.
Lubricants do.	4,099	4,254	1	France 601; West Germany 322; Belgium-Luxembourg 310.
Residual fuel oil do.	16,213	13,683	1,813	United Kingdom 2,590; Greece 1,753; Malta 1,594.
Bitumen and other residues do.	991	758	6	Tunisia 192; Switzerland 163; Austria 151.
Bituminous mixtures do.	49	23	(2)	Libya 2; United Kingdom 2.
Petroleum coke do.	234	180	--	Austria 140; Switzerland 27.

[r]Revised. NA Not available.
[1]Table prepared by Jozef Plachy.
[2]Less than 1/2 unit.

Table 3.—Italy: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS				
Alkali and alkaline-earth metals:				
Alkali metals	4,729	4,256	--	West Germany 2,246; France 1,974.
Alkaline-earth metals	121	150	--	Austria 64; West Germany 45.
Aluminum:				
Ore and concentrate thousand tons	1,182	1,281	(2)	Australia 713; Guinea 467; Greece 41.
Oxides and hydroxides	305,591	271,818	1,019	France 72,323; Ireland 53,408; Australia 52,315.
Ash and residue containing aluminum	88,641	124,402	--	Austria 106,947; France 6,607; West Germany 2,753.
Metal including alloys:				
Scrap	108,485	133,276	3,038	France 36,848; West Germany 31,257; United Kingdom 16,189.
Unwrought	254,498	291,820	32	West Germany 74,784; Netherlands 56,996; France 30,896.
Semimanufactures	112,435	118,168	5,327	West Germany 49,089; France 21,745; Belgium-Luxembourg 12,539.
Antimony:				
Ore and concentrate	2	5	--	All from West Germany.
Oxides	560	764	--	Belgium-Luxembourg 282; United Kingdom 257; France 120.
Metal including alloys, all forms	177	222	--	Belgium-Luxembourg 88; Netherlands 40; France 27.
Arsenic: Metal including alloys, all forms	539	621	NA	France 231; Belgium-Luxembourg 194; West Germany 103.
Beryllium:				
Oxides and hydroxides value, thousands	$9	$12	--	All from United Kingdom.
Metal including alloys, all forms	1	3	2	Mainly from West Germany.
Bismuth: Metal including alloys, all forms	39	69	--	United Kingdom 47; West Germany 15.
Cadmium: Metal including alloys, all forms	135	107	--	Netherlands 25; France 18; United Kingdom 10.
Cesium and rubidium: Metal including alloys, all forms	--	10	--	All from United Kingdom.

See footnotes at end of table.

Table 3.—Italy: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Chromium:				
Ore and concentrate	192,211	220,529	--	Albania 140,944; Republic of South Africa 34,073; U.S.S.R. 17,050.
Oxides and hydroxides	1,669	2,083	217	West Germany 1,447; Yugoslavia 139.
Metal including alloys, all forms	122	244	--	United Kingdom 187; France 24.
Cobalt:				
Oxides and hydroxides	161	184	--	Belgium-Luxembourg 111; Finland 27.
Metal including alloys, all forms	327	409	8	France 114; West Germany 97; Belgium-Luxembourg 53.
Columbium and tantalum: Metal including alloys, all forms:				
Columbium (niobium)	3	64	--	France 62.
Tantalum	3	4	1	West Germany 2.
Copper:				
Ore and concentrate	2,214	4	--	All from Belgium-Luxembourg.
Matte and speiss including cement copper	20	374	--	Austria 331; Finland 22.
Oxides and hydroxides	386	360	4	Norway 119; West Germany 115; Belgium-Luxembourg 88.
Sulfate	4,900	2,699	--	Yugoslavia 1,903; Czechoslovakia 480; France 283.
Ash and residue containing copper	4,482	3,576	--	Austria 3,336; Canada 98.
Metal including alloys:				
Scrap	82,442	112,098	3,224	West Germany 29,707; United Kingdom 28,512; France 27,951.
Unwrought	306,726	336,680	251	Chile 97,143; Zambia 51,241; Peru 29,624.
Semimanufactures	119,583	151,534	253	France 49,695; West Germany 48,968; Belgium-Luxembourg 18,652.
Gallium: Metal including alloys, all forms	2	5	--	France 4.
Germanium: Metal including alloys, all forms value, thousands	$89	$134	--	Belgium-Luxembourg $80.
Gold:				
Waste and sweepings do	$3,025	$2,800	$513	Sweden $1,426; Switzerland $390; Portugal $240.
Metal including alloys, unwrought and partly wrought thousand troy ounces	4,858	6,516	4	Republic of South Africa 3,324; Switzerland 2,815.
Hafnium: Metal including alloys, all forms value, thousands	$2	$32	--	All from West Germany.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite thousand tons	13,799	19,240	([2])	Brazil 6,746; Liberia 3,559; Mauritania 2,779.
Pyrite, roasted	44	4,708	--	China 4,000; Belgium-Luxembourg 43.
Metal:				
Scrap thousand tons	4,446	5,486	262	France 2,154; West Germany 1,687; U.S.S.R. 715.
Pig iron, cast iron, related materials	333,071	417,031	3,767	Brazil 65,564; Venezuela 64,048; West Germany 56,820.
Ferroalloys:				
Ferrochromium	66,973	106,703	10	Republic of South Africa 50,609; Zimbabwe 19,820; Greece 8,862.
Ferromanganese	64,719	115,780	--	France 46,782; Republic of South Africa 32,928; Norway 11,705.
Ferromolybdenum	1,066	1,247	9	Belgium-Luxembourg 527; Netherlands 308; Austria 150.
Ferronickel	13,375	16,134	--	France 6,025; Colombia 3,164; New Caledonia 1,907.
Ferrosilicochromium	1,273	581	--	West Germany 398; Norway 100.
Ferrosilicomanganese	24,914	27,968	--	Norway 19,762; Republic of South Africa 2,710.
Ferrosilicon	46,080	65,505	--	Norway 20,090; France 18,142; West Germany 15,595.
Silicon metal	13,724	10,701	7	Norway 4,878; France 3,163; Sweden 769.
Unspecified	6,475	9,028	276	France 4,381; Brazil 1,243; Belgium-Luxembourg 794.

See footnotes at end of table.

Table 3.—Italy: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal —Continued				
Steel, primary forms thousand tons	2,288	2,769	27	France 866; Belgium-Luxembourg 623; West Germany 470.
Semimanufactures:				
Bars, rods, angles, shapes, sections do	748	934	1	France 237; West Germany 192; Switzerland 125.
Universals, plates, sheets do	1,318	1,509	31	France 307; West Germany 222; Austria 134.
Hoop and strip do	195	222	(2)	France 80; West Germany 74; Austria 21.
Rails and accessories do	128	107	8	West Germany 41; Netherlands 15; Canada 9.
Wire do	63	83	(2)	Belgium-Luxembourg 25; Yugoslavia 18; France 11.
Tubes, pipes, fittings do	198	295	(2)	West Germany 98; France 84; Austria 14.
Castings and forgings, rough do	8	10	(2)	West Germany 3; Spain 2; Yugoslavia 2.
Lead:				
Ore and concentrate	5,589	11,329	--	Iran 9,697; Morocco 1,632.
Oxides	1,979	2,091	2	Netherlands 1,287; West Germany 720.
Ash and residue containing lead	2,207	1,063	257	Switzerland 431; France 211.
Metal including alloys:				
Scrap	21,642	14,188	45	Switzerland 5,403; France 4,694; West Germany 1,726.
Unwrought	133,499	124,743	100	West Germany 28,218; Morocco 24,586; United Kingdom 15,726.
Semimanufactures	2,863	2,176	4	Yugoslavia 1,558; Belgium-Luxembourg 238; West Germany 170.
Lithium:				
Oxides and hydroxides	215	416	30	West Germany 206; United Kingdom 25.
Metal including alloys, all forms	2	5	1	West Germany 2; United Kingdom 2.
Magnesium: Metal including alloys:				
Scrap	2,217	2,580	2	West Germany 779; Netherlands 682; France 404.
Unwrought	988	1,950	40	Norway 992; France 550; Belgium-Luxembourg 108.
Semimanufactures	1,188	1,709	76	France 660; Belgium-Luxembourg 586; Norway 167.
Manganese:				
Ore and concentrate, metallurgical-grade	385,550	273,191	--	Gabon 151,109; Republic of South Africa 62,123; Brazil 21,996.
Oxides	2,793	2,550	4	Belgium-Luxembourg 1,143; France 809.
Metal including alloys, all forms	1,974	2,653	19	France 1,672; Republic of South Africa 746; Netherlands 50.
Mercury 76-pound flasks	804	3,993	--	Netherlands 2,204; Algeria 986; Spain 319.
Molybdenum:				
Ore and concentrate	2,360	4,438	904	Netherlands 2,211; Chile 825; Belgium-Luxembourg 270.
Oxides and hydroxides	47	86	--	Netherlands 69; West Germany 17.
Metal including alloys:				
Scrap	19	14	14	
Unwrought	45	26	1	Belgium-Luxembourg 10; West Germany 6.
Semimanufactures	111	149	15	Netherlands 74; Austria 42.
Nickel:				
Ore and concentrate	1	--		
Matte and speiss	2,676	4,261	124	Cuba 1,729; Austria 1,479; Netherlands 668.
Oxides and hydroxides	2,300	2,106	--	Cuba 1,647; Australia 336.
Ash and residue containing nickel	145	62	--	France 42; Greece 20.
Metal including alloys:				
Scrap	143	87	--	U.S.S.R. 54; Republic of South Africa 17; Norway 10.
Unwrought	14,257	20,283	4,801	Netherlands 4,403; Canada 2,266; Australia 2,029.
Semimanufactures	7,536	2,473	121	West Germany 855; United Kingdom 809; Sweden 177.

See footnotes at end of table.

Table 3.—Italy: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Platinum-group metals:				
Waste and sweepings value, thousands	$2,229	$4,783	NA	Yugoslavia $2,463; Egypt $1,248; United Kingdom $484.
Metal including alloys, unwrought and partly wrought thousand troy ounces	169	158	2	United Kingdom 74; Switzerland 45; West Germany 22.
Rare-earth metals including alloys, all forms	63	54	--	Austria 27; West Germany 2.
Rhenium: Metal including alloys, all forms	12	(2)	--	Mainly from Austria.
Selenium, elemental	29	36	--	United Kingdom 15; Japan 9; West Germany 4.
Silicon, high-purity	102	52	--	Belgium-Luxembourg 35; Yugoslavia 15; Switzerland 2.
Silver:				
Waste and sweepings value, thousands	$2,372	$3,072	NA	Switzerland $1,507; France $693; Israel $326.
Metal including alloys, unwrought and partly wrought thousand troy ounces	10,227	12,610	NA	West Germany 2,614; Mexico 2,466; Switzerland 1,900.
Tellurium and arsenic, elemental	32	33	--	Sweden 30.
Tin:				
Oxides	49	72	--	West Germany 41; France 30.
Ash and residue containing tin	4	61	--	France 30; Switzerland 20.
Metal including alloys:				
Scrap	1	3	--	Zambia 2; Netherlands 1.
Unwrought	5,765	5,962	--	Indonesia 2,036; Malaysia 1,266; Brazil 1,217.
Semimanufactures	223	251	9	West Germany 116; United Kingdom 67; France 32.
Titanium:				
Ore and concentrate	6,314	22,382	--	Canada 17,325; Republic of South Africa 2,621; Australia 2,165.
Oxides	45,332	39,053	351	West Germany 15,460; France 8,669; Belgium-Luxembourg 4,518.
Metal including alloys:				
Scrap	1,740	2,356	353	Austria 1,834; West Germany 105.
Unwrought	43	81	--	United Kingdom 33; France 25; U.S.S.R. 16.
Semimanufactures	208	369	85	West Germany 99; United Kingdom 72; Japan 24.
Tungsten:				
Ore and concentrate	54	157	--	Canada 118; Austria 20.
Oxides and hydroxides	--	(2)	--	All from France.
Metal including alloys:				
Scrap	1	--		
Unwrought	23	20	--	France 7; United Kingdom 4; Belgium-Luxembourg 3.
Semimanufactures	60	57	5	West Germany 14; France 12; United Kingdom 12.
Uranium and thorium:				
Ore and concentrate	7	48	--	Netherlands 23.
Metal including alloys, all forms:				
Uranium	4	1	--	All from United Kingdom.
Thorium	--	2	--	All from Netherlands.
Vanadium:				
Ore and concentrate	--	(2)	NA	NA.
Oxides and hydroxides	106	135	--	Austria 55; West Germany 30; China 27.
Ash and residue containing vanadium	1,923	1,511	--	Austria 783; West Germany 559.
Metal including alloys:				
Scrap	--	(2)	--	All from West Germany.
Unwrought	(2)	5	--	West Germany 4; Belgium-Luxembourg 1.
Semimanufactures	23	1	--	All from West Germany.

See footnotes at end of table.

Table 3.—Italy: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984 United States	Sources, 1984 Other (principal)
METALS —Continued				
Zinc:				
Ore and concentrate	201,564	291,425	--	Canada 116,699; Peru 54,788; Ireland 29,867.
Oxides	5,782	5,419	2	West Germany 1,837; France 968; Portugal 895.
Blue powder	1,626	1,705	--	West Germany 616; France 591; Norway 275.
Matte	5,763	8,943	36	West Germany 3,341; France 2,401; Switzerland 1,335.
Ash and residue containing zinc	6,596	6,078	17	West Germany 3,280; Greece 606; Belgium-Luxembourg 353.
Metal including alloys:				
Scrap	11,001	13,073	--	France 6,680; West Germany 2,637; United Kingdom 1,406.
Unwrought	95,715	105,306	50	West Germany 32,224; Belgium-Luxembourg 20,696; Netherlands 14,826.
Semimanufactures	4,704	4,307	1	West Germany 3,002; Belgium-Luxembourg 464; France 224.
Zirconium:				
Ore and concentrate	75,035	71,099	55	Australia 53,444; Republic of South Africa 16,921.
Metal including alloys:				
Scrap	1	9	--	France 5; West Germany 4.
Unwrought	8	1	--	All from France.
Semimanufactures	20	21	13	West Germany 6; France 2.
Other:				
Ores and concentrates	7,556	1,197	--	China 1,000; United Kingdom 144.
Oxides and hydroxides	499	711	9	West Germany 332; France 218.
Ashes and residues	67,720	47,467	429	Republic of South Africa 42,043; Yugoslavia 2,345.
Base metals including alloys, all forms	25	21	--	Belgium-Luxembourg 14.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	2,938	2,002	120	Greece 1,556; Yugoslavia 135; West Germany 110.
Artificial:				
Corundum	21,448	26,784	472	Austria 7,521; West Germany 5,172; Yugoslavia 4,252.
Silicon carbide	9,477	12,303	--	Norway 2,810; France 2,591; West Germany 2,433.
Dust and powder of precious and semiprecious stones including diamond kilograms	2,219	2,465	433	Switzerland 965; Ireland 788.
Grinding and polishing wheels and stones	2,798	3,561	22	Austria 1,251; West Gemany 711; Yugoslavia 308.
Asbestos, crude	41,620	41,421	130	Canada 17,791; Republic of South Africa 11,275; Zimbabwe 5,222.
Barite and witherite	14,424	11,787	--	Spain 5,162; Ireland 3,150; France 1,640.
Boron materials:				
Crude natural borates	153,527	181,086	4,925	Turkey 141,940; Netherlands 32,401.
Elemental	NA	1	--	All from West Germany.
Oxides and acids	1,744	2,604	11	Turkey 1,352; Yugoslavia 798; Belgium-Luxembourg 246.
Bromine	1,273	1,737	--	Israel 1,376; France 222.
Cement	235,958	252,338	44	Yugoslavia 173,569; France 72,558.
Chalk	21,443	37,067	--	France 37,011.
Clays, crude:				
Bentonite	39,530	48,559	451	Greece 44,701; West Germany 1,277; France 1,190.
Chamotte earth	69,614	73,355	2,751	France 50,558; West Germany 10,125; Czechoslovakia 9,377.
Kaolin	596,700	603,297	128,047	United Kingdom 247,532; West Germany 46,348; Spain 37,959.
Cryolite and chiolite	830	228	NA	Denmark 144; West Germany 82.
Diamond:				
Gem, not set or strung carats	171,443	193,540	NA	Belgium-Luxembourg 89,201; India 34,312; Switzerland 31,577.
Industrial stones do	114,613	179,458	--	Belgium-Luxembourg 116,304; Netherlands 41,115; United Kingdom 15,721.
Diatomite and other infusorial earth	5,347	4,658	305	France 3,371; Spain 315; Iceland 210.

See footnotes at end of table.

Table 3.—Italy: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Feldspar, fluorspar, related materials:				
Feldspar	14,419	13,117	378	France 5,066; West Germany 3,722; Switzerland 1,836.
Fluorspar	88,099	97,836	--	Spain 55,503; France 15,219; Republic of South Africa 11,698.
Unspecified	21,580	17,608	18	Canada 10,179; Norway 6,719.
Fertilizer materials:				
Crude, n.e.s	2,803	4,158	191	West Germany 2,374; France 944; Malta 233.
Manufactured:				
Ammonia	468,929	241,493	--	U.S.S.R. 208,919; Austria 30,807.
Nitrogenous	235,249	290,649	136	Austria 93,124; West Germany 73,592; Romania 33,158.
Phosphatic	114,063	157,817	7,495	Israel 45,241; Tunisia 44,674; France 38,928.
Potassic	615,142	671,217	--	Israel 211,634; U.S.S.R. 136,296; East Germany 86,154.
Unspecified and mixed	818,837	718,406	290,508	Tunisia 83,292; West Germany 77,265; Yugoslavia 56,610.
Graphite, natural	4,064	6,280	14	West Germany 1,853; Austria 1,072; China 940.
Gypsum and plaster	11,619	9,470	1,495	West Germany 4,624; Austria 1,681; France 1,505.
Iodine	213	294	--	Japan 137; Chile 81; Netherlands 34.
Kyanite and related materials	23,713	36,357	1,094	Republic of South Africa 20,150; West Germany 8,770; Spain 3,830.
Lime	631	847	--	Yugoslavia 403; West Germany 329; France 80.
Magnesium compounds:				
Magnesite	r16,096	23,141	--	Greece 21,791; United Kingdom 600; Austria 425.
Oxides and hydroxides	80,397	90,310	368	Greece 38,596; Austria 10,213; Netherlands 10,159.
Other	3,383	4,279	--	West Germany 4,162.
Mica:				
Crude including splittings and waste	896	1,297	186	France 569; Netherlands 115; Austria 112.
Worked including agglomerated splittings	345	450	18	Belgium-Luxembourg 165; France 91; West Germany 79.
Nitrates, crude	1,911	396	--	Belgium-Luxembourg 274; Netherlands 66; Czechoslovakia 20.
Phosphates, crude --- thousand tons	1,554	1,449	132	Morocco 613; Israel 280; Togo 208.
Phosphorus, elemental	22	2	--	All from West Germany.
Pigments, mineral:				
Natural, crude	565	262	NA	NA.
Iron oxides and hydroxides, processed	16,428	19,666	370	West Germany 15,035; Belgium-Luxembourg 1,409; France 1,089.
Potassium salts, crude	11,687	10,757	--	France 8,405; West Germany 2,325.
Precious and semiprecious stones other than diamond:				
Natural --- kilograms	57,125	73,370	7,311	Brazil 29,771; West Germany 12,377.
Synthetic --- do	5,835	5,914	NA	Switzerland 2,205; West Germany 1,213; France 556.
Pyrite, unroasted	262,813	186,607	--	Norway 62,388; Finland 27,797; Albania 27,315.
Quartz crystal, piezoelectric kilograms	3,286	1,304	NA	NA.
Salt and brine	378,105	706,662	1	Netherlands 275,271; France 241,280; Tunisia 93,873.
Sodium compounds, n.e.s.: Carbonate, manufactured	39,931	31,808	--	Yugoslavia 10,845; Switzerland 10,399; Romania 4,730.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	661,368	885,252	5,032	Spain 239,741; Finland 139,951; Brazil 96,008.
Worked	5,301	9,646	19	Spain 2,569; Greece 1,855; Yugoslavia 1,174.
Dolomite, chiefly refractory-grade	1,699	2,335	2	West Germany 1,480; France 411; Netherlands 330.
Gravel and crushed rock	14,277	76,097	7	Yugoslavia 61,030; France 10,399.
Limestone other than dimension	75	208	--	West Germany 186.
Quartz and quartzite	43,196	40,188	186	Switzerland 31,563; Yugoslavia 4,005.
Sand other than metal-bearing	989,902	997,032	554	France 568,812; West Germany 102,078; Switzerland 98,794.

See footnotes at end of table.

Table 3.—Italy: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Sulfur:				
Elemental:				
Crude including native and byproduct	464,907	376,160	16,475	Saudi Arabia 74,643; Poland 67,051; France 65,373.
Colloidal, precipitated, sublimed	961	1,364	--	West Germany 1,017; France 185; Yugoslavia 118.
Dioxide	496	23	--	All from France.
Sulfuric acid	43,607	68,131	29	Spain 48,681; Austria 7,255; Yugoslavia 7,182.
Talc, steatite, soapstone, pyrophyllite	22,944	26,065	7	Austria 13,065; France 6,808; Belgium-Luxembourg 3,210.
Vermiculite, perlite, chlorite	36,595	57,600	NA	U.S.S.R. 25,792; Greece 15,181; Republic of South Africa 9,103.
Other:				
Crude	25,241	37,371	322	West Germany 7,756; U.S.S.R. 7,619; Spain 7,563.
Slag and dross, not metal-bearing	21,513	5,009	--	West Germany 2,433; France 1,103; Austria 829.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	963	861	758	France 45; West Germany 45.
Carbon:				
Carbon black	r4,670	5,915	91	France 2,559; West Germany 1,393; United Kingdom 736.
Gas carbon	23,403	22,969	653	France 11,819; West Germany 5,083; Netherlands 3,021.
Coal:				
Anthracite thousand tons	110	540	109	Republic of South Africa 228; U.S.S.R. 69; Australia 62.
Bituminous do.	15,666	19,638	6,681	Australia 2,735; Poland 2,354; Netherlands 2,060.
Briquets of anthracite and bituminous coal do.	2	1	--	Mainly from France.
Lignite including briquets do.	76	96	(2)	Yugoslavia 43; West Germany 35; East Germany 17.
Coke and semicoke do.	98	175	23	West Germany 71; France 70; Poland 11.
Gas, natural million cubic feet	602,106	771,863	--	U.S.S.R. 306,129; Algeria 265,165; Netherlands 200,567.
Peat including briquets and litter	72,544	90,819	23	West Germany 53,285; U.S.S.R. 17,406; Austria 8,545.
Petroleum:				
Crude thousand 42-gallon barrels	537,536	468,744	--	Libya 85,440; Iran 64,288; U.S.S.R. 62,302.
Refinery products:				
Liquefied petroleum gas do.	10,423	13,376	142	Algeria 3,890; Libya 2,851; Saudi Arabia 1,336.
Gasoline do.	24,004	21,829	26	Kuwait 4,484; Yugoslavia 2,366; Libya 2,174.
Mineral jelly and wax do.	252	205	4	West Germany 50; Hungary 47; Yugoslavia 20.
Kerosene and jet fuel do.	649	850	60	Brazil 268; United Kingdom 145; Spain 139.
Distillate fuel oil do.	32,300	40,886	89	Romania 16,050; Algeria 8,144; Kuwait 7,561.
Lubricants do.	906	647	15	West Germany 151; France 128; Greece 79.
Residual fuel oil do.	114,140	120,746	2,378	Kuwait 27,825; U.S.S.R. 20,499; Venezuela 12,801.
Bitumen and other residues do.	1,209	2,017	1,490	Yugoslavia 468; Austria 32.
Bituminous mixtures do.	30	11	1	France 3; Sweden 3; Netherlands 2.
Petroleum coke do.	10,379	9,895	8,263	U.S.S.R. 723; United Kingdom 409.

rRevised. NA Not available.
[1]Table prepared by Jozef Plachy.
[2]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Aluminum.—The private company Tonolli, left Sameton S.p.A., the joint private-public venture for the recovery of secondary metals, owing to financial difficulties. Government-owned SAMIM thus owned 100% of Sameton at yearend. With this change, SAMIM acquired control of Tonolli's secondary aluminum subsidiaries, Metalsa and Alluminio.

Iron and Steel.—Nuova Italsider ordered a 130,000-ton-per-year electric galvanizing plant from Italimpianti S.p.A. This plant should be completed during 1987. The new galvanizing plant was designed for possible Zincrox production. The Zincrox is a new galvanizing process that produces highly corrosion-resistant materials. Products of the new plant may be used by the automobile industry.

Deltasider S.p.A. (Delta) ordered a hot rolling mill from Ponini Farrel di Castelanza S.p.A. The new mill will be part of Delta's Aosta works. Plant capacity should be 23 tons of steel per hour. Completion date was set for the end of 1986.

Società Europea Tubifici e Acciaierie S.p.A. placed an order with Voest-Alpine AG of Austria for a new continuous bloom caster. The caster will have five strands making square blooms of 120 to 250 millimeters, rectangles of 120 to 250 millimeters, and rounds of 120 to 250 millimeters.

Beltrame S.p.A. started sequence casting at its Vicenza works and brought the sixth strand of its Danieli continuous caster onstream. At Nuova Italsider's Campi works in Genoa, a new controlled pressure pouring (CPP) slab caster started production in the spring. The machine was built by Italimpianti under Amstad license. The Campi CPP was claimed to be the world's largest. Installation of this unit completed modernization of the Campi works, which included updating the electric furnace, installation of ladle treatment and degassing plant, and modernization of the plate mill.

The 200,000-ton-per-year coil plating plant at Patrica, Frossinone, operated by Lavemetal S.p.A., started production in the spring. Plant products included aluminized and zinc-aluminum-alloy-coated sheets made under license from Italy's Metallurgical Research Center. Nuova Italsider provided assistance during the design and construction of the plant and will market the products.

As part of the restructuring of the steel industry, efforts were made to arrange participation of private sector companies in the management of Finsider's Cornigliano works in Genoa.

Lead and Zinc.—Domestic mines contributed about 53% to the country's lead metal production and 21% to zinc metal output. SAMIM and Pertusola were the major mine producers of lead and zinc.

During October, production stopped at the Masua Mine, in Sardinia and operated by SAMIM, because the tailings ponds were full. Permission to build new ponds was delayed in the light of the disastrous collapse of the tailings dam at the Prestavel Mine. Influx of water continued to be a problem at Masua, and studies failed to locate exactly the points of water entry. In addition, exploration near the mine continued in an attempt to locate new mineralization near the Alice ore body.

At Porto Vesme, Sardinia, a zinc electrolytic plant rated at 80,000 tons of zinc per year came on-stream alongside of SAMIM's Imperial smelter complex.

Pyrite.—At the Campiano Mine, the problem of high temperatures underground was resolved by the completion of installation of a powerful air-conditioning unit in the shaft. The mine water was naturally acid and a system of ponds with lime treatment was installed.

INDUSTRIAL MINERALS

Fluorspar.—Sardinia remained the largest producer of fluorspar, and most of the Sicilian mines were owned by Mineraria Silius S.p.A. In Trentino Province, in northern Italy, a serious disaster halted production at the Prestavel Mine. A tailings dam broke and water mixed with mud destroyed housing in the village of Stava and killed 250 persons.

Stone.—Scarce data on activities of the stone industry of Italy indicated that 75,000 persons worked in quarries that produced various kinds of stone. Aggregate production was 6 million tons, of which 1.5 million tons was the noted white marble of Carrara.

Sulfur.—Impianti Gas Internationale S.p.A. completed a 30,000-ton-per-year sulfur recovery plant at Priolo. At yearend, the plant was not in full operation because of low sulfur content of crude oil processed in the refinery.

A 13,000-ton-per-year plant for recovery of sulfur went on-stream in the Raffineria di Roma petroleum refinery near Rome.

MINERAL FUELS

The energy supply of Italy remained dependent on large imports of solid, liquid, and gaseous fuels. Domestic production of energy carriers was modest and inadequate to meet the country's demand.

Coal.—Domestic production of coal was limited to output from two opencast mines, Santa Barbara in Tuscany and Pietrafitta in Umbria. To improve the domestic coal supply, the Italian Parliament gave final approval to a plan to reactivate the Sulcis coal mines in Sardinia. The legislation allocated the equivalent of $250 million to ENI to cover expected costs. Actual work started in the summer. The initial plan called for production of about 300,000 tons of coal per year starting in 1990. By the mid-1990's, coal output should reach 1.7 million tons of coal per year, most of which will be used by the powerplant at Porto Vesme. Italy's dependence on coal imports will not be drastically changed with its new production of coal in Sardinia. Carbosulsis S.p.A. was developing a flotation process capable of removing most of the sulfur content of the Sulcis coal.

After 5 years of research, Snamprogetti S.p.A., the engineering company of ENI, has developed the Reocarb method to produce a coal slurry with a coal content ranging from 70% to 75%. This new process uses less water because of additives patented by Snamprogetti. The additives make it possible to obtain a high fluidity and pumpability with less water than usually required so that the manufactured slurry can be used directly for burning. However, special burners, manufactured by Snamprogetti, have to be used. In Italy, one plant, with a capacity to produce pumpable slurry from 100,000 tons of coal per year, was operational in Livorno, and a license for the process was sold to the U.S.S.R.

Petroleum and Natural Gas.—Exploration was conducted by AGIP in the Ticino area between Piedmont and Lombardy. The exploratory well at Galliate, Piedmont, was planned to reach to over 8,000 feet in depth.

The Chevron Oil Co. reached an agreement in principle to sell all its retail operations to Isab S.p.A., a local company. Chevron was the fourth company to abandon the market in Italy, and the Government of Italy was concerned about the trend. However, no concrete steps to improve conditions under which foreign companies operate in Italy have as yet been taken.

At yearend, the French-owned Total S.A. also closed its 60,000-barrel-per-day Aquila refinery in Trieste. According to Total's announcement, this facility will be used as coastal petroleum storage. Closure of the refinery resulted in the loss of 490 jobs.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Italian lire (Lit) to U.S. dollars at the rate of Lit1,909=US$1.00 for 1985.

The Mineral Industry of Japan

By John C. Wu[1]

Japan's mining industry continued to face problems of low metal prices, high production costs, depleting ore reserves, increasing substitution of industrial raw materials, and appreciation of the Japanese yen. Despite increased mine production of gold, lead, silver, and zinc, most Japanese nonferrous metal mining companies were reportedly operating at a loss. In an effort to assist the nonferrous metal mining industry, the Ministry of International Trade and Industry (MITI) planned to extend a $21 million[2] emergency loan to 19 domestic copper, lead, and zinc mining companies that suffered from a drastic decline in domestic market prices of copper, lead, and zinc. MITI was expected to make the loan available to the financially troubled mining companies at a low interest rate of 3.3% per annum in early 1986.[3]

According to MITI's annual survey conducted in April 1985, the number of domestic operating metallic mines declined further to 59 from 67 in 1984, while the number of nonmetallic mines remained at 679. However, the number of employees in both metal and nonmetal mining declined from 9,242 to 8,950, and from 16,108 to 15,811 in 1985, respectively. The eight metallic mines that closed in fiscal year 1985 were four gold and silver mines, one lead and zinc mine, and three others. Depletion of ore reserves was the main reason for closing the metallic mines.

The only bright spot of Japan's mining industry was the opening of Japan's largest and richest gold mine, the Hishikari, in mid-1985. According to Sumitomo Metal Mining Co. Ltd., the owner and operator of the mine in southern Kyushu, ore grade during 1985 averaged 4.82 troy ounces of gold per ton of ore. Also in 1985, two additional promising gold deposits, reportedly, were discovered by the Metal Mining Agency of Japan in the Hokusatu and Kushikino areas of Kagoshima in southern Kyushu. Ore grades ranged from 0.40 to 0.43 troy ounce of gold and from 0.71 to 0.80 troy ounce of silver per ton of ore.

Japan continued to build its stockpiles of chromium, cobalt, manganese, molybdenum, nickel, tungsten, and vanadium. By the end of fiscal year 1985, ending March 1986, the amount of the seven metals stockpiled by the Government and by joint Government-private programs was expected to increase to a 9-day supply each, while the private program was expected to increase to a 3.6-day supply. The stockpile of the seven metals by the three programs, representing a 16.8-day supply at the end of fiscal year 1984, ending March 1985, was as follows:[4]

Commodity	Quantity (metric tons)
Cobalt, metal content	72
Ferrochromium, gross weight	24,598
Ferromanganese, gross weight	26,792
Ferrovanadium, metal content	218
Molybdenum concentrate, gross weight	713
Nickel, metal content	4,932
Tungsten concentrate, gross weight	111

Because of the tightening of MITI's budget, the total stockpile of the seven metals by the three programs was 14.4 days below the target of a 36-day supply for fiscal year 1985.

In the metallic mineral processing sector, the primary aluminum industry was still in great difficulty with no prospect of recovery. Production of primary aluminum declined further to its lowest level since 1963. Production of most base metals increased only slightly from that of 1984 because of stagnant domestic demand. Production of precious and minor metals was higher than that of 1984 owing to the growing demand by the country's expanding electric, electronic, and high-technology industries. Production of iron and steel remained relatively unchanged. Japan remained the world's second largest steel producer; one of the major metal producers of copper, nickel, titanium, and zinc; and one of the world's top three metal producers of bismuth, cadmium, gallium, germanium, indium, and manganese dioxide.

In the industrial minerals mining and processing sector, production of limestone was down moderately because of reduced demand by the cement industry. The cement industry was still undergoing restructuring to reduce installed capacity to 100 million tons per year. Its output dropped to the lowest level since 1977. Production of fertilizer materials and crude iodine remained at about the same level as that of 1984. However, exports of iodine were higher because of growing overseas demand. Japan remained the world's largest producer of iodine and one of the major producers of cement, limestone, and nitrogen fertilizer materials.

In the mineral fuels sector, Japan's coal mining industry suffered again from two more major coal accidents in Hokkaido and Kyushu, claiming 73 lives. In September, MITI appointed its Coal Mining Council to study the next 5-year period of Japan's coal mining industry on possibly lowering domestic coal production and relaxing the coal import policy. The Council was expected to submit recommendations by mid-1986. Japan's crude oil and natural gas production remained small but increasing owing to commissioning four new oil and gas fields offshore Niigata and Fukushima. Japan continued to import essentially all of its crude petroleum and 95% of its natural gas requirements. Imports of natural gas in the form of liquefied natural gas (LNG) reached a new record high, accounting for over 77% of the LNG traded in the world market. To liberalize imports of refined petroleum products, new legislation was finally passed by Japan's Diet in December and was expected to become effective in January 1986.

According to the Economic Planning Agency, Japan's economy, as measured by the change in real gross national product (GNP) in 1980 constant dollars, grew slower at 4.5% in 1985 compared with 5.1% (revised) in 1984. The slower growth in the Japanese economy was a direct result of a smaller increase in the industrial output of mining and manufacturing reflecting a deceleration of exports caused by the stronger Japanese yen. The output of the machinery industry, which fueled the impressive growth of Japan's industrial production in 1984, rose only 9%. As a result, the increase in industrial production of mining and manufacturing decreased to 4.5% compared with 11% in 1984. In 1985, Japan's GNP in 1980 constant dollars was estimated at $1.2 trillion, and in current dollars was estimated at $1.3 trillion, about one-third of the U.S. GNP. The inflation rate, as measured by the change in the Consumer Price Index, declined slightly to 2.1% from 2.2% (revised) in 1984. Despite a smaller increase in export earnings, Japan managed to score another record-high trade surplus owing mainly to substantially lower import bills of crude petroleum resulting from the lower price of crude oil in the world market.

PRODUCTION

Mine production of most nonferrous minerals was up slightly except for copper, manganese, and molybdenum. Mine output of gold rose sharply because of the startup of mining operations at the Hishikari gold mine in southern Kyushu. The drastic drop in mine output of manganese was attributable to the permanent shutdown of the Ooe manganese mine in Hokkaido. Mine production of most industrial minerals was down except for barite, bentonite, and dolomite. Mine output of limestone was down by more than 6 million tons because of reduced sales to the cement industry. Mine production of coal dropped to another record low resulting from a major coal accident in northern Hokkaido. However, domestic production of crude petroleum and natural gas increased moderately owing to increased output from four new oil and gas fields commissioned in 1984.

In the mineral processing sector, metal production of most base metals including primary aluminum, copper, lead, and zinc was lower than that in 1984 primarily owing to higher production costs and lower import metal prices resulting from the appreciation of the Japanese yen. However, metal production of most minor and precious metals was higher because of strong demand by the growing machinery and electric industries as well as by the expanding high-technology industry. Production of iron and steel was at about the same level as that of 1984, while production of specialty steel reached a new record high in 1985. Production of cement continued downward because of reduced exports to the Middle East and a stagnant domestic market. Production of refined petroleum products was down because of reduced demand for kerosene and heavy fuel oil resulting from the continuing oil conservation programs and substitutions of coal and LNG.

Table 1.—Japan: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984	1985[p]
METALS					
Aluminum:					
Alumina, gross weight ---- thousand tons--	1,344	959	1,065	1,172	978
Metal:					
Primary:					
Regular grades ----------do----	771	351	256	287	227
High-purity -----------do----	6	4	3	4	5
Secondary ---------------do----	840	761	802	819	861
Antimony:					
Oxide	6,238	6,446	7,596	9,698	8,243
Metal	390	260	273	253	296
Arsenic, white (equivalent of arsenic acid)	95	[e]100	[e]300	[e]500	[e]500
Bismuth	478	486	573	563	642
Cadmium	1,977	2,034	2,214	2,423	2,581
Chromium:					
Chromite, gross weight	10,959	11,129	8,396	7,420	11,920
Metal	3,625	3,785	2,786	3,452	3,800
Cobalt metal	2,421	1,942	1,371	905	1,277
Columbium and tantalum: Tantalum metal	53	44	40	[e]45	[e]45
Copper:					
Mine output, metal content	51,513	50,658	46,045	43,309	43,208
Metal:					
Blister and anode:					
Primary	930,000	948,200	944,600	821,100	802,300
Secondary	50,100	98,100	117,300	107,900	130,300
Total	980,100	1,046,300	1,061,900	929,000	932,600
Refined:					
Primary	929,967	948,158	944,551	821,064	802,341
Secondary	120,153	126,816	147,378	114,092	133,636
Total	1,050,120	1,074,974	1,091,929	935,156	935,977
Gallium metal[2]	8	7	8	17	[e]19
Germanium:					
Oxide	12	10	11	11	14
Metal	11	7	7	8	10
Gold:					
Mine output, metal content thousand troy ounces--	99	104	101	104	159
Metal -----------------------do----	1,214	1,271	1,296	1,342	1,383
Indium metal------------------do----	482	482	449	482	[e]482
Iron and steel:					
Iron ore and iron sand concentrate:					
Gross weight ------- thousand tons--	442	362	298	324	338
Iron content --------------do----	275	227	185	202	212
Roasted pyrite concentrate (50% or more Fe) do----	308	327	329	225	218
Metal:					
Pig iron and blast furnace ferroalloys do----	80,048	77,658	72,936	80,403	80,569
Electric-furnace ferroalloys:					
Ferrochrome	306,104	328,480	304,053	323,930	349,496
Ferromanganese	567,746	538,355	389,381	485,008	441,703
Ferronickel	244,135	214,523	180,826	217,053	227,043
Ferrosilicon	234,524	192,372	157,939	153,386	150,167
Silicomanganese	282,852	269,379	222,204	233,061	216,916
Ferrochromium-silicon[3]	10,469	9,845	7,152	6,451	9,463
Other:					
Calcium silicon	2,590	3,834	2,357	1,724	2,496
Ferrocolumbium	825	1,039	530	1,031	1,072
Ferromolybdenum	3,056	3,413	3,104	3,299	3,143
Ferrotungsten	362	329	200	144	114
Ferrovanadium	4,063	4,465	2,821	3,733	3,353
Unspecified	3,167	2,309	2,159	2,727	2,575
Total[4]	1,659,893	1,568,343	1,272,726	1,431,547	1,407,541

See footnotes at end of table.

Table 1.—Japan: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984	1985[p]
METALS —Continued					
Iron and steel —Continued					
Metal —Continued					
Steel, crude thousand tons	[r]101,676	99,548	97,179	105,586	105,279
Semimanufactures, hot-rolled:					
Of ordinary steels do	79,797	78,206	77,552	82,765	82,731
Of special steels do	13,281	13,660	13,286	16,070	16,802
Lead:					
Mine output, metal content	46,922	45,873	46,888	48,735	49,951
Metal, refined:					
Primary	175,371	183,132	203,325	233,816	233,706
Secondary	141,646	119,068	118,317	129,179	133,257
Magnesium metal:					
Primary	5,667	5,555	6,026	7,103	8,458
Secondary	28,437	21,670	13,012	15,656	20,894
Manganese:					
Ore and concentrate:					
Gross weight	86,696	78,045	75,199	61,635	21,140
Manganese content	20,953	19,928	19,860	16,679	5,562
Oxide	44,296	45,990	47,182	47,807	49,081
Metal	4,232	3,873	3,939	4,323	4,631
Molybdenum:					
Metal content of concentrate[e]	74	97	97	147	98
Metal	388	392	438	493	565
Nickel metal:					
Refined	23,791	23,327	23,812	23,356	23,258
Ni content of ferronickel	63,008	60,030	45,739	50,842	54,235
Total	86,799	83,357	69,551	74,198	77,493
Platinum-group metals:					
Palladium metal troy ounces	25,748	27,862	37,122	33,802	43,703
Platinum metal do	10,521	15,411	21,460	19,523	22,216
Rare-earth metals:					
Lanthanum oxide	227	118	160	235	254
Cerium metal	852	628	[e]600	[e]630	[e]630
Selenium, elemental	428	410	433	465	497
Silicon:					
Metal	11,906	8,124	--	--	--
High-purity	594	605	652	908	1,471
Silver:					
Mine output, metal content thousand troy ounces	9,010	9,843	9,877	10,403	10,899
Metal, primary do	40,252	41,573	48,794	50,952	52,817
Tellurium, elemental	62	63	55	65	[e]63
Tin:					
Mine output, metal content	561	529	[r]600	485	510
Metal, smelter	1,314	1,296	1,260	1,354	1,391
Titanium:					
Metal	24,938	16,850	10,590	15,368	21,414
Oxide	177,600	185,648	198,010	206,342	218,851
Tungsten:					
Mine output, metal content	631	604	475	477	526
Metal	1,820	1,775	1,842	2,386	2,638
Uranium metal kilograms	2,619	5,000	4,000	4,000	5,000
Zinc:					
Mine output, metal content	242,042	251,356	255,712	252,700	253,021
Oxide	64,735	60,924	64,796	72,794	71,065
Metal:					
Primary	575,645	549,010	579,021	644,360	629,504
Secondary	144,789	159,407	171,016	162,317	160,652
Zirconium:					
Metal	47	45	[e]45	[e]45	[e]45
Oxide	4,020	4,320	4,900	6,250	[e]6,700
INDUSTRIAL MINERALS					
Asbestos	3,950	4,135	[e]4,000	[e]4,000	[e]4,000
Barite	56,369	59,492	69,699	66,018	76,997
Bromine, elemental[e]	12,000	12,000	12,000	12,000	12,000
Cement, hydraulic thousand tons	84,827	[r]80,688	80,892	78,859	72,845
Clays:					
Bentonite	511,781	484,431	440,923	410,079	461,530
Fire clay	1,455,619	1,321,002	1,260,678	1,423,235	1,146,316
Kaolin	210,858	197,346	230,720	224,614	221,996
Feldspar and related materials:					
Feldspar	25,620	30,160	30,996	35,526	30,895
Aplite	350,123	349,355	[r]401,266	441,005	469,386
Gypsum thousand tons	6,137	6,363	5,845	[e]6,050	[e]6,300
Iodine, elemental	6,862	7,180	7,273	7,302	7,251
Lime: Quicklime thousand tons	8,026	7,777	7,436	7,753	7,454

See footnotes at end of table.

Table 1.—Japan: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984	1985[p]
INDUSTRIAL MINERALS —Continued					
Nitrogen: N content of ammonia thousand tons	[r]1,832	1,652	[r]1,545	1,668	[e]1,650
Perlite[e]	75,000	75,000	75,000	75,000	75,000
Salt, all types thousand tons	1,002	966	[r]921	1,200	[e]1,200
Sodium compounds, n.e.s.:					
Carbonate	1,177,695	1,162,398	1,103,378	1,036,133	1,057,102
Sulfate	284,677	255,969	260,661	278,941	276,814
Stone, crushed and broken:					
Dolomite thousand tons	5,787	4,996	4,386	4,268	4,329
Limestone do	176,702	168,259	169,780	169,825	163,759
Sulfur:					
S content of pyrite do	293	276	272	259	253
Byproduct:					
Of metallurgy do	1,236	1,268	1,239	1,191	1,192
Of petroleum do	1,080	1,051	1,102	1,142	1,065
Talc and related materials:					
Talc	114,466	99,886	87,124	84,522	78,616
Pyrophyllite	1,430,585	1,392,418	1,378,699	1,414,424	1,355,625
Vermiculite[e]	17,000	17,000	17,000	17,000	17,000
MINERAL FUELS AND RELATED MATERIALS					
Carbon black thousand tons	557	504	568	602	632
Coal:					
Anthracite do	34	32	17	23	26
Bituminous[5] do	17,653	17,574	17,045	16,622	16,357
Total do	17,687	17,606	17,062	16,645	16,383
Coke including breeze:					
Metallurgical do	44,864	46,520	43,600	48,145	48,622
Metallurgical breeze do	2,378				
Gashouse including breeze do	3,448	3,261	3,073	3,130	3,120
Fuel briquets, all grades do	376	334	282	306	315
Gas, natural:					
Gross[6] million cubic feet	74,245	72,305	73,645	75,293	78,562
Marketed do	71,594	70,440	[r]68,957	75,329	80,122
Natural gas liquids:					
Natural gasoline[e] thousand 42-gallon barrels	37	37	37	37	37
Liquefied petroleum gas from natural gas (field plants only)[e] do	300	300	300	300	300
Peat[e]	60	60	60	60	60
Petroleum:					
Crude thousand 42-gallon barrels	2,868	2,937	3,095	2,962	3,919
Refinery products:					
Gasoline:					
Aviation do	101	101	82	88	75
Other do	219,168	222,489	223,590	227,678	215,514
Jet fuel do	28,273	27,109	27,933	23,499	27,229
Kerosene do	174,548	169,825	168,982	168,774	152,477
Distillate fuel oil do	134,476	113,581	144,936	155,817	147,596
Residual fuel oil do	601,412	528,299	485,258	479,836	408,655
Lubricants do	11,806	10,774	11,517	12,032	12,133
Asphalt and bitumen do	27,078	27,078	29,682	30,719	29,814
Liquefied petroleum gas do	47,475	45,890	48,783	47,029	50,243
Naphtha do	92,403	71,804	72,509	73,175	65,093
Paraffin do	1,101	1,025	981	1,050	994
Petroleum coke do	717	761	717	881	1,088
Unfinished oils do	12,076	NA	4,478	48,243	39,525
Refinery fuel and losses do	113,002	118,708	88,591	[7]130,666	[7]153,968
Total do	1,463,636	1,337,444	1,307,989	1,399,487	1,304,404

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.

[1]Table includes data available through Aug. 26, 1986.

[2]Includes scrap recovery.

[3]For reasons not evident in sources, these figures are reported as negative numbers. (See also footnote 4.)

[4]Sum of listed detail as reported, but adding quantity bearing footnote 3 as positive numbers. Japanese sources provide the following totals for ferroalloy output in the years indicated, in metric tons: 1981—1,638,955; 1982—1,548,653; 1983—1,258,422; 1984—1,418,645; and 1985—1,388,615. These totals represent the sum of listed detail using the quantities bearing footnote 3 as negative numbers, thereby not only omitting the footnoted numbers, but actually subtracting them from the sum of all other alloys. The reason for this procedure in source publications is not explained.

[5]Includes coking coal and steam coal.

[6]Includes output from gas wells and coal mines.

[7]May include some additional unfinished oils.

TRADE

Despite a slight drop in the value of two-way merchandise trade, Japan managed to register another record-high merchandise trade surplus as its merchandise exports rose 3% to $176 billion, while imports dropped 5% to $130 billion in 1985. A further surge in exports of motor vehicles, tape recorders, office machinery, and scientific and optical equipment contributed most of the overall increase in export earnings, while a further decrease in overall imports was attributed mainly to a significant drop in imports of crude and partially refined petroleum.

In mineral and metal trade, imports of crude and partially refined petroleum were valued at $34.6 billion; coal, $5.2 billion; nonferrous metals, $4.0 billion; iron ore, $3.0 billion; and nonferrous ore, $2.2 billion. Exports of iron and steel products were valued at $13.6 billion; metal products, $3.5 billion; and industrial minerals, $2.0 billion. Exports of iron and steel products were at a slightly higher level than that of 1984 owing to a substantial increase in exports to China, while exports of industrial minerals and nonferrous metal products were at a lower level than that of 1984.

Imports of most ferrous and nonferrous metals were either at the same level or at a lower level than that of 1984 except for primary aluminum and gold. Imports of primary aluminum reached an all-time record high of 1.4 million tons because of a further decline in domestic production. Imports of gold also rose to another record high at 6.3 million troy ounces owing to the strong domestic demand by private hoarding for investment. Imports of coal increased to 93 million tons owing mainly to increased demand for steam coal by the electric power and cement industries. Imports of crude petroleum were at a lower level than that of 1984 because of reduced domestic consumption of heavy fuel oil.

Based on the value of two-way merchandise trade, the United States remained the single most important trade partner of Japan accounting for 37% of Japan's exports and 20% of Japan's imports. China displaced Saudi Arabia as the second largest trade partner of Japan, accounting for 6.2% of the value of two-way trade, followed by Saudi Arabia, 4.6%; Australia, 4.2%; Indonesia, 4%; and the Republic of Korea, 3.7%.

Table 2.—Japan: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984	
			United States	Other (principal)
METALS				
Alkali and alkaline-earth metals	261	281	1	Taiwan 224; Republic of Korea 44.
Aluminum:				
Oxides and hydroxides	569,199	573,071	3,405	Canada 277,160; Indonesia 122,965; China 69,963.
Metal including alloys:				
Scrap	637	2,259	--	Republic of Korea 1,171; Taiwan 1,065.
Unwrought	1,679	2,283	67	Republic of Korea 757; Thailand 443; Indonesia 428.
Semimanufactures	197,996	228,827	150,628	Republic of Korea 13,558; Taiwan 10,839; China 9,073.
Bismuth: Metal including alloys, all forms	250	159	52	Netherlands 65; West Germany 20; United Kingdom 10.
Cadmium: Metal including alloys, all forms	910	446	5	Netherlands 125; Austria 109; West Germany 57.
Chromium:				
Ore and concentrate	852	718	--	Republic of Korea 637.
Oxides and hydroxides	3,175	3,353	658	Taiwan 1,199; Republic of Korea 962; Indonesia 134.
Cobalt: Oxides and hydroxides	66	74	--	Republic of Korea 66.
Columbium and tantalum: Metal including alloys, all forms, tantalum	9	10	2	West Germany 5; Austria 2.
Copper:				
Sulfate	834	620	51	Taiwan 422; Philippines 39; United Kingdom 34.

See footnotes at end of table.

Table 2.—Japan: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued				
Copper —Continued				
Metal including alloys:				
Scrap	177,919	18,542	55	Taiwan 8,593; Thailand 3,434; Indonesia 3,193.
Unwrought	5,315	4,041	277	Republic of Korea 1,869; Taiwan 1,742.
Semimanufactures	207,614	226,481	42,507	Taiwan 36,705; China 26,884; Hong Kong 23,804.
Gold:				
Waste and sweepings value	$21,594	$21,623	$9,578	Singapore $12,045.
Metal including alloys, unwrought and partly wrought troy ounces	261,303	203,853	2,893	Singapore 112,339; Republic of Korea 21,841; Taiwan 16,235.
Iron and steel: Metal:				
Scrap	115,822	146,473	18	Republic of Korea 62,468; Taiwan 56,853; China 14,844.
Pig iron, cast iron, related materials	345,033	291,801	4,766	China 166,296; Taiwan 73,236; Republic of Korea 20,676.
Ferroalloys:				
Ferrochromium	5,429	2,095	511	Republic of Korea 982; Australia 209; North Korea 200.
Ferromanganese	22,202	22,822	2,500	North Korea 8,060; China 4,000; Malaysia 2,270.
Ferronickel	13,369	4,365	--	Netherlands 3,404; Republic of Korea 960.
Ferrosilicomanganese	107	93	--	Mainly to Ethiopia.
Ferrosilicon	1,135	1,199	16	Republic of Korea 421; Singapore 291; Taiwan 161.
Unspecified	r1,647	2,398	443	Republic of Korea 1,106; Taiwan 619.
Steel, primary forms thousand tons	3,301	3,309	269	Republic of Korea 909; China 794; Taiwan 162.
Semimanufactures:				
Bars, rods, angles, shapes, sections do.	8,239	7,503	1,292	China 2,351; Saudi Arabia 505; Republic of Korea 500.
Universals, plates, sheets do.	14,089	13,340	2,745	China 3,676; Republic of Korea 718; Taiwan 645.
Hoop and strip do.	602	704	142	China 162; Taiwan 60.
Rails and accessories do.	193	369	193	China 78; Indonesia 36; Brazil 27.
Wire do.	314	354	169	Australia 21; Hong Kong 20; China 18.
Tubes, pipes, fittings do.	5,519	6,485	1,263	U.S.S.R. 1,452; China 1,312.
Castings and forgings, rough do.	16	27	10	Singapore 7; Taiwan 2.
Lead:				
Ore and concentrate	3,001	14,172	3,263	Australia 6,279; Republic of Korea 3,267; North Korea 1,363.
Oxides	120	160	--	Vietnam 103; Republic of Korea 27; Indonesia 12.
Metal including alloys, all forms	16,037	18,454	30	Republic of Korea 6,118; Taiwan 3,816; Thailand 2,528.
Magnesium: Metal including alloys, all forms	79	1,547	(3)	U.S.S.R. 1,300; North Korea 61; China 46.
Manganese:				
Ore and concentrate	1,973	2,476	112	Tanzania 614; Republic of Korea 545; Philippines 485.
Oxides	35,547	37,069	19,104	Indonesia 2,720; U.S.S.R. 2,500; Republic of Korea 1,754.
Mercury 76-pound flasks	738	2,169	1,501	Philippines 327; Republic of Korea 149; Taiwan 122.
Molybdenum: Metal including alloys, all forms	51	41	2	Hungary 11; West Germany 9; Republic of Korea 7.
Nickel: Metal including alloys, all forms	1,144	1,930	178	Republic of Korea 299; Taiwan 225; Indonesia 122.
Platinum-group metals: Metals including alloys, unwrought and partly wrought troy ounces	158,631	117,017	45,165	Taiwan 55,026; Republic of Korea 4,572; Hong Kong 1,135.
Selenium, elemental	234	218	40	Netherlands 111; United Kingdom 21.

See footnotes at end of table.

Table 2.—Japan: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984 United States	Destinations, 1984 Other (principal)
METALS —Continued				
Silver: Metal including alloys, unwrought and partly wrought thousand troy ounces	7,074	4,268	196	Taiwan 1,342; Hong Kong 1,033; Republic of Korea 389.
Tin:				
Oxides	37	6	(²)	North Korea 3; Burma 2.
Metal including alloys, all forms	870	704	54	Republic of Korea 152; Iraq 129; Hong Kong 122.
Titanium:				
Oxides	19,055	17,222	174	Taiwan 5,993; China 2,972; Republic of Korea 2,693.
Metal including alloys, all forms	2,664	6,710	4,051	Netherlands 1,075; France 761; West Germany 460.
Tungsten: Metal including alloys, all forms	146	195	20	U.S.S.R. 41; West Germany 40; Taiwan 28.
Zinc:				
Oxides	1,344	794	39	Thailand 154; Taiwan 117; Vietnam 115.
Metal including alloys, all forms	57,576	52,791	2,075	Taiwan 14,021; Republic of Korea 8,775; Philippines 6,814.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	5,951	7,399	(²)	Hong Kong 3,115; Republic of Korea 2,434; Taiwan 1,183.
Artificial:				
Corundum	22,716	24,489	545	Republic of Korea 11,489; Taiwan 4,609; Australia 1,994.
Silicon carbide	5,965	4,947	21	Republic of Korea 2,720; Taiwan 1,625; Australia 224.
Dust and powder of precious and semiprecious stones including diamond kilograms	475	873	733	Taiwan 49; Republic of Korea 43; Belgium-Luxembourg 23.
Grinding and polishing wheels and stones	8,590	9,527	1,884	Hong Kong 1,187; Singapore 924; Republic of Korea 751.
Asbestos, crude	677	431	--	Republic of Korea 364.
Barite and witherite	30	400	--	All to Republic of Korea.
Boron materials:				
Crude natural borates	1,345	1,600	--	Republic of Korea 974; Taiwan 624.
Oxides and acids	232	326	1	Taiwan 203; Republic of Korea 69; Brazil 23.
Cement thousand tons	14,317	11,482	287	Saudi Arabia 4,079; Kuwait 1,874; Hong Kong 1,655.
Clays, crude	59,588	66,636	4	Taiwan 37,167; Republic of Korea 14,625; Indonesia 4,004.
Diamond:				
Gem, not set or strung carats	583	2,173	642	Hong Kong 871; Belgium-Luxembourg 464; Thailand 112.
Industrial stones do	22,639	29,369	62	Taiwan 19,000; Netherlands 4,535; North Korea 3,300.
Diatomite and other infusorial earth	1,322	2,200	1	Iraq 810; Taiwan 625; Australia 240.
Feldspar	28,886	31,770	--	Taiwan 28,793; Indonesia 2,235.
Fertilizer materials: Manufactured:				
Ammonia	1,472	14,081	--	Republic of Korea 7,457; Philippines 5,195; Thailand 1,126.
Nitrogenous thousand tons	659	935	1	Thailand 315; Hong Kong 125; China 116.
Phosphatic	17,601	4,190	--	Guyana 1,488; Taiwan 883; Yemen (Sanaa) 500.
Potassic	58	580	4	Republic of Korea 518.
Unspecified and mixed	107,615	164,767	655	Thailand 40,135; Pakistan 37,179; Sri Lanka 16,640.
Fluorspar	458	327	--	Vietnam 80; Taiwan 58; Republic of Korea 51.
Graphite, natural	2,515	2,927	61	Taiwan 921; Cuba 583; Republic of Korea 549.
Gypsum and plaster	10,039	9,658	4	Republic of Korea 2,596; Indonesia 1,801; Taiwan 1,783.

See footnotes at end of table.

Table 2.—Japan: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Iodine including bromine and fluorine	6,282	5,230	1,500	United Kingdom 970; France 625; West Germany 493.
Kyanite and related materials	8,439	9,238	118	Republic of Korea 3,894; Taiwan 3,355; Indonesia 973.
Lime	25,937	58,361	--	Australia 27,676; Papua New Guinea 26,714.
Magnesium compounds: Oxides and hydroxides	r79,299	115,532	9,286	Republic of Korea 33,267; U.S.S.R. 14,858; Australia 11,478.
Mica, all forms	1,098	1,283	70	Hong Kong 459; Taiwan 297; Republic of Korea 216.
Pigments, mineral:				
Natural, crude	67	28	--	Taiwan 16; Malaysia 10.
Iron oxides and hydroxides, processed	18,452	19,818	4,096	Taiwan 7,550; Republic of Korea 2,509; Egypt 1,365.
Precious and semiprecious stones other than diamond:				
Natural kilograms	239,974	37,626	513	Taiwan 18,984; Hong Kong 7,382; Republic of Korea 6,755.
Synthetic do	52,109	86,445	17,715	Republic of Korea 23,024; Malaysia 17,202; Hong Kong 10,107.
Pyrite, unroasted	33	4,655	--	Republic of Korea 4,650.
Salt and brine	1,292	1,250	228	Iraq 230; North Korea 147; Republic of Korea 133.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	21,889	13,377	4	Philippines 5,314; Indonesia 4,470; Papua New Guinea 1,969.
Sulfate, manufactured	8,897	5,907	10	Republic of Korea 2,654; Thailand 1,520; Philippines 1,204.
Stone, sand and gravel:				
Dimension stone	3,583	5,550	290	Republic of Korea 2,569; Brunei 1,495; Singapore 701.
Dolomite, chiefly refractory-grade	5,375	5,812	--	Indonesia 3,320; Taiwan 1,225; Saudi Arabia 900.
Gravel and crushed rock	159,698	197,356	91	Australia 196,000.
Limestone other than dimension	1,659,307	1,755,191	--	Australia 935,255; Hong Kong 763,604; Singapore 39,341.
Quartz and quartzite	5,362	5,401	40	Australia 5,070; Taiwan 188.
Sand other than metal-bearing	3,100	4,545	--	Republic of Korea 1,953; Taiwan 849; Bahrain 783.
Sulfur:				
Elemental:				
Crude including native and byproduct	239,025	274,095	--	Republic of Korea 211,821; Taiwan 56,278.
Colloidal, precipitated, sublimed	371	358	1	Republic of Korea 186; Philippines 49; Indonesia 36.
Sulfuric acid	723,322	199,052	--	China 78,931; Republic of Korea 48,426; Taiwan 26,512.
Talc, steatite, soapstone, pyrophyllite	4,058	4,838	53	Republic of Korea 2,818; Taiwan 1,031; Indonesia 362.
Other:				
Crude	25,932	21,745	542	Republic of Korea 10,631; Taiwan 3,981; Indonesia 1,080.
Slag and dross, not metal-bearing	523,708	470,440	33,801	Singapore 174,575; Republic of Korea 118,595; Philippines 94,111.
MINERAL FUELS AND RELATED MATERIALS				
Carbon black	13,364	10,517	240	Indonesia 2,377; Republic of Korea 1,886; Taiwan 1,104.
Coal, all grades including briquets	15,274	13,874	--	Republic of Korea 6,053; Philippines 5,800.
Coke and semicoke thousand tons	2,029	2,489	393	United Kingdom 523; Romania 445; Philippines 301.
Peat including briquets and litter	--	35	--	Iraq 18; Taiwan 17.
Petroleum refinery products:				
Liquefied petroleum gas thousand 42-gallon barrels	13	274	253	France 15.
Gasoline do	28	115	(2)	Taiwan 85; Philippines 27.
Mineral jelly and wax do	453	538	123	Republic of South Africa 118; Republic of Korea 61; Taiwan 50.

See footnotes at end of table.

Table 2.—Japan: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984 United States	Destinations, 1984 Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum refinery products —Continued				
Kerosene and jet fuel thousand 42-gallon barrels	30	12	--	Republic of Korea 9; Indonesia 1.
Lubricants do	1,288	1,349	178	Republic of Korea 388; Taiwan 207; Thailand 167.
Nonlubricating oils do	298	278	12	Republic of Korea 83; Taiwan 71; China 27.
Residual fuel oil do	203	705	(2)	Republic of Korea 687.
Bitumen and other residues do	129	66	--	Hong Kong 17; Republic of Korea 15; Singapore 14.
Petroleum coke do	199	183	48	Netherlands 42; Italy 34; Taiwan 19.

[r]Revised.
[1]Excludes exports under Japanese-United States Mutual Defense Agreement or for account of U.S. military forces. Table prepared by Audrey D. Wilkes.
[2]Less than 1/2 unit.

Table 3.—Japan: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984 United States	Sources, 1984 Other (principal)
METALS				
Alkali and alkaline-earth metals:				
Alkaline-earth metals	16	35	6	China 14; France 9; West Germany 6.
Unspecified	278	546	42	France 267; China 185.
Aluminum:				
Ore and concentrate thousand tons	3,580	3,862	3	Australia 2,213; Indonesia 973; Malaysia 580.
Oxides and hydroxides	35,209	142,851	989	Australia 138,150; West Germany 1,593; France 892.
Metal including alloys:				
Scrap	302,025	243,250	161,029	Hong Kong 18,108; Australia 11,629; Singapore 8,442.
Unwrought thousand tons	1,604	1,348	178	Australia 237; New Zealand 154; Venezuela 150.
Semimanufactures	36,792	41,632	2,207	Romania 5,532; France 4,336; Brazil 3,725.
Antimony:				
Ore and concentrate	6,272	6,987	--	Bolivia 3,861; China 2,641; Republic of South Africa 431.
Oxides	1,796	2,467	2	China 1,075; United Kingdom 1,000; U.S.S.R. 241.
Metal including alloys, all forms	3,487	5,118	--	Mainly from China.
Arsenic: Oxides and acids	272	199	(2)	France 159.
Beryllium:				
Oxides and hydroxides	80	85	70	Mainly from China.
Metal including alloys, all forms kilograms	4,445	2,993	2,993	
Chromium:				
Ore and concentrate	644,895	823,394	--	Republic of South Africa 418,259; India 138,911; Madagascar 60,488.
Oxides and hydroxides	2,556	2,004	798	West Germany 737; U.S.S.R. 350.
Cobalt:				
Oxides and hydroxides	517	412	50	Belgium-Luxembourg 324.
Metal including alloys, all forms	2,071	2,586	320	Zaire 1,408; Belgium-Luxembourg 501; Finland 124.
Columbium and tantalum:				
Ore and concentrate	861	2,317	--	Canada 2,038; Malaysia 174.
Metal including alloys, all forms, tantalum	42	57	33	West Germany 13; Belgium-Luxembourg 8.

See footnotes at end of table.

Table 3.—Japan: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Copper:				
Ore and concentrate thousand tons	3,135	2,930	162	Canada 797; Philippines 386; Chile 385.
Matte and speiss including cement copper	4,394	1,311	--	Brazil 643; Peru 579; Republic of South Africa 70.
Sulfate	252	368	(²)	China 180; Thailand 170.
Metal including alloys:				
Scrap	57,486	92,595	39,737	Hong Kong 14,057; Taiwan 7,352; Singapore 7,005.
Unwrought	246,449	537,912	64,884	Zambia 139,212; Chile 111,422; Peru 85,402.
Semimanufactures	4,619	12,150	1,550	Republic of Korea 6,357; Taiwan 2,048; France 1,338.
Germanium: Metal including alloys, all forms kilograms	811	1,959	1	China 1,300; U.S.S.R. 403; West Germany 109.
Gold: Metal including alloys, unwrought and partly wrought thousand troy ounces	3,532	6,215	25	Switzerland 3,258; United Kingdom 2,058.
Indium: Metal including alloys, all forms kilograms	4,308	[3]1,639	150	Belgium-Luxembourg 650; United Kingdom 539.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite thousand tons	109,153	125,372	(²)	Australia 58,357; Brazil 29,017; India 15,840.
Metal:				
Scrap do	3,906	4,018	2,484	U.S.S.R. 291; United Kingdom 271; Australia 267.
Pig iron, cast iron, related materials do	1,001	823	(²)	Brazil 375; U.S.S.R. 79; Australia 77.
Ferroalloys:				
Ferrochromium	297,533	395,381	--	Republic of South Africa 253,283; Zimbabwe 47,611; Philippines 32,811.
Ferromanganese	15,832	14,102	--	West Germany 5,506; Brazil 5,069; India 1,537.
Ferromolybdenum	460	591	--	Austria 261; Chile 130; West Germany 54.
Ferronickel	36,750	44,754	2,137	New Caledonia 15,932; Indonesia 13,299; Dominican Republic 9,185.
Ferrosilicochromium	5,379	8,665	--	Republic of South Africa 4,540; Zimbabwe 3,724; Zambia 401.
Ferrosilicomanganese	115,533	114,082	1,336	Brazil 57,830; Republic of South Africa 41,107; India 4,511.
Ferrosilicon	273,907	338,646	3,453	Norway 111,358; Brazil 52,090; Republic of South Africa 29,320.
Silicon metal	80,435	84,958	2,129	China 14,318; Republic of South Africa 13,758; Norway 11,818.
Unspecified	7,998	11,754	90	Brazil 3,832; France 3,517; China 1,320.
Steel, primary forms	1,288,971	2,076,226	1,245	Republic of Korea 784,269; Brazil 356,096; Taiwan 316,154.
Semimanufactures:				
Universals, plates, sheets	1,347,507	1,798,433	3,239	Republic of Korea 627,377; Romania 308,220; Brazil 267,341.
Unspecified	110,465	168,802	4,019	Republic of Korea 90,436; Brazil 41,098.
Lead:				
Ore and concentrate	237,807	249,226	--	Canada 61,039; Peru 57,503; Australia 49,957.
Oxides	2,736	5,921	3	Mexico 3,844; Singapore 1,679; China 322.
Metal including alloys:				
Scrap	1,012	450	254	New Caledonia 98; Papua New Guinea 64; United Arab Emirates 34.
Unwrought	61,209	108,448	549	Australia 54,226; North Korea 15,257; Mexico 14,101.
Semimanufactures	35	42	29	Republic of Korea 7; Singapore 6.
Lithium:				
Oxides and hydroxides	766	858	713	China 111; Hong Kong 34.
Metal including alloys, all forms	30	32	24	West Germany 8.

See footnotes at end of table.

Table 3.—Japan: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Magnesium: Metal including alloys:				
Scrap	302	192	--	Taiwan 101; Hong Kong 34; Malaysia 34.
Unwrought	15,006	14,642	10,755	Norway 2,587; Canada 732.
Semimanufactures	408	308	307	Mainly from West Germany.
Manganese:				
Ore and concentrate thousand tons	1,651	2,212	--	Republic of South Africa 1,207; Australia 532; India 276.
Oxides	787	1,371	3	Belgium-Luxembourg 1,368.
Mercury 76-pound flasks	3,583	1,522	--	Algeria 901; China 520; Spain 100.
Molybdenum:				
Ore and concentrate	18,737	18,246	5,640	Chile 5,133; Canada 3,819; Netherlands 2,431.
Oxides and hydroxides	549	578	528	Canada 18.
Metal including alloys, all forms	226	279	59	West Germany 172.
Nickel:				
Ore and concentrate thousand tons	2,297	2,835	--	New Caledonia 1,271; Indonesia 830; Philippines 734.
Matte and speiss	37,982	49,219	(2)	Indonesia 27,301; Australia 21,309; Canada 609.
Metal including alloys:				
Scrap	3,668	3,242	1,693	Taiwan 1,060; Canada 160.
Unwrought	27,400	32,840	3,866	Canada 12,240; U.S.S.R. 5,540; Norway 4,148.
Semimanufactures	3,931	3,471	933	United Kingdom 1,826; Canada 392; West Germany 134.
Platinum-group metals: Metals including alloys, unwrought and partly wrought:				
Palladium thousand troy ounces	1,024	1,258	102	U.S.S.R. 802; Republic of South Africa 177.
Platinum do	942	1,189	188	Republic of South Africa 504; United Kingdom 314; U.S.S.R. 119.
Rhodium do	75	58	3	U.S.S.R. 25; Republic of South Africa 19.
Iridium, osmium, ruthenium do	105	89	8	Republic of South Africa 64.
Unspecified do	33	72	5	Taiwan 43; West Germany 8; Pakistan 8.
Rare-earth metals including alloys, all forms	26	131	14	Brazil 107.
Selenium, elemental	23	28	8	Chile 8; Peru 3; Philippines 3.
Silicon, high-purity	60	114	42	Italy 26; West Germany 17; France 12.
Silver: Metal including alloys, unwrought and partly wrought thousand troy ounces	13,646	16,169	1,265	Mexico 9,271; Peru 3,608; Republic of Korea 1,019.
Tellurium, elemental	10	39	1	Peru 26; Belgium-Luxembourg 6; United Kingdom 3.
Tin: Metal including alloys, all forms	r29,842	31,912	6	Malaysia 19,548; Indonesia 6,425; Thailand 3,761.
Titanium:				
Ore and concentrate	411,047	645,972	--	Australia 265,819; Malaysia 202,667; Canada 72,056.
Oxides	6,625	6,262	561	Republic of Korea 1,444; United Kingdom 953; Belgium-Luxembourg 952.
Slag	63,118	62,697	--	Republic of South Africa 61,698; Canada 999.
Tungsten:				
Ore and concentrate	3,214	2,905	--	Republic of Korea 671; Portugal 660; Bolivia 250.
Metal including alloys, all forms	157	256	33	Republic of Korea 114; West Germany 73.
Uranium and/or thorium:				
Ore and concentrate	182	71	--	Niger 67.
Oxides and other compounds kilograms	13,094	17	1	West Germany 16.
Vanadium: Oxides and hydroxides	2,957	4,602	264	Republic of South Africa 3,879; China 327; Finland 121.
Zinc:				
Ore and concentrate	759,924	954,676	--	Australia 458,760; Peru 262,083; Canada 132,595.
Oxides	6,227	6,675	10	Republic of Korea 2,715; Taiwan 2,136; Singapore 943.

See footnotes at end of table.

Table 3.—Japan: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Zinc —Continued				
Metal including alloys:				
Scrap	248	464	263	Singapore 169.
Unwrought	45,118	60,797	208	Peru 18,247; North Korea 17,620; Mexico 9,670.
Semimanufactures	254	391	46	Norway 91; West Germany 78; China 57.
Zirconium:				
Ore and concentrate	198,224	217,648	3,169	Australia 183,799; Republic of South Africa 25,345.
Metal including alloys, all forms	75	163	9	France 153.
Other: Oxides and hydroxides	573	1,167	25	Italy 382; Norway 363; Canada 237.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	5,471	9,182	1,314	India 6,714; Malaysia 471.
Artificial: Corundum	8,623	20,226	137	China 9,242; Brazil 6,203; India 2,835.
Dust and powder of precious and semiprecious stones excluding diamond kilograms	121,930	221,215	--	West Germany 195,415; China 25,800.
Grinding and polishing wheels and stones	247	318	39	Austria 146; Italy 63; West Germany 23.
Asbestos, crude	237,413	239,747	10,319	Canada 97,130; Republic of South Africa 49,975; U.S.S.R. 42,885.
Barite and witherite	46,568	41,681	37	China 40,902.
Boron materials:				
Crude natural borates	49,850	51,800	--	All from Turkey.
Oxides and acids	21,125	24,828	18,772	Italy 3,906; Turkey 1,180; China 687.
Bromine and iodine	3,212	3,559	491	Israel 3,067.
Cement	16,052	173,675	72	Taiwan 93,677; Republic of Korea 76,722.
Clays, crude:				
Kaolin	549,763	684,405	514,583	Republic of Korea 66,149; Brazil 49,103; Malaysia 14,623.
Unspecified	259,474	282,003	116,958	China 139,009.
Diamond:				
Gem, not set or strung thousand carats	1,051	1,098	40	India 524; Israel 244; Belgium-Luxembourg 176.
Industrial stones do	794	682	92	Republic of South Africa 273; Zaire 77; Belgium-Luxembourg 57.
Dust and powder do	30,026	31,961	11,011	Ireland 19,039.
Diatomite and other infusorial earth	10,281	3,985	3,959	Mexico 20.
Feldspar	7,915	9,611	([2])	China 5,470; India 1,145; North Korea 957.
Fertilizer materials:				
Crude, n.e.s	1,175	1,452	--	Philippines 503; France 344; Peru 305.
Manufactured:				
Ammonia kilograms	180	1,021	776	West Germany 245.
Nitrogenous	64,959	59,946	6,749	Chile 16,598; Republic of Korea 9,939; Indonesia 8,766.
Phosphatic	72,018	73,694	27,758	Republic of Korea 45,789.
Potassic thousand tons	1,339	1,346	189	Canada 590; U.S.S.R. 223; West Germany 131.
Unspecified and mixed	397,091	333,274	309,639	Republic of Korea 10,302; Taiwan 6,828; Israel 3,543.
Fluorspar	435,333	513,284	--	China 294,524; Republic of South Africa 103,070; Thailand 100,076.
Graphite, natural	54,195	85,009	146	China 39,254; Republic of Korea 30,829; North Korea 11,026.
Gypsum and plaster	202,151	256,253	461	Mexico 180,197; Australia 34,491; Thailand 22,365.
Kyanite and related materials	17,675	27,515	7,125	Republic of South Africa 19,561.
Magnesium compounds:				
Magnesite	r44,778	50,420	--	China 48,743; North Korea 835.
Oxides and hydroxides	r245,793	278,277	9	China 183,658.
Mica:				
Crude including splittings and waste	9,705	13,001	601	India 5,587; China 3,406; Canada 1,300.
Worked including agglomerated splittings	147	84	3	India 40; Belgium-Luxembourg 24; Republic of Korea 14.
Nitrates, crude	--	3,500	--	All from Chile.
Phosphates, crude thousand tons	2,438	2,323	1,325	Morocco 586; Jordan 279.
Phosphorus, elemental	23,733	22,346	7,236	Canada 5,938; U.S.S.R. 2,399; Netherlands 2,013.

See footnotes at end of table.

Table 3.—Japan: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984 United States	Sources, 1984 Other (principal)
INDUSTRIAL MINERALS —Continued				
Pigments, mineral:				
Natural, crude	1,005	686	4	China 660.
Iron oxides and hydroxides, processed	6,194	8,999	3,036	West Germany 5,379; China 340.
Precious and semiprecious stones other than diamond:				
Natural:				
Gem material ---- kilograms	537,974	376,635	8,959	Brazil 250,740; Republic of South Africa 40,882; Taiwan 13,157.
Industrial stones ---- do	110	34	--	China 27; Switzerland 5; West Germany 2.
Synthetic ---- do	76,855	179,758	144,598	West Germany 14,098.
Salt and brine ---- thousand tons	6,381	6,458	(2)	Australia 3,028; Mexico 2,764.
Sodium compounds, n.e.s.:				
Carbonate, natural and manufactured	186	3,057	37	Kenya 3,020.
Sulfate, manufactured	46,642	55,419	1,818	China 44,411; Taiwan 8,342; Indonesia 848.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	629,366	667,716	23,899	India 162,906; Republic of Korea 144,792; China 82,812.
Worked	83,244	92,683	25	Republic of Korea 53,522; Italy 16,007; China 10,583.
Dolomite, chiefly refractory-grade	370,562	516,328	4,301	Philippines 388,239; Republic of Korea 92,235; Taiwan 29,800.
Gravel and crushed rock	377,807	285,794	15	Taiwan 265,909.
Limestone other than dimension	687	804	(2)	France 739; Taiwan 65.
Quartz and quartzite	75,732	104,939	1,190	India 47,859; Republic of Korea 18,684; China 16,719.
Sand other than metal-bearing	865,210	1,055,019	1,327	Australia 649,694; Taiwan 289,609; Malaysia 74,272.
Sulfur: Sulfuric acid	2	8,901	1	Philippines 8,899.
Talc, steatite, soapstone, pyrophyllite	615,182	619,260	18,586	China 439,042; Australia 118,759.
Other:				
Crude	247,955	356,699	10,822	Republic of Korea 187,784; Spain 86,400; Philippines 25,124.
Slag and dross, not metal-bearing	255,168	324,145	10,564	Republic of Korea 101,829; Taiwan 99,753; India 68,413.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	5,116	23,489	2,736	Australia 20,147; Trinidad and Tobago 526.
Carbon black	8,726	9,012	5,932	Canada 1,075; Republic of Korea 954; West Germany 634.
Coal:				
Anthracite ---- thousand tons	913	1,511	(3)	Republic of South Africa 846; China 206; Australia 174.
Bituminous ---- do	73,753	86,307	15,804	Australia 40,696; Canada 16,104; Republic of South Africa 6,929.
Lignite including briquets	43,315	24,870	1,028	U.S.S.R. 22,551; China 1,226.
Coke and semicoke	16,508	18,515	(2)	Australia 18,177; West Germany 338.
Peat including briquets and litter	17,769	19,961	10	Canada 19,447.
Petroleum:				
Crude ---- thousand 42-gallon barrels	1,288,306	1,327,491	--	Saudi Arabia 427,280; United Arab Emirates 204,855; Indonesia 172,501.
Partly refined ---- do	8,497	11,984	228	Kuwait 4,523; Indonesia 3,173; Venezuela 1,187.
Refinery products:				
Liquefied petroleum gas ---- do	344,286	432,109	11,776	Indonesia 168,216; Saudi Arabia 69,614; United Arab Emirates 50,945.
Gasoline ---- do	98,659	102,755	445	Saudi Arabia 24,885; Singapore 21,887; China 12,132.
Mineral jelly and wax ---- do	79	87	40	Republic of South Africa 22; China 17.
Kerosene and jet fuel ---- do	6,109	15,243	627	Singapore 6,320; Republic of Korea 2,150; China 1,364.
Distillate fuel oil ---- do	8,360	4,984	1,410	China 1,948; Saudi Arabia 1,212.
Lubricants ---- do	319	318	112	Netherlands Antilles 126; Singapore 25; Australia 22.
Residual fuel oil ---- do	62,412	73,889	13,259	Indonesia 25,925; Singapore 12,788; Republic of Korea 9,793.
Petroleum coke ---- do	20,394	18,279	16,293	China 984.

[r]Revised.
[1]Excludes imports under Japanese-United States Mutual Defense Agreement or for account of U.S. military forces. Table prepared by Audrey D. Wilkes.
[2]Less than 1/2 unit.
[3]May also contain some waste and scrap of germanium.

COMMODITY REVIEW

METALS

Aluminum.—Despite a steady increase in domestic demand for primary aluminum, Japan's production of primary aluminum by the ailing primary smelters including Mitsui Aluminium Co. Ltd., Nippon Light Metal Co. Ltd., Ryoka Light Metal Industries Ltd., Showa Light Metal Co. Ltd., and Sumitomo Aluminium Smelting Co. Ltd. dropped to its lowest level since 1963. The high cost of electric power and lower price of imported aluminum, resulting from further appreciation of the Japanese yen, remained the major factors for the continued decline in domestic primary aluminum production.

Because of the shrinking domestic demand for alumina and the continued decline in the world's prices of primary aluminum, Japan's alumina industry, which operated at less than 50% of installed capacity, shut down some of its production facilities. In September, Mitsui Aluminium decided to close its 400,000-ton-per-year Wakamatsu plant in Kitakyushu and contracted with the Shimizu plant of Nippon Light Metal to toll refine its imported bauxite. Showa Light Metal reportedly suspended production of alumina at its Yokohama plant, while production of alumina at Sumitomo Aluminium's 600,000-ton-per-year Kikumoto plant in Ehime was transferred to its parent company, Sumitomo Chemical Co. Ltd., in December.[5]

As a result of further appreciation of the Japanese yen, imports of primary aluminum rose 13% to 1.4 million tons, of which 1.2 million tons was regular-grade ingot, 25,265 tons was high grade, and the remainder was low-grade and aluminum alloy ingots. According to industry sources, imports of primary aluminum by the five primary smelters from captive-import development projects in Australia, Canada, Indonesia, New Zealand, the United States, and Venezuela totaled 651,921 tons. Of these imports, 358,000 tons (equivalent to the capacity cuts by the five smelters) was imported at a tariff rate of 1%, according to a decision made by the Ministry of Finance in 1984. All other imports of primary aluminum were subjected to a 9% tariff. Imports of primary aluminum by the five primary smelters reportedly will increase further in 1986 because of a captive project with Alumínio Brasileiro Ltda. of Brazil.

Japan's primary aluminum industry suffered another setback and will incur more financial difficulty because of actions taken by MITI to end the Government-sponsored stockpiling program and reduce the tariff on imports of aluminum mill products by 20% in 1986.

Under an agreement with MITI and the Light Metal Stockpiling Association on November 8, all primary aluminum smelters except Mitsui Aluminium were to buy back 101,521 tons of the stockpiled aluminum ingot on November 29, at a price of $2,200 per ton, about double that of the prevailing price. The remaining stockpiled aluminum of 14,849 tons, allocated to Mitsui Aluminium for repurchases at a later date, was to be stockpiled by private funds. Because of the high repurchase price, the four smelters reportedly were to encounter tremendous difficulties.[6]

Despite the opposition expressed by Japan's primary aluminum industry, MITI announced that the tariff on imports of aluminum mill products will be cut from 11.5% to 9.2% effective January 1986, and gradually reduce to the same 3% rate of the United States for aluminum mill products and 1% for aluminum ingot in 1988. As a result of MITI's decision, Showa Light Metal decided to close its 58,000-ton-per-year smelter in Chiba and withdraw completely from primary aluminum smelting effective March 1986.[7]

Domestic demand for primary aluminum increased slightly to 1.8 million tons, largely owing to a 3% increase in consumption by the aluminum rolling sector to 1.4 million tons and a 6% increase in consumption by aluminum casting to 131,467 tons. Consumption of primary aluminum for wire and cable dropped further by 6% to 66,848 tons. Exports of primary aluminum dropped sharply by 18% to 528 tons resulting from reduced shipments to the Republic of Korea.

As a result of decreased domestic production, the overall stocks of primary aluminum decreased 12% to 481,204 tons at yearend. Of the total stocks, 143,462 tons was held by producers, 201,713 tons by consumers, 121,180 tons by dealers, and 14,849 tons by a new privately funded Light Metal Stockpiling Association.

Chromium.—Domestic production of chromium ore and concentrate from the Tottori and Okayama areas rebounded to the 1981-82 level, while imports of chromium ore and concentrate increased 20% to 987,240 tons owing to increased consumption by the iron and steel industry. The major overseas suppliers of chromium ore and concentrate to Japan included the Republic of South Africa, 542,805 tons; India, 125,154 tons; and Albania, 94,123 tons. Consumption of chromium ore and concentrate for production of ferrochromium was 695,993 tons compared with 655,453 tons in 1984. Japan also imported 320,000 tons of ferrochromium principally from the Republic of South Africa, 197,416 tons; the Philippines, 33,719 tons; Brazil, 32,392 tons; India, 23,642 tons; and Zimbabwe, 23,359 tons.

Japan remained the world's leading producer of metallic chromium. Chromium metal using imported raw materials was produced by Toyo Soda Manufacturing Co. Ltd. at its 3,600-ton-per-year Yamagata plant using the electrolytic process and by Nippon Denko Co. Ltd. at its 1,200-ton-per-year Tokushima plant using the aluminothermic process. The 1985 production was estimated at 3,700 tons, of which about 2,200 tons was exported. Domestic consumption of chromium metal was 1,500 tons, of which 56% was consumed for superalloys, 22% for welding rods, 19% for aluminum alloys, and 3% for other.

Cobalt.—Production of cobalt metal rebounded to the 1983 level. Sumitomo Metal resumed production at its Niihama plant in Ehime Prefecture in August under a new tolling agreement with Nonoc Mining and Industrial Corp. (NMIC) of the Philippines. Between March 1984 and July 1985, Sumitomo Metal suspended production of cobalt metal because of the curtailment of nickel-cobalt mixed sulfide by NMIC from its mining operations on Nonoc Island. Production of cobalt metal by Nippon Mining Co. Ltd. at its Nikko plant in Ibaraki Prefecture rose slightly owing to increased shipments of nickel-cobalt mixed sulfide by Metals Exploration Queensland Pty. of Australia from its Greenvale Mine in Queensland. Imports of nickel-cobalt mixed sulfide totaled 14,209 tons containing 2,180 tons of cobalt, of which 1,220 tons was from Australia and 960 tons was from the Philipppines.

To meet domestic consumption, Japan also imported 2,158 tons of cobalt metal including powder and flakes principally from Zaire, Belgium, Zambia, Norway, and Finland, in order of value. Japan's consumption of cobalt metal was estimated to be 3,000 tons in 1985. Manufacturers of magnetic materials, high-speed specialty steels, and heat-resistant and ultrahard alloy steels remained the major consumers of cobalt metal in Japan.

In May, a sales agreement was signed by Marubeni Corp. of Japan and the Metal Marketing Corp. of Zambia Ltd. for the latter to export 300 tons of cobalt metal to Japan annually. Under the agreement, Marubeni was appointed exclusive agent to distribute in Japan 8% of the cobalt production by Zambia Consolidated Copper Mines Ltd. In past years, Mitsui Corp. was Japan's principal importer and sole distributor of cobalt metal from Zaire.[8]

Copper, Lead, and Zinc.—Japan's nonferrous mining industry continued to face problems of low metal prices, depleting ore reserves, and high cost of production. Two important copper, lead, and zinc mines in Akita Prefecture reportedly were closed permanently owing to exhaustion of reserves. The Namariyama Mine, operated by Namariyama Mining Co. Ltd. near Lake Towada in northeastern Akita, reportedly was closed in September, and the Minami-Furutobe Mine, operated by Furutobe Mining Co. Ltd., a subsidiary of Mitsubishi Metal Corp., also in northeastern Akita, was closed at yearend.

Mine production of copper dropped to its lowest level since 1963, while mine production of lead and zinc increased slightly over that of 1984. To meet domestic demand for copper, lead, and zinc, Japan continued to rely on imports of copper ore and refined metal to a large extent, and imports of lead and zinc ore and refined metal to a lesser extent.

In 1985, Japan imported 3 million tons of copper ore and concentrate for domestic metal production from the following sources, in metric tons:

Principal source	Quantity	Metal content
Canada	804,013	225,000
Chile	343,831	105,000
United States	365,944	90,000
Papua New Guinea	270,509	80,000
Philippines	298,526	75,000
Indonesia	245,908	70,000
Australia	243,063	60,000
Malaysia	134,273	30,000
South Africa, Republic of	70,161	25,000
Mexico	70,499	20,000
Peru	69,436	20,000

In addition, Japan imported 35,000 tons of blister mainly from the United States, Chile, and the Republic of South Africa; and 356,000 tons of refined copper principally from Zambia, the Philippines, Chile, Peru, the United States, and the Republic of South Africa, all in order of weight.

Japanese imports of lead and zinc ores and concentrates for metal production were 261,795 tons and 856,648 tons, respectively. Japan also imported 39,613 tons of refined lead and 64,519 tons of refined zinc. Australia, Canada, Peru, and the Republic of South Africa provided 90% of the lead ore imports, while Australia, Canada, Chile, Peru, and the Republic of South Africa supplied 93% of the zinc ore imports. The major suppliers of refined lead were Australia, Mexico, and Peru. The major suppliers of refined zinc were North Korea and Peru.

Domestic production of refined copper remained at about the same level as that of 1984 or 76% of the industry's installed capacity. Production of refined lead was slightly higher than that of 1984 or equivalent to 92% of the industry's installed capacity. Production of refined zinc was slightly lower than that of 1984 or 73% of the industry's installed capacity.

Domestic demand for refined copper dropped 8% to 1,364,641 tons owing to reduced demand for copper by the electronics industry and increased use of optical fiber. According to MITI, demand for copper by the wire and cable industry dropped 4% to 930,049 tons, while demand for copper by the brass mill industry also dropped 14% to 416,311 tons. However, exports of refined copper rose sharply to 51,042 tons from 18,366 tons in 1984 because of increased exports to China. By yearend, stocks of refined copper rose 7% to 167,420 tons, of which 74,008 tons was held by producers, 73,606 tons by fabricators, and 19,806 tons by distributors.

Domestic demand for refined lead rose slightly to 281,665 tons because of increased consumption of storage batteries, while domestic demand for refined zinc dropped slightly to 732,022 tons owing to decreased consumption of galvanized steel sheets. Exports of refined lead rose 48% to 24,271 tons, while exports of refined zinc dropped 26% to 33,427 tons in 1985. By yearend, stocks of refined lead decreased 9% to 30,206 tons, and stocks of refined zinc also dropped 11% to 75,179 tons.

Since 1970, Japan has been one of the top three producers of refined copper in the world. To maintain at least a 75% utilization of its 1.2-million-ton-per-year refining capacity, Japan has imported 3 million tons per year of copper ore and concentrate, which is equivalent to 70% of copper concentrate traded in the world market. However, because of a copper concentrate shortage in the world market and reduced supply during the past 3 years from its traditional sources, such as the Philippines, Japan has been actively seeking alternative reliable sources of foreign copper ore and concentrate, particularly in North and South America. As part of this effort, Sumitomo Metal reportedly was to participate in a joint mining project in the United States, Nittetsu Mining Co. Ltd. was to jointly develop a mine in Colombia, and Nippon Mining and Mitsubishi Metal were to participate in a multinational project in Chile.

After more than a year of negotiations, a final agreement was expected to be signed by Sumitomo Metal and Phelps Dodge Corp. of the United States in early 1986. Under the agreement, Sumitomo Metal and Sumitomo Corp. were to invest a total of 15% in equity or $75 million in Phelps Dodge's Morenci copper operation in Arizona. In return for their equity participation, Sumitomo Metal will take 15% of the copper output, or 37,500 tons of copper in concentrate per year, from the Morenci Mine over a 20-year period beginning in 1986.[9]

In August, Nittetsu Mining signed a joint venture agreement with Minas El Lobre Ltda. of Colombia to develop the El Lobre copper mine, about 80 kilometers southwest of Medellín. According to the development plan, a small-scale copper mine with an annual capacity of 100,000 tons of ore (4,000 tons of copper metal) is expected to be completed in 1988.

In October, Nippon Mining and Mitsubishi Metal jointly acquired a 10% interest in the $1.2 billion La Escondida copper project in Chile. The other major partners included Utah International Inc. (60%), a subsidiary of The Broken Hill Pty. Co. Ltd. of Australia, and Rio Tinto Zinc Corp. PLC (30%) of the United Kingdom. The La Escondida Mine, in Chile's Atacama Desert, is one of the richest undeveloped copper deposits in the world having proven reserves of 545 million tons of ore averaging 2.2% copper and 0.01% molybdenum. Under the plan, a large-scale copper mine and a concentrator with an annual capacity of 300,000 tons of copper in concentrate are expected to be completed in 1990. Most of the concentrate will be shipped to Japan for smelting.[10]

Table 4.—Japan: Mine production of copper, lead, and zinc in 1984

(Metric tons, metal content)

Company and location	Copper	Lead	Zinc
Akenobe Mining Co. Ltd.: Akenobe, Hyogo	3,978	--	12,957
Chuugai Mining Co. Ltd.: Jokoku, Hokkaido	--	474	1,185
Dowa Mining Co. Ltd.:			
Kosaka, Akita	4,053	5,850	20,643
Hanaoka, Akita	13,458	10,804	51,060
Furutobe Mining Co. Ltd.: Minami-Furutobe, Akita	2,695	916	3,636
Hanawa Mining Co. Ltd.: Hanawa, Akita	1,973	530	4,085
Hosokura Mining Co. Ltd.: Hosokura, Miyagi	--	5,157	14,406
Mitsui Mining & Smelting Co. Ltd.: Kamioka, Gifu	--	4,419	59,593
Nippon Zinc Mining Co. Ltd.: Nakatatsu, Fukui	--	2,272	21,464
Nittetsu Mining Co. Ltd.: Kamaishi, Iwate	4,295	--	--
Syakanai Mining Co. Ltd.: Syakanai, Akita	5,209	4,385	20,784
Toyoha Mining Co. Ltd.: Toyoha, Hokkaido	--	9,666	33,836
Yatani Mining Co. Ltd.: Yatani, Yamagata	--	2,724	4,867
Other	7,648	1,538	4,184
Total	43,309	48,735	252,700

Gold and Silver.—Japan's mine production of gold increased sharply to its highest level since 1973, while mine production of silver increased slightly. The increase in gold production was attributed mainly to Sumitomo Metal's new Hishikari gold mine in southern Kyushu. Owing to additional gold production from the Hishikari Mine, Japan's gold mine production by primary gold producers increased to 69% total mine output from 51% in 1984. However, mine production of silver from primary silver producers decreased to 9% of total mine output from 11% in 1984. The 1985 mine production of gold and silver was about 2% and 14%, respectively, of Japan's domestic demand.

Domestic metal production of gold and silver continued to increase as a result of larger input of domestic gold and silver ore. The share of gold metal production from domestic ore rose to 21% from 17% in 1984, while the share of silver metal production from domestic ore remained unchanged at 20%. The 1985 metal production of gold and silver was equivalent to 17% and 70%, respectively, of Japan's domestic demand.

To meet the strong demand for gold and silver, Japan's imports of gold metal rose 3% to another record high of 6.3 million troy ounces, while imports of silver metal surged 8% to 16.8 million troy ounces. Switzerland and the United Kingdom remained the two principal suppliers of imported gold metal, accounting for 46% and 18%, respectively, of imports. The other major suppliers were the Republic of South Africa, 11%; the U.S.S.R., 8%; Australia, 7%; and Belgium and Canada, 3% each. Australia emerged as the fifth largest supplier of gold metal to Japan owing to an unprecedented expansion in its gold mining industry in 1985. Mexico and Peru remained the two dominant suppliers of silver metal imports, accounting for 64% and 23%, respectively. The other important suppliers of silver metal and powder were Australia and the United States, 5% each, and the Republic of Korea, 2%.

Domestic demand for gold remained at a high level of 8.4 million troy ounces. Purchase of gold for private hoarding and jewelry, the two dominant consumers in Japan, remained at a high level, accounting for 42% and 23%, respectively, of Japan's demand. The other end users, including dental, medical, communication and electrical equipment, plating, and gilding, were at slightly lower levels than that of 1984. Domestic consumption of silver dropped slightly to 75.4 million troy ounces, of which 56% was for photographic materials; 10% for electric contact points; 9% for industrial silver nitrates; 5% each for brazing alloys and fabricated products; 4% for plating; and 11% for silverware, jewelry, dental, and other uses.

The much publicized Hishikari gold mine in Kagoshima Prefecture was finally brought into operation by Sumitomo Metal in July. According to an industry source, production of gold amounted to 19,162 troy ounces for the first 3 months of operation ending in September. Under the company's production plan, 72,300 troy ounces of gold and 53,100 troy ounces of silver were expected to be produced by treating 15,000 tons of ore during the following 6-month period ending in March 1986.[11] During the last quarter of 1985, the average ore grade had been running at between 150 and 162 grams of gold per ton of ore, which is considerably higher than the overall average ore grade of 80 grams of gold per ton of ore published earlier by the company. The higher ore grade, reportedly, came from the upper portion of the ore body.

In December, Mitsubishi Metal announced that its Chitose gold and silver mine, operated by Chitose Mining Co. Ltd. in Hokkaido, would be closed permanently in February 1986 because of exhaustion of ore reserves at the mine.

Iron and Steel.—Japan's mine production of iron ore and roasted pyrite increased slightly. Typical Japanese iron ore concentrate and roasted pyrite contained 62% iron. However, domestic mine production of iron ore and pyrite concentrate remained insignificant. Japan continued to import essentially all of its ore requirements to meet the demand of its iron and steel industry.

Imports of iron ore including iron sands, pellets, and sinters were 124 million tons compared with 125 million tons in 1984. Australia, Brazil, and India remained the dominant suppliers of iron ore to Japan, accounting for 44%, 23%, and 15%, respectively. Other important suppliers were the Republic of South Africa, 5%; Chile 4%; the Philippines, 3%; and Canada, New Zealand, and other, 2% each. Japan also imported 737,109 tons of ferruginous manganese ore and concentrate, 63% from the Republic of South Africa and 37% from India.

Consumption of iron ore including iron sands, pellets, sinter ore, and unprocessed iron ore by the iron and steel industry for production of pig iron totaled 132 million tons. Production of pig iron remained at the same level as that of 1984 and accounted for 16% of world production.

The 1985 pig iron production was equivalent to 65% of the industry's 123.7-million-ton-per-year installed capacity. Almost all of the pig iron was produced by 38 operating blast furnaces. Between 1984 and 1985, the industry's installed capacity of blast furnaces was cut by 13.5 million tons to 123.5 million tons per year by dismantling 11 of the 65 blast furnaces. In addition, the industry's installed capacity of electric furnaces was also being cut by 23,310 tons to 66,690 tons per year by dismantling three of eight electric furnaces.

Japan remained the world's second largest producer of crude steel, and its output accounted for 15% of world production in 1985. The 1985 crude steel output was equivalent to 69% of the industry's 152.4-million-ton-per-year installed capacity. Between 1984 and 1985, the installed capacity of basic oxygen and ultrahigh-power electric furnaces was cut by 3.4 million tons and 600,000 tons, to 124.0 million tons per year and 28.4 million tons per year, respectively. However, by yearend, the industry's installed capacity of continuous casting machines was being raised by 2.1 million tons to 87.3 million tons per year with 154 machines.

Japan's steel industry continued to improve its steel rolling efficiency by raising the continuous casting percentage. According to MITI, the percentage of continuous ingot casting for rolling rose to 93% from 91% in 1984. The percentages for rolled ordinary steel and specialty steel rose to 96% from 94% and to 79% from 76%, respectively. Production of ordinary steel was at about the same level as that of 1984, while production of specialty steel continued its upward trend and reached another record high of 16.8 million tons owing mainly to increased consumption by the automobile industry and exports. The relatively high steel production reportedly was sustained mainly by strong domestic demands for consumer durable goods and industrial machinery.

According to Japan's Iron and Steel Federation, domestic apparent consumption of steel dropped 1.3% to 73.4 million tons of crude steel equivalent. However, according to MITI, domestic orders for finished steel products by end use rose slightly over that of 1984. The automobile and home and office equipment manufacturing industries remained the major driving forces of domestic demand for both ordinary and specialty steel products. Steel exports remained at 35 million tons of crude steel equivalent, while imports dropped 28% to 3.1 million tons of crude steel equivalent in 1985. The sharp drop in imports was a direct result of reduced imports of steel plates and wide strips from Brazil.

According to MITI, exports of iron and steel products rose from 32.8 million tons in 1984 to 33.4 million tons in 1985, of which 28.4 million tons was ordinary steel; 2.2 million tons was specialty steel; 1.1 million tons was pig iron, ferroalloys, and ingots; and 1.1 million tons was steel wire products, semimanufactured steel products, and other steel products. The continued increase in exports to China helped Japan sustain a high level of steel exports. Exports of iron and steel products to China increased 27% to 10.9 million tons, those to the U.S.S.R., rose 2% to 2.1 million tons, while exports to the United States dropped 18% to 5.2 million tons resulting from import restrictions implemented in June by the United States. Other major importers of Japanese iron and steel products were the Republic of Korea, 1.9 million tons; Saudi Arabia, 1.3 million tons; Taiwan, 1.1 million tons; Iran, 881,000 tons; Thailand, 878,000 tons; and Hong Kong, 852,000 tons.

Imports of iron and steel products dropped 22% to 4.5 million tons, of which 2.5 million tons was ordinary steel; 820,000 tons, ferroalloys; 748,000 tons, pig iron; and 432,000 tons, ingots, semimanufactured steel products, specialty steel, and other steel products. Lower Japanese imports of iron and steel products were largely a direct result of reduced imports of ordinary steel from Brazil and Taiwan. However, imports of ordinary steel from the Republic of Korea remained at a high level of 1.5 million tons because of further appreciation of the Japanese yen against the Korean won.

Table 5.—Japan: Crude steel production and world rank of the top seven companies

	Output (million metric tons)		World rank	
	1984	1985	1984	1985
Nippon Steel Corp	29.60	28.56	1	1
Nippon Kokan K.K.	12.50	12.10	5	6
Sumitomo Metal Industries Ltd	11.30	10.99	7	9
Kawasaki Steel Corp.	10.28	10.86	8	11
Kobe Steel Ltd	6.62	6.46	16	18
Nisshin Steel Co. Ltd.	2.96	3.29	36	35
Tokyo Steel Manufacturing Co. Ltd	2.90	2.78	37	38
Total	76.16	75.04	XX	XX

XX Not applicable.

Table 6.—Japan: Domestic orders for ordinary and specialty steel products, by end use

(Thousand metric tons)

End use	Ordinary		Specialty	
	1984	1985	1984	1985
Automobiles	9,252	10,026	1,815	2,012
Construction	11,341	11,212	454	479
Conversion and processing	3,021	2,962	3,432	3,444
Electric machinery	2,598	2,544	83	82
Home and office equipment	685	698	193	199
Industrial machinery	1,630	1,653	1,025	1,025
Rolling stock	144	105	55	51
Shipbuilding	3,501	3,248	98	68
Steel dealers	15,337	16,064	931	988
Tanks and containers	1,993	2,004	109	68
Other	279	301	131	85
Total	49,781	50,817	8,326	8,501

Manganese.—Mine production of manganese ore and concentrate dropped to its lowest level since 1947 owing to the permanent closure of the Ooe Mine in Hokkaido by Hokushing Mining Co. Ltd. in October 1984. As a result, Japan's import reliance of manganese rose to 98% in 1985.

Japan imported 1.4 million tons of manganese ore and concentrate principally from the Republic of South Africa, 53%, and Australia, 35%. Consumption of manganese ore and concentrate by the iron and steel industry for production of ferromanganese and silicomanganese was 1 million tons and by other industries for production of electrolytic manganese dioxides and ceramics was 61,833 tons. Japan also imported 8,376 tons of high-grade manganese dioxide ore and concentrate from Australia, China, and Gabon for production of metallic manganese.

Japan was the world's leading producer of electrolytic manganese dioxide. The industry consists of four companies operating four plants in Japan and two plants overseas. For the past 4 years, production of electrolytic manganese dioxide has been increasing at an annual rate of 2.6% owing to the steady increase in world demand for manganese batteries.

According to Japanese industry sources, exports of electrolytic manganese dioxide were expected to reach 46,000 tons, accounting for over 90% of production in 1985.

Metallic manganese was produced by Toyo Soda at Huga with an annual capacity of 6,000 tons and Chuo Denki Kogyo Co. Ltd. at Taguchi with an annual capacity of 3,600 tons. Both plants used the electrolytic (wet) process. According to industry sources, 1985 production was estimated at 4,600 tons. Domestic consumption totaled 3,200 tons, of which 50% was for nonferrous alloys, 35% for specialty steels, 9% for welding rods, and 6% for chemical and other. Annual exports of metallic manganese was between 20 and 24 tons during the past 2 years.[12]

Table 7.—Japan: Electrolytic manganese dioxide production capacity

(Metric tons)

Company and location	Annual capacity
Daiichi Carbon Co.: Yokohama, Kanagawa	3,000
Japan Metals and Chemicals Co. Ltd.: Takaoka, Toyama	12,000
Mitsui Mining & Smelting Co. Ltd.: Takehara, Hiroshima	25,200
Toyo Soda Manufacturing Co. Ltd.: Hinata, Shizuoka	24,000
Total	64,200

Molybdenum.—Domestic mine production from the Higashiyama Mine was equivalent to only 1% of Japan's molybdenum requirements in 1985. To meet the demand for molybdenum, Japan imported 21,138 tons of roasted molybdenum concentrate, principally from the United States, 35%; Chile, 33%; and the Netherlands, 20%. Japan also imported 384 tons of molybdenum trioxide, mainly from the United States.

Consumption of molybdenum concentrate and trioxide totaled 9,505 tons, of which 6,253 tons was consumed by the ferroalloy industry for ferromolybdenum and molybdenum briquets, 1,361 tons for inorganic chemicals, 531 tons for molybdenum metal, and 1,360 tons for other.

To meet the demand for ferromolybdenum and molybdenum metal by the specialty steel industry, Japan also imported 988 tons of ferromolybdenum, mainly from Austria, Chile, and the Netherlands, as well as 251 tons of molybdenum metal including flakes, ingots, and powder, principally from Australia, the Federal Republic of Germany, and the United States.

Nickel.—Japan remained the world's third largest producer of refined nickel and a major consumer of nickel ore, ferronickel, and refined nickel. However, Japan continued to import all raw material for ferronickel and nickel metal products.

Imports of nickel ore rose 5% to 3.0 million tons because of increased consumption by the ferroalloy industry. Indonesia, New Caledonia, and the Philippines remained the three suppliers of nickel ore to Japan. Consumption of nickel ore for ferronickel rose 7% to 2.2 million tons. To meet the growing demand by the stainless steel industry, Japan also imported 46,155 tons of ferronickel, principally from New Caledonia, Indonesia, and the Dominican Republic, in order of volume.

Imports of nickel matte and nickel-cobalt mixed sulfide for production of refined nickel were 52,462 tons and 14,209 tons, respectively. Australia and Indonesia remained the major suppliers of nickel matte to Japan, while Australia and the Philippines remained the suppliers of nickel-cobalt mixed sulfide. Because of lower consumption and increased domestic production of nickel metal, imports of refined nickel dropped 15% to 28,996 tons. The major suppliers of refined nickel in 1985 were Canada, 9,063 tons; the U.S.S.R., 4,598 tons; Norway, 3,264 tons; Australia, 2,750 tons; the Philippines, 2,577 tons; and Zimbabwe, 2,383 tons.

According to MITI, consumption of refined nickel dropped 12% to 43,780 tons, of which 59% was consumed for specialty steel, 13% for galvanized sheet, 9% for nonferrous alloys, 6% for magnetic materials, 4% for storage batteries, 3% for rolled sheet, and 6% for other. Exports of refined nickel rose to 580 tons from 462 tons (revised) in 1984. Iran, the Republic of Korea, and Taiwan were major importers of Japanese refined nickel.

Titanium.—Japan was the world's third largest titanium sponge producer following the U.S.S.R. and the United States. Production of titanium sponge continued to recover and reached 22,000 tons. However, domestic demand for titanium sponge remained sluggish, while exports dropped significantly. As a result, industry yearend stocks of sponge metal rose sharply to 6,710 tons from 2,734 tons in 1984. According to the Japanese industry's estimate,[13] 1985 production and annual capacity of titanium sponge metal by company were as follows, in metric tons:

Company and location	Production	Capacity
Nippon Soda Co. Ltd.: Nihongi, Niigata	1,500	2,400
Osaka Titanium Co. Ltd.: Amagasaki, Hyogo	10,000	18,000
Showa Titanium Co. Ltd.: Toyama, Toyama	1,500	2,000
Toho Titanium Co. Ltd.: Chigasaki, Kanagawa	9,000	12,000
Total	22,000	34,400

Demand by domestic titanium mill producers, including sponge producers' inhouse consumption, was estimated to remain at the same level of 18,500 tons. However, exports of titanium sponge declined 39% to 3,992 tons because of a significant drop in exports to the United States. Exports to the United States dropped 57% to 1,698 tons, resulting from high dumping duties imposed by the United States and the appreciation of the Japanese yen. Other major buyers of Japanese titanium sponge in 1985 included France, 797 tons; the Federal Republic of Germany, 746 tons; the Netherlands, 515 tons; and the United Kingdom, 166 tons.

Production of titanium dioxide pigment increased slightly, while demand remained at the same level as that of 1984. However, exports of titanium dioxide pigment rose by 18% to 59,000 tons. According to the Japan Titanium Dioxide Association, Japan's supply and demand for titanium dioxide were as follows, in metric tons:

Item	1984	1985
Production	206,342	218,851
Imports	37,140	42,213
Domestic demand:		
Ceramic condensers	2,580	1,332
Chemical fibers	5,072	5,057
Paint	84,361	83,651
Paper	11,369	10,867
Printing inks	25,202	25,677
Rubber	4,386	3,778
Synthetic resin	13,140	14,153
Other	11,246	13,641
Exports	50,140	59,270
Producer stocks	8,745	10,170

All raw material for Japan's production of titanium sponge and titanium dioxide was met by imports. During 1985, imports of rutile and ilmenite totaled 604,044 tons, of which 296,592 tons was from Australia, 168,173 tons from Malaysia, 57,160 tons from Sri Lanka, 49,685 tons from India, 20,398 tons from Canada, 6,562 tons from the United States, and 5,474 tons from the Republic of South Africa. Japan also imported 95,476 tons of titanium slag, principally from the Republic of South Africa, for producing titanium dioxide.

In December, a $31 million loan was approved by the Long Term Credit Bank of Japan for the construction of a 100,000-ton-per-year synthetic rutile plant in North Capel, Western Australia. The plant was a joint venture of Westralian Sands Ltd. of Australia, Trioxide International Ltd. of the United Kingdom, and Ishihara Sangyo Co. Ltd. of Japan. According to Ishihara Sangyo, the plant was expected to be completed by yearend 1986.

In July, Osaka Titanium Co. Ltd. appealed to the U.S. Department of Commerce the original antidumping duty of 15.09%. After reexamination by the Department of Commerce, the duty imposed on Osaka Titanium was reduced to 14.59%, while duties for Toho Titanium Co. Ltd. and Nippon Soda Co. Ltd. remained at 34.25% and 56.37%, respectively.

Tungsten.—Domestic mine production of tungsten ore and concentrate increased slightly owing to strong demand by the iron and steel industry. However, because of the high production cost associated with the lower domestic ore grade and the appreciation of the Japanese yen, four of Japan's eight tungsten mines closed between 1983 and 1985. Three of the remaining four tungsten mining companies reportedly operated with losses. Japan imported more than 83% of its tungsten requirements in 1985.

Kiwaden Mining Co. Ltd. of Kiwaden, Yamaguchi Prefecture, which became independent from Awamura Mining Co. Ltd. in 1982, produced scheelite having an average ore grade of 5% tungsten and accounting for 37% of Japan's output. Nittetsu Mining at Shinyakuki, Fukushima Prefecture, produced scheelite from its limestone operations having an average grade of 0.8% tungsten and accounting for 32% of output. Tanaka Mining Co. Ltd. at Kuga, Yamaguchi Prefecture, produced scheelite having an average grade of 0.4% tungsten and accounting for 25% of output. Mitsubishi Metal produced scheelite at Ikino, Hyogo Prefecture, and extracted byproduct tungsten at its Akenobe tin mine in Hyogo, accounting for 6% of output.[14]

To meet the domestic demand, Japan imported 2,900 tons of tungsten ore and concentrate, principally from Portugal, 868 tons; the Republic of Korea, 525 tons; Bolivia, 288 tons; Australia, 227 tons; Peru, 184 tons; Canada, 176 tons; France, 165 tons; and China, 138 tons.

Consumption of tungsten ore and concentrate rose to 4,590 tons from 4,038 tons in 1984. According to MITI, of the tungsten ore and concentrate consumed in 1985, 77% was for tungsten metal; 18% for calcium tungsten; 4% for ferrotungsten; and 1% for inorganic chemicals and other. Stocks at yearend totaled 1,226 tons, of which 1,177 tons was held by consumers, 48 tons by producers, and 1 ton by dealers.

INDUSTRIAL MINERALS

Cement.—Production continued to decline because of the stagnant domestic market and a further drop in exports. Domestic demand was estimated to be 70 million tons, while exports declined 20% to 9 million tons. A further cutback in Middle Eastern public works and price competition among the Far Eastern cement producing countries remained the major causes of reduced exports. Exports to Saudi Arabia and Kuwait dropped 45% to 3.3 million tons, while exports to Hong Kong and Singapore remained at 3.2 million tons. In past years, exports to the United States were small; however, shipments to the United States increased significantly to 972,283 tons in 1985. During 1985, imports of cement also rose sharply to 476,928 tons from 173,675 tons in 1984 because of low-priced cement offered by the Republic of Korea and Taiwan.

According to industrial sources, the cement industry was to reduce capacity by 4.9 million tons per year by fiscal year 1986 ending in March in addition to the 25 million tons per year reduced in fiscal year 1985. After completion of the rationalization program, the cement industry was expected to operate at between 75% and 80% of its 99.4-million-ton-per-year capacity.

Fluorspar.—Japan remained the world's third largest consumer of fluorspar following the United States and the U.S.S.R., and continued to import all of its fluorspar requirements. Imports rose 11% to 570,656 tons, of which 344,562 tons of acid- and metallurgical-grade fluorspar was from China, 87,451 tons of acid grade from the Republic of South Africa, 86,752 tons of acid and metallurgical grades from Thailand, and 51,801 tons of metallurgical grade from Mexico. About 45% of the imports was acid grade.

According to Japanese industrial sources, consumption of metallurgical- and acid-grade fluorspar rose to 211,000 tons from 208,000 tons in 1984 and to 209,000 tons from 193,000 tons in 1984, respectively. The major consumer of metallurgical-grade fluorspar was the iron and steel industry. The major consumer of hydrofluoric acid was the manufacturers of fluorocarbon (flon) gas, which used 150,000 tons, of which 35% was for solvents, 30% for refrigerants, 15% for blowing agents, 9% for aerosols, and 11% for export. Other uses of hydrofluoric acid were 10,500 tons for fluorinated resins and 800 tons for fluorinated rubber.

Iodine.—Japan remained the world's largest producer of iodine, accounting for 59% of the production. Production of iodine from the Chiba, Niigata, and Miyazaki areas increased steadily over the past 5 years owing to increasing exports and domestic demand for food and feed additives, X-ray contrast media, industrial chemicals, catalysts, photosensitive materials, and pharmaceuticals. Annual iodine production capacity was expanded to 9,220 tons from 8,700 tons in 1980. Production of crude iodine and annual capacity by company and area in 1984 were as follows, in metric tons:

Company and production area	Production	Capacity
Ise Chemical Industries Co. Ltd.:		
Chiba	2,445	3,000
Niigata	575	900
Miyazaki	180	360
Kanto Natural Gas Development Co. Ltd.: Chiba	880	1,030
Nippon Chemicals Co. Ltd.: Chiba	290	450
Nippon Halogens Chemical Co. Ltd.: Niigata	280	360
Nippon Natural Gas Industry Co. Ltd.: Chiba	1,040	1,320
United Resources Industry Co. Ltd.: Chiba	1,610	1,800
Total	7,300	9,220

Ise Chemical Industries Co. Ltd. operated five plants in Chiba, one plant in Niigata, and one plant in Miyazaki using the blow-out process. Kanto Natural Gas Development Co. Ltd. operated three plants in Chiba using the ion-exchange process. Nippon Chemicals Co. Ltd. and Nippon Halogens Chemical Co. Ltd. operated one plant each using the blow-out process. Nippon Natural Gas Industry Co. Ltd. operated four plants in Chiba using the ion-exchange process. United Resources Industry Co. Ltd. operated two plants in Chiba using the blow-out process.

The Chiba iodine production area continued to have land subsidence problems. The Government reportedly introduced regulations to alleviate the problem by limiting the spacing of wells and requiring reinjection of brines by the iodine producers. The Miyazaki area remained the only area for future expansion of iodine production. According to Ise Chemical, the annual capacity of its Miyazaki plant could be expanded to 700 tons from its current capacity of 360 tons. The company reportedly took over Woodward Iodine Corp. of the United States in July 1984.

According to the latest market survey by industry, Japan's demand for iodine and its compounds by end user was pharmaceutical, 22%; synthetic chemicals and catalysts, 20%; food and feed additives, 12%; agricultural, 11%; sanitizers, 10%; stabilizers, 10%; inks and dyes, 4%; photography, 4%; and other, 7%.

Limestone.—Japan remained the world's third largest limestone producer. The output of limestone dropped 6 million tons owing mainly to reduced demand by the cement industry. According to the Limestone Association of Japan, limestone was produced from 308 quarries in Japan. However, 80% was produced from 41 quarries, each having an output of 1 million tons or more. To improve productivity and safety, 99% of the limestone reportedly was mined by the bench cut method. The industry also made substantial progress in environmental preservation, pollution prevention, blasting technology, and quarry highwall retention.

Limestone was consumed for cement, 50%; construction aggregate, 25%; iron and steel, 13%; lime, 6%; pulverized limestone, 3%; soda and glass, 1%; and other, 2%. Japan's lime industry consumed 10 million tons of limestone and produced 7.4 million tons of quicklime and 1.8 million tons of hydrated lime. The pulverized limestone industry produced ground limestone mainly for fillers and animal feed.

MINERAL FUELS

Coal.—Japan's coal mining industry suffered another setback when two coal mines operated by Mitsubishi Coal Mining Co. Ltd. had explosions in April and May. As a result, coal production failed to rebound as planned but dropped further to 16.4 million tons. The explosions at the Minami-O-Yubari Mine in northern Hokkaido and a mine near Nagasaki in northeastern Kyushu reportedly claimed 62 and 11 lives, respectively. The Minami-O-Yubari Mine was 1 of Japan's top 10 producing coal mines having an annual capacity of 1.1 million tons. It was also one of the few profit-making coal mines in Hokkaido.

As a result of the Minami-O-Yubari coal mine accident, the output of coal from the Hokkaido area dropped 6% to 9.8 million tons. Of the 1985 coal production, 12.4 million tons was steam coal, 3.9 million tons was coking coal, and 25,490 tons was anthracite. The average heating value of coal produced in 1985 was 6,210 kilocalories per kilogram. The number of coal miners decreased further by 718 to 14,369 at the end of 1985. However, labor productivity continued to improve, reaching 92.5 tons of coal per month per miner compared with 90.5 tons of coal per month per miner in 1984. The number of days worked decreased to 299.7 from 301.5 in 1984.

Domestic coal production was equivalent to 15% of demand in 1985. To meet the growing domestic demand, imports of coal rose 7% to 93.4 million tons, of which 69.2 million tons was coking coal, 22.3 million tons was steam coal, and 1.9 million tons was anthracite. Australia, Canada, and the United States remained the principal suppliers of coking coal to Japan. Australia, China, and the Republic of South Africa remained the major suppliers of steam coal. Anthracite was imported from the Republic of South Africa, Australia, China, Vietnam, and North Korea, in order of tonnage. A significant increase in imports of coal from the U.S.S.R. was reported in 1985, especially for coking coal, which rose 71% to 2.7 million tons. On the contrary, imports of coking coal from the United States dropped 15% to 12.8 million tons. The average c.i.f. price of coking coal from the U.S.S.R. was $54 per ton and from the United States, $68 per ton.

Domestic demand for coal rose 6% to 110.6 million tons resulting mainly from a 20% increase in demand for steam coal by the electric power industry and a 16% increase in demand for coking coal by the coke manufacturing industry. Of the coal consumed, imported coal accounted for 84% while domestic coal accounted for 16%. Despite a much higher price for domestic coal, its market share remained fairly constant owing to the Government policy that consumers must purchase domestically produced coal before importing low-priced coal. During fiscal year 1985, imported steam coal, on a c.i.f. basis, averaged $42 per ton while the standard price set by MITI for domestic steam coal for power generation was $87 per ton, effective May 1, 1985. Imported coking coal prices, on a c.i.f. basis, averaged $55 per ton while the price for domestic coking coal was $108 per ton, effective May 1, 1985.[15]

In Japan's seventh 5-year plan (fiscal years 1982-86), a production target of 20 million tons per year was set by the Government. Despite heavy Government subsidies, the production target was never reached during the past 5 years, and most coal mining companies continued to suffer losses. To establish policy for the domestic coal mining industry for the eighth 5-year plan (fiscal years 1987-91), MITI requested in September that the Coal Mining Council, one of its advisory panels, study and submit recommendations by the summer of 1986. The Council was expected to focus on (1) the desirable and more realistic target for domestic coal production, and (2) possible relaxation of the coal import policy that required domestic coal consumers to purchase domestic coal at least equal to 10% of their coking coal imports and 20% of their steam coal imports.[16]

Because of the rising cost of domestic coal production, widening price gaps between domestic and imported coal, and growing pressure from domestic consumers as well as foreign coal suppliers, the domestic coal production target reportedly was to be scaled down and MITI's coal import guideline was to be revised. As a result of these policy changes, the industry predicted that many inefficient domestic coal mines were expected to be closed gradually during the next 5-year plan.

Table 8.—Japan: Coal consumption, by sector

(Thousand metric tons)

Sector	1984[r]	1985
Manufacturing:		
Cement, ceramics, other:		
Domestic	2,336	2,250
Imported	10,140	11,110
Coke:		
Domestic	914	913
Imported	4,100	4,912
Iron and steel:		
Domestic	2,687	2,371
Imported	62,859	63,399
Utilities:		
Electric power:		
Domestic	9,773	9,710
Imported	9,292	13,096
Gas:		
Domestic	413	393
Imported	828	788
Other:		
Domestic	1,486	1,669
Imported	6	9
Total demand	104,834	110,620
Of which:		
Domestic	17,609	17,306
Imported	87,225	93,314

[r]Revised.

Petroleum and Natural Gas.—Domestic production of crude oil rose sharply owing to increased output of the North-Aga Oilfield, operated by Idemitsu Oil Development Co. Ltd. offshore Niigata Prefecture. The North-Aga Oilfield started commercial operation in October 1984 at 1,000 barrels per day, which was increased to 5,500 barrels per day in 1985. Despite reduced output of natural gas from coal mines, the output of natural gas rose moderately owing to increased output from four new gasfields that were commissioned in 1984. These gasfields were the Iwaki-Oki, offshore Fukushima; the Katagai and South-Nagaoka, both offshore Niigata Prefecture; and the Yurihara oil and gas field in Akita Prefecture.

Despite increased output of crude oil and natural gas, Japan continued to import almost all of its crude oil and 95% of its natural gas requirements. Imports of crude oil dropped 8% to 1.2 billion barrels because of reduced production of kerosene and heavy fuel oil by domestic refineries, while imports of natural gas, in the form of LNG, rose 7% to 27.6 million tons owing to increased consumption by the utility industry.

Of the crude oil imports, 70% came from the Middle East, 16% from Southeast Asia, 7% from China, 5% from Latin America, and 2% from Africa and Australia. The top 10 suppliers were the United Arab Emirates, 21.3%; Saudi Arabia, 17.4%; Indonesia, 11.4%; Oman, 8.8%; Iran, 7.2%; China and the Neutral Zone, 6.5% each; Qatar, 5.8%; Mexico, 4.1%; and Malaysia, 3.3%.

The structure of Japan's crude oil imports continued to shift from major international oil companies to national oil companies of producing countries on a government-to-government basis. Crude oil supplied by major international oil companies dropped to 26% from 31% in 1984, by national oil companies of producing countries on a government-to-government basis rose to

59% from 57%, by Japanese producers of overseas oil rose to 11% from 9%, and by other independent international oil companies remained at 4%. Japan's crude oil imported from the spot market reportedly reached 31% of imports compared with only 23% in 1984. Imports of LNG were from Indonesia, 15.0 million tons; Brunei, 5.1 million tons; Malaysia, 4.4 million tons; the United Arab Emirates, 2.2 million tons; and the United States, 1.0 million tons.

Consumption of crude oil dropped 7% to 1.1 billion barrels resulting from reduced production of kerosene and heavy fuel oil by the refining industry because of a substantial decrease in demand for type "C" fuel oil by the utility and manufacturing industries. According to MITI, the refining industry operated at 62% capacity in 1985. Consumption of LNG totaled 27.6 million tons, of which 78% was consumed by the electric power industry, 20% by the city gas industry, and 2% by other industries.

In 1985, progress had been made in oil exploration and development both domestically and overseas. In July, Japan Offshore Ltd. announced that in 1987 it would begin commercial production of oil and gas in the Iwafune Oilfield offshore Niigata Prefecture at a daily rate of 7,000 barrels of oil and 10.6 million cubic feet of natural gas. The development cost was estimated at $125 million, of which 60% would be financed by a loan from the Japan Development Bank. Japan-China Oil Development Corp. (JCODC) of Japan and Bohai Bay Oil Development Corp. of China reached an agreement in July to start commercial production of crude oil offshore at BZ-28 block in Bohai Bay at a rate of 9,000 barrels per day in November 1987. The development cost was estimated at $200 million and was to be financed primarily by the Export-Import Bank of Japan and the Japanese Government-owned Japan National Oil Corp. In October, JCODC and Chengbei Oil Development Corp. of China began commercial production of oil offshore in the Chengbei Oilfield in Bohai Bay at the rate of 5,700 barrels per day. Of this output, the Japanese share of 42.5% was to be exported to Japan, and China, reportedly, was expected to export most of its share to Japan also.[17]

In May, a joint exploration agreement between Teikoku Oil Co. Ltd. of Japan and the Hamilton Group Co. of the Republic of Korea was reached for exploration of oil and gas offshore the Japanese-Korean Continental Shelf. In June, another contract was signed in Bangkok by Nippon Thailand LNG Co. Ltd. of Japan and Thai LNG Co. Ltd. of Thailand to conduct a feasibility study to develop offshore gas resources in the Gulf of Siam and to construct a 2- to 3-million-ton-per-year LNG plant. The $2 billion joint development of a natural gas and LNG production project in Canada reportedly was dropped, while the $3.8 billion joint development of the Sakhalin natural gas and LNG production project with the U.S.S.R. was still under negotiation by yearend.[18]

To liberalize imports of refined petroleum products, the Government of Japan approved a bill to lift bans on importing gasoline, kerosene, and fuel oil in November. The legislation called Temporary Measures Law for Specified Oil Products Import was passed by the Diet in December. Under the new legislation to be implemented on January 1, 1986, and be effective until December 31, 1996, the importers of refined petroleum products were required to register with MITI. The importers were to be limited to those that can refine crude oil, meet mandatory oil stockpiling, and control product quality standards. The importers were also required to report their annual import plans and their business activities to MITI and allow MITI to set standard prices for imported oil products.[19]

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[1]Economist, Division of International Minerals.

[2]Where appropriate, values have been converted from Japanese yen (¥) to U.S. dollars at the rate of ¥238.54=US$1.00 for 1985.

[3]American Metal Market. V. 93, No. 210, Oct. 30, 1985, p. 1.

[4]Japan Metal Review (Tokyo). No. 629, Aug. 1, 1985, pp. 2-3.

[5]Sumitomo Corp. (Tokyo). Nonferrous Metals in Japan. Apr. 1, 1986, p. 56.

[6]Japan Metal Journal (Tokyo). V. 15, No. 45, Nov. 11, 1985, p. 9; No. 46, Nov. 18, 1985, p. 5.

[7]———. V. 15, No. 52, Dec. 30, 1985, p. 6.

[8]Metal Bulletin (London). No. 6988, May 21, 1985, p. 19. Mining Journal (London). May 24, 1985, pp. 365-366.

[9]Japan Metal Journal (Tokyo). V. 15, No. 45, Nov. 11, 1985, p. 2; v. 16, No. 3, Jan. 24, 1986, p. 3.

[10]———. V. 15, No. 43, Oct. 28, 1985, p. 4.

[11]———. V. 15, No. 45, Nov. 11, 1985, p. 8.

[12]Arumu Publishing Co. (Tokyo). Industrial Rare Metals. Annual Review, 1985. No. 87, p. 136.

[13]Roskill's Letter From Japan (London). No. 121, May 1986, p. 10.

[14]Arumu Publishing Co. (Tokyo). The Rare Metal News. No. 1356, June 1, 1986, p. 8.

[15]Japan Petroleum and Energy Weekly (Tokyo). V. 21, No. 28, July 14, 1986, p. 3.

[16]U.S. Embassy, Tokyo, Japan. State Dep. Telegram 9646, May 14, 1985.

[17]———. State Dep. Telegram 4843, Mar. 8, 1985; Telegram 14315, July 15, 1985.

[18]———. State Dep. Telegram 9447, May 10, 1985; Telegram 2272, June 17, 1985; Telegram 24838, Dec. 4, 1985; Telegram 1915, Jan. 31, 1986.

[19]———. State Dep. Telegram 24143, Nov. 22, 1985; Telegram 25425, Dec. 13, 1985.

The Mineral Industry of Jordan

By Michael D. Fenton[1]

Jordan ranked third behind Morocco and the United States as an exporter of phosphates, with India, Indonesia, Pakistan, Poland, Romania, and Yugoslavia as its major markets. The Jordan Phosphate Mines Co. (JPMC) began a significant expansion program after a very successful marketing effort for phosphate rock in East Asia, South Asia, and Eastern Europe. Jordan's Arab Potash Co. (APC) expected to supply 2% to 3% of the world's potash supply from the Dead Sea, and although production and exports increased, continued weakness of world market prices and corrosion and erosion problems at its plant caused APC to operate at a loss as it has since 1983. To ease the burden of debt servicing, APC converted most of its overdrafts with local banks into a syndicated loan that will mature in 7 years. Similarly, the Jordan Fertilizer Industry Co. (JFI) experienced a downturn in sales and high debt-servicing costs.

Jordan was completely dependent on imports of crude oil, primarily from Saudi Arabia. In an effort to reduce this dependence and the drain of limited foreign exchange resources, Jordan was planning to import coal for electric power generation in exchange for phosphate rock. Extensive oil shale deposits were studied also, but a shortage of water and the large capital investment may be inhibiting factors in the development of this resource in times of falling oil prices. Jordan also began a national energy conservation program in which fuel subsidies were cut 30% and consumer oil product and electricity prices were increased. Jordan's Natural Resources Authority (NRA) increased expenditures for petroleum exploration and tried to interest foreign groups in joining the exploration effort. Although optimism remained high, Jordan fell short of having a commercially producing oilfield.

PRODUCTION AND TRADE

The main products mined and processed in Jordan were limestone, marble, phosphates, and potash. Dolomite, gypsum, kaolin, and salt were also mined, and there was some potential for copper, feldspar, magnesium, and uranium.

Proven reserves of phosphate rock were nearly 800 million tons. Production continued from the El Hasa and Wadi El Abiyad Mines at El Hasa, in central Jordan, at 3.8 million tons per year and 2.4 tons per year, respectively. Apparently, the Ruseifa Mine at Ruseifa closed in mid-1985, but installation of a new extraction concentrator began during the year, and output was expected to increase to about 0.8 million tons per year.

Production of phosphate rock in 1985 by JPMC of 6.07 million tons was down 3.1% from the 1984 level. Product grades, expressed as bone phosphate lime (BPL), and production were 66% to 68% BPL, 70,200 tons; 69% to 72% BPL, 2,442,000 tons; and 73% to 77% BPL, 3,555,300 tons. Exports declined by only 1.8% from 4.7 million tons in 1984 to 4.6 million tons in 1985, while international phosphate exports declined

2.5%. Export sales during the first half of 1985 were valued at $77 million,[2] an increase of over $67 million for the first half of 1984. Full-year sales of nearly $190 million gave JPMC a net profit of $9.2 million. Phosphate rock exports constituted about 25% of total exports.

Most of the phosphate rock went to Eastern Europe (32%), South Asia (29%), and East Asia (27%), with 21% exported to India, 14.8% to Romania, 9.7% to Indonesia, 7.2% to Poland, 6.7% to Japan, and 5.3% to Pakistan. Exports to Austria, France, Romania, and Yugoslavia declined, but increased to Bangladesh, India, Indonesia, the Republic of Korea, and Poland. JPMC began an ambitious expansion program that would allow exports of phosphate rock to increase to over 9 million tons per year by the year 2000. Beginning in 1990, several million tons of export phosphate would be available through countertrade agreements for the 1 million tons per year of bituminous coal that would be needed for the expanded Aqaba powerplant.

JPMC's deliveries of phosphate rock to JFI in 1985 declined by 13.8%, and exports of diammonium phosphate (DAP) by JFI were down 5% to about 500,000 tons relative to 1984. The loss of exported DAP was worth $120 million. Ethiopia, Thailand, and Vietnam, which imported almost 100,000 tons of DAP in 1984, did not import any from Jordan in 1985, and exports to China decreased by about 50%. Also, exports to Italy and Pakistan decreased significantly. However, nearly 80% of these reduced deliveries were matched by increased deliveries to India and Saudi Arabia.

JFI sent its first shipment of 6,000 tons of aluminum fluoride to the Egyptalum smelter at Nag Hammadi in 1985.

Jordan remained dependent on Saudi Arabia, and to a lesser degree on Iraq, for its petroleum requirements. Oil imports from Saudi Arabia for refining at the 60,000-barrel-per-day Zarqah refinery were 1,782,094 tons, or 35,886 barrels per day, via the Trans-Arabian Pipeline (TAPline), and 698,661 tons, or 14,069 barrels per day, was trucked from Iraq. Iraq also supplied 10,014 tons of liquefied petroleum gas and 394,614 tons of fuel oil. The import bill of $650 million was 82% of the value of Jordanian exports, 11% of the gross national product, and $208 million more than the foreign aid received by Jordan. Jordan Petroleum Refinery Co. reported a net profit of $11.1 million, 13% over that of 1984, for about 21 million barrels of oil products.

Cement production increased, and dependence on imports decreased significantly as Jordan's capacity to make cement improved. South Cement Co. agreed to sell 1 million tons to Egypt's Cement Supply Bureau and 500,000 tons per year over a period of 3 years to Saudi Arabia at a relatively low price.

Table 1.—Jordan: Production of mineral commodities[1]

Commodity	1981	1982	1983	1984[p]	1985[e]
Cement, hydraulic metric tons	964,700	795,000	1,271,332	1,988,424	2,124,000
Clays do.	20,000	14,335	7,817	26,035	26,000
Gypsum do.	53,054	39,959	41,187	109,863	110,000
Iron and steel: Steel, crude[e] do.	[2]134,900	140,000	140,000	140,000	140,000
Lime do.	20,000	59,839	267,093	224,318	224,000
Petroleum:					
Crude thousand 42-gallon barrels	--	--	--	--	21
Refinery products:					
Gasoline do.	[r][e]2,800	[r][e]3,430	2,695	2,700	4,900
Jet fuel do.	[r][e]1,900	[r][e]2,200	2,146	1,150	15
Kerosene do.	1,327	[r][e]2,100	1,734	1,750	1,500
Distillate fuel oil do.	[r][e]3,900	[r][e]4,000	5,132	5,200	9,700
Residual fuel oil do.	[r][e]3,650	[r][e]3,900	5,300	5,350	2,085
Liquefied petroleum gas do.	[r][e]550	[r][e]750	875	900	930
Paraffin do.	[r][e]650	[r][e]800	1,026	1,100	1,100
Unspecified including lubricants do.	[r][e]205	[r][e]200	53	[r][e]200	70
Refinery fuel and losses do.	[r][e]750	[r][e]850	NA	[r][e]900	700
Total do.	[r][e]15,732	[r][e]18,230	18,961	19,250	21,000
Phosphate:					
Mine output thousand metric tons	4,244	4,390	4,748	6,263	6,067
P_2O_5 content[e] do.	1,379	1,427	1,544	[r]2,069	2,011
Phosphatic fertilizer metric tons	NA	117,000	365,122	568,968	500,650
Potash:					
Crude salts do.	--	[e]15,000	280,000	486,868	932,000
K_2O equivalent do.	--	[e]9,100	170,000	[r][e]297,000	550,000
Salt[e] thousand metric tons	30	50	80	80	80
Stone:					
Limestone[e] metric tons	7,000	7,000	7,000	7,000	7,000
Marble do.	[e]5,000	[e]5,100	102	4,625	4,600

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through July 1, 1986.
[2]Reported figure.

Table 2.—Jordan: Exports and reexports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS				
Aluminum: Metal including alloys, all forms	1,852	4,347	--	Japan 2,195; Netherlands 1,417; West Germany 265.
Copper: Metal including alloys, all forms	1,528	655	--	Netherlands 278; Italy 150; West Germany 120.
Gold: Metal including alloys, unwrought and partly wrought ___troy ounces__	42,857	96	96	
Iron and steel: Metal:				
Scrap	1,125	9,594	--	Japan 8,658.
Semimanufactures	2,984	4,056	--	Iraq 3,415; Saudi Arabia 484.
Lead: Metal including alloys, all forms	154	201	--	All to Saudi Arabia.
Zinc: Metal including alloys, scrap	588	378	--	Netherlands 140; India 129; Saudi Arabia 109.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.: Natural: Corundum, emery, pumice, etc	--	270	--	All to Saudi Arabia.
Cement	288	178,821	--	Do.
Clays, crude: Kaolin	--	7,126	--	Lebanon 7,052; Kuwait 44.
Fertilizer materials: Manufactured:				
Nitrogenous	292,864	530,049	--	India 221,840; Pakistan 88,799; China 62,612.
Phosphatic	422	852	--	Abu Dhabi 450; Lebanon 278.
Potassic	2,555	458,232	--	NA.
Lime	3,667	6,138	--	Iraq 2,938; Saudi Arabia 1,710; Kuwait 1,490.
Phosphates, crude ___ thousand tons__	3,701	4,873	--	Romania 861; India 811; Yugoslavia 342.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	23,896	31,735	--	Saudi Arabia 19,078; Iraq 5,568; Kuwait 2,204.
Sulfate, manufactured	1,024	4,785	--	Iraq 4,548; Syria 128.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	24,293	41,857	--	Iraq 27,844; Lebanon 8,114; Kuwait 4,481.
Worked	81,272	78,758	--	Kuwait 68,933; Abu Dhabi 4,223; Saudi Arabia 1,529.
Sand other than metal-bearing	1,027	9,441	--	Kuwait 7,520; Saudi Arabia 1,751.
Sulfur: Sulfuric acid	80	79	--	All to Saudi Arabia.
Talc, steatite, soapstone, pyrophyllite	2,889	5,221	--	Saudi Arabia 3,428; Kuwait 1,490.
MINERAL FUELS AND RELATED MATERIALS				
Petroleum refinery products:				
Lubricants_____42-gallon barrels__	1,064	1,050	7	United Kingdom 420; Iraq 371.
Bitumen and other residues _do____	436	--		
Bituminous mixtures _____do____	854	--		

NA Not available.
[1]Table prepared by Virginia A. Woodson.

Table 3.—Jordan: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides	--	9,147	10	Netherlands 8,998; West Germany 76.
Metal including alloys:				
Scrap	106	160	(2)	Saudi Arabia 91; Greece 49.
Unwrought	2,385	2,658	--	Egypt 1,586; Spain 498; Kuwait 492.
Semimanufactures	6,806	5,096	36	Greece 1,963; Italy 707; Turkey 597.
Copper:				
Ore and concentrate	--	44	--	All from Italy.
Metal including alloys:				
Scrap	130	1,014	--	Mainly from Italy.
Semimanufactures	719	1,332	13	West Germany 413; Turkey 242; United Kingdom 169.

See footnotes at end of table.

Table 3.—Jordan: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Gold: Metal including alloys, unwrought and partly wrought troy ounces	3,274	809,169	--	Sweden 531,451; Switzerland 259,070.
Iron and steel: Metal:				
Scrap	4,978	2,551	--	Kuwait 1,746; Saudi Arabia 447; Iraq 233.
Pig iron, cast iron, related materials	13,036	241	--	Kuwait 206; Saudi Arabia 27.
Ferroalloys:				
Ferromanganese	151	350	--	All from Belgium-Luxembourg.
Ferrosilicon	98	63	--	All from France.
Steel, primary forms	184,410	145,536	--	Turkey 60,346; U.S.S.R. 35,843.
Semimanufactures:				
Bars, rods, angles, shapes, sections	46,355	64,359	--	Italy 9,391; Belgium-Luxembourg 8,005; Spain 6,574.
Universals, plates, sheets	55,134	41,754	--	Japan 11,255; West Germany 5,812; Belgium-Luxembourg 5,276.
Hoop and strip	445	717	--	Japan 537; West Germany 93.
Rails and accessories	195	605	--	Hungary 596.
Wire	5,033	9,409	--	Belgium-Luxembourg 2,430; Bulgaria 1,726; Romania 1,444.
Tubes, pipes, fittings	42,238	44,572	1,286	Taiwan 7,519; France 7,606; Italy 6,272.
Lead:				
Oxides	95	134	--	United Kingdom 76; Belgium-Luxembourg 56.
Metal including alloys, unwrought	772	[3]332	--	Saudi Arabia 306; Belgium-Luxembourg 25.
Platinum-group metals: Metal including alloys, unwrought and partly wrought, platinum troy ounces	98,060	147,668	--	Switzerland 147,636.
Silver: Metal including alloys, unwrought and partly wrought do	1,833	71,214	--	United Kingdom 65,587; Italy 5,048.
Titanium: Oxides	1,593	2,173	1,115	Belgium-Luxembourg 281; France 253; United Kingdom 218.
Zinc: Metal including alloys:				
Scrap	219	200	--	Belgium-Luxembourg 150; West Germany 50.
Unwrought	421	499	--	Belgium-Luxembourg 397; Poland 100.
Semimanufactures	132	203	--	Zimbabwe 100; Japan 69; West Germany 31.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	27	237	--	United Kingdom 206; Belgium-Luxembourg 20.
Grinding and polishing wheels and stones	466	534	--	Italy 370; West Germany 39; Turkey 24.
Cement	611,438	60,286	--	Lebanon 29,465; Iraq 11,800; Greece 10,553.
Chalk	769	1,300	--	United Kingdom 675; France 288; China 93.
Clays, crude: Kaolin	280	399	15	Turkey 334; West Germany 48.
Diamond:				
Gem, not set or strung carats	10,000	--		
Industrial stones do	--	35,000	--	Belgium-Luxembourg 30,000; India 5,000.
Diatomite and other infusorial earth	--	1,579	--	Syria 1,550.
Feldspar, fluorspar, related materials	903	2,251	--	Finland 1,275; Turkey 596; Sweden 252.
Fertilizer materials:				
Crude, n.e.s	2,938	1,925	--	Netherlands 1,593; Belgium-Luxembourg 200.
Manufactured:				
Ammonia	11,599	67,895	20,985	Netherlands 20,717; U.S.S.R. 16,019; Qatar 10,003.
Nitrogenous	28,966	24,526	([2])	U.S.S.R. 12,000; Romania 4,020; Saudi Arabia 2,419.
Phosphatic	10,138	3,808	([2])	Iraq 2,911; Syria 400; Spain 201.
Unspecified and mixed	3,160	5,101	18	Netherlands 2,878; West Germany 796; Austria 649.
Gypsum and plaster	3,182	2,383	([2])	Lebanon 930; Iraq 672; France 249.
Kyanite and related materials[4]	1,484	2,345	50	Turkey 941; Cyprus 520; United Kingdom 402.
Lime	22,908	1,830	--	Lebanon 1,770; West Germany 60.

See footnotes at end of table.

Table 3.—Jordan: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Pigments, mineral:				
Natural, crude	136	--		
Iron oxides and hydroxides, processed	165	237	--	West Germany 165; Spain 36.
Precious and semiprecious stones other than diamond:				
Natural ... kilograms	6	5	--	Belgium-Luxembourg 3; India 1; Thailand 1.
Synthetic ... do	22	710	--	India 646; Taiwan 55.
Salt and brine	1,314	1,306	15	Saudi Arabia 1,031; Kuwait 240.
Sodium compounds, n.e.s:				
Carbonate, manufactured	1,412	2,934	--	France 1,100; Belgium-Luxembourg 770; United Kingdom 515.
Sulfate, manufactured	1,293	7,205	--	Romania 4,851; Saudi Arabia 1,557.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	18,412	14,892	6	Italy 11,236; Greece 1,431; Turkey 487.
Worked	645	711	1	Italy 696.
Gravel and crushed rock	5,403	3,188	--	Italy 2,919; Turkey 200.
Sand other than metal-bearing	451	342	([2])	Netherlands 104; Syria 56; Finland 45.
Sulfur:				
Elemental:				
Crude including native and byproduct	113,148	126,426	--	Saudi Arabia 94,713; Canada 31,500.
Colloidal, precipitated, sublimed	42,494	102,469	--	Iraq 101,644.
Sulfuric acid	315	111	--	Greece 110.
Talc, steatite, soapstone, pyrophyllite	427	220	--	China 100; Norway 69; Austria 36.
Other: Crude	167	60	--	Austria 23; Lebanon 14; France 13.
MINERAL FUELS AND RELATED MATERIALS				
Carbon black	--	90	--	Austria 75; West Germany 11.
Coal:				
Anthracite and bituminous	NA	529	--	France 193; West Germany 180; Belgium-Luxembourg 135.
Lignite including briquets	NA	100	--	All from Netherlands.
All grades including briquets	499	--		
Coke and semicoke	311	633	--	France 196; West Germany 180; Belgium-Luxembourg 135.
Peat including briquets and litter	456	1,032	--	Finland 290; Netherlands 268; West Germany 236.
Petroleum:				
Crude[5] thousand 42-gallon barrels	18,326	17,586	--	All from Saudi Arabia.
Refinery products:				
Gasoline ... do	--	([2])	--	Mainly from Syria.
Mineral jelly and wax ... do	--	3	([2])	Iraq 2; West Germany 1.
Kerosene and jet fuel ... do	r([2])	([2])	([2])	Mainly from Saudi Arabia.
Lubricants ... do	114	176	9	United Kingdom 73; Belgium-Luxembourg 35.
Nonlubricating oils ... do	--	4	([2])	Belgium-Luxembourg 2; France 1.
Residual fuel oil ... do	4	--	--	
Bituminous mixtures ... do	3	14	([2])	France 12.

r Revised. NA Not available.
[1] Table prepared by Virginia A. Woodson.
[2] Less than 1/2 unit.
[3] Includes scrap.
[4] May include bentonite.
[5] May include shale oils.

COMMODITY REVIEW

METALS

A plan for the construction of a 10,000-ton-per-year iron foundry at Yarmouk for pipe, pipe fittings, and engineering castings was announced by Jordan Engineering Industries Co. The plant would be expanded to 16,700 tons per year after its proposed opening in 1987. Annual savings for Jordan on imports was estimated to eventually be $26 million. The International Bank for Reconstruction and Development (World Bank) was considering contributing to this venture engineered by the Arab Mining Co.

of Amman and the Arab Investment Co. of Baghdad.

INDUSTRIAL MINERALS

Cement.—The Jordan Cement Factories Co. (JCF) of Amman was adding a 1-million-ton-per-day crushing, preblending, and raw-mill feeding plant, and a 200,000-ton-per-day cement grinding, packing, and dispatch facility to its 5,700,000-ton-per-day plant at Fuheis. Mitsubishi Corp. and Kobe Steel Ltd. of Japan were to supply equipment, and Holderbank Management and Consulting Ltd. was responsible for design and coordination of construction.

South Cement planned to complete the second of two 1-million-ton-per-year cement production lines in the recently inaugurated Rashadiya portland cement plant in southern Jordan. JCF and South Cement agreed to merge as a result of increasing excess capacity in the Middle East and because of the declining construction industry. South Cement anticipated losses of $27.9 million for 1985. The new company was to be capitalized at $127 million.

South Cement was mining nearly exhausted gypsum reserves in the Hasa area. An additional reserve of 1.5 million tons that was found in the Tafila area in southern Jordan was expected to last for a decade.

The Jordanian-Syrian Industrial Co.'s white cement plant, having a capacity of 100,000 tons per year, started trials in September, and the new 1-million-ton-per-year plant being built near Amman by Kobe Steel of Japan for JCF was scheduled for completion in 1986.

Fertilizer Materials.—*Phosphate Rock.*—Jordan awarded a 2-year, $3.3 million contract to a French-Jordanian consortium for a feasibility study of a new minesite at Shidiyah in southern Jordan, 125 kilometers north of Aqaba, containing proven reserves of 790 million to 1,000 million tons of phosphate rock. The French firms Sofrerail, Société Française d'Etudes Minières (Sofremines), Charbonnages de France-Chemie, and Bureau de Recherches Géologiques et Minières joined with the Jordanian consulting firm Dar al-Handasah to study phosphate mining and beneficiation, fertilizer production, transport by rail to the Aqaba port, shipping, and the construction of a townsite for 25,000 people. According to this feasibility study, the first phase of mining, to cost about $60 million to $70 million, was expected to begin in 1988 at a rate of between 0.5 and 1 million tons per year and progress to 3 million tons per year in 1990 and 9 million tons per year by the year 2000. Total investment was estimated to be about $300 million, excluding railway construction.

PHB Weserhütte AG of the Federal Republic of Germany contracted to construct a $2.26 million phosphate-loading facility and wharf for ships under 10,000 deadweight tons at Aqaba. Jordan's phosphate export capacity would increase from 4.5 to 6 million tons per year.

The Ransomes and Rapier W2000, a 30.5-cubic-meter dragline operated by JPMC at El Hasa, is the only such machine operating in the Middle East. It stripped 5,561 million cubic meters of overburden during the first 7 months of 1985, and a new annual record was expected. JPMC planned to buy as many as five more by 1990. Ransomes and Rapier and four U.S. companies submitted bids for two electric draglines.

JPMC contracted Finland's Rauma-Repola Oy's Parkano works to supply five drying units costing about $1.9 million to replace older, less energy-efficient driers installed in 1976 by the United Kingdom's Newell Dunford. The project should be finished by early 1987.

Five Halco Mining Inc. 410C drills that can drill 85- to 200-millimeter shot holes to 170 meters were delivered for use at the phosphate mines. Four more 410C's were to be delivered soon.

Potash.—Since the opening in 1982 of the Ghor-al-Safi potassium chloride plant, built by APC near the Dead Sea, production had been increasing and, in 1985, reached 932,000 tons per year of granular potash. APC decided to increase the plant's capacity to 1.4 million tons per year, rather than 1.2 million tons as previously planned, with the help of the World Bank and the consultant, Jacobs International Co. Full capacity was expected to be reached in 1987.

Construction by Krebs & Cie. S.A. of France progressed on a bagging plant and a table salt extraction unit at Safi. Annual output was designed at 30,000 tons, and the facility was to be finished in 1986.

APC and an Egyptian company planned to build a 150,000-ton-per-year potassium sulfate plant at Safi.

MINERAL FUELS

The Government of Jordan doubled the allocation for petroleum exploration to $35.6 million in its 1985 budget. Exploration activity was focused on the Hamzah structure in the Al-Azraq region of eastern Jordan near the Saudi Arabian border where three completed oil wells tested at 600 to 1,000 barrels per day, and the drilling of two additional wells was in progress. Although a cumulative production of 21,000 barrels was trucked for refining at Zarqa, the field was not considered to have commercial status because Hamzah No. 1, the first of 16 wells drilled, only produced an average of 70 barrels per day for the year, and none of the succeeding wells contained oil in producible quantities. The NRA had spent over $100 million since 1981 on exploration and, by 1985, attempted to attract international oil companies to share the burden. Eleven Australian, British, Netherlands, French, and U.S. companies expressed interest in reviewing geological data.

As a result of a countrywide seismic survey, drilling of several exploratory wells was scheduled for 1985 in the Ramtha and Irbid areas. Also, a seismic survey for petroleum was to be done in two stages by Iraqi personnel. The first stage was to be in the Dead Sea area; the second, in areas south and northeast of Amman.

Saudi Arabia continued exporting oil at a rate of almost 36,000 barrels per day through TAPline to Jordan, rather than close the pipeline as previously scheduled, while talks continued concerning the construction of the 900-kilometer, $1 billion, Iraqi-Jordanian oil pipeline project. Iraq demanded that loan repayments be made over 8 years in crude oil, with Iraq reserving the right to suspend all repayments if the venture were interrupted by any military or political action by Israel. Meanwhile, Iraq continued supplying oil by truck to Jordan at a rate of about 14,000 barrels per day.

A new oil berth costing about $20 million was to become operational at Aqaba by yearend. About 74,000 barrels per day of crude oil and fuel oil, probably of non-Jordanian origin, were to be exported from the new berth, a significant increase from the previous 15,000 to 25,000 barrels per day from the Aqaba facilities. Since the beginning of the Iran-Iraq war, Aqaba had become a major import and export facility on the Red Sea. Prewar annual docking of 1,500 ships had increased to 2,500 ships annually.

As part of its oil exploration activities, Jordan was studying the crude oil potential of its shale deposits by drilling 10 exploratory holes and by encouraging foreign companies to explore. Reserves exploitable by opencast mining at El Lajjun, Sultani, and Jurf el Darawish were 742, 569, and 1,243 million barrels of oil, respectively. Shale at El Lajjun carried as much as 36 gallons of oil per ton. A feasibility study and pilot plant project by two West German companies at El Lajjun would perhaps lead to a 50,000-barrel-per-day oil distillation plant. The NRA commissioned Technopromexport of the U.S.S.R. to do a feasibility study for a 350- to 400-megawatt shale-fired power station at Qatrana.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Jordanian dinars (JD) to U.S. dollars at the rate of JD0.394=US$1.00.

The Mineral Industry of the Republic of Korea

By E. Chin[1]

With the exception of limestone and aggregates, the Republic of Korea was deficient in almost all mineral raw materials required by the country's manufacturing industries. However, in view of domestic consumption, there was significant mine output of coal, graphite, kaolin, pyrophyllite, talc, and tungsten. The country's largest metallurgical sector was iron and steel, which had to import almost all of its needs for coking coal, iron ore, and manganese. Aluminum was produced from imported material. Copper and zinc were produced from domestic and imported ore. The largest industrial minerals processing sector was cement. Although the Republic of Korea produced about 20 million tons per year of coal, there was no domestic output of oil and natural gas.

The Republic of Korea's gross national product (GNP) in 1985 was estimated at $82 billion[2] in current prices. GNP in constant 1980 prices was $84 billion in 1985 compared with $81 billion in 1984, representing a real growth of 4.4%. The input of the mining and quarrying sector to GNP in 1985 was only $1.2 billion compared with $24.9 billion for manufacturing.[3]

The total labor force was estimated at 14.9 million. Employment in the mining sector was 154,000 compared with 7.6 million for services; 3.9 million for agriculture, forestry, and fishing; and 3.5 million for manufacturing. Monthly earnings for all industries averaged $328 based on 24 worker-days. Monthly earnings per person for various sectors of the economy were as follows: services, $592; utilities, $571; construction, $385; mining, $324; and manufacturing, $260. Monthly earnings in the mining sector by type of output was coal mining, $348 (24.6 worker-days); metal mining, $284 (23.9 worker-days); and other mining, $214 (21.3 worker-days).

The wholesale price index (1980 = 100) for all commodities was 128. Indices for select products were electricity, 146; petroleum, 135; ceramic and glass products, 130; chemicals, 124; iron and steel products, 119; and nonferrous metal products, 107. Wholesale prices for select commodities were aluminum sash bar, $2 per kilogram; anthracite coal, $37 per ton; cement, $0.05 per kilogram; compound fertilizers, $0.21 per kilogram; electrolytic copper, $1,702 per ton; fuel oil, $0.18 per liter; galvanized sheet, $398 per ton; gasoline, $0.85 per liter; gold, $11 per gram; hot-rolled steel coil, $259 per ton; reinforced steel bar, $258 per ton; and wire rod, $269 per ton.

The value of construction orders received in 1985 totaled $6.0 billion: $3.3 billion for building construction and $2.7 billion for civil engineering works. Construction orders for roads and bridges were valued at $566 million; powerplants, $196 million; harbors and airports, $168 million; railroads, $112 million; and dams, $32 million. By sector, construction orders by the chemicals and petroleum industries were $190 million; iron and steel, $24 million, and mining, $1.5 million.

Orders for machinery and equipment by the construction sector were valued at $269 million; basic metals, $69 million; chemicals, $59 million; fuels, $36 million; and mining, $35 million.

Marine freight unloaded for select items was as follows, in thousand tons (loaded data are given in parentheses): oil, 43,556 (17,103); mineral ores, 18,725 (2,663); anthracite coal, 5,171 (2,300); cement, 5,121 (8,025); salt, 870 (107); and fertilizers, 275 (1,400). Freight transport by rail included 21.9 million tons for anthracite coal, 5.0 million tons for cement, 4.1 million tons for mineral ores, and 1.6 million tons for fertilizers.

Under a long-term plan established by the Ministry of Energy and Resources, industrial establishments that were energy inefficient were to reform their process into energy-efficient ones or be phased out gradually by the Government. In 1985, 31.4% of the country's industrial output was by energy-inefficient firms, down from 33.7% in 1984. By Government mandate, this share was to be further reduced to 10.3% in 1991.[4]

Under the Foreign Capital Inducement Act, the Government's policy was to attract foreign capital for the sound development of the national economy. There were 660 ventures eligible for foreign investment, the bulk of which was 449 in manufacturing compared with only 12 in mining. In addition, there were 14 mining projects not eligible for foreign investment: 2 projects were not yet assigned to a Government overseer, 1 was prohibited, and 11 were restricted. The restricted projects included those that were highly polluting, but were to be eventually opened to investment. The projects were not specifically named in the act.

PRODUCTION

The Republic of Korea has no indigenous resources of oil and natural gas. Anthracite coal was the country's most important mine product by volume and value in 1985.

Mine output of metallic minerals included ores of copper, iron, lead and zinc, molybdenum, and tungsten, with only the latter significant in terms of world output. Domestic mine output of copper accounted for less than 1% of the ore requirement for copper metal production; iron for close to 4% of the requirement for pig iron; 100% for lead; and about 45% for zinc. In addition, there was a small output of molybdenum ores, and sporadically, manganese and tin. The largest metals sector was iron and steel with an aggregate output capacity of 13.5 million tons per year, followed by copper, 135,000 tons per year; zinc, 110,000 tons per year; aluminum, 20,000 tons per year; and lead, 15,000 tons per year.

For industrial minerals, the Republic of Korea produced significant quantities of diatomaceous earth, feldspar, graphite, kaolin, pyrophyllite, silica, and talc. The largest industrial minerals processing sectors were cement and fertilizers. Domestic quarrying of limestone and aggregate were the raw materials for the cement industry, while that for the fertilizer industry was largely imported.

The country's large and strategic companies were state-run enterprises. Mineral-related companies under the control of the Ministry of Trade and Industry were Chinhae Chemical Co. Ltd.; Korea Fertilizer Co. Ltd.; Korea General Chemical Corp.; Korea Heavy Industries Construction Co. Ltd.; Namhae Chemical Corp.; Pohang Iron and Steel Co. Ltd. (Posco); and Yong-Nam Chemical Co. Ltd. Those under the control of the Ministry of Energy and Resources were Dai Han Coal Corp.; Korea Electric Power Corp.; Korea Energy Management Corp.; Korea Mining Promotion Corp.; Korea Petroleum Development Corp.; Korea Resources Recovery and Reutilization Corp.; and Korea Tungsten Mining Co. Ltd. The Ministry of Construction controlled four large companies—Industrial Sites and Water Resources Development Corp.; Korea Highway Corp.; Korea Land Development Corp.; and Korea National Housing Corp.[5]

Table 1.—Republic of Korea: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984	1985[p]
METALS					
Aluminum, primary	17,506	15,226	12,629	18,252	17,695
Arsenic, mine output, white arsenic equivalent	169	306	560	NA	NA
Bismuth metal	100	95	100	126	135
Cadmium, smelter	300	320	320	230	--
Copper:					
Mine output, metal content	501	320	389	279	309
Metal:					
Smelter	108,200	119,400	124,000	100,200	106,900
Refined, primary	107,984	110,818	123,289	129,078	140,144
Gold metal troy ounces	43,147	55,750	72,083	79,156	77,258
Iron and steel:					
Iron ore and concentrate:					
Gross weight thousand tons	594	620	655	625	542
Iron content do.	333	347	367	350	304
Metal:					
Pig iron do.	7,928	8,445	8,024	8,763	8,833
Ferroalloys:					
Ferromanganese	68,300	60,306	52,896	58,600	61,396
Ferrosilicon	32,000	32,478	32,489	35,300	34,840
Other	27,185	33,240	[r]43,824	50,215	54,879
Total	127,485	126,024	129,209	144,115	151,115
Steel, crude thousand tons	10,753	11,753	11,916	13,034	13,539
Lead:					
Mine output, metal content	13,635	12,167	12,226	10,837	8,811
Metal, smelter	7,200	9,500	10,500	12,000	14,500
Manganese ore and concentrate:					
Gross weight	--	--	--	74	--
Manganese content	--	--	--	30	--
Molybdenum, mine output, metal content	464	361	142	158	333
Silver metal thousand troy ounces	3,061	3,237	3,366	3,759	3,990
Tin, mine output, metal content	--	--	--	19	21
Tungsten, mine output, metal content	2,739	2,420	2,480	2,702	2,384
Zinc:					
Mine output, metal content	56,198	58,175	55,980	49,232	44,828
Metal, primary	83,915	99,211	107,860	108,460	111,653
INDUSTRIAL MINERALS					
Asbestos	14,084	15,933	12,506	8,062	4,703
Barite	--	--	552	2,729	2,785
Cement, hydraulic thousand tons	15,617	17,887	21,282	20,413	20,424
Clays: Kaolin	694,584	625,824	684,447	721,220	658,282
Diatomaceous earth	42,176	55,249	55,968	48,496	53,613
Feldspar	103,263	85,040	109,896	127,057	145,414
Fluorspar, metallurgical-grade	6,464	3,667	6,361	4,672	705
Graphite:					
Crystalline	842	627	695	2,305	1,602
Amorphous	34,049	26,338	32,571	56,258	69,877
Total	34,891	26,965	33,266	58,563	71,479
Kyanite and related materials: Andalusite	90	33	289	209	42
Mica: All grades	NA	20,355	14,402	24,436	20,044
Nitrogen: N content of ammonia	746,723	543,302	430,169	464,194	441,983
Salt	602,000	864,000	481,000	518,000	643
Sodium carbonate, manufactured	202,063	185,670	230,600	247,927	250,890
Stone, sand and gravel:					
Agalmatolite	302,975	315,800	NA	--	--
Limestone thousand tons	27,931	30,736	32,992	33,456	31,037
Quartzite do.	545	490	842	868	872
Sand including glass sand do.	585	657	1,223	858	1,096
Sulfur: S content of pyrites	--	--	127	--	--
Talc and related materials:					
Pyrophyllite	395,216	466,324	460,922	656,442	738,304
Talc	169,401	124,793	171,214	192,208	194,174
MINERAL FUELS AND RELATED MATERIALS					
Carbon black	60,943	58,047	75,424	82,369	91,019
Coal: Anthracite thousand tons	19,865	20,116	19,861	21,370	23,621
Coke do.	4,401	4,539	4,682	5,199	5,000
Fuel briquets: Anthracite briquets	18,543	20,865	18,932	21,316	19,453

See footnotes at end of table.

Table 1.—Republic of Korea: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984	1985[p]
MINERAL FUELS AND RELATED MATERIALS —Continued					
Petroleum refinery products:					
Gasoline ----- thousand 42-gallon barrels--	6,184	5,182	4,902	5,519	9,729
Jet fuel ---do---	5,409	6,521	9,074	10,469	10,000
Kerosene ---do---	8,124	8,368	9,199	9,109	10,452
Distillate fuel oil ---do---	39,167	41,701	48,560	54,156	54,783
Residual fuel oil ---do---	86,613	81,679	87,140	84,907	75,566
Lubricants ---do---	1,507	2,081	1,733	1,962	3,807
Other ---do---	30,744	26,577	30,860	43,288	19,031
Refinery fuel and losses[e] ---do---	5,068	6,260	6,700	6,400	4,036
Total ---do---	182,816	178,369	198,168	215,810	187,404

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Includes data available through July 31, 1986.

TRADE

During the past decade, total trade value increased from $16.5 billion in 1976 to $61.4 billion in 1985. In that period, the Republic of Korea's cumulative trade deficit totaled $25.4 billion. The Government vigorously continued to support its export policy to limit the annual deficit. In 1985, the trade deficit was $853 million compared with $1.4 billion in 1984.

The major export destinations in 1985 were the United States, $10.8 billion; Japan, $4.5 billion; Hong Kong, $1.6 billion; Canada, $1.2 billion; the Federal Republic of Germany, $979 million; Saudi Arabia, $969 million; the United Kingdom, $913 million; and Panama, $746 million. Shipments to these countries accounted for 72% of the total exports. The major export classes were manufactured goods, $15.4 billion; machinery and transportation equipment, $11.4 billion; foodstuffs, $1.2 billion; mineral fuels and related materials, $951 million; chemicals and related products, $936 million; inedible crude materials, $298 million; and other, $30 million.

Receipts from Japan and the United States accounted for 45% of total imports. Shipments from Japan were valued at $7.6 billion; the United States, $6.5 billion; Malaysia, $1.2 billion; Australia, $1.1 billion; the Federal Republic of Germany, $979 million; Indonesia, $669 million; Saudi Arabia, $640 million; and Canada, $630 million. The major import classes were machinery and transportation equipment, $10.6 billion; mineral fuels and related materials, $7.4 billion; manufactured goods, $4.8 billion; inedible crude materials, $3.9 billion; chemicals, $2.8 billion; foodstuffs, $1.4 billion; and other, $300 million.[6]

Table 2.—Republic of Korea: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984	
			United States	Other (principal)
METALS				
Aluminum: Metal including alloys, all forms	13,015	11,610	170	Saudi Arabia 2,825; Philippines 1,383; Malaysia 927.
Arsenic:				
Ore and concentrate	2,850	--		
Oxides and acids	114	186	68	Taiwan 50; Bangladesh 35.
Bismuth: Metal including alloys, all forms	92	136	61	Netherlands 37; West Germany 20.
Cadmium:				
Oxides and hydroxides	--	159	--	Taiwan 111; Japan 21; West Germany 20.

See footnotes at end of table.

Table 2.—Republic of Korea: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984	
			United States	Other (principal)
METALS —Continued				
Cadmium —Continued				
Metal including alloys, all forms	397	393	66	Netherlands 258; West Germany 37.
Chromium: Oxides and hydroxides kilograms	--	300	--	All to Japan.
Cobalt:				
Oxides and hydroxides	--	18	--	Japan 10; West Germany 8.
Metal including alloys, all forms kilograms	7,500	6	--	All to Japan.
Columbium and tantalum: Metal including alloys, all forms, tantalum do	40	465	--	Do.
Copper: Metal including alloys:				
Scrap	2,716	1,517	--	Do.
Unwrought	25,251	2,933	--	Japan 2,612.
Gold: Metal including alloys, unwrought and partly wrought troy ounces	19,263	8,072	1,607	Japan 6,465.
Iron and steel: Metal:				
Scrap	284,597	135,288	1	Thailand 66,200; Japan 41,185; Indonesia 26,500.
Pig iron, cast iron, related materials	18,062	10,837	30	Thailand 10,080; Japan 700.
Ferroalloys:				
Ferromanganese	701	338	--	Pakistan 188; Hong Kong 100; Indonesia 50.
Ferronickel	31	34	--	All to Japan.
Ferrosilicomanganese	1,241	350	--	Do.
Ferrosilicon	180	71	--	Do.
Unspecified	3,001	3,001	--	Do.
Steel, primary forms thousand tons	1,824	1,578	235	Japan 832; Philippines 211; Thailand 75.
Semimanufactures do	4,375	4,554	1,722	Saudi Arabia 999; Japan 718; India 104.
Lead:				
Ore and concentrate	--	3,000	--	Japan 2,000; Australia 1,000.
Metal including alloys, all forms	58	71	13	Saudi Arabia 36; Japan 18.
Magnesium: Metal including alloys:				
Scrap	36	--		
Unwrought	16	--		
Manganese: Oxides	30	--		
Nickel: Metal including alloys:				
Scrap	3	58	--	All to Japan.
Unwrought	3	18	--	Do.
Platinum-group metals:				
Waste and sweepings value, thousands	$208	$231	--	All to West Germany.
Metal including alloys, unwrought and partly wrought troy ounces	197	1,017	465	Japan 552.
Silver:				
Ore and concentrate value, thousands	$1,937	$143	$143	
Metal including alloys, unwrought and partly wrought thousand troy ounces	1,911	1,666	594	Japan 1,019.
Tin:				
Ore and concentrate	--	19	--	All to Singapore.
Metal including alloys:				
Scrap	--	66	--	All to Japan.
Unwrought	--	18	2	Japan 16.
Titanium:				
Ore and concentrate	--	54	--	All to Pakistan.
Oxides	2,395	1,796	5	Japan 1,476; Taiwan 141.
Tungsten:				
Ore and concentrate	1,061	859	--	Japan 668; West Germany 131; Netherlands 60.
Oxides and hydroxides	--	59	--	United Kingdom 54.
Metal including alloys, all forms	277	301	1	Japan 124; United Kingdom 77; West Germany 47.
Uranium and/or thorium: Ore and concentrate	142	--		
Vanadium: Oxides and hydroxides	34	--		
Zinc:				
Oxides	2,790	2,943	--	Japan 2,639.
Ash and residue containing zinc	2,393	9,354	6	Australia 6,620; Japan 2,728.
Metal including alloys, all forms	r502	163	10	Australia 69; Taiwan 40; Singapore 25.

See footnotes at end of table.

Table 2.—Republic of Korea: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
INDUSTRIAL MINERALS				
Abrasives, n.e.s.: Natural, corundum, emery, pumice, etc	4	73	--	All to Japan.
Barite and witherite	--	350	--	Do.
Cement ______ thousand tons	5,042	3,170	372	Saudi Arabia 822; Singapore 585; United Arab Emirates 375.
Clays, crude	62,537	78,016	--	Japan 77,264.
Feldspar, fluorspar, related materials	31,679	23,501	--	Taiwan 22,477; Japan 1,001.
Fertilizer materials: Manufactured:				
Nitrogenous	239,451	224,191	NA	Philippines 78,864; Thailand 33,644; Fiji 30,750.
Phosphatic	37,565	44,263	--	Japan 31,115; Fiji 13,100.
Potassic	10,389	28,466	--	Japan 22,553; Fiji 4,350; Malaysia 1,000.
Unspecified and mixed	910,881	1,056,591	NA	Thailand 287,569; Philippines 172,750; Kenya 29,500.
Graphite, natural	32,694	39,864	34	Japan 32,078; Taiwan 4,750; Indonesia 555.
Gypsum and plaster	59,159	24,226	NA	Japan 24,000.
Lime	3,100	600	--	All to Singapore.
Precious and semiprecious stones other than diamond:				
Natural ______ value, thousands	$2,598	$3,259	$1,219	Japan $1,928; Hong Kong $62.
Synthetic ______ do	$3,748	$11,887	$7,993	West Germany $843; France $778.
Salt and brine	3,193	1,647	1,515	Japan 25; Libya 14.
Sodium compounds, n.e.s.: Sulfate, manufactured	--	5	--	All to Saudi Arabia.
Stone, sand and gravel:				
Dimension stone	207,653	196,604	561	Japan 191,131; Taiwan 3,978.
Dolomite, chiefly refractory-grade	59,565	92,045	--	Japan 92,000.
Gravel and crushed rock	826	1,199	--	Japan 849; Jordan 262.
Quartz and quartzite	16,041	18,505	--	Japan 18,438.
Sand other than metal-bearing	2,004	3,056	--	Japan 2,700; Jordan 262.
Sulfur: Elemental: Crude including native and byproduct	2,238	2,456	--	Indonesia 1,202; Burma 300; Sri Lanka 264.
Talc, steatite, soapstone, pyrophyllite	45,898	40,650	2,991	Japan 15,650; Thailand 8,678; Taiwan 3,405.
Vermiculite	115	--		
Other:				
Crude	213,228	253,288	--	Japan 135,666; Taiwan 116,705; Indonesia 600.
Slag and dross, not metal-bearing	81,786	99,323	--	Japan 99,104.
MINERAL FUELS AND RELATED MATERIALS				
Carbon black	3,533	5,381	--	Hong Kong 2,100; Japan 945; Indonesia 788.
Coke and semicoke	--	21,996	--	All to Philippines.
Petroleum refinery products:				
Liquefied petroleum gas thousand 42-gallon barrels	88	21	--	All to Japan.
Naphtha ______ do	4,263	6,238	479	Japan 5,759.
Gasoline:				
Aviation ______ do	1,217	2,228	--	Japan 2,165.
Motor ______ do	149	49	--	Hong Kong 46.
Kerosene and jet fuel ______ do	1,266	1,159	1	Japan 1,071; Hong Kong 86.
Distillate fuel oil ______ do	4,549	4,951	237	Japan 4,175; Singapore 308.
Lubricants ______ do	114	260	16	China 47; Bangladesh 32.
Residual fuel oil ______ do	4,895	228,470	178	Japan 227,632; Hong Kong 648.

[r]Revised. NA Not available.
[1]Table prepared by Audrey D. Wilkes.

Table 3.—Republic of Korea: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS				
Aluminum:				
Ore and concentrate	6,095	9,305	NA	Hong Kong 6,937; Japan 1,753; Guyana 418.
Oxides and hydroxides	69,681	77,739	34	Australia 33,601; Japan 30,111; Taiwan 5,876.
Metal including alloys:				
Scrap	6,089	5,069	3,671	Japan 521; Kuwait 212.
Unwrought	333,797	143,228	20,331	Australia 27,217; New Zealand 20,859.
Semimanufactures	24,848	29,302	1,299	Japan 13,507; Australia 4,985; Belgium-Luxembourg 1,943.
Antimony:				
Ore and concentrate	956	1,250	NA	Thailand 943.
Oxides	311	354	8	Japan 113; United Kingdom 74; West Germany 62.
Metal including alloys, all forms	r149	251	NA	Hong Kong 153; Taiwan 44.
Chromium:				
Ore and concentrate	3,853	5,027	--	Philippines 4,613; Japan 414.
Oxides and hydroxides	2,311	1,840	387	Japan 1,059; Italy 323.
Cobalt:				
Oxides and hydroxides	12	21	3	Japan 8; Canada 7.
Metal including alloys, all forms	182	139	3	Zaire 66; Zambia 26; Netherlands 20.
Copper:				
Ore and concentrate	371,278	347,665	NA	Canada 97,260; Mexico 74,321; Philippines 46,982.
Matte and speiss including cement copper	r15,865	25,911	5,629	Uganda 8,198; Chile 6,405; Philippines 5,679.
Oxides and hydroxides	257	284	43	Norway 122; Japan 65; West Germany 54.
Ash and residue containing copper	--	49,950	--	All from Japan.
Metal including alloys:				
Scrap	42,787	32,364	22,047	Hong Kong 2,247; Singapore 1,905.
Unwrought	r37,675	53,966	1,105	Chile 22,306; Zambia 7,479; Japan 5,380.
Semimanufactures	10,445	14,256	358	Japan 10,271; Taiwan 791; Belgium-Luxembourg 554.
Gold: Metal including alloys, unwrought and partly wrought ___troy ounces	57,394	62,807	30,194	Japan 30,984; Malaysia 694.
Indium: Metal including alloys, all forms kilograms	263	120	1	Japan 119.
Iron and steel:				
Iron ore and concentrate including roasted pyrite ___ thousand tons	r10,171	10,288	--	Australia 4,465; India 2,137; Brazil 2,000.
Metal:				
Scrap ___do	1,896	2,081	1,701	Australia 140; Japan 68.
Pig iron, cast iron, related materials	r107,814	206,883	20	Brazil 111,932; Pakistan 48,286; Australia 13,040.
Ferroalloys:				
Ferrochromium	4,390	6,222	8	Philippines 2,002; Japan 786; India 300.
Ferromanganese	9,004	4,084	4	Japan 1,714; Norway 299; West Germany 203.
Ferromolybdenum	163	202	36	Chile 74; United Kingdom 35.
Ferronickel	120	820	--	All from Japan.
Ferrosilicomanganese	115	213	NA	NA.
Ferrosilicon	4,745	5,899	246	Norway 2,508; France 810; Canada 737.
Ferrovanadium	105	81	10	Belgium-Luxembourg 26; United Kingdom 23.
Silicon metal	867	1,424	36	Canada 840; Italy 156; Norway 138.
Unspecified	1,974	3,913	40	France 2,056; Japan 1,335; Taiwan 252.
Steel, primary forms thousand tons	1,002	1,423	2	Japan 900; Brazil 186.
Semimanufactures ___do	1,240	2,078	15	Japan 1,814.
Lead:				
Oxides	62	69	(3)	Japan 39; Mexico 24.
Metal including alloys:				
Scrap	6,661	6,534	2,150	Australia 2,459; United Arab Emirates 670.
Unwrought	38,394	31,466	288	Peru 7,919; Taiwan 6,499; Australia 5,879.

See footnotes at end of table.

Table 3.—Republic of Korea: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984	
			United States	Other (principal)
METALS —Continued				
Lithium:				
Oxides and hydroxides	33	38	37	NA.
Metal including alloys, all forms kilograms	35	32	22	Japan 10.
Magnesium: Metal including alloys, unwrought	585	661	262	France 210; Norway 168.
Manganese:				
Ore and concentrate:				
Battery-grade	6,310	5,372	NA	Singapore 4,590; Japan 454.
Metallurgical-grade	190,147	249,992	NA	Australia 94,652; India 84,664; Gabon 32,514.
Oxides	2,054	1,626	--	Japan 1,621.
Mercury 76-pound flasks	557	406	42	Spain 210; Japan 118.
Molybdenum: Ore and concentrate	151	179	144	United Kingdom 18; Canada 17.
Nickel:				
Oxides and hydroxides	r36	45	NA	Canada 26; Japan 17.
Metal including alloys:				
Scrap	167	224	NA	Canada 192.
Unwrought	2,001	2,306	401	Canada 994; Australia 467.
Platinum-group metals: Metals including alloys, unwrought and partly wrought troy ounces	20,402	108,801	97,311	Japan 9,957; United Kingdom 1,214.
Silver:				
Waste and sweepings[3] value, thousands	$95	--		
Metal including alloys, unwrought and partly wrought troy ounces	181,941	215,313	13,953	Japan 148,150; Singapore 47,454.
Tin:				
Ore and concentrate	574	1,749	--	Burma 974; Singapore 635; Thailand 140.
Metal including alloys, all forms	2,303	2,496	63	Malaysia 1,197; Indonesia 715.
Titanium:				
Ore and concentrate	37,698	44,071	--	Malaysia 37,974; Australia 6,080.
Oxides	2,974	3,089	50	Japan 2,343; West Germany 667.
Metal including alloys, all forms	360	361	3	Japan 340.
Tungsten: Metal including alloys, all forms	150	34	10	Japan 21.
Uranium and/or thorium: Oxides and other compounds	12	107	50	Canada 57.
Zinc:				
Ore and concentrate	114,399	103,172	NA	Australia 82,652; Chile 4,534.
Ash and residue containing zinc	843	697	51	Saudi Arabia 612.
Metal including alloys:				
Scrap	8,577	11,867	1,757	Japan 5,942; Australia 2,654.
Unwrought	5,417	18,703	--	Australia 7,603; Peru 2,392; Japan 2,322.
Zirconium: Ore and concentrate	2,514	7,097	--	Australia 5,751; Malaysia 912; Japan 380.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	3,711	3,783	497	Japan 2,747; India 484.
Artificial:				
Corundum	13,680	16,114	50	Japan 11,845; Hong Kong 1,144; Austria 403.
Silicon carbide	4,739	5,227	7	Japan 2,931; West Germany 1,452.
Dust and powder of precious and semiprecious stones including diamond kilograms	1,984	2,202	1,531	Japan 654.
Grinding and polishing wheels and stones	873	952	51	Japan 777.
Asbestos, crude	113,305	59,693	2,290	Canada 18,965; Zimbabwe 998.
Barite and witherite	469	949	--	Thailand 450; United Kingdom 392.
Boron materials:				
Crude natural borates	967	818	--	All from Japan.
Oxides and acids	1,684	1,663	869	Italy 370; Argentina 270.
Bromine	162	319	NA	NA.
Cement	4,149	7,688	134	Japan 7,118; France 251.
Chalk	290	1,942	--	France 1,907.
Clays, crude:				
Bentonite	2,860	3,816	2,367	France 1,332.
Chamotte and dinas earths	6,943	8,782	870	Hong Kong 5,994; Japan 706.
Kaolin	36,258	36,032	30,624	Hong Kong 2,930; Japan 1,116.
Unspecified	29,174	35,325	6,706	Japan 16,093; Hong Kong 9,130.
Cryolite and chiolite	200	5	--	All from Japan.
Diamond: Natural: Gem, not set or strung value, thousands	$431	$833	$139	Belgium-Luxembourg $589; Japan $73.

See footnotes at end of table.

Table 3.—Republic of Korea: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Feldspar, fluorspar, related materials	19,213	30,001	--	Thailand 29,627.
Fertilizer materials: Manufactured:				
Ammonia	313,804	362,068	233,763	Australia 35,919; Indonesia 22,783.
Nitrogenous	20,747	1,958	NA	Chile 1,565.
Potassic	310,603	358,851	NA	Canada 332,577; Jordan 21,000.
Unspecified and mixed	8,952	48,461	47,590	Japan 434; Belgium-Luxembourg 234.
Graphite, natural	443	1,260	NA	Japan 484; India 170; Taiwan 135.
Gypsum and plaster	218,722	222,205	61	Australia 156,077; Thailand 33,004; Mexico 25,000.
Iodine	11	16	1	Japan 15.
Kyanite and related materials	1,307	1,704	706	Hong Kong 10.
Magnesium compounds:				
Magnesite, crude	r49	50,060	--	All from Japan.
Oxides	r24	4,956	--	Japan 4,718.
Mica:				
Crude including splittings and waste	434	569	193	Japan 146; Malaysia 126.
Worked including agglomerated splittings	50	83	1	Japan 73.
Nitrates, crude	127	3,215	18	Chile 2,891; Belgium-Luxembourg 288.
Phosphates, crude ___ thousand tons	1,592	1,652	1,450	Jordan 129; Australia 44.
Phosphorus, elemental	1,578	1,841	724	Netherlands 367.
Pigments mineral:				
Natural, crude	133	163	--	Austria 96; Japan 52.
Iron oxides and hydroxides, processed	2,682	4,290	123	Japan 3,347; West Germany 634.
Potassium salts, crude	22,920	--		
Precious and semiprecious stones other than diamond:				
Natural _____ value, thousands	$1,336	$2,486	$1,209	Japan $651; Hong Kong $268.
Synthetic ___ do	$3,545	$9,645	$5,426	Japan $1,985; Taiwan $1,016.
Salt and brine	757,371	757,954	20	Australia 631,416; Yemen (Sanaa) 126,303.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	3,475	10,498	10,498	
Sulfate, manufactured	10,592	13,202	2	Taiwan 3,268; Japan 2,394; Indonesia 1,496.
Stone, sand and gravel:				
Dimension stone	15,495	29,658	9	Italy 19,805; Japan 3,086; India 2,665.
Dolomite, chiefly refractory-grade	653	155	--	Japan 86; Norway 69.
Gravel and crushed rock	771	2,291	100	France 1,859; Japan 249.
Limestone other than dimension	5,000	10,512	--	All from Japan.
Quartz and quartzite	307	613	46	Sweden 358; Belgium-Luxembourg 144; Japan 53.
Sand other than metal-bearing	142,632	122,966	4	Australia 122,516; Japan 444.
Sulfur:				
Elemental:				
Crude including native and byproduct	448,076	567,836	--	Canada 353,869; Japan 213,967.
Colloidal, precipitated, sublimed	706	1,292	930	Japan 341.
Sulfuric acid	229,867	47,029	275	Japan 46,753.
Talc, steatite, soapstone, pyrophyllite	5,225	20,981	812	Australia 10,188; Hong Kong 7,078; Japan 2,732.
Vermiculite	--	56	1	Kenya 55.
Other:				
Crude	r19,174	29,683	460	Japan 16,007; Australia 4,894.
Slag and dross, not metal-bearing	37,234	43,663	(2)	Japan 43,472.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	89	26	24	Japan 2.
Carbon black	3,743	2,985	824	Japan 1,988; West Germany 123.
Coal:				
Anthracite ______ thousand tons	805	819	256	Australia 58; Taiwan 20.
Bituminous ___ do	10,151	12,193	1,672	Australia 5,997; Canada 2,884.
Lignite including briquets	--	43,558	NA	Australia 13,830.
Coke and semicoke	159,509	150,404	1,005	Japan 146,381; Australia 2,808.
Petroleum:				
Crude thousand 42-gallon barrels	184,646	196,921	NA	Saudi Arabia 35,992; Oman 26,277; Indonesia 16,454.
Refinery products:				
Liquefied petroleum gas do	3,859	6,124	NA	Saudi Arabia 5,571; Kuwait 383; Australia 106.
Gasoline ___ do	138	370	154	Japan 97; Australia 88.
Naphtha ___ do	5,297	3,794	--	Singapore 2,354; Bahrain 818; United Arab Emirates 487.
Mineral jelly and wax do	90	82	5	Japan 63.

See footnotes at end of table.

Table 3.—Republic of Korea: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum —Continued				
Refinery products —Continued				
Kerosene and jet fuel thousand 42-gallon barrels	303	479	72	Japan 361.
Distillate fuel oil do	1,104	1,789	866	Canada 634; Singapore 277.
Lubricants do	542	1,110	650	Japan 401.
Residual fuel oil do	13,241	11,858	4,060	Singapore 2,971; Saudi Arabia 1,621.
Petroleum coke do	492	791	785	Japan 6.

[r]Revised. NA Not available.
[1]Table prepared by Audrey D. Wilkes.
[2]Less than 1/2 unit.
[3]Includes platinum-group and other precious metals.

COMMODITY REVIEW

METALS

Aside from tungsten minerals, metal ore mining in the Republic of Korea was insignificant by world standards. Alumina, copper concentrate, and iron ore had to be imported for metal production. Mine output of only lead and zinc were important for domestic smelting.

Aluminum.—Although annual consumption of aluminum was about 350,000 tons, there was only one refinery in the Republic of Korea. Aluminium of Korea Ltd. (Koralu) operated a 17,500-ton-per-year refinery at Ulsan. Koralu imported all of its alumina requirements from Japan. The bulk of the aluminum demand was from imports of unwrought metal, primarily from the Middle East, with smaller quantities from Australia, Japan, and the United States. In addition, there were imports of small tonnages of scrap metal and semimanufactures.

Copper.—Annual copper consumption was about 425,000 tons. About 30% of the consumption was supplied by two refineries operated by Korea Mining & Smelting Co. Ltd.: the 40,000-ton-per-year refinery at Changhang and the 100,000-ton-per-year refinery at Onsan. Expansion of the Onsan refinery from 80,000 to 100,000 tons was completed. Korea Mining imported virtually all of its copper concentrate inasmuch as domestic mine output was less than 500 tons of contained copper. Imports of concentrate were from the Philippines, Canada, and Mexico in that order.

Iron and Steel.—The Republic of Korea had an annual installed capacity to produce 13.8 million tons of steel. The industry was dominated by Posco, a state enterprise with an annual capacity of 9.1 million tons. Posco's steelmaking operations at Pohang, the country's only integrated iron and steel facility, consisted of four blast furnaces, six LD (Linz Donowitz) converters, four continuous casters, mills, a cold-rolling mill, a slabbing mill, a billet mill, two plate mills, and two wire rod mills. In addition, Posco placed orders for a 1-million-ton-per-year cold-rolling mill and a continuous caster to be installed at Pohang.

Construction of Posco's second steel facility at Gwangyang, Cholla-Namdo, was slightly ahead of schedule. Completion of the first stage of the 2.7-million-ton-per-year integrated Gwangyang facility was scheduled for completion in September 1988. Steelmaking facilities at Gwangyang will include a blast furnace, an LD converter, a continuous casting facility, and hot- and cold-rolling mills. Second-stage construction at Gwangyang was in the planning stage to increase capacity to 5.5 million tons per year, which included a blast furnace, a LD converter, and continuous casting.

Posco's capacity was about 10 times the capacity of Dongkuk Steel Mill Co. Ltd. and Inchon Iron & Steel Co. Ltd., the second and third largest steel producers in the country, respectively. Dongkuk had an annual output capacity of 930,000 tons from eight electric furnaces. Other equipment included four continuous casters, a wire rod mill, four section mills, and a plate mill. Inchon's capacity was 920,000 tons from seven electric furnaces. Inchon had three continuous casters, four section mills, a wire rod mill, and a hot-strip mill.

Lead and Zinc.—Annual lead consumption was estimated at 60,000 tons. Korea Mining operated a 15,000-ton-per-year smelter at Changhang. In addition, there were a number of scrap refining facilities utilizing imported materials to produce close to 10,000 tons of lead per year. The bulk of the demand was met by receipts of unwrought lead from Australia, Peru, and Taiwan.

There were two zinc refineries in the Republic of Korea. Young Poong Corp. operated a 34,000-ton-per-year refinery at Sukpo, and Korea Zinc Co. had a 70,000-ton-per-year refinery at Onsan. Domestic mine production supplied about one-half of the refinery feed of concentrates and the remainder was imported primarily from Australia. Annual zinc consumption was about 125,000 tons, of which 70% was consumed by the iron and steel industry for galvanizing pipe and plate. Expansion of Korea Zinc's refinery at Onsan to 120,000 tons per year was expected to begin in mid-1986.

Tungsten.—Korea Tungsten accounted for close to 99% of tungsten mine output from its operation at Sang Dong. The remainder of the output, about 75 tons, was from small operations at Okbeng, Ssangjan, Wol-Ak, and other places.

INDUSTRIAL MINERALS

Limestone quarrying was the largest industrial mineral sector in the Republic of Korea. Annual output of limestone was about 30 million tons and used principally in cement manufacture. Annual output of glass sand, quartzite, and talc and related materials each was about 900,000 tons. Annual production of kaolin was about 700,000 tons; feldspar, 125,000 tons; and diatomaceous earth, 50,000 tons. Most of the graphite produced was of the amorphous type. In addition, small tonnages of andalusite, asbestos, barite, and fluorspar were produced. Production of urea fertilizers totaled about 840,000 tons; ammonium sulfate fertilizers, 181,000 tons; and complex fertilizers, 1,900,000 tons.

Cement was by far the largest industrial minerals processing sector. Total annual output capacity was about 22.5 million tons. Ssangyong Cement Industrial Co. Ltd. accounted for 60% of the total production capacity from its three plants. Ssangyong Cement operated the largest single cement plant in the world—the 8.7-million-ton-per-year plant at Donghae. Ssangyong Cement also operated its captive limestone quarry near Donghae. Limestone quarrying at Donghae began on July 20, 1967, and by the end of 1985, cumulative limestone production reached 100 million tons, equivalent to 86 million tons of cement. The remainder of the annual cement production capacity, about 8 million tons, was from eight companies. Seventy-five percent of the cement produced was domestically consumed, and 25% was exported.

MINERAL FUELS

The only energy sources indigenous to the country were anthracite coal and electricity from hydro, thermal, and nuclear powerplants. About 25% of the coal produced was by Dai Han Coal, a state enterprise, and the remainder by private companies. All of the output was domestically consumed, primarily for space heating.

Total power generation capacity at yearend was 14 million kilowatts. On December 18, a 1-million-kilowatt thermal powerplant was placed in operation at Poryong, Chungchung-Namdo. The Poryong plant was fueled by bituminous coal. According to Korea Electric Power, 55.7% of the total generating capacity was from oil-fired plants; 14.9% from bituminous coal; 7.4% from anthracite coal; 13.5% from nuclear; and 8.5% from hydropower.

Total power generation in 1985 was 58.2 billion kilowatt hours (kW•h). Thermal powerplants accounted for 37.8 billion kW•h; nuclear, 16.7 billion kW•h; and hydropower, 3.7 billion kW•h. Total power consumption was 40.4 billion kW•h. Consumption by select sectors included basic metals, 6.1 billion kW•h; chemicals, 5.7 billion kW•h; metal products, 4.8 billion kW•h; industrial products, 3.5 billion kW•h; and mining, 0.9 billion kW•h.

The Republic of Korea's dependence on foreign energy sources was expected to increase from 76.8% in 1985 to 82.5% in 1991. Because of its weak energy resource base, domestic companies have invested in overseas mining ventures. For instance, the Republic of Korea was 100% dependent on imports of bituminous coal; the demand of which was estimated at 16.1 million tons in 1985. About 16% of the consumption was met by South Korean investments. Posco imported 420,000 tons from its wholly owned Tamona Mine in Pennsylvania, United States, 745,000 tons from its joint venture

Mount Thorley Mine in Australia, and 525,000 tons from the Greenhills Mine in Canada; Suneel Shipping Co. imported 490,000 tons from the Usibelli Mine in Alaska; and Hyundai Corp. and Daesung Coal Mining Co. together imported 350,000 tons from the Drayton Mine in Australia.

Moreover, South Korean firms have invested $94 million since 1981 in overseas oil development ($30 million by the companies themselves and $64 million in Government subsidies). Kodeco Energy Co. has invested $77 million in developing oil wells in Madura, Indonesia. Crude production from Madura was expected in early 1986. Four companies, including Korea Petroleum Development Corp. (Pedco), invested $12 million in developing oil wells in Marib, North Yemen. These wells were expected to begin production in late 1986. Lucky-Goldstar International Corp. and Kodeco invested $4.7 million on feasibility studies to develop wells in Adang, Indonesia, while Yukong Corp. invested $190,000 for feasibility studies in Mauritania.

The Republic of Korea continued exploration and surveying for offshore oil. Pedco started a 2,150-kilometer seismic survey in the fourth mining block in an area 250 kilometers southwest of Cheju Island. Geographic Seismic Inc. of the United States was overseeing the operation. Previously, Gulf Oil Co. and Zupex Inc. of the United States conducted a 7,000-kilometer seismic survey in the fourth block without success. Pedco had conducted a 2,838-kilometer seismic survey in the sixth mining block and a 3,352-kilometer survey in the fifth mining block. In December, Pedco and Hadson Petroleum International of the United States entered into a joint venture agreement for a 3,000-kilometer seismic survey in an area just south of Cheju Island in the fifth mining block. This agreement also provided for drilling of two exploratory wells.

Oil refining in the Republic of Korea began in 1964 with 35,000 barrels per day by Korea Oil Corp. In 1985, refinery capacity was 790,000 barrels per day by five companies: Homan Oil Refinery Co. Ltd., Kukdong Oil Co. Ltd., Kyung In Energy Co., Ssangong Oil Refining Co. Ltd., and Yukong. The largest refiner was Yukong with sales of $3.2 billion in 1985, followed by Homan, $2.8 billion; Ssangyong, $910 million; Kyung In, $659 million; and Kukdong, $235 million. Net profits of the five refiners, however, were collectively only $36.9 million.[7]

The Republic of Korea's second liquefied petroleum gas (LPG) storage terminal was being built at Asan, Kyonggi-do, 80 kilometers south of Seoul. Pedco was in charge of constructing the 160,000-ton-capacity terminal. The 160,000-ton-capacity LPG storage terminal at Yochon, Cholla-Namdo, was privately owned by Yosu Energy Co. (formerly Jungwoo Energy Co.).

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Korean won (W) to U.S. dollars at the rate of W890.2=US$1.00 for 1985.

[3]U.S. Embassy, Seoul, Republic of Korea. State Dep. Airgram A-24, Nov. 14, 1985, p. 11.

[4]Economy (Seoul). Korea Annual 1985. 22d ed., 1985, pp. 81-147.

[5]The Bank of Korea (Seoul). Economic Statistics Yearbook 1985. June 1985, p. 329.

[6]Economic Planning Board (Seoul). Monthly Statistics of Korea. V. 2, 1986, p. 175.

[7]Korean Business Review (Seoul). The Petroleum Industry in Korea. No. 77, Apr. 1985, pp. 47-54.

The Mineral Industry of Kuwait

By Michael D. Fenton[1]

The oil sector exerted a dominant influence over the Kuwaiti economy with proven oil reserves of 92.7 billion barrels, second only to Saudi Arabia in the Middle East and to the U.S.S.R., a supply which should last about 250 years at current production levels. Recent discoveries could raise proven reserves to 100 billion barrels. Because Kuwait's oil was among the least expensive in the world to produce, at about $1 per barrel, it continued to be profitable despite a soft world oil market. Kuwait's proven natural gas reserves, mostly associated gas, were 36,645 billion cubic feet. The development of a nonhydrocarbon industrial base (about 6% of the gross domestic product) was precluded by the small size of the domestic market, by a lack of nonhydrocarbon natural resources, and by shortages of skilled Kuwaiti labor. Kuwait's nonfuel mineral-producing sector consisted of cement, clays, and lime. Also, chlorine, salt, and caustic soda were produced, mostly for domestic consumption.

The unfavorable oil market outdated the goals of the 5-year development plan that began in July. An annual growth rate of 3.9% was expected, with the oil sector growing by 3.5% per year. Although economic activity had been depressed by a weak international oil market and the proximity of the Iraq-Iran war, Kuwait's global diversification (including oil refining and the transport and marketing of refined products; oilfield services and engineering; petrochemicals; exploration; and foreign, nonpetroleum investing) sustained the economy. Unlike other members of the Organization of Petroleum Exporting Countries (OPEC), Kuwait avoided incurring current account deficits; in 1985, it had a $5 billion surplus.

Finding outlets for Kuwaiti petroleum and refined products had significance beyond the foreign exchange earned, because gas associated with the production of oil was required as fuel for desalination plants, power stations, and feedstock for petrochemical industries. Kuwaiti crude was relatively heavy, and output levels needed to be maintained to produce sufficient oil-associated gas. Gas production declined significantly since 1984, and petroleum gas liquefying units in the ports of al-Ahmadi and Shuaiba operated below maximum capacity. Also, the fertilizer plant of the Petrochemical Industries Co. (PIC), formerly Kuwait Chemical Fertilizer Co. and a wholly owned subsidiary of Kuwait Petroleum Corp. (KPC), operated at about 62% of capacity. Onshore exploration for nonassociated gas was unsuccessful, and exploration was extended offshore. Since a revival in associated gas output appeared unlikely in the near term, Kuwait expected to begin importing liquefied natural gas (LNG), and progress continued toward the completion of the gas-gathering project in the al-Ratawi and Khafaji offshore fields. An increased gas supply would allow Kuwait to export more of its current maximum OPEC-allowable 900,000 barrels per day (bbl/d). The published price for the gas was $1 per million British thermal units, possibly the lowest export price in the world.

PRODUCTION AND TRADE

Crude oil production of 980,800 bbl/d in 1985 was less than that of 1984, but greater than Kuwait's November 1984 OPEC quota of 900,000 bbl/d. Installed production capacity was 2 million bbl/d.

Exports of crude oil in fiscal year (FY) 1984 amounted to 375,000 bbl/d, down 30.3%. KPC'S FY 1984 total exports of refined products amounted to over 450,000 bbl/d, up 14.3%; but sales by KPC and its local subsidiaries of crude oil, gas products, and shipping services were $10,800 million, down from $12,500 million. Overseas sales, drilling, and construction subsidiaries earned $3,500 million, an increase from $2,800 million in 1984. However, KPC reported FY 1984 net profits of $720 million, down by 25.4%, and its subsidiary companies operated at a $247 million loss. This is the second successive annual fall in KPC's profits. The estimated net profits in the FY 1984 budget were estimated to rise by 33.4% because of reductions in expenditures.

Changes in domestic consumption of less than 200,000 bbl/d should have no significant affect on Kuwait's export capacity, but this capacity will continue to be adversely affected by the Iran-Iraq war and the consequent danger to shipping in the Persian Gulf as it was in 1984.

Production of natural gas was a low 158 billion cubic feet, down from 175 billion cubic feet in 1984, because all gas output was a coproduct of the production of crude oil. Kuwait purchased the 125,000-cubic-meter El Paso LNG tanker from Algeria's state-owned Sonatrach to import gas for local power stations and industrial plants. LNG was to be purchased from either Abu Dhabi, Algeria, or Libya.

Kuwait attempted to circumvent recent weaknesses in international demand for crude petroleum by expanding its domestic refining capacity, and by acquiring marketing networks in Europe to increase sales of refined products. Total crude oil throughput at the three Kuwait refineries—Shuaiba, Mina Abdullah, and Mina al-Ahmadi—during FY 1984 rose by 17% to 543,500 bbl/d. Products output was 27.6 million tons. Liquefied petroleum gas (LPG) plants produced 168.6 billion cubic feet of gases and condensates, down 6.3% from FY 1983, and sales fell to 1.15 million tons from an earlier 1.41 million tons. Production of propane and butane dropped 11% to 1.6 million tons. The KPC continued to be one of the most rapidly expanding integrated companies in the world; its West European operations held perhaps 10% of that market and absorbed 30% to 35% of KPC's exports from Kuwait. KPC superseded the major multinational oil companies insofar as it controlled the extraction of crude oil, an advantage that other oil companies largely lost in about 1973. Twenty-five percent of Kuwaiti crude was refined abroad in Kuwaiti-owned refineries and sold in Kuwaiti-owned gasoline stations in Western Europe, 60% was sold according to long-term contracts, and 15% was refined and sold locally.

PIC's production of ammonia and urea increased by 17% and 8%, respectively, in FY 1984 as a result of the start of PIC's fourth ammonia line. Sales of urea in FY 1984 were 580,000 tons compared with a previous 541,000 tons, and ammonia sales were 71,000 tons compared with an earlier 58,000 tons. Local and foreign sales of sulfuric acid were 5,000 tons compared with 3,650 tons in the previous year. A net profit of $14 million contrasted with a previous net loss of $34 million. This profit was a result of strict control of expenditures that offset below-capacity production of 62%.

KPC produced a record high 198,000 tons of sulfur in 1985, 31% over the 1984 production of 151,000 tons. Exports increased to 166,000 tons, and inventories doubled to about 100,000. The primary market for Kuwaiti sulfur was India, which received 73,000 tons. In early 1985, KPC agreed to send India 80,000 to 100,000 tons annually for 3 years. The remaining 57,000 tons of exports went to Pakistan (22,000 tons), Tunisia (25,000 tons), and Tanzania (10,000 tons).

Kuwait's cement industry was part of the problem of uncoordinated cement plant proliferation in the Gulf region. Falling demand caused underutilization of capacity and surplus production, and cheap Asian and European imports exacerbated the problem. Kuwait had three cement plants producing over 4 million tons per year, down from 5 million tons per year in the early 1980's. Kuwait generally exports cement to Iraq.

Kuwait Oil Tanker Co. (KOTC), a wholly owned subsidiary of KPC, recorded a profit of $36.7 million in FY 1984 despite the Iran-Iraq war and the recession in the world's oil tanker market. KPC transported in its fleet all of its LPG exports, 73% of its petroleum products exports, and 37% of its crude oil. KOTC purchased two 200,000-deadweight-ton (dwt) Japanese-built tankers; it abandoned its plans to purchase six 150,000-dwt crude oil tankers. KOTC decided to construct six new product tankers at an estimated cost of about $120 million. Three will be 35,000-dwt vessels (32-foot drought) and the remainder will be 120,000-dwt vessels (53-foot drought). The South Korean or Japanese shipbuilders to be selected will deliver the tankers in 1987-88. KOTC also had four 72,000-cubic-meter-capacity LPG carriers trading between Kuwait, Turkey, and Japan on long-term contracts. Three very large crude carriers were shuttling crude and refined products to clients' tankers off Fujairah, Oman, to avoid loss by war-related attacks and to save on insurance premiums.

KOTC also planned to convert two of its crude oil tankers, the 290,084-dwt *Kazamah* and the 267,911-dwt *al-Faiha*, into dual purpose vessels capable of carrying products as well as oil. The fleet expansion and modification of 29 vessels was expected to meet the anticipated increase in demand for the export of oil products following the completion of work on the expansion projects of the Mina Abdullah and Mina al-Ahmadi refineries.

The Kuwait Foreign Petroleum Exploration Co. (KUFPEC), a wholly owned subsidiary of KPC, acquired full ownership from a 60% equity interest of the Geneva-based International Energy Development Corp. (IEDC). IEDC, through its subsidiaries, had petroleum exploration and production interests in Australia, Congo, Egypt, Italy, Oman, Sudan, Tanzania, and Turkey. The program registered successes in Egypt with a commercial discovery of oil in the Gulf of Suez (the Amal Field in a joint venture with KUFPEC and CFP-Total) and in Australia where commercial oil and substantial gas reserves have been proven in the Eromanga and Amadeus Basins, respectively. KPC's takeover of full ownership, through KUFPEC, reflects KPC's continu-

Table 1.—Kuwait: Production of mineral commodities[1]

Commodity	1981	1982	1983	1984[p]	1985[e]
Cement thousand metric tons	1,549	1,553	1,124	1,184	[2]1,082
Clay products, nonrefractory: Sand-lime bricks cubic meters	293,682	419,000	[e]450,000	[e]450,000	[2]336,200
Gas, natural:[3]					
Gross million cubic feet	223,525	162,728	182,000	175,000	158,000
Marketed do.	196,352	145,853	153,665	152,000	114,000
Lime: Hydrated and quicklime metric tons	21,598	10,200	[e]14,000	15,000	[2]47,536
Natural gas liquids:					
Natural gasoline thousand 42-gallon barrels	5,463	3,914	[e]4,400	7,940	3,500
Butane do.	6,976	5,060	[e]6,800	5,300	5,000
Propane do.	9,564	4,938	[e]9,000	7,300	6,900
Total do.	22,003	13,912	[e]20,200	20,540	15,400
Nitrogen: N content of ammonia metric tons	213,330	183,000	356,000	386,600	[2]368,600
Petroleum:					
Crude[3] thousand 42-gallon barrels	411,174	300,220	384,888	420,971	358,000
Refinery products:					
Gasoline, motor do.	8,255	10,196	[r] [e]12,000	[r] [e]13,200	14,000
Jet fuel do.	5,788	6,346	[r] [e]6,800	[r] [e]7,500	8,000
Kerosene do.	7,451	7,694	[r] [e]8,500	[r] [e]9,400	10,000
Distillate fuel oil[4] do.	23,822	63,200	[r] [e]70,500	[r] [e]77,300	81,000
Gas oil do.	41,749	40,044	[r] [e]45,600	[r] [e]49,000	51,000
Naphtha do.	13,116	22,137	[r] [e]24,000	[r] [e]26,400	28,000
Asphalt do.	1,526	1,237	[r] [e]1,700	[r] [e]1,900	2,000
Unspecified do.	749	2,600	[r] [e]3,400	[r] [e]3,800	4,000
Total do.	102,456	153,454	[r] [e]172,500	[r] [e]188,500	198,000
Salt metric tons	18,663	19,300	[e]20,000	21,000	[2]19,100
Sodium and potassium compounds: Caustic soda do.	8,900	8,700	[e]9,000	9,500	[2]19,800
Sulfur:					
Elemental, petroleum byproduct do.	97,000	140,644	[e]145,000	[r] [e]151,000	198,000
Sulfuric acid do.	4,759	8,900	[e]15,000	[r] [e]4,495	[2]4,600

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through June 20, 1986.
[2]Reported figure.
[3]Includes Kuwait's share of production in the Kuwait-Saudi Arabia Divided Zone.
[4]Includes diesel oil.

ing long-term interest in exploration as part of its worldwide oil activities. In addition to interests held through IEDC, KUFPEC was actively involved in exploration in a dozen countries including Bahrain and Tunisia, where it was acting as operator. IEDC also owned a consulting firm based in Geneva that served third-party clients.

COMMODITY REVIEW

INDUSTRIAL MINERALS

Chloride.—Tokuyama Soda Co. of Japan was constructing a 75-ton-per-day chlorine plant at Shuaiba. The second part of this plant is a 150-ton-per-day salt unit. Hitachi Zosen of Japan was to build a new chlorine plant that will have a daily output of 75 tons of chlorine, 84 tons of caustic soda, and 150 tons of salt.

Fertilizer Materials.—PIC began commercial production in a new 272,000-ton-per-year ammonia plant at Shuaiba that replaced a 107,000-ton-per-year nitrogen plant. The capacity at Shuaiba increased 60%. PIC had in its domestic fertilizers division three ammonia plants with a total capacity of 708,000 tons per year (with a fourth due to start later in the year), an ammonium sulfate plant with a 165,000-ton-per-year capacity, a sulfuric acid plant with a 132,000-ton-per-year annual capacity, and three urea installations having a combined capacity of 792,000 tons. These plants were not operating at full capacity because of a reduction in associated gas supply.

PIC participated as a 25% owner in the establishment of the Turkish-Arab Fertilizer Co. (TAGAS), capitalized at $70 million. TAGAS will produce in Turkey 1,500 tons per day of ammonium nitrate and 1,400 tons per day of diammonium phosphate from ammonia feedstock provided by PIC.

A joint petrochemical venture between Kuwait, Tunisia, and China to build a phosphate fertilizer plant in the Chinese Province of Hebei at Kin Huang Do continued. The plant was to be constructed by the Tunisian phosphoric acid and fertilizer firm Société Industrielle d'Acide Phosphorique et d'Engrais, a joint venture owned 51% by the Tunisian Government and 49% by KPC. The capacity of the plant was expected to be 480,000 tons per year of diammonium phosphate or 600,000 tons per year of nitrogen potassium phosphate fertilizers. PIC and Tunisia were to supply the ammonia and phosphate, respectively.

Sulfur.—The general contractor JGC-Yokohama secured a $1 billion contract on what was known as the Mina Ahmadi Further Upgrading Project, which included the construction of two 400-ton-per-day sulfur recovery units. This project was scheduled to be completed in April 1986.

Sulfur production will be increased in 1986 when a sulfur recovery unit, part of the Mina Abdulla Refinery Expansion Project, comes on-stream. KPC's subsidiary, C. F. Braun (a division of Santa Fe International), was designing and constructing the sulfur recovery unit for Kuwait National Petroleum Co. (KNPC). Capacity at the new plant was expected to be 271,000 tons per year, possibly in three single streams, each with 50% of total capacity (i.e., two streams running and one in reserve). An existing plant with a capacity of 63,000 tons per year would continue to operate until the new unit comes on-stream.

Much of the output from these new facilities was to be for export, since domestic consumption was limited and unlikely to increase significantly in the foreseeable future. One potential consumer was PIC, which operated a 132,000-ton-per-year sulfuric acid plant at Shuaiba. The plant received molten sulfur direct from the local refinery. This facility was constructed to supply feedstock for the adjacent 165,000-ton-per-year ammonium sulfate plant, with surplus product being used in the production of batteries and in water desalination.

MINERAL FUELS

Natural Gas.—C. F. Braun was appointed project manager by Kuwait Oil Co. for the construction of the Iraq-Kuwait 150-mile (250-kilometer) gas pipeline to deliver associated gas from Iraq's southern Rumaila oilfields to Kuwait's gas processing and transmission system. Kuwait Metal Pipe Industries was to supply 57 miles each of 36-inch and 10-inch pipe. The project's cost was to be financed entirely by Kuwait. The first stage of the project, scheduled to start in May 1986, was to supply 200 million cubic feet per day of associated gas to Kuwait, and this would be expanded to a maximum of 400 million cubic feet per day, as well as 40,000 bbl/d of condensates. Gas-gathering stations in Iraq's southern oilfields were to be connected with booster station 130 in northern Kuwait. The first 200 million cubic feet per day were to be available as a result of the newly commissioned export of 500,000 bbl/d of Basrah light crude from the Rumaila oilfields via the Yanbu terminal on Saudi Arabia's Red Sea coast. Further associated gas was to become available when Basrah crude started moving northward to feed the 500,000-bbl/d expansion of the Iraq-Turkey export pipeline (current capacity 1 million bbl/d) that was scheduled for completion by early 1987. The Iraqi contribution was to help repay its war-related debts to Kuwait at the rate of about $500 million per year, and was to be used to supplement local supplies of associated gas for desalination, industrial, and power generation purposes, and in the underutilized gas liquefaction plant.

The South Gas Project, involving the construction of gas gathering and transmission lines connecting the al-Ratawi and Khafaji offshore fields in the Neutral Zone with Kuwait's gas processing and pipeline system, was expected to be completed by the French Technip Co. Agreement had not been reached between Kuwait and Saudi Arabia on the disposition of Neutral Zone gas. The flow rate through pipelines to Mina al-Ahmadi for treatment was planned to be about 1,270 million cubic feet per day.

Petroleum.—*Production.*—KPC planned to start exporting 38° to 40°-gravity, 1% sulfur crude from Magwa Field; a number of small, nearby discoveries; and zones below the usual producing horizon in the Burgan Field. Production was expected to be 10,000 bbl/d by 1986, and to increase 50,000 bbl/d in each successive year to 200,000 bbl/d.

The new export stream will replace a portion of the 31°-gravity (Kuwait Blend), 2.5% sulfur stream; it will not increase production. The light crude will help boost associated gas supply because the new production will have a gas-to-oil ratio two to three times that of medium and heavy oil production.

Kuwait officials in 1984 disclosed substantial additions to reserves, including 36° to 40°-gravity crude at depths of 12,000 to 15,000 feet. Reserves of heavy crude also were discovered to the north; a little less than one-half of the total new reserves may be light crude. There was speculation in Kuwait that these discoveries could boost reserves to 100 billion barrels.

In early 1985, four development wells were spudded in the Marrat Formation, three in Magwa, and one in Minagish. Two development wells were completed in Umm Gudair, and a third was in Minagish. Six new production wells were completed and tested, and experimental pilot water-injection schemes for pressure maintenance were begun in the northern and western fields.

Refining.—KNPC was engaged in two large-scale projects, estimated to cost about $4.5 billion, for the modernization and upgrading of the Mina Abdullah and Mina al-Ahmadi refineries. These two projects would raise Kuwait's total refining capacity from 520,000 bbl/d to nearly 700,000 bbl/d in 1986, including 200,000 bbl/d for the Shuaiba refinery (over 65% of Kuwaiti crude oil production). Cracking capacity would triple to over 200,000 bbl/d, thereby increasing from 13% to 32% of distillation capacity. The final result would be a relative increase in the production of gas oil, kerosene, and gasoline.

The contract for the Mina al-Ahmadi project, which will raise capacity to 270,000 bbl/d, was awarded to Japan Gasoline Corp. A 33,300-bbl/d residue desulfurizing unit, a 15,800-bbl/d kerosene unit, and a 55,000-bbl/d gasoline unit were completed in June 1984, and a 30,500-bbl/d vacuum distillation unit and a 33,500-bbl/d viscosity breaker were scheduled for completion in 1986.

Meanwhile, construction work on the modernization project of the Mina Abdullah refinery by C. F. Braun was expected to be completed in 1985. The project, estimated to cost about $2 billion, would raise the refinery's design capacity to 220,000 bbl/d in 1986. The existing units would be upgraded with the addition of a vacuum distillation unit, a 35,000-bbl/d Isomax unit, a 385-million-cubic-foot-per-day hydrogen production unit, and a 325-ton-per-year sulfur recovery unit. New processing units would be installed, including an atmospheric distillation unit, a catalytic cracker, a residue coking unit with a capacity of 60,000 bbl/d that would also make naphtha and kerosene, a hydrotreating unit, and facilities for the treatment of refinery gases. The project also includes the construction of a sea island for the export of refined products via tankers of up to 14,000 dwt.

Ishikawajima Harima Heavy Industries of Japan was awarded a contract by KPC for the construction of 59 oil storage tanks at Mina al-Ahmadi. The tanks, with a total capacity of 7.4 million barrels, were scheduled for delivery in September 1986.

KNPC contracted with Combustion

Engineering Simcon Inc. to study the modernization of the instrumentation and control system at its Shuaiba refinery.

The KPC signed contracts for processing a total of 1.3 million tons (about 25,000 bbl/d) of Kuwait crude in the 360,000-bbl/d Saras-Agip refinery at Sarroch in Sardinia, Italy. The products were to be channeled into KPC's marketing and distribution network in Italy.

The Belgian subsidiary of KPC acquired 53 company-owned retail service stations from Elf Belgique S.A. Following this transaction, KPC had a retail network of over 400 service stations in Belgium. The subsidiary operated large distribution installations in Antwerp, Brussels, Ghent, and Liege to cover sales in Belgium, and a blending plant for lubricating oil in Antwerp for the supply of the Belgian market, as well as for export to about 20 different countries.

Kuwait Petroleum International, the London-based marketing subsidiary of KPC, began the sale of lead-free gasoline to motorists in Belgium, Denmark, Luxembourg, the Netherlands, and Sweden through at least 150 service stations out of a total of 1,500 European stations it had purchased in 1983 from Gulf Oil Corp. The number of service stations was to be increased to over 500 by 1987. The gasoline was produced at KPC's refineries in Denmark and the Netherlands.

Petrochemicals.—C. F. Braun was awarded a contract for the engineering design and supervision of the construction of a $400 million petrochemical plant at Vancouver, British Columbia, Canada.

PIC signed a letter of intent with C. F. Braun for the construction at the Shuaiba Industrial Area of a 62,000-ton-per-year polypropylene plant for PIC costing $110 million. The plant would run propylene from a fluid catalytic cracker at the Mina al-Ahmadi refinery. The polypropylene process to be used would be either Himont-Mitsui or Hoechst (Ste. Française), 30% of which was owned by Kuwait.

Plans for C. F. Braun to build a 32,000-ton-per-year polystyrene plant and a 20,000-ton-per-year phthalic anhydride plant have been canceled, and the Kuwait Petrochemical Products Co. (KPPC) was liquidated in October by shareholders. KPPC, which was set up to undertake various activities in the petrochemicals field and was owned 45% by PIC, 25% by the Industrial Bank of Kuwait, and 15% each by the Kuwait Melamine Co. and the Independent Petroleum Group, was unable to raise the necessary finance. The only project completed by the company since its establishment in 1980 was the construction of a $3.3 million, 80,000-ton-per-year plant at Shuaiba for the production and packaging of powdered sulfur for agricultural and industrial purposes.

Construction continued by Rowaisat, a local firm, on a $17 million, 5,000-ton-per-year plant to process residual lubricants.

KPC offered for sale its Rotterdam petrochemical complex that it acquired as part of its takeover of the Gulf Oil Co. refinery in 1981. The complex included a 300,000-ton-per-year ethylene cracker and aromatics, styrene, and other downstream units. The state oil minister expressed an interest in expanding operations in the Far East, and the complex may be moved there if it cannot be sold.

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[1]Physical scientist, Division of International Minerals.

The Mineral Industry of Liberia

By Ben A. Kornhauser[1]

Liberia's major exploitable minerals remained iron ore, gold, and diamonds. Of these, iron ore exports provided about two-thirds of the foreign exchange. However, depressed world market prices for the ore seriously handicapped the Government's ability to furnish proportional funding for development programs that were to be financed largely by various international development banks. The Government-owned National Iron Ore Co. Ltd. (NIOC) ceased operations because of its low-grade ore, low prices, and lack of market. The Mifergui-Nimba iron ore deposits in Guinea, which were near the Liberian border and would be viable only through ore transport via the Port of Buchanan, were still under continuing feasibility studies. Interest in developing gold concessions continued. Gold Coast Resources of the United States was funded in 1985 for a gold dredging operation. Oil exploration was still under way and unsuccessful.

PRODUCTION AND TRADE

Liberia's major trading partners continued to be the European Communities and the United States, which remained the leading trading partner and source of capital and technical assistance. The country's primary exploitable mineral resources continued to be iron ore, gold, and diamonds. Of the foreign exchange generated by exports, approximately 65% came from iron ore and 3% from official diamond transactions. The exported diamonds were valued at $4.7 million and represented decreases of 42% in exports and 57% in value compared with those of 1984. Gold exports decreased 54% compared with those of 1984 and were valued at $1.2 million.

The open economy, which depended largely upon exports, was damaged seriously by the slack demand and falling prices for Liberia's major exports, particularly iron ore. As a result of inadequate Government counterpart funding in 1985 for development projects and debt arrears, major donor programs of the International Bank for Reconstruction and Development (World Bank), the African Development Bank, and the European Economic Community were suspended for lengthy periods. The economy was depressed further by factors including liquidity crises, rising debt servicing requirements, Government deficits, and balance-of-payments deficits. The continuing lack of confidence in the Government created a liquidity crisis that was worsened by the issuance of Liberian $5 coins to cope with the cash shortage. Circulation of the unmonetized coins resulted in a drastic drop in the volume of circulated U.S. dollars and in a severe shortage of U.S. dollars to pay for imports. Of the 220,000 persons in the labor force participating in the monetary economy, only 17,000 were employed in mining.

Table 1.—Liberia: Production of mineral commodities

Commodity[1]	1981	1982	1983	1984[p]	1985[e]
Cement, hydraulic ---- thousand metric tons --	86	80	85	84	95
Diamond:[e]					
Gem ---- thousand carats --	132	170	160	108	66
Industrial ---- do ----	204	263	240	132	72
Total ---- do ----	336	433	400	240	[2]138
Gold[e] ---- troy ounces --	16,720	[3]12,656	15,379	[3]10,538	[2] [3]4,867
Iron ore ---- thousand metric tons --	19,704	18,165	14,937	15,100	[2]15,300
Petroleum refinery products:					
Gasoline ---- thousand 42-gallon barrels --	500	NA	NA	NA	NA
Jet fuel ---- do ----	250				
Kerosene ---- do ----	60				
Distillate fuel oil ---- do ----	1,000				
Residual fuel oil ---- do ----	1,800				
Other ---- do ----	40				
Refinery fuel and losses ---- do ----	250				
Total ---- do ----	3,900	NA	NA	NA	NA

[e]Estimated. [p]Preliminary. NA Not available.
[1]In addition to the commodities listed, a variety of crude construction materials (clays, stone, and sand and gravel) were produced, but available information is inadequate to make reliable estimates of output levels.
[2]Reported figure.
[3]Gold figures are based on gold taxed for export and include smuggled gold.

Table 2.—Liberia: Exports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
Abrasives, n.e.s.: Grinding and polishing wheels and stones ----	25	--		
Cement ----	195	--		
Coal: All grades including briquets ----	32	--		
Diamond: Industrial stones value, thousands --	$26,282	$17,223	$2,259	Belgium-Luxembourg $9,821; United Kingdom $4,349.
Fertilizer materials: Manufactured, nitrogenous ----	5	--		
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite -- thousand tons --	16,304	15,704	1,235	West Germany 5,810; Italy 3,707.
Metal: Semimanufactures, universals, plates, sheets ----	3	1	--	All to Guinea.
Petroleum refinery products:				
Gasoline, motor -- 42-gallon barrels --	28,883	--		
Kerosene and jet fuel ---- do ----	--	140	--	Do.
Distillate fuel oil ---- do ----	7,445	6,043	--	Do.
Lubricants ---- do ----	6,111	273	--	Do.
Residual fuel oil ---- do ----	34,192	--		
Bituminous mixtures ---- do ----	7,042	--		
Salt and brine ----	4	--		
Silver: Metal including alloys, unwrought and partly wrought value, thousands --	$5	$11	--	Switzerland $10; West Germany $1.
Zinc: Metal including alloys, semimanufactures ----	7	--		
Other: Ores and concentrates ----	1,485	11,662	--	Italy 5,200; Turkey 5,000; Belgium-Luxembourg 1,173.

[1]Table prepared by Virginia A. Woodson.

Table 3.—Liberia: Imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS				
Aluminum: Metal including alloys, semimanufactures	262	645	42	Switzerland 355; Japan 188.
Copper: Metal including alloys:				
Unwrought	1	1	--	Mainly from United Kingdom.
Semimanufactures	45	13	--	West Germany 7; France 2.
Iron and steel: Metal:				
Scrap	71	71	--	All from Switzerland.
Pig iron, cast iron, related materials	8	12,298	--	West Germany 12,296.
Ferroalloys	--	5	--	All from Brazil.
Steel, primary forms	167	107	20	Belgium-Luxembourg 35; West Germany 16.
Semimanufactures:				
Bars, rods, angles, shapes, sections	2,654	4,337	322	Canada 1,302; Poland 739; Belgium-Luxembourg 717.
Universals, plates, sheets	6,619	6,709	183	Japan 5,022; West Germany 713.
Hoop and strip	36	34	7	West Germany 18; Republic of Korea 5.
Rails and accessories	810	875	670	West Germany 170.
Wire	10	66	1	Belgium-Luxembourg 59.
Tubes, pipes, fittings	876	1,336	414	West Germany 551; Belgium-Luxembourg 96.
Castings and forgings, rough	48	129	68	India 33; Belgium-Luxembourg 11.
Lead: Metal including alloys:				
Wrought	13	10	--	All from West Germany.
Semimanufactures	52	37	--	West Germany 32; Belgium-Luxembourg 3.
Nickel: Metal including alloys, all forms	24	--		
Silver: Metal including alloys, unwrought and partly wrought value, thousands	$3	--		
Tin: Metal including alloys, all forms	17	37	20	France 17.
Zinc: Metal including alloys:				
Unwrought	--	2	--	All from West Germany.
Semimanufactures	32	102	--	Japan 97; West Germany 4.
Other: Ores and concentrates	22,302	--		
INDUSTRIAL MINERALS				
Abrasives, n.e.s.: Grinding and polishing wheels and stones value, thousands	$40	$342	$11	West Germany $323.
Asbestos, crude	6	19	--	Belgium-Luxembourg 11; Sweden 6.
Cement	48,214	62,877	1,437	Norway 30,694; Spain 26,616.
Clays, crude	22,213	24,880	12	West Germany 24,867.
Diamond: Gem, not set or strung value, thousands	$3	$1	NA	NA.
Fertilizer materials:				
Crude, n.e.s	15	406	339	Netherlands 59.
Manufactured:				
Nitrogenous	4,189	3,914	2,273	Norway 1,574.
Phosphatic	221	29	--	All from West Germany.
Potassic	55	5	5	
Unspecified and mixed	698	61	50	United Kingdom 4; Netherlands Antilles 3.
Lime	244	59,621	155	Italy 47,175; United Kingdom 12,284.
Magnesium compounds: Magnesite, crude	11	--		
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$1	$2	--	All from Zaire.
Synthetic do	--	$1	$1	
Salt and brine	2,919	4,259	283	West Germany 3,532; Netherlands 55.
Sodium compounds, n.e.s.: Carbonate, manufactured	69	132	52	Sweden 50; West Germany 17.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	1,911	464	--	Italy 420; France 44.
Worked value, thousands	$91	$80	--	France $48; China $32.
Gravel and crushed rock	1,362	435	220	Italy 215.
Limestone other than dimension	6,050	36,587	1,477	West Germany 34,723.
Sand other than metal-bearing	--	1	NA	NA.
Sulfur: Elemental, crude including native and byproduct	--	9	NA	NA.
Other: Crude	16	552	--	All from Spain.
MINERAL FUELS AND RELATED MATERIALS				
Coal: All grades including briquets	--	23	17	NA.
Petroleum:				
Crude 42-gallon barrels	2,528,582	NA		

See footnotes at end of table.

Table 3.—Liberia: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum —Continued				
Refinery products:				
Liquefied petroleum gas 42-gallon barrels	313	858	290	Ivory Coast 186; Sierra Leone 139.
Gasoline, motor do	43,571	453,747	4,582	NA.
Mineral jelly and wax do	1,928	5,462	370	Denmark 1,338; West Germany 1,236; China 866.
Kerosene and jet fuel do	22,994	169,896	--	Netherlands 122,295; Canada 37,301.
Distillate fuel oil do	--	504,632	--	Canada 179,144; unspecified 297,624.
Lubricants do	38,773	53,620	12,579	West Germany 16,408; Belgium-Luxembourg 7,385.
Residual fuel oil do	146,706	472,008	--	Netherlands 278,148; Canada 193,600.
Bituminous mixtures do	248	333	206	France 55; Italy 48.

NA Not available.
[1]Table prepared by Virginia A. Woodson.

COMMODITY REVIEW

METALS

Gold.—Gold Coast Resources was funded by foreign investors for $4 million to develop a portion of its gold concession of 500 square kilometers. The first dredging was to be on the Dubo River where the company already had a small test dredge.[2]

Iron Ore.—The low world price for iron ore greatly reduced the export value of Liberia's major mineral commodity and led to the April 1 closing of the Government's NIOC operations. NIOC had difficulty selling its low-grade ore on the world market and had not paid its workers for about 6 months. NIOC was in the northwest near the Sierra Leone border.

Production of iron ore increased slightly to 15.3 million tons, a 1.3% increase over output in 1984. Production at the Bong Mining Co. was 7.3 million tons, an increase of 8.5% over that of 1984, and the LAMCO Joint Venture Operating Co. (LJV) produced 7.8 million tons, up 4.3% over 1984 output. Shipments of fines, lumps, pellets, and sinter feed totaled 16.3 million tons, slightly less than that of 1984. These materials went essentially to Western European countries except for the 2 million tons of fines shipped to the United States for LJV.

The $500,000 feasibility study of the Mifergui-Nimba iron ore deposit in Guinea at the Liberian border, funded by the World Bank, stated that a $267 million investment was needed for a 10-million-ton-per-year operation, that an 18-kilometer railway was required to link to LJV's existing railway in Liberia that runs to the Port of Buchanan, that the project would extend the life of LJV's Nimba Mine, and that a further study was necessary to assess the project's economic viability and marketing of the ore.

Two Norwegian shipping companies, Providence Shipping (owned by the Liberian Government) and Norn Shipping (a Liberian-based company owned by Norwegian interests), signed an agreement to transport one-half of Liberia's annual iron ore exports of approximately 14 million tons. The contract was valued at $700 million over the next 20 years. The first shipment was scheduled from the Port of Buchanan in the third quarter of 1985. The very depressed freight rate for iron ore from Liberia to European Community countries was about $5 per ton.[3]

MINERAL FUELS

At yearend, the Amoco Liberian Exploration Co. had drilled three exploratory oil wells offshore Grand Cape Mount and Rivercess Counties at water depths of about 1,500 feet. By yearend, Amoco had spent about $25 million on its exploration.[4]

The Government of Liberia granted an offshore concession to the Henry Resources Corp., a wholly owned subsidiary of the Henry Energy Corp. of the United States, to the Aracca Petroleum Corp. of the United States for an area covering approximately

1.2 million acres. The tract, east of Monrovia, included the Edina and Robertsport Basins, running northwest of the St. Paul River to southeast of the St. John River. Henry Energy was committed to 217 linear miles of seismic survey and to drilling at least two wells to a depth of 500 meters. If petroleum were discovered, a production license would be issued for 25 years. If the discovery were commercial, the Government would have the option to participate in up to 30% of the venture.[5]

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[1]Physical scientist, Division of International Minerals.
[2]Mining Journal (London). V. 304, No. 7802, Mar. 1, 1985, p. 146.
[3]Metal Bulletin (London). No. 7005, July 23, 1985, p. 29.
[4]Footprints Today (Monrovia, Liberia). Nov. 5, 1985, pp. 10-12.
[5]Oil & Gas Journal. V. 83, No. 6, Feb. 11, 1985, p. 50.

The Mineral Industry of Libya

By Thomas Glover[1]

The declining economy of the world oil market had a devastating effect on Libya's economy. Oil exports, accounting for 99% of Libya's foreign exchange earnings and 53% of its gross domestic product, had shrunk sharply since 1980 owing to a decline in global demand for crude oil. By 1985, daily production had likewise declined more than 50% as the demand for crude oil declined. Libya's crude reserves remained, by far, Africa's largest.

Libya's currency reserves steadily decreased during the year, owing to the necessity of financing foreign trade. The development budget for 1985 was approximately 19% less than that of 1984. Economic growth, projected at 9.4% in the development plan, grew at approximately one-third of that planned.

Owing to Libya's excessive dependence on oil for its economic growth, the balance of trade deteriorated from a surplus of $11.5 billion in 1980 to a trade deficit in 1985. Problems in connection with economic development were more severe in Libya than in other oil-producing countries primarily because high-priced Libyan crude led to a lower share of the world oil market, and also because of trade sanctions by the U.S. Government applied to imports of Libyan crude and to exports of U.S. technology.

The short-term outlook for the economy of Libya seemed depressing, although longer term prospects seemed to be brighter. New oil discoveries of some magnitude were made in 1985. Libya's reserves of crude oil were sufficient for over 50 years of production at current withdrawal rates. Libya's response to the slump in oil exports was efforts to increase productivity and output in the agricultural and industrial sectors. In the agricultural sector, a 400-kilometer water pipeline costing $9 billion was being laid from artesian wells in the desert to agricultural production centers near the coast. In the industrial centers, aluminum, cement, petrochemical, and steel plants were being built or were in planning stages.

Another factor in the economy of Libya was the shortage of qualified Libyan labor. The shortage of foreign currency reserves and political problems prompted thousands of expatriates to return to their native countries. Their departure crippled much of the consumer sector of the economy.

PRODUCTION AND TRADE

Libya's principal source of foreign exchange earnings continued to be its exports of crude oil and petrochemical products. Production of crude oil, slightly less than that of 1984, was estimated to average 1.059 million barrels per day (bbl/d). The country's exploration for and production of crude oil and the supporting infrastructure continued to depend heavily on the support and technologies of foreign countries. Crude oil production quotas set at 0.99 million bbl/d by the Organization of Petroleum Exporting Countries (OPEC) in 1984 remained the same in 1985. Production quotas applicable to the various producing companies were approximately as follows, in barrels per day:[2]

Oasis Oil Co. of Libya Inc. (Continental Oil Co., Marathon Oil Co., and Amerada-Hess Corp.) in partnership with the Libya National Oil Co. (LNOC)	400,000
Azienda Generali Italiana Petroli S.p.A. (AGIP) with LNOC	155,000
Arabian Gulf Exploration Co. (AGECO) Umm al-Jawabi (LNOC for crudes from the Akmna and Sarir Fields)	140,000
Occidental Petroleum Corp. with LNOC	142,000
Sirte Oil Co. (LNOC, formerly Esso Sirte Oil Co.)	125,000
LNOC (formerly Mobil Oil Libya Ltd.)	63,000
Others	15,000

Libya agreed to deliver 40,000 bbl/d of crude oil to Italy in the first 8 months of 1985 in partial repayment of commercial debts to Italian firms. Total crude oil involved amounted to approximately 10 million barrels valued at $300 million.[3] Libya owed nearly $800 million to Italian firms prior to the agreement. On July 27, another agreement was made for an additional 25,000 bbl/d of crude oil between Libya and Italy for further repayment of Libyan commercial debts to Italian firms working in Libya.

Libya agreed to supply Sudan with 2,315,000 barrels of crude oil during the last 6 months of 1985 at a rate of 386,000 barrels per month. The agreement was between Libya's Brega Petroleum Marketing Co. and Sudan's General Oil Establishment.

Under an agreement signed in 1984, Libya was delivering 22,000 bbl/d of crude oil to Yugoslavia as a partial payment for Yugoslav goods and services. Also, Libya was shipping 100,000 bbl/d to the U.S.S.R., but one-fifth of this volume was being diverted by the U.S.S.R. to Yugoslavia. In a three-way arrangement in 1985, Libya agreed to deliver an additional 20,000 bbl/d of crude to Yugoslavia for which Libya was to receive credit from the U.S.S.R. in partial payment of the $4 billion to $5 billion owed by Libya for military hardware.

The President of the United States issued Executive Order 12538 November 15, 1985, banning the importation of refined petroleum products from Libya. Crude oil from Libya to the United States had been banned by Presidential Proclamation No. 4907 dated March 10, 1982.

Libya and the Soviet Union signed a long-term agreement on October 14, 1985, to develop economic, scientific, and trade cooperation, and they further agreed to expand existing bilateral cooperation in all fields.

Libya's cash reserves fell to an estimated $2.6 billion in 1985 owing to reduced prices for oil and the necessity of increasing the volumes of many imported products. Apparently, because of the decline, Libya slowed some big industrial projects that were to highlight its future internal development. Construction of the Sirte fertilizer plant and the Zuwarah aluminum plant were put off. Work on a steel mill was slowed because of unpaid bills.

Table 1.—Libya: Production of mineral commodities[1]

Commodity[2]	1981	1982	1983	1984[p]	1985[e]
Cement, hydraulic[e] ... thousand metric tons	3,200	4,000	5,000	6,000	6,500
Gas, natural:[e]					
Gross ... million cubic feet	432,000	425,000	258,000	295,000	292,000
Marketed[3] ... do	108,000	115,000	150,000	150,000	150,000
Gypsum[e] ... thousand metric tons	180	175	180	180	180
Iron and steel: Steel, crude[e] ... metric tons	10,000	10,000	10,000	10,000	10,000
Lime ... thousand metric tons	235	225	260	[e]260	260
Nitrogen: N content of ammonia ... do	[e]150	244	250	[e]250	250
Petroleum:					
Crude ... thousand 42-gallon barrels	407,705	418,000	401,500	390,915	386,535
Refinery products:					
Naphtha ... do	3,833	4,000	4,000	4,000	6,000
Gasoline ... do	3,250	4,000	5,000	5,000	7,000
Kerosene and jet fuel ... do	4,100	5,000	7,000	7,000	11,000
Distillate fuel oil ... do	7,350	8,000	10,000	10,000	15,000
Residual fuel oil ... do	13,475	12,500	10,000	10,000	15,000
Other ... do	475	500	600	600	1,000
Refinery fuel and losses ... do	750	1,000	900	900	2,000
Total ... do	33,233	35,000	37,500	37,500	57,000
Salt[e] ... thousand metric tons	10	10	12	12	12
Sulfur, byproduct of petroleum and natural gas[e] metric tons	11,000	12,000	14,000	14,000	14,000

[e]Estimated. [p]Preliminary.
[1]Table includes data available through June 12, 1986.
[2]In addition to the commodities listed, a variety of construction materials (sand and gravel, crushed stone, brick, and tile) is produced, but available information is inadequate to make reliable estimates of output levels. Natural gas liquids are also produced but are blended with crude petroleum and are reported as part of that total.
[3]Excludes gas reinjected into reservoirs.

COMMODITY REVIEW

METALS

Aluminum.—In mid-1985, Libya authorized work to proceed on the country's first aluminum plant at Zuwarah near Tripoli. The Zuwarah plant was scheduled to have a smelter capacity of 120,000 tons per year, which would make it the fourth largest plant in Africa. When and if the plant is ever activated, alumina would be provided by Energoinvest of Yugoslavia. The plant was planned to be powered with Libyan natural gas. In addition to the smelter, the complex would have a petroleum coke plant, a port, and a power generating station, all at an estimated cost of $2 billion. Although contract bids were solicited in midyear, the entire project was put on hold owing to economic problems in early fall.

Iron and Steel.—The integrated iron and steel complex at Misratah was more than 75% completed in 1985. At mid-1985, plans for startup were scheduled for 1986, but work at the complex was thrown off schedule because a South Korean contracting firm quit work until it was paid. The iron and steel complex was scheduled to employ 5,000 workers when fully operational and would cost approximately $5 billion. The complex would be fueled by Libyan natural gas and would use all imported iron ore during the first phase of operation. During this phase, annual capacity was to be 1.3 million tons of soft steel and an equal amount of steel products.

A later expansion to 5 million tons was planned with the use of iron ore to be mined in Wadi al-Shati in southern Libya. The complex when completed will include a direct-reduction plant for iron ore, two electric steel mills, a hot-rolling mill, a cold-rolling mill, a wire-rolling mill, and a section mill, as well as the required infrastructure facilities.

INDUSTRIAL MINERALS

Cement.—The new Zliten cement plant was turned over to the Libyan Government by Kawasaki Heavy Industries Ltd. of Japan. The plant, a 1-million-ton-per-year operation, utilized a vertical roller mill for raw grinding. Prior to the startup of this plant, seven plants were operating in Libya with a total yearly design capacity of 7 million tons. The status of the new cement plant at Derna could not be determined.

Gypsum.—Flotech A/S of Denmark was awarded an engineering and consulting contract for a 200,000- to 300,000-ton-per-year gypsum plant to be constructed outside Tripoli. Cost of the project was estimated at $40 million and was financed by the Libyan Development Bank. In addition to the gypsum plant, plans called for the mining of gypsum deposits approximately 70 kilometers from Tripoli. Other scheduled developments were the construction of export facilities and the extension of a natural gas pipeline to the plant. Gypsum exports were targeted for Scandanavian countries.

MINERAL FUELS

Natural Gas.—Occidental Petroleum Corp. of the United States sold 25% of its natural gas and oil holdings in Libya to Osterreichische Mineralöverwaltungs AG (OMV) of Austria in June 1985 for a reported price of $120 million. Under the agreement, OMV acquired 4,631,000 barrels per year of crude oil and 812,000 barrels per year of condensates. Libya National Oil Co. (LNOC) held a 51% share in the joint venture.

Libya's abundance of natural gas was put to useful purposes instead of being flared. The natural gas was used in Libya's petrochemical plants for power generation, desalinization of seawater, and for making liquefied natural gas.

Petroleum.—*Exploration.*—Société Nationale Elf Aquitaine of France returned four onshore exploration permits to Libya owing to poor seismic results and a dry hole.

A lengthy legal action between Libya and Malta over Continental Shelf oil drilling rights was settled by the International Court of Justice (ICJ) during the first week of June. The ICJ adjusted the median line between Libya and Malta 18 nautical miles northward from a previous location, giving Libya a greater control over the Continental Shelf between the two countries.

Tunisia requested further clarification on the Libyan-Tunisian offshore dispute from the ICJ. According to Tunisia, certain clarifications were necessary in order to implement an earlier court decision.

Sirte Oil Co., in cooperation with Rompetrol of Romania, discovered two new oil-producing areas in Libya. The Sirte discovery, offshore north of Tripoli, flowed 4,694 bbl/d from a depth of 7,740 feet. Rompetrol's discovery in southwestern Libya near the Algerian border flowed 1,800 bbl/d from a depth of 4,625 feet.

LNOC made eight oil discoveries and four natural gas discoveries during the first half of 1985. Six of the discoveries were made in the Sirte Basin, five in the Ghadamis Basin, and one in the Marzuk Basin. LNOC drilled 27 development wells, 29 exploratory wells, and 3 demarcation wells in new fields during the period. Three new fields under development included the Hakim Field where 15 wells were drilled, the Faregh Field in the Sirte Basin, and the Bouri Field in an offshore area. Bouri was the first offshore field developed by Libya. During the same period, Braspetro, the international subsidiary of Brazil's State-owned Petróleo Brasileiro S.A., made a final exploration assessment after drilling six wells without commercial results in a 60,000-square-kilometer area in the Marzuk Basin in southwestern Libya.

LNOC undertook a number of studies on selected oil wells to determine the best methods, economically and technically, for increasing production. The results of the studies indicate the possibility of recovering up to 15% more of the oil in the producing formations compared with previous production methods.

Production.—Crude oil production from Libya's 900 plus oil wells averaged slightly less than 1.1 million bbl/d in 1985, off about 12,000 bbl/d from daily average production in 1984. OPEC's production quota set in 1984 at 990,000 bbl/d remained the same in 1985, even though output exceeded that amount by 69,000 bbl/d. During the first calendar quarter of the year, production averaged 1,000,000 bbl/d; in the second quarter, the average rose to 1,026,000 bbl/d, then fell to 973,000 bbl/d in the third quarter, and then rose finally to 1,167,000 bbl/d in the fourth quarter. Libya ranked 8th in daily oil production among OPEC members, 14th among all oil-producing countries, and produced less than 2% of the world's oil output.

During the third calendar quarter of 1985, Libya's oil production fell more than 50,000 bbl/d owing to difficulties experienced in at least two oilfields. In early July, Azienda Generali Italiana Petroli S.p.A.'s (AGIP) Bu Attifel Field was shut down for approximately 2 weeks for pump and pipeline repairs. Of AGIP's Libyan production, approximately 90% came from the Bu Attifel Field. Oasis Oil Co.'s Oasis Field production was also cut back 25% owing to full storage at the Sider export terminal.

Refining.—Test production at Libya's long delayed Ras Lanuf Oil and Gas Processing Co.'s refinery at the coastal town of Ras Lanuf was begun in early 1985. Design capacity of the facility was 220,000 bbl/d, of which 124,000 bbl/d was fuel oil; 35,000 bbl/d, naphtha; 50,000 bbl/d, gas oil; and 11,000 bbl/d, kerosene-jet fuel. Libya plans to use a substantial part of the product output for its domestic market, particularly fuel oil for coastal electric power stations. Soon after startup, some of the facility's products were sold to Japan.

Brega Petroleum Marketing contracted to sell approximately 25% of Ras Lanuf's projected output of naphtha to the London affiliate of Dow Chemical Corp. for 1 year. Volume was approximately 9,300 bbl/d.

Technimont S.p.A., engineering subsidiary of Montedison of Italy, was awarded a $50 million engineering services contract in connection with the projected expansion and upgrading of the recently opened Ras Lanuf refinery. The proposed work included vacuum and naphtha hydrotreating, catalytic reforming, delayed coking, hydrocracking, and visbreaking units. The services contract included design work, licensing and awarding of turnkey contracts, and supervision of construction work and startup operations. Construction was scheduled for completion in 5 years.

Efficiency operating tests were carried out on the Tubruq Oil Refinery for the first time in 1985. The plant was designed to have an output capacity of 20,000 bbl/d and achieved a 98.1% rating of 19,620 bbl/d. The daily output consisted of 9,089 barrels of heavy fuel oil, 5,233 barrels of diesel, 611 barrels of kerosene, 1,400 barrels of aircraft fuel, 3,043 barrels of gasoline, and 244 barrels of heavy petroleum.

Petrocoke.—Japan's Marubeni Corp. reached an agreement with the Libyan Aluminum Co. to financially support the construction of a petroleum coke plant at Zuwarah. Two other members of the consortium to build the plant were Italy's Belleli Industrie Meccaniche and the Republic of Korea's Daewoo Corp. It appeared that the project would proceed despite a delayed start on the construction of the aluminum smelter, in which part of the calcinated coke output would be used.

Uranium.—According to the Atomic Energy Secretary of Libya, "enough uranium has been discovered in Libya to cover the country's own needs." Some radioactive deposits have been found south of Ghadames, plus other quantities that have been discovered in the Ghat and Uwainat al-Gharbiya area. Studies were done on the Aouzou Strip following an earlier discovery of uranium deposits.

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[1]Physical scientist, Division of International Minerals.

[2]Middle East Economic Survey (Nicosia, Cyprus). V. 29, No. 14, Jan. 13, 1986, p. A2.

[3]Where necessary, values have been converted from Libyan dinars (LD) to U.S. dollars at the rate of LD0.33=US$1.00.

The Mineral Industry of Madagascar

By Kevin Connor[1]

During 1985, Madagascar's mineral industry continued to produce small tonnages of a variety of industrial minerals for domestic consumption, while chromite ore, graphite, mica, and ornamental stones were produced for export. Petroleum exploration activities were under way throughout the year, both onshore and offshore. Five exploration wells were drilled to completion during the year, with disappointing results. No petroleum was found, and natural gas was discovered in only one of the wells. Mobil Oil Corp. of the United States closed out its Madagascar operations in August, leaving only four international petroleum companies operating within three exploration concessions at yearend.

Also during the year, the Madagascar Ministry of Industry, Energy, and Mines completed a mineral inventory program of the island with technical assistance from France's Bureau de Recherches Géologiques et Minières (BRGM). The program was estimated to cost $324,000[2] and was funded by the European Development Fund. Also in 1985, the U.S.S.R. was conducting geological studies and developing a metallogenic map of Madagascar. The Soviets were interested in exploration for base metals, rare metals, and industrial minerals. The Soviets also completed feasibility studies on Madagascar's known bauxite and uranium deposits, but determined they were economically unfeasible to develop in the near future.

Government Policies and Programs.— With assistance and advice from various international lending sources, the Madagascar Government adopted a new investment code during June. The new code was considered a much more liberal and flexible code than the Charts de Entreprises, which was adopted by the Government in 1973. The new law opened up to private investors a number of areas previously excluded to them, although certain sectors considered strategic, such as banking, energy generation, and naval construction, were still to be excluded from public domain. Weak world markets for metals and high capital costs for development of new mines and processing operations continued to plague the Madagascar Government in 1985, and it was hoped that the new code would stimulate foreign interest and investment in the country's mineral sector.

Outlined in its public spending program for 1984 through 1987, the Government allocated only 11% of its mining investment budget outside of the petroleum sector. Of the nonpetroleum allocation, 80% of the funding was to be spent on developing the country's coal, iron, and uranium deposits.

PRODUCTION AND TRADE

Madagascar's mineral production and mineral export trade sectors were essentially stagnant in 1985, except for chromite ore production, which increased to its highest level in 5 years. Slight decreases in the U.S. dollar value of products exported resulted in a small decrease in total mineral export receipts, estimated at slightly over $12 million. Exports of chromite ore concentrate were slightly over 102,000 tons for 1985 while graphite and mica exports were 13,500 tons and 877 tons, respectively. Graphite export revenues were estimated at $5.7 million, while chromite export sales remained in second place at an estimated $5.2 million. Semiprecious and ornamental stones, such as beryl, tourmaline, amethyst, and rose and smoked quartz, were also mined and exported in small quantities. The total value of exports for the ornamental and semiprecious stones was estimated to be slightly more than that for the mica trade, which was reported to be $580 million for 1985. Madagascar continued to export small quantities of scrap metal, salt, abrasives, and cement. Also, as in previous years, small quantities of byproducts from the country's sole petroleum refinery at Tamatave were exported to neighboring islands. Export receipts from mineral commodities produced from native deposits continued to represent less than 1% of the country's gross domestic product and less than 5% of all export receipts.

Table 1.—Madagascar: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984[p]	1985[e]
METALS					
Beryllium: Beryl in quartz, concentrates, industrial and ornamental	[r] [e]50	[r]68	(3)	46	50
Chromium: Chromite concentrate, gross weight	99,689	44,223	45,729	59,765	[4]127,415
Gold, mine output, metal content[e] troy ounces	110	110	110	130	130
INDUSTRIAL MINERALS					
Abrasives, natural: Garnet (industrial only)[e] kilograms	5,000	5,000	7,000	10,000	10,000
Cement, hydraulic	35,796	35,921	[e]35,000	[e]35,000	35,000
Clays: Kaolin	1,746	2,511	[e]2,500	[e]2,500	2,500
Feldspar[e] kilograms	1,800	1,800	1,800	1,800	1,800
Gem and ornamental stones:					
Agate do.	45,822	[e]20,000	8,450	9,300	9,300
Amazonite do.	711	700	8,910	6,162	6,200
Amethyst:					
Gem do.	24	12	15	10	10
Geodes do.	350	4,300	[e]4,300	[e]4,300	4,300
Apatite (ornamental only) do.	29	[e]30	3	3,500	3,500
Aragonite	1,166	1,101	1,226	809	800
Beryl kilograms	NA	68,400	170	45,723	46,000
Calcite (ornamental only)	NA	NA	600,000	1,584,000	1,600,000
Celestine kilograms	24,882	27,000	29,644	[e]30,000	30,000
Citrine, gem do.	33	[e]30	12	46	50
Cordierite do.	348	[e]350	27	10	10
Garnet: Gem do.	NA	60	1,196	2,603	2,600
Jasper do.	2,850	17,100	[e]17,000	--	--
Labradorite do.	3,084	9,200	7,847	2,740	2,700
Quartz:					
Crystal do.	NA	NA	5,283	32,467	32,500
Rose quartz do.	58,842	[e]58,850	247,943	139,645	140,000
Hematoid do.	NA	NA	1,885	14,964	15,000
Geodes do.	60	NA	NA	2,970	3,000
Other ornamental do.	3,527	[e]3,500	1,200	6,397	6,500
Smelting do.	NA	NA	771,000	1,058,000	1,000,000
Tourmaline:					
Gem do.	[e]1,750	[e]750	7	2	2
Other ornamental do.	NA	NA	5,231	26,558	27,000
Graphite, all grades	13,334	[r]15,210	13,557	13,973	[4]14,000
Mica, phlogopite:					
Block	334	NA	28	26	NA
Splittings and sheet	NA	NA	72	71	NA
Scrap	49	NA	619	623	NA
Total	383	1,300	719	720	[4]589
Quartz, piezoelectric kilograms	73	55	51	145	150
Salt, marine[e]	30,000	30,000	30,000	30,000	30,000
Stone:					
Calcite, industrial[e]	2,000	2,000	2,000	2,000	2,000
Marble, cipoline	NA	13	3,511	113	110
Other: Bastnasite[e] kilograms	23,000	23,000	25,000	25,000	25,000
MINERAL FUELS AND RELATED MATERIALS					
Petroleum refinery products:					
Gasoline thousand 42-gallon barrels	544	[r]466	242	87	[4]454
Kerosene and jet fuel do.	335	[r]293	175	49	[4]304
Distillate fuel oil do.	[r]774	[r]734	734	129	[4]598

See footnotes at end of table.

Table 1.—Madagascar: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984[p]	1985[e]
MINERAL FUELS AND RELATED MATERIALS —Continued					
Petroleum refinery products —Continued					
Residual fuel oil thousand 42-gallon barrels	[r]953	[r]1,026	1,026	142	[4]729
Other do	37	[r]27	13	2	[4]30
Refinery fuel and losses do	NA	NA	NA	NA	NA
Total do	[r]2,643	[r]2,546	2,190	409	[4]2,115

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through Aug. 4, 1986.
[2]In addition to the commodities listed, modest quantities of unlisted varieties of crude construction materials (clays, sand and gravel, and stone) presumably are produced, but output is not reported, and available information is inadequate to make reliable estimates of output levels.
[3]Less than 1/2 unit.
[4]Reported figure.

COMMODITY REVIEW

METALS

Titanium.—The Canadian firm QIT-Fer et Titane Inc. of Montreal was completing a preliminary feasibility study of the titanium-bearing sands on Madagascar's east coast during the latter part of the year. QIT's assessment was that the coastal deposits could support an operation producing 300,000 tons per year of ilmenite concentrate. The resultant concentrate could then be shipped to QIT's existing Canadian smelter, to produce 200,000 tons of 90% titanium dioxide slag, and high-purity iron. The high-purity iron coproduct, a unique feature of QIT's Canadian smelter, would be sold as a high-grade charge to ductile iron foundries. The slag could be used in either the chloride or sulfate process for manufacturing titanium dioxide pigment. QIT's proposed production from Madagascar's coastal beach sands could increase world supplies of titanium dioxide by 6%. A joint venture between QIT and the Madagascar Government to develop the sands was expected to be signed as early as sometime in the first half of 1986.

Other Metals.—Efforts to build a ferrochrome operation at Moramanga near the country's main source of electrical power, the Andekaleka hydroelectric dam, and development of the Soalala iron ore deposits on the island's west-central coast continued to be stalled owing to a lack of investment capital. Econo Oy of Finland completed a favorable study on the Moramanga ferrochrome project at the end of 1984, and together the French BRGM and an Italian company, Finanziaria Siderurgica S.p.A., completed a feasibility study on the Soalala iron deposit in 1983, with a proposed follow-up second phase to have begun in 1985. However, neither project went forward during 1985 owing to the general lack of international investment interest.

Exploration and feasibility project work on the Ambatolampy-Andravoravo gold deposits was proposed and planned during the year, with financial assistance from the French Government and technical assistance from BRGM. Also to be explored were gold deposits in the Ilea-Ambositra region. Both gold-bearing areas were south of Antananarivo and east of Antsirabe. The work was expected to get under way during the first half of 1986. The areas were mined for gold about the turn of the 19th century, with recorded production totals as high as 2,000 kilograms per year.

MINERAL FUELS

Coal.—Negotiations with the British Petroleum Coal Co. (BP Coal) continued during the year, and a contract agreement for a phase 1 evaluation of the Sakoa Coalfield of southwestern Madagascar was expected to be signed early in 1986. The contract was to cover an extensive geological evaluation and mining analysis for the entire coalfield, including a comprehensive core drilling program to assess coal reserves and coal quality. Upon proving out favorable coal reserves and development of a preliminary mining plan, BP Coal envisioned subsequent program phases to develop an open pit operation of up to 5 million tons per year. Almost all of the coal would be for export. The Sakoa area is in a remote and undeveloped area of Madagascar and would require a considerable amount of infrastructural development to support a large-scale mining operation. Also, the intended loadout port of Tulear on the southwestern coast would require a substantial infusion of capital investment to expand and modernize existing port facilities. The phase 1 cost alone was estimated at $50 million.

Petroleum.—At the end of 1985, the Amoco Madagascar Petroleum Co. stopped all drilling activity and announced a 1-year cessation pending reappraisal of the geological data available. Drilling results in 1985 were poor, with only trace amounts of oil and gas found after completing four wells in the Morondava Basin, Amoco's exploration concession in the southwestern part of the country. Amoco may conduct further seismic work during the drilling hiatus and was required to drill at least one more well under its contract. Amoco also had the option of adding an additional concessional exploration tract to its existing acreage.

Occidental Petroleum Corp. and Union Oil Co. of the United States were proceeding with their geological studies and were expected to begin drilling operations in their concession in the Tulear region, just south of Amoco's concession, in the first half of 1986.

Mobil drilled one well during the year in its offshore concession. The well produced only natural gas, and Mobil closed out its operation in August. No discoveries were reported during the year by the Italian oil company Azienda Generali Italiana Petroli S.p.A. concerning its exploration efforts in the Mugunda Basin.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Madagascar francs (FMG) to U.S. dollars at the rate of FMG650=US$1.00.

The Mineral Industry of Malaysia

By John C. Wu[1]

The mineral industry of Malaysia suffered a major setback in 1985 as the output value of its two major mineral commodities—crude oil and tin—dropped considerably. The decline in crude oil output was largely a direct result of a Government conservation policy as well as further softening of oil prices in the world market. The decline in tin output was in part caused by imposition of export control by the International Tin Council (ITC) and a sharp decline in tin prices following the October tin crisis in the world market. However, Malaysia remained the world's largest producer of tin, accounting for 19% of the world's tin mine production. Malaysia also emerged as one of the top five exporters of liquefied natural gas (LNG) in the world as well as an important producer of direct-reduced iron (DRI) and nitrogen fertilizer materials in Southeast Asia.

The mineral fuels sector continued to play a major role in Malaysia's mineral industry. Despite a slight cutback in the output of crude oil to an average of 430,000 barrels per day, the output of natural gas reached an all-time high of 474.5 billion cubic feet, and LNG production also rose to 4 million tons from 3.7 million tons in 1984. Export earnings from crude oil and LNG amounted to $5 billion[2] accounting for 32% of total export earnings. As a result of recent exploration and discoveries of new oil and gas deposits offshore Terengganu and offshore West Malaysia, Malaysian oil and natural gas reserves increased to between 2.9 billion and 3.1 billion barrels, and 44 trillion and 49 trillion cubic feet, respectively.

To attract and encourage new exploration and development of oil and natural gas deposits, the Government approved a new production-sharing contract in December. Under the new terms, a higher cost recovery factor and profit split ratio would be allowed. In addition, all bonus payments to the Government by foreign contractors were to be eliminated.

During the year, three petroleum products projects came on-stream. A 346,000-ton-per-year methanol plant became operational on Labuan Island offshore Sabah in April. An LNG export terminal went into operation, and an Association of Southeast Asian Nations (ASEAN) fertilizer plant was started near Bintulu, Sarawak, in October.

In the metallic mineral sector, tin mining suffered further from the ITC's export control and the tin market crisis on the London Metal Exchange (LME). As a result of suspended tin trading on all world tin markets in late October, the output of tin dropped sharply in the last quarter of the year. The country's gravel pumping sector, which contributed about 50% of total tin output, shut down 146 mines. The industry's labor force was reduced to 16,829 workers at yearend from 23,623 at the end of 1984. To assist the industry in overcoming the crisis, the Government reportedly was considering various options including possible reintroduction of a price reduction in power cost and subsidizing fuel oil as well as automatic extensions and renewal of mining leases. The activity in other metallic minerals sectors was slower than that of 1984 because of the low export prices. However, an increasing activity in gold mining was reported in Sarawak.

In the mineral processing sector, Malaysia brought on-stream its second DRI plant and a steelworks in Terengganu. The $350 million steel complex was completed by a Japanese consortium led by Nippon Steel Corp. in May. The country's first DRI plant on Labuan Island completed its first full year of operation and successfully marketed about 300,000 tons of hot-briquetted iron (HBI) to 12 countries. Because of a slowdown in Malaysia's construction activity, the output of cement remained stagnant. However, the output capacity of the cement industry was expected to increase by 2.3 million tons when three new cement plants are completed in 1986.

According to Malaysia's Ministry of Finance, the estimated output of the mining and quarrying sector in 1985 dropped slightly to about \$2.5 billion in 1978 constant prices and contributed 9.8% to Malaysia's gross domestic product (GDP) compared with 10.5% in 1984. Malaysia's GDP was estimated to have grown 5.2% to \$25.3 billion compared with 7.6% in 1984. Total export earnings were estimated at \$15.8 billion, and imports, at \$13.3 billion.[3] The inflation rate in Malaysia, as measured by the Consumer Price Index, was 4.0% compared with 5.8% (revised) in 1984 while unemployment rose to 8% from 6.3% (revised) in 1984.

In July, a new guideline was announced by Malaysia's Finance Minister to boost foreign and local investments in Malaysia. Under the new investment guidelines, up to 80% of foreign equity would be allowed for a joint venture that exports 80% of its output. However, for a joint venture involving processing of nonrenewable resources, 70% equity must be held by a local firm, of which 30% was set aside for Bumiputra to ensure that locals would obtain more benefit in the exploitation of depleting natural resources.[4]

PRODUCTION

The overall output of the mining industry was at a lower level than that of 1984 owing to a decline in the output of crude oil and tin. The output of other mineral commodities such as bauxite, iron ore, and tungsten was also at a lower level. However, the output of natural gas rose sharply because of increased use of natural gas in the production of LNG, electricity, and for manufacturing iron and steel products. The output of gold also rose slightly owing to increased gold mining activities in the State of Sarawak.

The output of crude oil decreased to 430,000 barrels per day from 446,800 barrels (revised) per day in 1984 owing to the Government policies of conserving its oil resources. The sharp drop in tin output was a direct result of the October tin crisis in the world tin markets. After 3 years of struggle, Malaysia's tin industry has made itself one of the world's low-cost tin producers with the extreme hardship of shutting down 300 high-cost, small gravel pumping mines, idling one-half of its 58 dredges, and laying off 12,000 of its workers.

Significant progress was made in the mineral processing sector. The country's second DRI plant was put into operation in the State of Terengganu. An ASEAN fertilizer project in Bintulu to produce ammonia and urea was also started in Sarawak. A \$300 million methanol plant reportedly started commercial operation on Labuan Island offshore the State of Sabah.

Table 1.—Malaysia: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984	1985[p]
METALS					
Aluminum: Bauxite, gross weight thousand tons	701	589	502	680	492
Antimony, mine output, metal content (Sarawak)	191	139	136	17	26
Columbium and tantalum concentrate, gross weight	23	8	67	27	76
Copper, mine output, metal content (Sabah)	28,642	30,086	29,048	28,852	30,507
Gold, mine output, metal content:					
Malaya troy ounces	5,691	r5,788	5,792	7,041	7,097
Sabah do.	69,563	r84,614	r82,662	82,012	78,818
Sarawak do.	67	r23	162	474	4,371
Total do.	75,321	r90,425	r88,616	89,527	90,286
Iron and steel:					
Iron ore and concentrate thousand tons	532	340	114	194	182
Steel, crude do.	210	210	350	350	550
Rare-earth metals: Monazite, gross weight[3]	320	582	1,051	4,451	5,808
Silver, mine output, metal content (Sabah) thousand troy ounces	472	502	481	470	522
Tin:					
Mine output, metal content	59,938	52,342	41,367	41,307	36,884
Metal, smelter	70,326	62,836	53,338	46,911	47,000
Titanium: Ilmenite concentrate, gross weight[3]	172,757	101,202	222,722	234,984	315,736
Tungsten, mine output, metal content	35	43	r31	25	20
Zirconium: Zircon concentrate, gross weight[3]	1,307	2,147	2,548	7,614	11,652
INDUSTRIAL MINERALS					
Barite	19,365	25,272	21,434	23,421	23,394
Cement, hydraulic thousand tons	2,833	3,123	r3,241	3,469	e3,300
Clays: Kaolin	44,084	44,363	57,432	72,472	82,576
Nitrogen: N content of ammonia	37,000	27,800	28,800	38,900	e35,000
MINERAL FUELS AND RELATED MATERIALS					
Gas, natural (Sarawak):					
Gross million cubic feet	85,816	NA	150,161	398,700	483,224
Marketed do.	23,124	NA	NA	NA	NA
Petroleum:[4]					
Crude thousand 42-gallon barrels	94,210	120,450	139,800	163,082	156,950
Refinery products:					
Gasoline do.	7,412	7,676	7,608	8,288	e8,300
Jet fuel do.	2,525	2,657	2,618	2,642	e2,650
Kerosene do.	2,067	2,152	4,079	4,623	e4,600
Distillate fuel oil do.	12,566	13,173	14,062	14,351	e14,400
Residual fuel oil do.	13,207	10,374	11,254	11,585	e11,600
Other do.	2,675	2,595	3,593	3,929	e4,060
Refinery fuel and losses do.	NA	NA	NA	NA	NA
Total do.	40,452	38,627	43,214	45,418	e45,610

eEstimated. pPreliminary. rRevised. NA Not available.

[1]All production is from Peninsular Malaysia (Malaya) unless otherwise specified. Table includes data available through July 29, 1986.

[2]In addition to the commodities listed, a variety of crude construction materials (clays, sand and gravel, and stone), fertilizers, and salt are produced, but output is not reported, and available information is inadequate to make reliable estimates of output levels.

[3]Based on export figures.

[4]Includes production from Malaya, Sabah, and Sarawak.

TRADE

Malaysia's export earnings declined slightly to an estimated $15.8 billion, while imports rose slightly to an estimated $13.0 billion. The decline in export earnings was caused by the lower prices of crude oil; LNG; major agricultural commodities such as palm oil, rubber, and timber; and major mineral commodities such as bauxite, copper, and tin.

Exports of crude oil averaged 409,000 barrels per day and earned $4 billion. The main buyers were Singapore, Japan, Thailand, the Philippines, the United States, the Republic of Korea, and Australia, in that order. However, the bulk of exports to Singapore was reexported back to Malaysia as refined petroleum products. Exports of tin rose 45% to 57,400 tons; however, export earnings of tin rose only 9% to $697 million because of a lower export unit price. Belgium, the Netherlands, Japan, and the U.S.S.R., in order of value, were the main buyers of refined tin. Australia also bought considerable amounts of tin metal and tin concentrate from Malaysia. All exports of LNG were to Japan. Because of increased export volume of LNG, export earnings from LNG rose to $966 million from $725 million (revised) in 1984. All exports of bauxite, copper concentrate, ilmenite, and other rare-earth minerals were to Japan.

Imports of electrical components, machinery, petroleum products, and transport equipment remained the major imported items. Japan, the United States, and the European Economic Community (EEC) countries were the major suppliers of imported capital goods, which accounted for about one-third of Malaysian imports.

The U.S. share of total Malaysian trade was 14.2% compared with 14.8% in 1984. Other major trade partners of Malaysia were Japan, Singapore, and the EEC, in that order.

Table 2.—Malaysia: Exports and reexports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS				
Aluminum:				
Ore and concentrate	489,931	522,049	--	Japan 435,828; Taiwan 48,300; Singapore 32,572.
Metal including alloys:				
Scrap	6,139	6,366	--	Japan 5,664; Singapore 373; Taiwan 143.
Unwrought	78	70	--	Japan 64.
Semimanufactures	8,596	30,796	3,306	Singapore 23,668; Hong Kong 1,502.
Antimony: Ore and concentrate	320	44	--	Japan 36.
Columbium and tantalum: Ore and concentrate	99	81	--	Japan 35; Netherlands 28.
Copper:				
Ore and concentrate	121,875	125,886	--	All to Japan.
Metal including alloys:				
Scrap	8,297	9,685	161	Japan 3,819; Singapore 2,585; Republic of Korea 1,727.
Unwrought	9	118	--	Mainly to Thailand.
Semimanufactures	2,038	2,299	75	Singapore 1,553.
Gold:				
Waste and sweepings kilograms	5,921	222	191	West Germany 27.
Metal including alloys, unwrought and partly wrought troy ounces	29,201	53,576	45,674	Singapore 2,823; Philippines 1,613; Japan 1,553.
Iron and steel:				
Iron ore and concentrate including roasted pyrite	31,075	16,636	--	Indonesia 9,728; Singapore 6,698.
Metal:				
Scrap	12,724	20,179	--	Singapore 15,436; Philippines 2,000; Thailand 1,500.
Pig iron, cast iron, related materials	395	4,987	--	Japan 4,597.
Ferroalloys	78	7	--	Mainly to Singapore.
Semimanufactures	29,389	85,278	49	Thailand 46,729; Singapore 29,699.
Lead: Metal including alloys:				
Scrap	46	19	--	Japan 13.
Unwrought	599	578	--	Indonesia 351; Singapore 207.
Semimanufactures	50	379	36	Singapore 294; Philippines 38.
Mercury 76-pound flasks	--	290	--	Mainly to Singapore.
Nickel: Metal including alloys:				
Scrap	19	106	8	Singapore 58; Philippines 33.
Unwrought	214	473	230	Philippines 111; Republic of Korea 64.
Semimanufactures	141	145	24	Singapore 113.
Platinum-group metals: Metals including alloys, unwrought and partly wrought[2] troy ounces	482	257	32	Thailand 129; West Germany 96.
Silver:				
Ore and concentrate[2]	100	--		
Waste and sweepings[2]	56	52	28	Hong Kong 12; West Germany 11.
Metal including alloys, unwrought and partly wrought troy ounces	746,539	307,007	7,941	Singapore 276,400; Japan 20,062.

See footnotes at end of table.

Table 2.—Malaysia: Exports and reexports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued				
Tin: Metal including alloys:				
Scrap	1,167	430	3	Singapore 364; United Kingdom 53.
Unwrought	57,230	39,688	25	Japan 19,496; Netherlands 11,915; Singapore 2,181.
Semimanufactures	120	796	248	United Kingdom 403.
Titanium:				
Ore and concentrate	207,339	224,152	--	Japan 194,167; Republic of Korea 16,197; Taiwan 10,646.
Oxides	55	57	--	Singapore 50.
Metal including alloys, all forms	(3)	16	--	Japan 9; United Kingdom 7.
Tungsten:				
Ore and concentrate	40	347	30	Republic of Korea 306.
Metal including alloys, all forms	1	24	--	Japan 23.
Uranium and thorium:				
Ore and concentrate	1,055	1,138	--	France 561; Netherlands 422.
Metal including alloys, all forms	1	(3)	--	All to Singapore.
Zinc:				
Oxides	2,560	207	(3)	Japan 172.
Metal including alloys:				
Scrap	762	661	--	Japan 272; Taiwan 189; Singapore 138.
Unwrought	85	64	--	Japan 62.
Semimanufactures	203	300	--	Singapore 219.
Zirconium: Ore and concentrate	2,662	2,344	--	Japan 1,152; Republic of Korea 630; Taiwan 522.
Other: Ashes and residues	4,292	12,487	--	Singapore 7,578; Netherlands 2,670; Japan 989.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	383	469	--	Japan 468.
Dust and powder of precious and semiprecious stones excluding diamond -- value, thousands	--	$1	--	All to Singapore.
Grinding and polishing wheels and stones	55	122	(3)	Australia 102.
Asbestos, crude	28	1	--	All to Singapore.
Barite and witherite	8,801	10,250	--	Mainly to Singapore.
Cement	13,535	218,056	--	Singapore 217,996.
Chalk	2,587	151	--	All to Singapore.
Clays, crude:				
Bentonite	354	531	--	Singapore 510.
Kaolin	29,636	38,132	--	Japan 15,765; Taiwan 13,261; Singapore 7,475.
Unspecified	25,777	11,361	--	Singapore 10,224.
Cryolite and chiolite	540	--		
Diamond:				
Gem, not set or strung value, thousands	$3,157	$6,685	$909	Belgium-Luxembourg $2,910; Singapore $2,215.
Industrial stones do	$728	$30	--	All to Singapore.
Feldspar, fluorspar, related materials	25	32	--	Do.
Fertilizer materials: Manufactured:				
Ammonia	212	334	--	Singapore 312.
Nitrogenous	2,461	2,808	--	Singapore 2,560; Liberia 210.
Phosphatic	4,048	1,283	--	All to Singapore.
Potassic	80	159	--	Singapore 134.
Unspecified and mixed	379	4,705	--	Singapore 4,414; Hong Kong 288.
Lime	19,722	17,602	--	All to Singapore.
Mica: Crude including splittings and waste	325	246	--	Republic of Korea 126; Singapore 102.
Phosphates, crude	3,583	1,902	--	Hong Kong 1,692; Singapore 123.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$53	$334	$9	West Germany $176; Singapore $107.
Synthetic do	$1,153	$1,204	--	Mainly to Japan.
Salt and brine	343	599	--	Indonesia 221; Philippines 115; Thailand 105.
Sodium compounds, n.e.s.: Carbonate, manufactured	4,674	2,208	--	Mainly to Singapore.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	48,039	626,808	--	Singapore 623,954.
Worked	30	263	--	Singapore 251.

See footnotes at end of table.

Table 2.—Malaysia: Exports and reexports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Stone, sand and gravel —Continued				
Dolomite, chiefly refractory-grade	477	11	--	Sri Lanka 8; Singapore 3.
Gravel and crushed rock	41,133	38,445	--	Singapore 29,298; Brunei 9,087.
Limestone other than dimension	27,014	21,898	--	Singapore 21,668.
Quartz and quartzite	882	890	--	All to Singapore.
Sand other than metal-bearing	1,568,479	1,598,421	--	Singapore 1,503,924; Japan 86,439.
MINERAL FUELS AND RELATED MATERIALS				
Carbon black	3,882	54,284	14	Indonesia 52,459.
Gas, natural: Liquefied value, thousands	$358,110	$757,265	--	All to Japan.
Petroleum:				
Crude thousand 42-gallon barrels	109,653	127,178	736	Singapore 42,106; Japan 37,622; Republic of Korea 16,121.
Refinery products:				
Liquefied petroleum gas value, thousands	$3	$2	--	Philippines $1; Singapore $1.
Gasoline thousand 42-gallon barrels	1,108	2,216	(3)	Japan 1,980; Singapore 235.
Kerosene and jet fuel do	2,400	4,443	--	India 2,108; Singapore 1,881.
Distillate fuel oil do	131	2,035	--	Thailand 854; Singapore 555; Philippines 322.
Lubricants do	19	3	(3)	Singapore 2.
Residual fuel oil do	3,490	3,767	--	Singapore 2,172; Japan 1,595.

[1]Table prepared by Audrey D. Wilkes.
[2]May include other precious metals.
[3]Less than 1/2 unit.

Table 3.—Malaysia: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1984	Sources: United States	Sources: Other (principal)
METALS			
Alkali and alkaline-earth metals	28	5	United Kingdom 10; Japan 9.
Aluminum:			
Ore and concentrate	1,201	--	Mainly from China.
Oxides and hydroxides	7,074	211	Japan 5,809; China 560; United Kingdom 212.
Metal including alloys:			
Scrap	618	--	Japan 319; Singapore 218; Thailand 79.
Unwrought	31,695	1,935	Canada 10,957; Australia 8,890; Bahrain 4,253.
Semimanufactures	13,524	1,289	Japan 4,270; Singapore 3,398; Republic of Korea 916.
Antimony: Metal including alloys, all forms	35	--	China 27; Japan 5.
Arsenic: Oxides and acids	758	1	France 320; Sweden 134; United Kingdom 125.
Bismuth: Metal including alloys, all forms	2	--	Taiwan 1.
Cadmium: Metal including alloys, all forms	3	(2)	Singapore 2.
Chromium:			
Ore and concentrate	9	--	All from Japan.
Oxides and hydroxides	82	11	West Germany 34; Japan 31.
Cobalt:			
Oxides and hydroxides	115	(2)	Japan 72; Australia 41.
Metal including alloys, all forms	44	--	All from Canada.
Copper:			
Ore and concentrate	70	--	Singapore 46; Japan 20.
Sulfate	1,353	52	U.S.S.R. 600; United Kingdom 265; New Zealand 170.

See footnotes at end of table.

Table 3.—Malaysia: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1984	Sources: United States	Sources: Other (principal)
METALS —Continued			
Copper —Continued			
Metal including alloys:			
Scrap	710	(2)	Japan 349; Singapore 261.
Unwrought	18,309	4	Zambia 14,875; Chile 2,000; Philippines 844.
Semimanufactures	15,708	1,455	Japan 4,672; Australia 2,863; Singapore 2,246.
Gold: Metal including alloys, unwrought and partly wrought troy ounces	236,824	39,581	United Kingdom 119,574; Singapore 67,883.
Iron and steel:			
Iron ore and concentrate including roasted pyrite	414,286	9	Brazil 263,790; Norway 125,824; India 24,660.
Metal:			
Scrap	48,361	527	Singapore 41,028; Japan 4,603.
Pig iron, cast iron, related materials	6,333	30	Japan 2,915; Brazil 2,603.
Ferroalloys:			
Ferromanganese	8,764	5	Japan 2,848; Australia 2,180; France 1,816.
Ferrosilicon	3,389	8	Norway 1,746; Japan 680; Belgium-Luxembourg 392.
Unspecified	1,133	41	Taiwan 670; Japan 133; United Kingdom 126.
Steel, primary forms	552,824	87	Netherlands 113,258; Brazil 86,566; Poland 82,115.
Semimanufactures:			
Bars, rods, angles, shapes, sections	373,568	265	Japan 221,208; United Kingdom 38,690; Taiwan 29,353.
Universals, plates, sheets	698,223	1,203	Japan 444,342; Republic of Korea 102,004; Brazil 69,253.
Hoop and strip	15,708	57	Japan 10,023; United Kingdom 1,604.
Rails and accessories	9,837	40	Poland 7,591; Japan 952.
Wire	73,633	20	Singapore 36,105; China 8,573; Romania 5,902.
Tubes, pipes, fittings	163,873	3,699	Japan 124,955; Singapore 13,924.
Castings and forgings, rough	3,363	53	China 1,192; Belgium-Luxembourg 402; Japan 391.
Lead:			
Oxides	356	1	Australia 245; West Germany 49.
Metal including alloys:			
Scrap	792	--	Singapore 789.
Unwrought	13,504	64	Burma 5,847; Australia 5,537.
Semimanufactures	3,199	17	Singapore 1,242; Japan 904; Australia 757.
Magnesium: Metal including alloys, all forms	34	3	Norway 21; West Germany 5.
Manganese:			
Ore and concentrate	1,462	--	Singapore 1,088; Australia 287.
Oxides	1,707	--	Japan 830; Singapore 586; China 153.
Metal including alloys, all forms	8	8	
Mercury 76-pound flasks	435	(2)	West Germany 319; Spain 58.
Molybdenum: Metal including alloys, all forms	14	--	United Kingdom 7; Belgium-Luxembourg 6.
Nickel:			
Ore and concentrate	16	1	Netherlands 7; Japan 4.
Metal including alloys:			
Scrap	21	--	All from Japan.
Unwrought	398	277	Japan 73; Canada 27.
Semimanufactures	1,191	446	Singapore 442; Japan 129.
Platinum-group metals: Metals including alloys, unwrought and partly wrought troy ounces	63,305	32	West Germany 57,711.
Silver:			
Ore and concentrate[3]	1	NA	NA.
Metal including alloys, unwrought and partly wrought thousand troy ounces	2,229	1,043	Japan 854; United Kingdom 116.
Tin:			
Ore and concentrate	16,364	--	Australia 11,266; Zaire 2,374; Bolivia 1,032.
Metal including alloys:			
Unwrought	854	377	Singapore 321.
Semimanufactures	166	60	Singapore 59.
Titanium:			
Ore and concentrate	190	--	Australia 166.
Oxides	7,302	600	Japan 2,062; United Kingdom 1,660; Australia 1,531.
Metal including alloys, all forms	2	--	All from United Kingdom.
Tungsten: Metal including alloys:			
Unwrought	5	1	Japan 1; Singapore 1.
Semimanufactures	79	47	Japan 20.

See footnotes at end of table.

Table 3.—Malaysia: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1984	Sources: United States	Sources: Other (principal)
METALS —Continued			
Uranium and/or thorium:			
Ore and concentrate	2,029	6	Australia 1,211; Thailand 812.
Metal including alloys, all forms	10	(2)	Japan 8.
Zinc:			
Ore and concentrate	73	--	Australia 36; Netherlands 18; United Kingdom 14.
Oxides	218	3	West Germany 70; France 60; United Kingdom 39.
Blue powder	262	(2)	Norway 213; United Kingdom 37.
Metal including alloys:			
Scrap	119	--	Australia 63; Singapore 39.
Unwrought	17,823	74	Australia 12,036; Canada 2,721; Japan 903.
Semimanufactures	1,074	3	Canada 429; Australia 293.
Zirconium: Ore and concentrate	425	--	Japan 338; United Kingdom 60.
Other:			
Ores and concentrates	5	2	Japan 2.
Ashes and residues	2,584	4	Japan 2,075; Singapore 335.
INDUSTRIAL MINERALS			
Abrasives, n.e.s.:			
Natural: Corundum, emery, pumice, etc	338	93	Japan 63; Singapore 40; Netherlands 35.
Artificial: Corundum	1	(2)	Mainly from Singapore.
Dust and powder of precious and semiprecious stones excluding diamond value, thousands	$40	$1	Japan $34.
Grinding and polishing wheels and stones	[4]2,578	142	Japan 814; China 705; West Germany 188.
Asbestos, crude	23,146	1,850	Canada 11,626; Singapore 5,735.
Barite and witherite	12,429	--	Thailand 4,502.
Boron materials:			
Crude natural borates	66	26	Papua New Guinea 22.
Oxides and acids	356	94	China 202.
Cement thousand tons	1,518	(2)	Japan 482; Singapore 425; Republic of Korea 270.
Chalk	767	--	United Kingdom 584; France 83; Japan 56.
Clays, crude:			
Bentonite	20,797	593	Philippines 18,377; Singapore 835.
Kaolin	4,168	10	United Kingdom 2,239; Australia 1,678.
Unspecified	9,941	194	West Germany 2,373; Japan 2,231; United Kingdom 2,148.
Cryolite and chiolite	27	(2)	West Germany 20.
Diamond:			
Gem, not set or strung value, thousands	$23,142	$125	India $8,220; Belgium-Luxembourg $5,989; United Kingdom $3,711.
Industrial stones do	$26	$23	India $3.
Diatomite and other infusorial earth	715	644	Philippines 51.
Feldspar, fluorspar, related materials	16,145	39	India 7,209; China 3,213; Thailand 3,199.
Fertilizer materials:			
Crude, n.e.s.	40,547	9	Singapore 39,934.
Manufactured:			
Ammonia	256	24	Indonesia 129; Belgium-Luxembourg 33.
Nitrogenous	503,983	63,730	Indonesia 121,327; Japan 64,928; Qatar 62,399.
Phosphatic	7,019	236	Christmas Island 3,311; Republic of Korea 1,000; Taiwan 1,000.
Potassic	489,469	59,241	Canada 156,076; West Germany 125,978; U.S.S.R. 97,889.
Unspecified and mixed	47,466	4,923	Belgium-Luxembourg 20,801; West Germany 12,301; Canada 5,086.
Graphite, natural	1,183	1	Japan 1,007.
Gypsum and plaster	170,782	26	Thailand 166,831.
Lime	5,874	--	Thailand 3,639; Singapore 1,842; China 310.
Magnesium compounds:			
Magnesite including calcined	5,921	10	Spain 3,903; China 1,494; Japan 375.
Other (kieserite)	66,483	--	West Germany 56,074; East Germany 7,199.
Mica:			
Crude including splittings and waste	67	2	India 38; United Kingdom 22.
Worked including agglomerated splittings	30	(2)	Italy 15; West Germany 11.
Nitrates, crude	31	--	China 30.
Phosphates, crude	284,628	--	Christmas Island 174,377; Jordan 62,657.
Pigments, mineral: Iron oxides and hydroxides, processed	2,183	25	West Germany 1,324; United Kingdom 248; Japan 239.
Potassium salts, crude	244	--	West Germany 214.

See footnotes at end of table.

Table 3.—Malaysia: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1984	Sources: United States	Sources: Other (principal)
INDUSTRIAL MINERALS —Continued			
Precious and semiprecious stones other than diamond:			
Natural ______ value, thousands	$2,752	$722	Singapore $1,023; Hong Kong $361.
Synthetic ______ do	$16	(²)	Japan $11; West Germany $2.
Salt and brine	129,871	109	Thailand 46,564; Australia 40,150; China 21,014.
Sodium compounds, n.e.s.:			
Carbonate, manufactured	34,488	19,547	Kenya 9,010; West Germany 3,108.
Sulfate, manufactured	9,780	7	Taiwan 5,670; Indonesia 2,497; China 890.
Stone, sand and gravel:			
Dimension stone: Crude and partly worked	2,601	(²)	Italy 1,829; India 368; Pakistan 174.
Dolomite, chiefly refractory-grade	141	--	Norway 90; Japan 48.
Gravel and crushed rock	1,833	55	Japan 501; India 337; France 333.
Limestone other than dimension	2,429	(²)	Philippines 1,700; Singapore 310; Japan 199.
Quartz and quartzite	53	--	Japan 28; Finland 23.
Sand other than metal-bearing	3,026	205	Thailand 1,578; West Germany 363; Japan 269.
Sulfur:			
Elemental:			
Crude including native and byproduct	6,766	(²)	Singapore 5,823; West Germany 601.
Colloidal, precipitated, sublimed	8,447	24	Singapore 7,668; West Germany 308.
Dioxide	113	105	Japan 6.
Sulfuric acid	828	3	Singapore 490; West Germany 275.
Talc, steatite, soapstone, pyrophyllite	5,966	102	China 2,931; Republic of Korea 1,075; Australia 775.
Other:			
Crude	1,826	22	West Germany 1,497; China 100.
Slag and dross, not metal-bearing	10,272	8	Japan 7,885; Singapore 1,927.
MINERAL FUELS AND RELATED MATERIALS			
Asphalt and bitumen, natural	46,079	11	Singapore 40,938; China 2,430.
Carbon:			
Carbon black	1,090	162	Japan 240; Mexico 200; Republic of Korea 144.
Gas carbon	16	--	All from Japan.
Coal:			
Anthracite	7,050	(²)	Indonesia 7,040.
Bituminous	384,589	--	Indonesia 320,325; Australia 64,152.
Briquets of anthracite and bituminous coal	78	1	Australia 64; United Kingdom 10.
Lignite including briquets	12	4	France 8.
Coke and semicoke	21,796	--	Japan 15,340; Australia 4,310.
Peat including briquets and litter	16	1	Netherlands 15.
Petroleum:			
Crude ______ thousand 42-gallon barrels	18,710	--	Saudi Arabia 15,314; Kuwait 2,805.
Refinery products:			
Liquefied petroleum gas value, thousands	$13,889	$14	Singapore $13,582.
Gasoline:			
Aviation _ thousand 42-gallon barrels	26	1	Australia 15; Singapore 10.
Motor ______ do	5,243	3	Singapore 5,237.
Mineral jelly and wax ______ do	59	1	China 20; Indonesia 11; United Kingdom 7.
Kerosene and jet fuel ______ do	1,273	(²)	Singapore 1,270.
Distillate fuel oil ______ do	6,430	--	Singapore 6,368.
Lubricants ______ do	883	13	Singapore 641; Australia 127.
Residual fuel oil ______ do	9,837	(²)	Singapore 9,142.
Bitumen and other residues ______ do	133	14	Singapore 115.
Bituminous mixtures ______ do	19	(²)	Singapore 6; United Kingdom 6; Australia 4.
Petroleum coke ______ do	18	--	Mainly from Burma.

NA Not available.
[1]Import data for 1983 were not available at time of publication. Table prepared by Audrey D. Wilkes.
[2]Less than 1/2 unit.
[3]May include other precious metals.
[4]Excludes unreported quantity valued at $765,851.

COMMODITY REVIEW

METALS

Aluminum.—Production of bauxite decreased sharply to an average rate of 41,000 tons per month from 57,000 tons per month in 1984. The decline in output was caused by the shutdown of mining operations by Johore Mining and Stevedoring Co. Sdn. Bhd. at Sungei Rengit in southern Johore. During 1984, Malaysia exported 522,049 tons (revised) of bauxite, mainly to Japan, compared with 489,931 tons in 1983. Export earnings from bauxite were valued at $8 million in 1984 compared with $7.5 million in 1983.

In March 1985, Malaysia signed an agreement with Wimpey International PLC of the United Kingdom to study the planned $806 million aluminum project along the Malaysian east coast. The planned project included construction of a 110,000-ton-per-year aluminum smelter at Kuantan in Pahang, and development of two bauxite mines at Lembah Jabor in Kemaman and at Bukit Goh near Pahang. Malaysia imports about 60,000 tons of primary aluminum annually to meet its domestic demand. Because of the growing domestic demand for aluminum, the planned aluminum smelter was considered by the Government as part of Malaysia's overall plan to improve its industrial base and was one of several plans to help the country diversify from oil revenue.[5]

Copper.—The output of copper concentrates from the Mamut Mine in Sabah increased to about 130,000 tons from 120,000 tons in 1984. The average copper content of concentrate remained at about 24%. Malaysia exported all of its copper concentrate to Japan. According to Japanese trade statistics, Japanese imports of copper concentrate from Malaysia totaled 134,273 tons. To extend the remaining 5-year mine life of the Mamut copper mine, a 3-year contract was signed between Malaysia and the Metal Mining Agency of Japan for further exploration of copper in the Mamut area in early July. Drilling was expected to start during the second half of 1985.[6]

Gold.—Gold recovered as a byproduct at the Mamut copper mine in Sabah accounted for 87% of gold production in Malaysia. However, several small gold mines were reopened in the areas of Malaya and Sarawak during the year. As a result, gold production from these two areas rose by 53% to 11,468 troy ounces from 7,515 ounces in 1984. In August, a joint venture was formed by Sons of Gwalia NL and ARI Ltd. of Australia to acquire a 45% interest in the Saburan gold mining project from Southern Gold Mining Development Sdn. Bhd. The Saburan Mine, in the Bau mining district of Sarawak, reportedly has estimated ore reserves of 2 million to 3.75 million tons, averaging between 3.5 and 5.0 grams of gold per ton of ore.

Iron and Steel.—Malaysia's first DRI plant, operated by Sabah Gas Industries Malaysia Sdn. Bhd. (SGIM) on Labuan Island off Sabah, finished its first full year of operation. The 1985 production of HBI by the plant was estimated at 500,000 tons. According to SAMA Industrial Products Sdn. Bhd., the marketing agent of SGIM's HBI, the plant exported about 300,000 tons of HBI to 12 countries. Of the exports, 100,000 tons was exported principally to Italy, Spain, and Turkey, and 200,000 tons, mainly to Australia, Japan, and other Asian countries. After a trial shipment of 10,000 tons to China, SGIM signed a contract with China to export 200,000 tons of HBI per year to China in 1986-87.[7]

The country's second DRI plant, operated by Perwaja Terengganu Sdn. Bhd. (PTSB), came on-stream in May. After a 4-month performance test run, the plant finally went into full commercial production of steel billets in September. During the last quarter of 1985, the plant reportedly was operating at 75% of its 650,000-ton-per-year capacity. According to company officials, the DRI plant was designed to produce 650,000 tons of HBI per year, from which 560,000 tons of steel billets per year would be converted. During the performance test, some technical problems were reported. However, repairs were completed in July and operation was resumed in August. The 1985 production of steel billets was estimated at 150,000 tons.

Construction of the $300 million steelworks complex by a Japanese consortium led by Nippon Steel of Japan, which began in October 1982, was completed in 2-1/2 years.[8] The complex at the Telok Kalong industrial estate, in Terengganu on the eastern coast of Peninsular Malaysia, included a 1,900-ton-per-day, direct-reduction-shaft furnace supplied by Nippon Steel, three 75-ton electric arc furnaces provided by Daido Steel Co. Ltd., two four-strand continuous casters built by Mitsubishi Heavy Industries Ltd., and a gas reformer supplied by Chiyoda Chemical Engineering and Construction Co. Ltd. of Japan. PTSB, established in 1982, is 51% owned by Heavy Industries Corp. of Malaysia Bhd., 19% by the Terengganu state-owned Mentri Besar Inc., 15% by Nippon Steel, and 15% by seven other Japanese equipment suppliers and trading companies.

To meet the raw material requirements for the DRI plant, PTSB reportedly imported 300,000 tons of pellets from Brazil and Sweden as well as 80,000 tons of lump ore from Brazil. It also signed a contract with Cia. Vale do Rio Doce of Brazil to supply 150,000 tons of pellets beginning in August 1985.

To protect the country's new billets producer, the Government of Malaysia reportedly introduced new regulations in late 1985 restricting imports of billets. Under the new regulations, importers must obtain Government permission before steel billets can be imported.[9]

Tin.—Malaysia's tin industry has been in a decline since 1980 because of a steady decrease in the world's demand for tin resulting from technological development (substitution effect) and the oversupply of tin caused by ITC's price supporting mechanism through its buffer stock operations since 1981 and ITC's export controls since 1982.

Because of the relative strength in Malaysian dollars and the persistent price differential of tin trading between the LME and the Kuala Lumpur Tin Market (KLTM), the buffer stock manager was permitted by the ITC to have greater flexibility to operate below the floor price of $12.15 per kilogram in April 1985. As a result, the KLTM tin prices dropped to $11.58 per kilogram on April 30 owing to a lack of support from the buffer stock manager.[10]

In October, as tin prices, based on the British pound, began to drop on the LME because of further devaluation of the U.S. dollar against the British pound, selling of tin on the LME accelerated. On October 24, the ITC's buffer stock operations finally collapsed owing to a lack of funds. Tin trading on the LME was suspended. On the following day, the KLTM stopped trading and the U.S. General Services Administration halted its tin disposals.

According to industry sources, the October tin market crisis was a direct result of the weakening U.S. dollar, the ITC's high cost of financing the excessive tin stocks buildup, and increased tin production and exports from non-ITC tin producing countries such as Bolivia, Brazil, and China.

Following the tin market crisis, the ITC members convened five separate sessions between October 29 and December 12. However, by yearend, the ITC failed to reach a consensus on how to resolve the crisis, and all the world tin markets remained suspended.

The immediate impact of the October tin market crisis on the Malaysian tin industry has been severe, especially in the gravel pumping sector. According to information provided by Malaysia's Department of Mines, about 150 gravel pumping units were forced to shut down because of cash-flow problems in the last quarter of 1985. During the same period, the tin industry as a whole laid off 5,400 workers, of whom 70% were from the gravel pumping sector. The 1985 tin output also decreased almost 4,500 tons from that of 1984, of which 68% was attributed to the reduced output from the gravel pumping sector.

Malaysia remained the world's largest tin producer, accounting for 19% of the market economy countries' production. According to the statistics of Malaysia's Department of Mines, the number of operating mines decreased further to 358 at the end of 1985 from 449 at the end of 1984 while the number of workers employed by the tin industry dropped to 16,829 at the end of 1985 from 23,623 at the end of 1984. During the year, the number of operating dredges remained at 29 while the number of operating gravel pumping units decreased by 146 to 207 at the end of 1985. The output of tin from the dredging sector declined slightly to 11,297 tons, while the output from the gravel pumping sector dropped sharply to 18,500 tons. Of the tin produced in 1985, 50% was mined by gravel pumping, 31% by dredging, and 19% by opencasting and other methods of mining.

To reduce the impact of the tin crisis on tin mining areas, a high-level official committee reportedly was formed by the Government of Malaysia. In November, various Malaysian mining associations pleaded for Government subsidies of a 50% reduction in electricity rates and an automatic renewal of all mining lands on lease. The State governments reportedly had indicated their willingness to grant an automatic extension and renewal of mining leases as a way of salvaging the difficult period. However, the reintroduction of the 1984 reduction in electricity rates and diesel fuel subsidies had not been decided by the Government before yearend.

In anticipation of a price drop when the tin market reopens for trading, a group of gravel pumping miners reportedly were forming a joint sales company in early December to pool tin stocks of miners and planned to sell through this company directly to purchasers.

Malaysia Mining Corp. (MMC), the country's largest tin producer, reportedly was hit hard by the ITC's export controls and the October tin crisis. According to company officials, MMC was operating at only 51% of its normal capacity, idling one-half of its 42 dredges in 1985. To offset the declining revenues from its tin mining operations, MMC was actively diversifying its operations into other areas of business such as engineering, trading, and property development. However, the company's financial health reportedly would continue to rely substantially on the performance of its tin operation.[11]

Kuala Langat Mining Sdn. Bhd. (KLM) reportedly submitted an application for production quotas to Malaysia's Department of Mines in May. KLM's first tin dredge was expected to become operational in the last quarter of 1985. However, no date was set by the Central Committee of Tin Export Controls, which has the authority to set production quotas for each mine for KLM to start tin production.

Exports of tin rose sharply to 57,400 tons from 39,700 tons in 1984, and export earnings from tin also increased to $697 million from $640 million (revised) in 1984. However, the average unit value of tin exports reportedly dropped sharply to $11,963 per ton in 1985. Export earnings from tin accounted for about 4.3% of Malaysia's gross exports.[12]

INDUSTRIAL MINERALS

Cement.—Demand for cement in Malaysia declined slightly owing to cancellation of numerous commercial building projects in the Kuala Lumpur area and a stagnated activity in residential construction. As a result, the output of cement was at a lower level than that of 1984. However, the capacity of the country's cement industry was expected to continue to expand because of the anticipated demand from major public works projects to be carried out by the Government during the fifth 5-year economic plan (1986-90).

The construction of the 1.2-million-ton-per-year cement plant and two cement distribution depots near Pedang Rengas in Perak was near completion and was expected to come on-stream in June 1986. The $167 million contract was awarded to Korea Heavy Industries and Construction Co. Ltd. of the Republic of Korea on a turnkey basis with the major equipment supplied by Fuller Co. of the United States in 1984. Perak Hanjoong Simen Sdn. Bhd., a joint venture company of Malaysia and the Republic of Korea, established in late 1982, is the owner and operator of the plant.[13]

Two other cement projects that were still under construction and scheduled to be completed in 1986 are the 600,000-ton-per-year plant at Kangar in Perlis, owned by the Cement Industries Malaysia Sdn. Bhd., and the 500,000-ton-per-year plant at the Telok Sepangar industrial estate near Kota Kinabalu in Sabah, owned by two Sabah State agencies and a private company.

Fertilizer Materials.—ASEAN Bintulu Fertilizer Sdn. Bhd. (ABF) reportedly completed its $291 million ammonia-urea plant at Tanjung Kiturong near Bintulu in Sarawak in October. Commercial operation was scheduled on October 7, with a capacity of 1,000 tons of ammonia per day and 1,500 tons of urea per day. Malaysia claimed ABF's plant is the largest single-stream granular urea producer in the world. Natural gas for the plant's raw material requirements was supplied from the Central Luconia Gasfield, about 150 kilometers offshore.

The annual production of the plant was estimated at 450,000 tons of urea, of which 50% was expected to be consumed domestically and the remainder divided among the ASEAN member countries according to their equity contributions. According to a company official, Malaysia's annual demand for urea in 1984-85 was about 200,000 tons and was met by imports from Japan, the Republic of Korea, the U.S.S.R., and Indonesia, in that order.[14]

MINERAL FUELS

Natural Gas.—Natural gas production continued to increase owing to further growth in downstream gas utilization projects including manufacturing of LNG and DRI as well as power generation and general household use. According to Government and industry statistics, natural gas production from the Central Luconia Gasfields offshore Sarawak was at a rate of 1 billion cubic feet per day in mid-1985. Production from the Duyong and Bekok Gasfields offshore Terengganu was estimated at 175 million cubic feet per day while production from offshore Labuan Island in Sabah was about 85 million cubic feet per day.

Production of LNG by Malaysia LNG Sdn. Bhd., at Tanjung Kiturong near Bintulu, Sarawak, was estimated at 212 billion cubic feet compared with 196 billion cubic feet in 1984 and 90 billion cubic feet in 1983. The gas reserves in the Central Luconia Gasfields were estimated at 18 trillion cubic feet, of which 7 trillion cubic feet was to be utilized solely for LNG production by the Bintulu plant. At full capacity in 1986, consumption of natural gas was expected to reach 1.25 billion cubic feet per day, and about 6.2 million tons of LNG would be produced.[15] All LNG produced at the Bintulu plant was exported to Japan under a 20-year contract. Export earnings of LNG were estimated at $966 million compared with $725 million in 1984.

In the Peninsular Malaysia gas utilization project, consumption of natural gas also rose substantially owing to commenced operations of the steelworks, owned and operated by PTSB at Telok Kalong in Terengganu, and the Paka electric power station at Paka in Terengganu. Consumption of processed gas by the DRI and steel complex was about 23 million cubic feet per day while the Paka power station consumed about 150 million cubic feet per day. Under the first-phase utilization project, a 32-million-cubic-foot liquefied petroleum gas plant and export terminal reportedly were also being built to produce liquefied petroleum gas, liquid propane, and butane for domestic consumption and export in 1985.

On Labuan Island offshore Sabah, the associated gas gathered from Samarang Oilfield was consumed by a DRI plant, a small powerplant, and a methanol plant owned and operated by SGIM. In early 1985, the $300 million methanol plant was shut down owing to technical problems related to the insulation and heat exchange equipment. Full capacity production was rescheduled for April. The rated capacity of the methanol plant is 660,000 tons per year.

Petroleum.—Malaysia's crude oil production decreased slightly to an average of 430,000 barrels per day from 446,800 barrels (revised) per day in 1984. According to Malaysia's Finance Minister, the cutback in the 1985 crude oil production was in line with the Government policy of showing solidarity with the Organization of Petroleum Exporting Countries to stabilize world oil prices. However, because of a continuing decline in world oil prices and a higher economic growth planned for 1986 under the Government's fifth economic plan, Malaysia's crude oil production reportedly was expected to reach an average of 510,000 barrels per day in 1986.

Malaysia's 1985 crude oil production capacity was estimated to be 545,000 barrels per day with Esso Production Malaysia Inc. (EPMI) operating 9 oilfields offshore Terengganu, Sarawak Shell Bhd. (SSB) operating 11 oilfields offshore Sarawak, and Sabah Shell Petroleum Co. (SSP) operating 5 oilfields offshore Sabah. During the first 9 months of 1985, EPMI's output averaged 213,070 barrels per day, SSB averaged 140,788 barrels per day, and SSP averaged 78,340 barrels per day.[16]

According to an industry source, exploration activities in Malaysia rose slightly in terms of exploratory wells drilled. During 1985, 38 exploratory wells were drilled compared with 16 in 1984. As a result, new oil deposits reportedly have been discovered offshore Terengganu near the Dulong Oilfield in Block P6. According to a Government source, the newly discovered oil deposits would remain unexplored mainly because of low oil prices and the Government's efforts to conserve its oil resources. However, if the area were explored, the output of crude oil from the deposits is expected to boost Terengganu's output of 210,000 barrels per day by 50%.

To attract more exploration and encourage development of oil deposits, an incentive production-sharing contract (PSC) was drafted by Petroleum National Bhd. (Petronas), the state-owned oil company, and was approved by the Government in December. Under the new PSC, the cost recovery factor for the foreign contractor and/or operator was to increase from 30% to 50% of gross crude production, and from 35% to 60% of natural gas sales. In addition, profit split ratios would be on a sliding scale based on average daily production instead of the old formula of 70-30 in favor of Petronas. The split for the first 10,000 barrels of output per day would be 50-50; for the next 10,000 barrels per day, 60-40 in favor of Petronas; and output in excess of 20,000 barrels per day, 70-30 in favor of Petronas. For natural gas, profit split ratios would be 50-50 for the first 2 trillion cubic feet of gas sales, and beyond that level, the split would revert to the current 70-30 ratio in favor of Petronas.

According to the Minister of Finance, all bonus payments previously paid to the Government by oil companies would be waived under the new PSC terms. Under the old

PSC, contractors were required to pay signature bonuses, discovery bonuses of $2.5 million each, and a production bonus of $5 million for every 50,000 barrels of crude oil per day.[17]

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[1]Economist, Division of International Minerals.

[2]Where necessary, values have been converted from Malaysian ringgits (M$) to U.S. dollars at the rate of M$2.43=US$1.00 in 1984 and M$2.55=US$1.00 in 1985.

[3]Far Eastern Economic Review (Hong Kong). V. 130, No. 64, Nov. 7, 1985, p. 80.

[4]Malaysia Industrial Digest (Kuala Lumpur). V. 2, 1985, p. 1.

[5]American Metal Market. V. 93, No. 51, Mar. 15, 1985, p. 6.

[6]Japan Metal Journal (Tokyo). V. 15, No. 28, July 15, 1985, p. 1.

[7]Metal Bulletin (London). No. 7045, Dec. 13, 1985, p. 39.

[8]Nippon Steel News (Tokyo). No. 180, June 1985, p. 3.

[9]Metal Bulletin (London). No. 7042, Dec. 3, 1985, p. 29.

[10]The Malaysia Tin Bureau (Washington, DC). Tin News. V. 34, No. 11, Nov. 30, 1985, p. 1.

[11]Mining Journal (London). Aug. 16, 1985, p. 121.

[12]Business Times (Kuala Lumpur). Mar. 19, 1986, p. 22.

[13]Rock Products. Apr. 1986, p. 70.

[14]New Straits Times (Kuala Lumpur). Mar. 17, 1985, p. 9.

[15]U.S. Embassy, Kuala Lumpur, Malaysia. State Dep. Airgram A-26, Apr. 24, 1985, p. 7.

[16]Business Times (Kuala Lumpur). Oct. 26, 1985, p. 12.

[17]New Straits Times (Kuala Lumpur). Dec. 6, 1985, p. 2.

The Mineral Industry of Malta

By John R. Craynon and Roman V. Sondermayer[1]

The mineral industry of Malta remained insignificant during 1985. Limestone and salt production accounted for the majority of domestic activity. The country relied on imports for nearly all of its raw material needs.

Reportedly, the first stage of port construction at Marsaxlokk Bay was completed in July 1984. The construction continued during 1985 and was expected to cost $171 million[2] when completed with the assistance of Saudi Arabia, Abu Dhabi, and China. This facility will strengthen Malta's already important position as a major Mediterranean transshipment point for mineral and energy commodities.

Enemalta Corp. signed an agreement to purchase 110,000 tons of coal from La Sociedad Española de Carbón Exterior (CARBOEX) at a cost of $5.9 million. Negotiations were being conducted for an additional 120,000-ton purchase. CARBOEX expects Malta to become a consumer of 600,000 tons of thermal coal annually within the next several years.

The boundary median line dispute with Libya was not completely settled during 1985, even though relations between the two countries improved. The International Court of Justice ruled in June that the median line should be moved 18 kilometers north of its present location, giving Libya more control of the Continental Shelf. Malta reportedly did not accept this decision. The disagreement affects Malta's ability to assign offshore petroleum drilling and leasing rights.

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[1]Physical scientists, Division of International Minerals.

[2]Where necessary, values have been converted from Maltese lira (LM) to U.S. dollars at the rate of LM1=US$2.1385, the average rate in 1985.

Table 1.—Malta: Production of mineral commodities[1]

Commodity	1981	1982	1983	1984[p]	1985[e]
Lime[2] — cubic meters	6,504	7,500	5,080	6,222	6,000
Limestone[2] — thousand metric tons	465	402	808	808	800
Salt — metric tons	109	130	150	118	120

[e]Estimated. [p]Preliminary.
[1]Table includes data available through Mar. 28, 1986.
[2]Note, unit of measure has been changed.

Table 2.—Malta: Exports and reexports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984
METALS			
Aluminum: Metal including alloys:			
Scrap	94	285	Italy 231; Netherlands 23.
Semimanufactures ---- value, thousands	$55	$99	Saudi Arabia $59; Italy $38.
Copper: Metal including alloys, scrap	464	512	Netherlands 142; Denmark 101; West Germany 90.
Iron and steel: Metal:			
Scrap	7,252	12,744	Italy 9,869; Greece 1,470.
Semimanufactures ---- value, thousands	$54	$861	Belgium-Luxembourg $805; Libya $22; Algeria $12.
Lead: Metal including alloys, scrap	185	335	Italy 220; West Germany 115.
Magnesium: Metal including alloys, scrap	--	1	All to Netherlands.
Nickel: Metal including alloys:			
Scrap	2	5	All to United Kingdom.
Semimanufactures ---- value, thousands	$9	--	
Silver: Metal including alloys, unwrought and partly wrought ---- troy ounces	1,855	--	
Zinc: Metal including alloys, scrap	53	48	Italy 21; Spain 15; United Kingdom 11.
Other: Ashes and residues	13	--	
INDUSTRIAL MINERALS			
Abrasives, n.e.s.: Grinding and polishing wheels and stones ---- value, thousands	$601	$695	Yugoslavia $253; Australia $227; West Germany $93.
Diamond: Gem, not set or strung ---- do	$4,710	$4,044	All to Belgium-Luxembourg.
Fertilizer materials: Crude	74	253	All to Italy.
Stone, sand and gravel: Dimension stone, worked value, thousands	(2)	$18	All to United Kingdom.
MINERAL FUELS AND RELATED MATERIALS			
Petroleum refinery products: Lubricants 42-gallon barrels	4,063	3,808	Libya 14; bunkers 3,787.

[1]Table prepared by Jozef Plachy.
[2]Less than 1/2 unit.

Table 3.—Malta: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides value, thousands	$16	$21	--	France $11; West Germany $6.
Metal including alloys:				
Unwrought ---- do	$2	$27	--	All from United Kingdom.
Semimanufactures ---- do	$3,947	$4,827	--	Italy $3,848; United Kingdom $552.
Chromium: Oxides and hydroxides do	$1	$7	--	All from United Kingdom.
Copper: Metal including alloys:				
Scrap	3	--		
Unwrought	5	1	--	All from West Germany.
Semimanufactures value, thousands	$1,347	$1,124	$16	United Kingdom $544; West Germany $361; Italy $89.
Iron and steel:				
Iron ore and concentrate, pyrite, roasted	--	7	--	Yugoslavia 6.
Metal:				
Scrap	14	190	--	All from United Kingdom.
Pig iron, cast iron, related materials	386	10,418	--	Greece 10,069; United Kingdom 188.
Ferroalloys, unspecified	28	26	--	United Kingdom 21.
Steel, primary forms[2]	6,727	7,802	--	United Kingdom 2,861; Italy 2,241; Turkey 1,000.
Semimanufactures value, thousands	$13,635	$15,143	$2	Belgium-Luxembourg $3,851; United Kingdom $3,068; France $2,770.
Lead:				
Oxides ---- do	$80	$84	--	United Kingdom $54; West Germany $29.
Metal including alloys:				
Unwrought	53	61	--	United Kingdom 43; Belgium-Luxembourg 18.
Semimanufactures value, thousands	$34	$37	--	United Kingdom $23; Belgium-Luxembourg $6.

See footnotes at end of table.

Table 3.—Malta: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Magnesium: Metal including alloys:				
Scrap	1	--		
Semimanufactures value, thousands	--	$1	--	All from West Germany.
Manganese: Oxides do.	$1	--		
Mercury do.	$4	$1	--	Do.
Nickel: Metal including alloys:				
Unwrought	2	2	--	All from United Kingdom.
Semimanufactures value, thousands	$10,187	$998	--	West Germany $725; Ireland $238.
Platinum-group metals: Metals including alloys, unwrought and partly wrought do.	([3])	$1	--	All from Italy.
Silver: Metal including alloys, unwrought and partly wrought do.	$144	$413	--	United Kingdom $252; Italy $141.
Tin: Metal including alloys:				
Unwrought do.	--	$6	--	All from United Kingdom.
Semimanufactures do.	$688	$1,061	--	United Kingdom $667; Italy $238; France $76.
Titanium: Oxides do.	$314	$439	$17	United Kingdom $192; Italy $134; West Germany $83.
Zinc:				
Oxides do.	$52	$51	--	Netherlands $38; Norway $8.
Blue powder	--	4	--	Belgium-Luxembourg 2; West Germany 2.
Metal including alloys:				
Unwrought	105	140	--	France 60; Belgium-Luxembourg 55; Netherlands 20.
Semimanufactures value, thousands	$55	$54	--	United Kingdom $12; France $10; Netherlands $7.
Other:				
Ores and concentrates	1	2	--	All from Yugoslavia.
Oxides and hydroxides value, thousands	$85	$65	--	West Germany $44; United Kingdom $20.
Ashes and residues	1,365	--		
Base metals including alloys, all forms value, thousands	$3	$51	--	United Kingdom $48.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc. value, thousands	$67	$44	$1	Italy $24; West Germany $7.
Artificial: Corundum do.	$37	$44	--	Yugoslavia $28; Poland $13.
Dust and powder of precious and semiprecious stones including diamond do.	$34	$16	--	Belgium-Luxembourg $8; Ghana $8.
Grinding and polishing wheels and stones do.	$313	$387	$4	Italy $175; West Germany $65; Yugoslavia $61.
Barite and witherite do.	$20	$2	--	All from United Kingdom.
Boron materials: Oxides and acids do.	$1	--		
Cement	187,832	208,403	NA	NA.
Chalk value, thousands	$44	$65	--	United Kingdom $34; France $16.
Clays, crude	1,116	369	--	United Kingdom 246; Italy 103.
Cryolite and chiolite value, thousands	$8	$12	--	Italy $9; Yugoslavia $3.
Diamond:				
Gem, not set or strung do.	$4,924	$4,985	--	Ghana $2,614; Switzerland $1,109; Belgium-Luxembourg $839.
Industrial stones do.	$522	$6	--	Ghana $5.
Diatomite and other infusorial earth do.	$26	$20	$1	Italy $15; West Germany $2.
Fertilizer materials:				
Crude, n.e.s	7	9	--	All from United Kingdom.
Manufactured:				
Ammonia value, thousands	$23	$27	--	France $13 United Kingdom $8.
Nitrogenous	1,467	1,191	--	Belgium-Luxembourg 714; West Germany 350; Italy 88.
Phosphatic	8	--		
Unspecified and mixed	1,294	1,948	1	North Korea 1,005; West Germany 426; Belgium-Luxembourg 418.
Graphite, natural	20	--		
Gypsum and plaster value, thousands	$33	$44	$2	Spain $28; France $9.
Lime	157	377	--	Italy 376.

See footnotes at end of table.

Table 3.—Malta: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Magnesium compounds: Magnesite value, thousands	$3	--		
Mica:				
Crude including splittings and waste do	$2	$4	--	All from United Kingdom.
Worked including agglomerated splittings do	$41	$6	--	West Germany $4.
Nitrates, crude do	$6	--		
Pigments, mineral:				
Natural, crude do	$8	$6	--	All from United Kingdom.
Iron oxides and hydroxides, processed do	$10	$15	--	West Germany $6; United Kingdom $4.
Precious and semiprecious stones other than diamond:				
Natural do	$13	$7	--	Austria $1; India $1; Italy $1.
Synthetic do	$1	$2	--	Thailand $1.
Salt and brine do	$205	$120	--	United Kingdom $45; Tunisia $35; Italy $29.
Sodium compounds, n.e.s.: Carbonate, manufactured	164	181	--	Turkey 125; West Germany 56.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked value, thousands	$1,009	$1,351	--	All from Italy.
Worked do	$60	$4	--	Italy $3; Spain $1.
Gravel and crushed rock do	$503	$557	--	Italy $548.
Quartz and quartzite do	$34	$7	--	West Germany $3; United Kingdom $2.
Sand other than metal-bearing[2]	1,167	1,095	--	Italy 821; United Kingdom 187.
Sulfur:				
Elemental:				
Crude including native and byproduct	40	109	--	Italy 108.
Colloidal, precipitated, sublimed	217	127	--	Italy 121.
Dioxide value, thousands	$16	$3	--	United Kingdom $2.
Sulfuric acid do	$43	$93	--	Italy $55; Netherlands $32.
Talc, steatite, soapstone, pyrophyllite do	$51	$32	$6	Norway $11; Italy $7.
Other: Crude do	$10	$3	$1	Austria $2.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	3	13	13	
Carbon: Carbon black value, thousands	$296	$411	$76	Italy $196; West Germany $120.
Coal:				
Anthracite and bituminous	52,398	94,405	--	Poland 50,037; Italy 44,364.
Briquets of anthracite and bituminous coal	26	(3)	--	All from West Germany.
Coke and semicoke	20	--		
Peat including briquets and litter	413	207	--	Netherlands 81; United Kingdom 55; Ireland 53.
Petroleum refinery products:				
Mineral jelly and wax[2] 42-gallon barrels	441	3,321	--	Hungary 2,274; West Germany 881.
Lubricants[2] do	20,277	20,384	105	Belgium-Luxembourg 6,426; United Kingdom 6,041; Italy 3,500.
Bitumen and other residues do	39,741	12	--	All from West Germany.
Bituminous mixtures value, thousands	$99	$88	--	United Kingdom $53; Italy $27.

NA Not available.
[1]Table prepared by Jozef Plachy.
[2]Totals are incomplete owing to unreported quantities.
[3]Less than 1/2 unit.

The Mineral Industry of Mauritania

By Thomas O. Glover[1]

Iron ore was the main contributor to the Mauritanian economy in 1985. The parastatal mining company, Société Nationale Industrielle et Minière (SNIM) owned and operated all of the iron ore mines in Mauritania. Iron ore sales accounted for 85% of the country's export earnings and aided the development of the administrative and industrial sectors.

Annual gross domestic product growth since 1980 has averaged about 3% per year. Foreign assistance as a proportion of total expenditures remained slightly above 60%. The debt service through 1988 was scheduled at an annual rate of one-third of the total budget. For the second consecutive year, Mauritanian iron ore exports exceeded 9 million tons, decreasing from 9.5 million in 1984 to 9.3 million tons in 1985. Owing to high petroleum fuel costs and lower-than-anticipated iron ore prices, the $450 million[2] Guelbs project was not operating profitably.

PRODUCTION AND TRADE

Production of iron ore for export decreased slightly compared with that of 1984, but the value increased slightly more than $3 million. Total value of iron ore exports was slightly more than $150 million. Iron ore production totaled 9.2 million tons compared with 9.0 million tons in 1984. Sales of iron ore for both 1984 and 1985 exceeded mine production. Approximately 600,000 tons was withdrawn from stockpiles to meet sales contracts for the 2-year period. As in previous years, most shipments in 1985 were destined for Western Europe, of which 2.1 million tons was sold to Belgium-Luxembourg, 2.4 million tons to France, and 2.7 million tons to Italy. A total of eight countries received Mauritanian iron ore, all shipped through the port at Nouadhibou on the Atlantic Ocean.

Copper mining at Akjoujt was expected to commence by 1987. The Government of Mauritania offered to export copper concentrates to three companies in Japan.

Table 1.—Mauritania: Production of mineral commodities[1]

Commodity[2]	1981	1982	1983	1984^p	1985^p
Cement, hydraulic metric tons	60,000	60,000	60,000	NA	[3]75,000
Gypsum do	[4]1,732	^e5,000	4,000	800	5,470
Iron and steel:					
Iron ore:					
Gross weight[5] thousand metric tons	8,704	8,255	7,385	9,527	9,333
Iron content^e do	5,243	4,750	4,250	5,754	^e5,600
Metal:					
Steel, crude metric tons	--	6,823	NA	NA	NA
Semimanufactures do	4,400	10,391	5,454	898	4,481

^eEstimated. ^pPreliminary. NA Not available.
[1]Table includes data available through June 26, 1986.
[2]In addition to the commodities listed, modest quantities of unlisted varieties of crude construction materials (clays, sand and gravel, and stone) and salt presumably are produced, but output is not reported quantitatively, and available information is inadequate to make reliable estimates of output levels.
[3]Cement made from imported clinker.
[4]Gypsum mine only operated Jan.-Mar. 1981.
[5]Reported figure for iron ore exports.

COMMODITY REVIEW

METALS

Copper.—Société Arabe Minière D'Inchiri Mauritania (SAMIN), a Jordan-based mining company, was developing an open pit copper mine at Akjoujt in 1985. The mine, previously operated from 1971 through 1978, was scheduled to reopen in 1987. The deposit contains 25% oxide ore and 75% sulfide ore. A new copper ore process was to be used that differed greatly from the TORCO process previously employed when over 98,000 tons of copper metal was produced. When the operation commences in 1987, the company expects to produce and process 1.5 million tons of ore per year, with gold as a byproduct. Outokumpu Oy, a mining and metallurgical company from Finland, sold an ore dressing plant and a storage building complete with conveyors to SAMIN for the mine. All of the copper concentrate from the Akjoujt operation was scheduled to be exported. The mine, with an estimated development cost of $112 million, would produce 105,000 tons of concentrates per year.

Iron Ore.—SNIM's newly developed Guelb iron ore mine, El Rhein, which commenced shipments of ore in January 1985, encountered technical problems during the year, and the production plan for the whole year was revised from 2.5 million tons to 1.5 million tons. Production of magnetic concentrates began at the El Rhein Mine, located about 15 miles north of the main Kedia d'Idjil Field, the first of the Guelb deposits to be developed. If an increased demand for iron ore develops, the Oum Arwagen deposits would also be tapped for still another mine. Located approximately 7 miles from the El Rhein Mine, development at Oum Arwagen would begin in 1988 with production of concentrates starting in 1990. SNIM proposed to invest approximately $92.2 million in a project to reduce production costs and improve management. The project was proposed to be completed in mid-1988. Twenty million dollars in financing would come from the International Bank for Reconstruction and Development, previous lenders of $55.8 million to the Guelb Project, and the balance from other Arab sources.

Steel.—A steel miniplant purchased by SNIM in 1976 was turned over to the Arab Iron and Steel Co. in 1984. The plant, in Nouadhibou, on the Atlantic Ocean, was scheduled to produce various steel foundry products in the near future in addition to current production of reinforcing bars. The equity capital was $7.5 million, of which the Arab Mining Co. owned one-third.

INDUSTRIAL MINERALS

Gypsum.—Production of gypsum, halted in 1981, resumed in November 1984. Output in 1985 was 5,470 tons from the N'Drahamcha quarry, 50 kilometers northeast of Nouakchott. The location of the new quarry was near the old site. The new quarry's capacity was estimated to be 120,000 tons per year. The new facility, scheduled to produce gypsum for both domestic use and foreign exports, was owned and operated by the Société Arabe des Industries Metalliques, in which SNIM was an equal partner with the Kuwait Foreign Trading, Contracting, and Investment Co. Mauritania's total reserves of 98% pure gypsum were estimated at 1 billion tons.

Phosphate.—A consortium of companies consisting of Mauritania's SNIM, Bureau de Recherches Geologiques et Minières (BRGM), Société Senegalaise des Phosphates de Thies, and the Romanian Geomin Co., utilizing BRGM as manager, discovered a large deposit of phosphate near the Senegalese border. The 1984 discovery was estimated to total 95 million tons of rock averaging 19% to 20% phosphate pentoxide. It was estimated by the consortium that the deposit could support an output rate that would allow 2 million tons per year of marketable material to be produced. Preliminary estimates put the cost of the mine and related facilities at approximately $400 million.

MINERAL FUELS

Three oil companies from the Republic of Korea, Taiwan, and the United States were engaged in a joint petroleum exploration project in Mauritania. Yukong Ltd., an affiliate of the Republic of Korea's Sunkyung Business Group, the Chinese Petroleum Corp. (CPC) of Taiwan, and Occidental Oil Co. (Oxoco) of the United States, jointly conducted a seismic survey of potentially productive areas in Mauritania. The initial survey indicated that the structures possessed a high possibility of oil and gas reserves. Oxoco held a 50% share in the venture, with Yukong and CPC each holding a 25% share.

Mauritania and Algeria signed an intergovernmental agreement to proceed with the rehabilitation of the Nouadhibou refinery, and then to operate and manage the facility. In keeping with the agreement, two contracts were signed by the Mauritanian Refining Industries Co, the Algerian National Petroleum Engineering Co., and the Mauritanian Marketing and Refining Co. The contracts also covered the construction of a liquid propane gas unit, a seawater desalinization plant, and the restoration of the Nouadhibou port facilities.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Mauritanian ouguiya (UM) to U.S. dollars at the rate of UM76.8=US$1.00.

The Mineral Industry of Mexico

By Orlando Martino[1]

Mexico's external and domestic crisis caused by the large foreign debt and economic austerity continued during 1985. In addition, the Mexican economy suffered from a major disturbance caused by the earthquake at Mexico City in September. Fortunately, the petroleum and mining installations in the area did not suffer damage and no significant loss of output resulted. A large number of miners from the country's main mining districts used their underground experience to help in the earthquake rescue operations. In response to a request from the Government of Mexico, the U.S. Government sent a team trained to use a seismic system and television capability developed to locate trapped miners. The U.S. Bureau of Mines sent a safety team with specialized equipment.

The Mexican economy was also disadvantaged by a decreasing trend in foreign exchange earnings from exports of crude oil. The substantial earnings loss relative to the peak year of 1982 was caused by lower foreign demand as well as lower average price per barrel. For Mexico, an oil price change of $1.00 per barrel represented a foreign exchange earnings loss of about $550 million. Despite this deteriorated situation in the world oil market, Mexico maintained its position as the fourth most important world oil producer and exporter. Although output from the oil industry contracted slightly, it continued to play a major role in Mexico's economy, accounting for 12% of the gross domestic product (GDP). This compares with the mining industry, which accounted for 1.4% of GDP. The oil industry contributed about 35% of the central Government's total fiscal revenues. The importance of Mexico's oil industry was most apparent in the export sector where petroleum-based exports including crude oil, petroleum products, and petrochemicals accounted for 67% of total merchandise exports. Mexico continued as the chief supplier of foreign oil to the U.S. market. For the second time in recent history, the State-owned oil monopoly Petróleos Mexicanos (PEMEX) announced a small reduction in proven reserves of hydrocarbons from 71.75 billion barrels equivalent at yearend 1984 to 70.90 billion barrels at yearend 1985.

As the world's leading miner, refiner, and exporter of silver, Mexico's earnings from its mineral trade was affected by a 25% drop from 1984 silver prices to an average of $6.14 per troy ounce. Silver was the country's second most important mineral export commodity after oil, which in 1984 accounted for 35% of the value of nonfuel mineral exports.

Despite Mexico's austerity program and the slack in the world economy, Mexico's mining industry retained a certain dynamism and continuity in its operations. Contrary to silver's performance, increases occurred in a number of metallic and industrial minerals such that Banco de México was able to report[2] a 4.7% growth of output of the mining sector in 1985. This was in line with the 4.9% growth in overall industrial output. Growth of output in the mining sector also reflected the 2.7% increase of GDP in 1985 over that of 1984, which was lower than the revised 3.7% growth in 1984 over that of 1983. At current prices, the GDP in 1985 was estimated at $188 billion.[3]

In addition to the growth in domestic demand, the increase in Mexico's mineral production was stimulated by the continued expansion of the U.S. economy in 1985, although at a lower rate than that of prior years. More than two-thirds of Mexico's mineral exports are generally absorbed by the United States. For the United States, Mexico is the third most important trading partner after Canada and Japan. In 1985, the United States increased its total imports from Mexico by 6%. Mexico's mineral sector was also stimulated by the economic growth in trading partners in the Latin American region, in Western Europe, and in Japan.

Results among the private mineral companies were mixed. The larger more diversified companies were able to adjust to lower world prices by reducing operating costs and improving productivity. Profits were lower, however. An official of the Cámara Minera de México (CAMIMEX) stated that none of the 250 companies registered with CAMIMEX had to close down in 1985, nor was there a reduction in the labor force. Total employment in the mineral sector actually increased by 3%. On the other hand, the private small- and medium-size mineral companies, which are generally poorly financed, experienced difficulties during 1985 because of lower prices and high energy costs, forcing many to withdraw from mining operations, although the exact number is not known. The large increases in gasoline and diesel fuel prices made it uneconomical for small operators with low-grade deposits to truck their ore to the nearest regional beneficiation plant.

The large private mining group within the mining sector accounted for about one-half of the sector's output and was dominated by five major companies: Industrias Peñoles S.A. de C.V. (Peñoles), Grupo Industrial Minera México S.A. de C.V. (Grupo IMMSA), Empresas Frisco S.A. de C.V. y Subsidiarias (Frisco), Corporación Industrial Sanluis S.A. de C.V., and Cía. Fresnillo S.A. de C.V. (Fresnillo) owned 60% by Peñoles and 40% by AMAX Inc. As a diversified holding company, Grupo IMMSA operated its metal producing mines through a subsidiary, Industria Minera México S.A. (IMMSA). IMMSA and other subsidiaries are actually held through a subholding company in which ASARCO Incorporated has a 34% equity interest.

The group of companies with Government equity participation accounted for more than one-third of the nonfuel mineral sector output. The Government's direct role as a mineral producer was implemented by two autonomous agencies under the policy guidance of the Secretary of Energy, Mines and Parastate Industries (SEMIP): the Comisión de Fomento Minero (CFM) and the Fideicomiso de Minerales No Metálicos Mexicanos (FNMM). CFM, with a staff of 2,700 persons, was involved in a large number of mineral operations for producing coal, copper, fluorspar, gold, iron ore, manganese, phosphate rock, silver, and sulfur. According to recent data, CFM had a majority position in 12 companies such as Azufrera Panamericana S.A., Cía. Exploradora del Istmo S.A., Cía. Real del Monte y Pachuca S.A., and Minera Carbonífera Río Escondido S.A. (MICARE); and a minority position in 11 companies, most notable of which are Cía. Minera Autlán S.A. de C.V., Cía. Minera de Cananea S.A., Mexicana de Cobre S.A., and Minera Real de Ángeles S.A. de C.V. CFM functioned through 19 regional offices and operated 21 beneficiation plants in the most important mining districts of Mexico, especially to service the needs of the small- and medium-size mining group. CFM also administered an important program of credit, not easily available to the small- and medium-size miners. This credit program expanded during 1985 despite the Federal budget deficit problem. The number of credit operations increased by 23% relative to that of 1984, and the total amount of the loans increased 33% to $27 million. Miners in Sinaloa, Coahuila, Durango, Sonora, and Chihuahua, in order of importance, received one-half of the total credit. The exploration and mineral evaluation programs of the Consejo de Recursos Minerales (CRM), decentralized under SEMIP, was also reduced because of the restraints on Government spending. FNMM was a major producer of industrial minerals, chiefly barite and graphite.

Government Policies and Programs.—The Government was considering measures for revitalizing the mineral industries by expanding domestic demand through further industrialization and for increasing mineral export earnings as a factor in helping to solve the country's international financial crisis. The measures under consideration included liberalization of rules and procedures for foreign investment.

In May, the Government announced a number of fiscal incentives to help the mineral industries face the problems of escalating costs and depressed prices. The incentives, which cover a wide variety of metallic and industrial minerals, must be applied for from the Secretaría de Hacienda y Crédito Público in Mexico City. For medium-size companies, the incentives are in the form of fiscal certificates amounting to 40% of exploration and infrastructure costs and 30% of prospecting costs, as credit against all Federal taxes. The certificates are valid for 5 years. To qualify for the incentive scheme, mining companies must be 51% Mexican owned and have a specified maximum gross sales. Under a second scheme, companies with income above this level can claim 10% of prospecting and exploration costs for already operating mines, 20% for new mining projects, and 20% in credit for the cost of machinery, whether new, used, locally made, or imported.

In October, the International Bank for Reconstruction and Development granted a $105 million loan to participate in a $210 million program to specifically stimulate and assist the small- and medium-scale mining group with poor access to financing. The program was designed to help finance investments in new mining projects, expansion of current facilities, technical assistance, exploration projects, acquisition of mining and metallurgical equipment, and improvements in the regional laboratories. The program is entitled "Programa Especial Complementario de Apoyo a la Pequeña y Mediana Minería (PECAM)," and will be coordinated by a special staff within SEMIP. The different segments of the program will be implemented as relevant by the three main Government entities devoted to the mineral sector—CRM, CFM, and FNMM. The loan was a followup to the first $140 million loan of May 1980 for the same purposes. It was estimated that PECAM would increase mineral output by assisting about 200 operations across Mexico and create 5,000 to 6,000 jobs.

Since certain headquarters buildings and facilities of several mineral-related agencies suffered damage from the September earthquake in Mexico City, the Government was considering relocating CFM, CRM, FNMM, and certain offices of SEMIP to a new National Mining Center to be established in Pachuca, State of Hidalgo, center of a traditional mining district active since colonial times.

As a result of the reorganization of the Federal Administration carried out in July, SEMIP was directed to continue to administer the energy sector through four directorates covering energy policy, energy operations, energy research and development, and international energy trade and parastate industries. In August, the Government manifested its intentions to continue to develop its nuclear industry with the official publication announcing the responsibilities assigned to SEMIP. As an integral part of this effort, the Government was considering the formation of two new bodies in the public Federal Administration: the National Center for Energy Conservation and the National Commission for the Nuclear Industry.

PRODUCTION

Production of mineral fuels—crude oil, natural gas, and coal—all decreased, relative to that of 1984, in response to less favorable conditions in the domestic and international markets. However, output of petroleum products increased to a record high to meet foreign demand. Virgin stock (unfinished crude oil), a relatively new marketable petroleum product for Mexico, increased 16%. Mexico was near self-sufficiency with regard to the diversity of petroleum products required by its economy.

Results among the nonfuel minerals was mixed despite the positive growth in the domestic economy and some improvement in world trade. Among the metallic minerals, increased mine output was notable in antimony, 39%, arsenic, 15%; and bismuth, 114%. Although mine output of silver is estimated to have decreased, production of refined gold increased 12% over that of 1984 to almost 200,000 troy ounces and refined silver increased almost 10% over that of 1984 to nearly 66 million ounces. Mined lead output increased to a recent record-high level not exceeded since 1954. Smelter and refined lead output also increased significantly as a result of the expansion of Mexico's automobile industry. The metallic commodities registering decreased volumes relative to that of 1984 included refined aluminum, copper, iron ore, manganese ore, mercury, selenium, and tin. The contraction of the steel industry was responsible for lower output of iron ore, manganese, and coking coal.

Among the industrial minerals, output of barite continued its upward trend and achieved another record high. Cement production was also at a record level, apparently because of the reconstruction following the earthquake in Mexico City in September. Production of magnesia increased by 15% over that of 1984. Less notable increases were in fluorspar, nitrogen, sodium compounds, and sulfur. Decreases in production of industrial minerals was significant with respect to bentonite, 22%, and salt, 12%.

According to the latest available report[4] issued by CRM covering 1984, the value of metallic minerals produced was 62% of the total (including coal, but excluding oil and gas), while industrial minerals accounted for 38%. The three most valuable nonfuel minerals produced were silver, 22% of the total; zinc, 11%; and copper, 10%; followed in importance by sand and gravel, sulfur, coal, salt, aluminum, and lead. Employment in the mining sector in 1984 expanded to 217,000 and represented 2.4% of the total number employed in industry. Employment in 1985 increased by an estimated 3% to 223,000.

Table 1.—Mexico: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984	1985[p]
METALS					
Aluminum:					
Primary	43,237	41,180	39,706	43,988	42,743
Secondary	20,341	25,770	15,722	22,500	32,000
Antimony:					
Mine output, metal content[3]	1,800	1,565	2,519	3,064	4,266
Metal (in mixed bars and refined)	354	253	1,782	1,907	2,694
Arsenic, white[4]	6,517	4,740	4,557	5,496	6,312
Bismuth[5]	656	606	545	433	925
Cadmium:					
Mine output, metal content	1,433	1,444	1,341	1,135	1,140
Metal, refined	590	607	642	571	733
Copper:					
Mine output, metal content[6]	232,902	229,179	195,959	303,523	290,000
Metal:					
Blister (primary only)	[r]69,199	[r]77,473	91,994	80,304	80,649
Refined:					
Primary	61,301	61,424	80,903	69,806	73,503
Secondary[e]	10,000	14,000	15,000	13,844	14,000
Total[e]	71,301	75,424	95,903	83,650	87,503
Gold:					
Mine output, metal content[6] troy ounces	198,594	214,349	198,177	270,998	[e]297,000
Metal, refined do.	176,861	175,189	177,504	177,118	198,723
Iron and steel:					
Iron ore, mine output:					
Gross weight[7] thousand tons	8,711	8,155	8,040	8,317	7,820
Metal content do.	5,749	5,382	5,306	5,489	5,161
Metal:					
Pig iron do.	3,767	3,598	3,537	3,926	3,530
Sponge iron do.	1,686	1,505	1,497	1,448	1,442
Total do.	5,453	5,103	5,034	5,374	4,972
Ferroalloys:					
Ferromanganese do.	[r]141	[r]135	140	160	154
Silicomanganese do.	26	[r]32	42	42	39
Ferrosilicon do.	23	[r]24	24	23	28
Ferrochromium do.	3	6	3	7	6
Other do.	2	[r]2	1	2	3
Total do.	[r]195	[r]199	210	234	230
Steel, crude do.	7,663	7,056	6,978	7,560	7,303
Semimanufactures do.	[r]6,272	[r]5,642	5,465	6,006	5,904
Lead:					
Mine output, metal content[8]	148,916	170,172	184,261	202,561	206,732
Metal:					
Smelter:					
Primary	156,677	145,382	166,800	174,834	203,036
Secondary (refined)[e]	38,000	34,000	29,000	25,000	23,000
Total[e]	194,677	179,382	195,800	199,834	226,036
Refined:					
Primary (including lead content of antimonial lead)	150,550	137,238	162,461	162,205	185,193
Secondary[e]	38,000	34,000	29,000	25,000	23,000
Total	188,550	171,238	191,461	187,205	208,193

See footnotes at end of table.

Table 1.—Mexico: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984	1985[p]
METALS —Continued					
Manganese ore:					
Gross weight[9]	578,314	508,667	350,011	476,158	395,000
Metal content	208,193	183,120	133,004	180,940	150,647
Mercury, mine output, metal content 76-pound flasks	6,962	8,558	6,411	11,140	7,659
Molybdenum, mine output, metal content	451	5,190	5,866	4,054	3,761
Selenium, mine output, metal content	12	29	24	44	42
Silver:					
Mine output, metal content[8] thousand troy ounces	52,916	59,175	63,607	75,340	[e]69,000
Metallurgical products, metal content do.	50,151	46,784	58,544	60,021	65,739
Tin:					
Mine output, metal content	28	27	334	416	376
Metal, smelter, primary	838	944	1,216	1,531	[e]1,500
Tungsten, mine output, metal content	263	194	186	274	291
Zinc:					
Mine output, metal content[8]	206,569	242,332	266,292	303,573	[e]300,000
Metal, smelter, primary	126,537	126,953	174,991	167,034	175,353
Metal, refined, primary	139,059	123,509	171,390	162,912	171,388
INDUSTRIAL MINERALS					
Barite	317,738	363,753	357,043	426,095	435,000
Cement, hydraulic thousand tons	17,978	19,298	17,068	18,436	21,066
Clays:					
Bentonite	220,454	184,918	226,140	267,348	208,000
Common	277,766	249,069	213,775	212,758	NA
Fuller's earth	65,378	42,488	41,574	45,697	[e]45,000
Kaolin	207,824	172,390	162,000	130,296	NA
Diatomite	56,600	56,342	43,967	44,634	[e]45,000
Feldspar	130,826	115,559	117,518	84,791	[e]100,000
Fluorspar:[10]					
Acid-grade thousand tons	508	409	407	344	379
Ceramic-grade do.	108	54	46	37	27
Metallurgical-grade do.	307	166	73	213	270
Submetallurgical-grade do.	193	106	79	105	53
Total do.	1,116	735	605	699	729
Graphite, natural:					
Amorphous	41,142	34,370	42,669	39,846	41,600
Crystalline	1,152	1,804	1,658	1,683	1,310
Gypsum and anhydrite, crude (yeso)	2,390,431	2,042,484	2,958,085	2,945,222	2,366,019
Lime, hydrated and quicklime thousand tons	4,500	4,000	3,630	4,000	4,000
Magnesium compounds:					
Magnesia[11]	68,578	64,605	66,300	105,701	121,698
Magnesite	12,117	22,492	23,187	30,424	[e]30,000
Mica, all grades	2,077	510	1,560	1,676	[e]1,600
Nitrogen: N content of ammonia[12]	1,795,647	2,029,800	1,935,500	1,772,610	1,858,778
Perlite	56,731	32,425	41,377	31,515	NA
Phosphate rock	503,252	653,050	785,038	591,519	600,000
Salt, all types thousand tons	7,953	5,561	5,703	6,167	5,451
Sodium compounds:					
Sodium carbonate (soda ash):					
Natural	204,600	178,900	179,700	192,000	200,185
Synthetic	196,600	217,200	217,900	231,008	257,223
Sulfate, natural (bloedite)[13]	[r]421,475	[r]470,751	395,287	413,238	398,836
Stone, sand and gravel:					
Calcite, common	246,040	234,694	344,793	480,986	NA
Dolomite	371,027	353,265	363,575	392,877	NA
Limestone[14] thousand tons	39,046	40,880	35,276	29,055	NA
Marble	171,152	119,759	149,086	149,220	NA
Quartz, quartzite, glass sand (silica)	1,009,330	828,187	929,059	936,876	976,173
Sand and gravel:					
Sand thousand cubic meters	56,392	60,339	50,564	51,778	NA
Gravel do.	36,518	39,074	33,018	33,530	NA
Strontium minerals (celestite)	41,344	31,676	37,506	31,991	30,754
Sulfur, elemental:					
Frasch process thousand tons	1,652	1,391	1,225	1,364	1,551
Byproduct:					
Of metallurgy[e] do.	100	100	100	[r]87	125
Of petroleum and natural gas do.	426	425	377	461	475
Total do.	2,178	1,916	1,702	1,912	2,151

See footnotes at end of table.

Table 1.—Mexico: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984	1985[p]
INDUSTRIAL MINERALS —Continued					
Talc	13,733	12,270	11,032	8,900	9,000
Vermiculite[15]	596	522	399	505	NA
Wollastonite	14,602	15,599	10,784	9,251	2,309
MINERAL FUELS AND RELATED MATERIALS					
Carbon black (negro de humo)	335,906	328,763	381,425	277,197	264,317
Coal, run-of-mine:					
Metallurgical thousand tons	6,849	6,833	7,181	7,117	6,360
Steam do	1,237	786	1,818	2,215	2,200
Total do	8,086	7,619	8,999	9,332	8,560
Coke:[16]					
Metallurgical do	r2,974	r2,986	2,996	2,927	2,355
Imperial do	12	9	9	35	30
Breeze do	90	8	8	8	5
Total do	r3,076	r3,003	3,013	2,970	2,390
Gas, natural:					
Gross million cubic feet	1,482,196	1,549,921	1,479,560	1,373,457	1,315,337
Marketable do	1,214,240	1,279,398	1,274,465	1,193,929	1,145,297
Natural gas liquids:					
Field condensate thousand 42-gallon barrels	309	654	8,300	41,824	26,583
Other do	88,145	NA	NA	NA	NA
Petroleum:					
Crude do	843,933	1,002,430	972,922	982,517	960,114
Refinery products:					
Gasoline:					
Aviation do	544	653	420	436	406
Other do	130,559	126,410	129,230	132,199	133,226
Jet fuel do	10,558	11,177	9,998	12,370	12,379
Kerosene do	15,047	16,541	14,258	11,654	11,286
Distillate fuel oil (diesel) do	98,530	84,254	81,745	85,358	89,726
Residual fuel oil do	126,665	127,621	127,819	137,210	145,258
Lubricants do	3,512	2,854	2,402	2,499	2,433
Liquefied petroleum gas do	49,595	55,042	56,539	56,781	60,981
Asphalt do	6,651	7,288	6,185	8,292	8,360
Unspecified do	7,543	7,541	9,430	2,591	2,251
Unfinished crude oil[17] do	--	--	--	14,577	16,954
Refinery fuel and losses do	21,856	22,478	28,951	37,805	35,649
Total do	471,060	461,859	466,977	501,772	518,904

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.

[1]Table includes data available through Aug. 15, 1986.

[2]In addition to the commodities listed, pumice and additional types of crude construction materials are produced, but output is not reported, and available information is inadequate to make reliable estimates of output levels.

[3]Sb content of ores for export plus Sb content of antimonial and impure bars plus refined metals.

[4]Calculated white As equivalent of metallic As content of products reported.

[5]Refined metal plus Bi content of impure smelter products.

[6]Mine output series revised beginning with 1979 to show actual mine output. Prior published data for mine output was derived from data on refined products and concentrates.

[7]Calculated from reported Fe content on the basis of concentrate and pellets containing 66% iron. Total run-of-mine output in 1984 was just under 14 million tons.

[8]Production series modified, beginning with 1979, according to available detail data on mine output per municipality and State.

[9]Calculated from reported Mn content of mine production on the basis of ore and nodules averaging 38% manganese.

[10]Beginning with 1979, revised data is obtained from the Instituto Mexicano de la Fluorita A.C.

[11]Reported by Industrias Peñoles S.A. de C.V. (Peñoles) as the only major producer.

[12]Beginning in 1981, Petróleos Mexicanos (PEMEX) initiated production of liquid nitrogen, which in that year amounted to 29,540 tons; 1982—39,009 tons; 1983—44,971 tons; 1984—47,047 tons; and 1985—46,435 tons.

[13]Series reflects output reported by Peñoles, Mexico's principal producer, plus an additional estimated 30,000 tons by a smaller operator.

[14]Excluding that for cement production.

[15]First year of production registered for vermiculite by the Consejo de Recursos Minerales was in 1980.

[16]Includes coke made from imported metallurgical coal.

[17]Specified by PEMEX as "virgin stock-28" and was processed at its refineries primarily for export.

TRADE

Petroleum continued to dominate Mexico's mineral trade. However, earnings from petroleum exports suffered from a combination of reduced foreign demand and lower price. Total exports of petroleum including crude oil, petroleum products, and a much smaller amount of petrochemicals were valued at $14.6 billion compared with $16.5 billion in 1984. Although the value of crude oil exported decreased by 11% and petrochemicals by 41%, the value of petroleum products—mostly unfinished crude oil, gasoline, fuel oil, and diesel oil—actually increased 8% to $1.23 billion. Mexico also suffered from the loss of earnings regarding natural gas exports to the United States, which were suspended in November 1984. These earnings had reached $540 million in 1982. The dominance of crude oil in Mexico's international trade is shown in the following table:

	1980	1981	1982	1983	1984	1985
Total Mexican exports ________value, millions__	$15,308	$19,379	$21,006	$22,312	$24,054	$21,866
Crude oil exports __________________do____	$9,449	$13,305	$15,623	$14,821	$14,968	$13,296
Crude oil share ________________percent__	61.7	68.7	74.4	66.4	62.2	60.8
Mining, metallurgical exports ___value, millions__	$1,347	$1,256	$887	$1,018	r$1,061	$1,008
Mining, metallurgical share__________percent__	8.8	6.5	4.2	4.8	r4.4	4.6

rRevised.

The United States continued as Mexico's most important foreign market, taking 52.5% of all crude oil exports. Mexico, in turn, continued as the chief supplier of crude to the United States. Mexico's main overseas market group, comprised of the United States, Spain, Japan, France, and the United Kingdom, in order of importance, received 86% of its crude oil exports. The United States was also the chief market for Mexican exports of petroleum products.

As for exports of nonfuel minerals, CRM's data for 1984 show that metallic exports (dominated in value in decreasing order by silver, copper, zinc, and lead) represented 73% of such exports, while industrial minerals (dominated by sulfur, salt, gypsum, and fluorspar, in decreasing order) represented 27% of the total. Preliminary data for 1985 show that although the volume of silver exports increased, earnings actually decreased relative to that of 1984 because of lower prices. The volume of lead exports increased by 35% over that of 1984 while zinc exports decreased by 10% from that of 1984 to 77,700 tons. In the nonfuel exports, the United States took 56% of the total value, followed by Asia, 16%, and the European Common Market Countries, 15%.

The considerably lower value of mineral commodities imported by Mexico gave a strong positive balance in its mineral trade. Mexico is a very diversified mineral producer and self-sufficient in most minerals. The value of imports of petroleum products increased 38% in 1985 to $480 million. CRM data for 1984 show that imports of mining and/or metallurgical commodities were valued at $545 million consisting of iron, aluminum, copper, potash, asbestos, phosphate rock, coke, tin, and nickel, in order of importance. The United States supplied 70% of Mexico's nonfuel mineral imports in 1984.

In November 1985, the Government of Mexico decided to request that the formal procedure be initiated for Mexico's accession to the General Agreement on Tariffs and Trade (GATT). Mexico's accession to GATT was expected to be finalized by mid-1986.

Table 2.—Mexico: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983[r]	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides	5	27	26	Guatemala 1.
Metal including alloys:				
Scrap	1,613	3,710	3,010	Japan 700.
Unwrought	572	803	803	
Semimanufactures	529	[2]29	6	West Germany 9; Colombia 6.
Antimony:				
Ore and concentrate	2,624	3,805	3,804	France 1.
Metal including alloys, all forms	183	115	65	Netherlands 39; Brazil 11.
Arsenic: Oxides and acids	2,653	3,287	3,153	Brazil 124; Argentina 10.
Bismuth: Metal including alloys, all forms	677	495	249	Belgium-Luxembourg 112; Brazil 74.
Cadmium: Metal including alloys, all forms	278	373	179	Netherlands 115; Japan 34.
Copper:				
Ore and concentrate	112,241	102,678	77	West Germany 35,351; Republic of Korea 24,499; Japan 21,073.
Metal including alloys:				
Scrap	663	750	645	Japan 105.
Unwrought	10,905	14,988	7,253	Belgium-Luxembourg 4,789; West Germany 2,696.
Semimanufactures	4,581	459	343	El Salvador 95; Cuba 11.
Iron and steel:				
Iron ore and concentrate	1,359	1,764	1,764	
Metal:				
Scrap	5,123	15,446	14,078	Japan 938; Netherlands 226.
Pig iron, cast iron, related materials	64,157	52,025	45,928	Japan 5,579; West Germany 110.
Semimanufactures	1,023,600	886,000	NA	NA.
Lead:				
Ore and concentrate	370	10,980	7,712	Belgium-Luxembourg 3,268.
Metal including alloys:				
Scrap	443	3,617	3,617	
Unwrought	90,603	93,496	34,157	Belgium-Luxembourg 17,570; Japan 14,401.
Unspecified	127	137	73	United Kingdom 44; Venezuela 15.
Manganese:				
Ore and concentrate	102,478	230,594	90,108	Norway 76,108; France 20,000.
Oxides	40,591	15,876	57	Colombia 4,320; Japan 2,939; Argentina 2,394.
Mercury 76-pound flasks	6,260	6,664	1	Brazil 3,603; Argentina 2,578; Nicaragua 200.
Molybdenum:				
Ore and concentrate	7,482	4,674	415	West Germany 3,419; United Kingdom 563.
Oxides and hydroxides	([3])	--		
Nickel:				
Ore and concentrate	1	--		
Metal including alloys, unspecified	37	4	([4])	Mainly to Cuba.
Selenium, elemental	15	--		
Silver: Metal including alloys, unwrought and partly wrought thousand troy ounces	44,571	47,386	33,257	Japan 8,802; Switzerland 2,894.
Tungsten:				
Ore and concentrate	545	847	847	
Metal including alloys, unwrought	19	11	([4])	Mainly to Sweden.
Zinc:				
Ore and concentrate	121,624	171,863	29,884	Belgium-Luxembourg 96,515; U.S.S.R. 12,552.
Blue powder	2,887	2,481	1,960	Venezuela 315; Dominican Republic 102.
Metal including alloys:				
Scrap	64	220	220	
Unwrought	79,337	84,431	52,024	China 8,171; Japan 7,166.
Semimanufactures	11,600	5,980	1,656	Venezuela 1,404; Uruguay 1,073.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.: Natural: Corundum, emery, pumice, etc	192	609	609	
Asbestos, crude	32	152	152	

See footnotes at end of table.

Table 2.—Mexico: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983[r]	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Barite and witherite	160,621	54,043	41,062	Venezuela 7,465; Costa Rica 3,326.
Clays, crude:				
Bentonite	570	3,602	3,490	Costa Rica 84; Cuba 25.
Fuller's earth	26	475	55	Chile 390; Peru 30.
Kaolin	235	2,117	175	Cuba 1,928; Guatemala 12.
Unspecified	128	129	71	Peru 17; Colombia 11.
Diamond: Gem, not set or strung thousand carats	965	22,020	22,020	
Diatomite and other infusorial earth	3,116	4,081	203	Argentina 1,802; West Germany 873; Brazil 782.
Feldspar	(4)	1,198	1,198	
Fluorspar:				
Acid-grade	327,100	386,059	250,064	Canada 122,933; Netherlands 6,718.
Other grades including ceramic	110,491	321,575	169,357	Netherlands 86,087; Japan 30,364.
Graphite, natural	19,420	21,323	21,113	Dominican Republic 180; Hungary 18.
Gypsum and plaster thousand tons	3,657	3,912	3,352	Canada 275; India 224.
Magnesium compounds: Magnesite kilograms	--	575	45	Venezuela 530.
Phosphates, crude	21,846	--		
Precious and semiprecious stones other than diamond: Natural	7	24	21	Japan 2; Netherlands 1.
Salt and brine thousand tons	7,789	9,676	3,178	Japan 5,911; Canada 561.
Stone, sand and gravel:				
Dimension stone: Crude and partly worked	2,319	2,081	1,686	China 153; Japan 133.
Dolomite, chiefly refractory-grade	699	921	398	El Salvador 285; Guatemala 188.
Gravel and crushed rock	516	NA		
Limestone other than dimension	1,106	214,186	214,002	Belize 184.
Quartz and quartzite	9	9	9	
Sand other than metal-bearing	6,111	3,965	3,924	El Salvador 23; Costa Rica 6.
Sand and gravel	25,491	34,606	34,575	Honduras 17; Panama 14.
Strontium minerals: Celestite	38,769	45,296	42,251	Japan 2,632; Canada 412.
Sulfur: Elemental:				
Crude including native and byproduct thousand tons	1,933	1,520	1,305	United Kingdom 141; France 20.
Colloidal, precipitated, sublimed	1	20	20	
Unspecified	24	13	12	Italy 1.
Talc, steatite, soapstone, pyrophyllite	161	24	24	
Vermiculite	124	276	276	
Other: Crude	223	530	72	Nicaragua 241; Brazil 79.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	83,893	199,430	199,227	Guatemala 106; Honduras 65.
Carbon black	3	--		
Coal: All grades including briquets	43	140	140	
Coke and semicoke	108	88	33	Panama 35; El Salvador 20.
Gas, natural: Gaseous million cubic feet	79,242	54,020	51,502	NA.
Petroleum:				
Crude thousand 42-gallon barrels	561,005	556,479	273,788	Spain 61,213; Japan 57,874.
Refinery products:				
Liquefied petroleum gas do	1,556	2,920	2,227	NA.
Gasoline:				
Aviation do	--	159	NA	NA.
Motor do	7,906	13,162	3,196	NA.
Kerosene and jet fuel do	1,151	1,696	782	NA.
Distillate fuel oil do	8,928	3,948	2,050	NA.
Lubricants do	75	--		
Residual fuel oil do	9,462	4,403	3,302	NA.
Unfinished crude oil do	1,633	14,544	NA	NA.

[r]Revised. NA Not available.
[1]Table prepared by H. D. Willis.
[2]Includes only particles of aluminum dust and powder.
[3]Revised to zero.
[4]Less than 1/2 unit.

Table 3.—Mexico: Imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983[r]	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS				
Aluminum:				
Ore and concentrate	26,658	54,312	25,696	Guyana 16,597; French Guiana 11,989.
Oxides and hydroxides	154,816	188,058	186,853	West Germany 631; Brazil 181.
Metal including alloys:				
Scrap	13,080	33,835	33,814	West Germany 20.
Unwrought	11,860	32,933	27,900	Canada 3,179; France 1,606.
Semimanufactures	5,877	NA		
Unspecified	20	--		
Arsenic: Metal including alloys, all forms ... kilograms	1,245	907	907	
Beryllium: Metal including alloys, all forms ... do	--	119	119	
Bismuth: Metal including alloys, all forms	80	632	632	
Cadmium: Metal including alloys, all forms ... kilograms	28	85	85	
Chromium: Ore and concentrate	32,868	52,714	32,958	Panama 11,009; Sudan 4,358.
Cobalt: Metal including alloys, all forms	84	117	55	Belgium-Luxembourg 50; Zaire 4.
Copper: Metal including alloys, all forms	19,933	49,654	49,320	Belgium-Luxembourg 217; Panama 60.
Iron and steel:				
Iron ore and concentrate	160	131	53	Chile 74; West Germany 3.
Metal:				
Scrap	616,693	631,182	625,957	Cuba 2,674; West Germany 1,994.
Pig iron, cast iron, related materials	3,988	9,250	5,380	Brazil 2,468; Canada 1,254.
Steel, primary forms	71,060	258,357	13,881	France 146,577; West Germany 96,322.
Semimanufactures:				
Bars, rods, angles, shapes, sections	20,009	3,693	2,922	Brazil 485; Japan 131.
Rails and accessories	29,512	75,522	66,225	Cuba 9,297.
Lead: Metal including alloys:				
Scrap	249	1,204	1,203	NA.
Unwrought	6	46	46	
Unspecified	2	(2)	(2)	
Magnesium: Metal including alloys, all forms	2,040	1,552	1,403	West Germany 50; Panama 41.
Manganese: Ore and concentrate	155,418	141,803	8,088	Panama 132,873; Australia 842.
Mercury ... 76-pound flasks	1	1	1	
Molybdenum:				
Ore and concentrate	(2)	72	64	West Germany 8.
Metal includng alloys:				
Unwrought	(2)	2	2	
Unspecified	1	2	(2)	West Germany 1; United Kingdom 1.
Nickel:				
Matte and speiss	1,227	2,088	1,424	Canada 457; Cuba 191.
Metal including alloys, semimanufactures	70	111	62	Switzerland 21; France 17.
Platinum-group metals: Metals including alloys, unwrought and partly wrought:				
Palladium ... troy ounces	1,061	2,218	643	Switzerland 1,575.
Platinum ... do	81	161	64	Switzerland 97.
Unspecified ... do	424	54	45	Egypt 9.
Selenium, elemental	10	(2)	(2)	
Tin:				
Ore and concentrate	1,974	3,553	2,499	Peru 837; Singapore 159.
Metal including alloys:				
Scrap	270	453	453	
Unwrought	463	73	73	
Titanium: Ore and concentrate	76,157	95,518	--	Australia 95,517; Sweden 1.
Tungsten: Metal including alloys, all forms	11	59	57	West Germany 1; Singapore 1.
Zinc:				
Blue powder	119	397	377	Belgium-Luxembourg 20.
Metal including alloys:				
Scrap	6	3	3	
Unwrought	--	28	28	
Zirconium: Ore and concentrate	6,114	4,749	4,392	Australia 278; Spain 73.

See footnotes at end of table.

Table 3.—Mexico: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983[r]	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS				
Abrasives, n.e.s.: Natural: Corundum, emery, pumice, etc	756	829	534	Brazil 210; West Germany 84.
Asbestos, crude	32,862	53,567	15,188	Canada 28,935; United Kingdom 6,663.
Barite and witherite	90,251	34	28	West Germany 3; Switzerland 3.
Boron materials: Crude natural borates	538	1,582	1,564	Argentina 18.
Clays, crude:				
Bentonite	406	496	491	United Kingdom 5.
Kaolin	64,146	84,162	83,179	United Kingdom 784; Spain 150.
Unspecified	99,254	142,586	141,155	France 899; West Germany 421.
Cryolite and chiolite	47	90	2	Denmark 82; West Germany 6.
Diatomite and other infusorial earth	368	190	189	West Germany 1.
Feldspar, fluorspar, related materials	2,014	960	847	Canada 96; Spain 14.
Graphite, natural	196	14	10	Switzerland 3; West Germany 1.
Gypsum and plaster	5,897	12,830	12,830	
Magnesium compounds: Magnesite	3	4	2	West Germany 1; Switzerland 1.
Mica:				
Crude including splittings and waste	47	162	157	West Germany 3; Belgium-Luxembourg 1.
Worked including agglomerated splittings	15	1	1	
Phosphates, crude thousand tons	1,115	1,251	381	Morocco 841; Togo 29.
Potassium salts, crude	158,685	215,332	70,129	West Germany 68,938; Israel 31,500.
Precious and semiprecious stones other than diamond: Natural kilograms	38	322	304	West Germany 18.
Quartz crystal, piezoelectric do	10	228	228	
Salt and brine	456	572	571	West Germany 1.
Stone, sand and gravel:				
Dimension stone, crude and partly worked	329	59	3	Guatemala 56.
Calcite, common	1,309	1,298	1,256	Italy 34; Netherlands 5.
Dolomite, chiefly refractory-grade	170	89	89	
Quartz and quartzite	637	1,017	652	Sweden 282; Spain 71.
Sand other than metal-bearing	71,116	86,918	86,756	West Germany 89; Ghana 28.
Sand and gravel	2,319	2,858	2,858	
Sulfur: Elemental:				
Crude including native and byproduct	324	493	493	
Colloidal, precipitated, sublimed	179	361	360	West Germany 1.
Talc, steatite, soapstone, pyrophyllite	75,546	102,654	101,471	Italy 650; Republic of Korea 201.
Vermiculite	447	98	98	
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	412	631	631	
Carbon black	191	43	43	
Coal:				
Lignite including briquets	5,372	6,061	6,058	United Kingdom 3.
All grades including briquets	272,869	366,315	16,357	Colombia 171,794; Canada 164,051.
Coke and semicoke	52,533	79,752	52,967	Panama 26,785.
Gas, natural: Gaseous million cubic feet	1,716	1,862	1,786	NA.
Peat including briquets and litter	257	164	143	Canada 21.
Petroleum refinery products:				
Liquefied petroleum gas thousand 42-gallon barrels	3,793	10,426	8,178	NA.
Gasoline, motor do	46	39	NA	NA.
Mineral jelly and wax do	58	45	NA	NA.
Kerosene and jet fuel do	385	445	NA	NA.
Lubricants do	2,059	1,122	725	NA.
Residual fuel oil do	--	3	NA	NA.
Petroleum coke do	278	316	233	United Kingdom 83.

[r]Revised. NA Not available.
[1]Table prepared by H. D. Willis.
[2]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Aluminum.—El Instituto Mexicano del Aluminio A.C. reported that Mexico's total aluminum consumption increased from 117,500 tons in 1984 to just under 150,000 tons in 1985. The difference between this figure and the 75,000 tons supplied from primary and secondary sources was imported.

It was reported that domestic producers of aluminum production were concerned that Mexico's proposed entry into GATT would create problems of foreign competition. Increased costs of local energy and foreign material inputs have forced a notable increase in the cost of aluminum from $2.40 per kilogram in 1980 to about $3.53 per kilogram in 1985.

Mexico's only producer of ingot aluminum from imported alumina, Aluminio S.A. de C.V., continued its expansion project at its plant in Veracruz to increase capacity from 44,000 to 94,000 tons per year by yearend 1987.

Copper.—The major event relating to copper was the virtual completion of Mexico's new 230,000-ton-per-year smelter associated with La Caridad surface mine in Sonora State, 23 kilometers north of Nacozari de García, a town of 20,000 people. Startup was scheduled for the first quarter of 1986. The new smelter will employ 650 permanent personnel and is northwest of the concentrator plant and the surface mine. A rail link is provided to permit rail shipment of blister (anode) copper from the smelter to points north across the U.S. border and south to the Port of Guaymas on the Pacific Ocean where the operator, Mexicana de Cobre, plans to construct a copper refinery. La Caridad smelter has a capacity to treat 600,000 tons of copper concentrate per year. Since the La Caridad concentrator output capacity is 450,000 tons of concentrate, the balance of 150,000 tons in installed smelter capacity would be available to handle non-Mexican concentrate on a toll charge basis as well as concentrate from Cananea.

The availability of La Caridad's new smelter capacity of 230,000 tons per year will give Mexico a total smelter capacity to produce anode copper of about 340,000 tons, which is above the requirements of the country's only copper refinery operated by Cobre de México S.A. at Mexico City with an expanded capacity of 150,000 tons per year of refined copper. Since a minor part of La Caridad's smelter output, 70,000 tons, will be allocated for the domestic market, the balance of anode copper would be available for export.

La Caridad smelter cost almost $333 million and will in 1986 be another element in Mexicana de Cobre's original scheme to construct a fully integrated copper complex. The mine, crushing plant, and concentrator were inaugurated in 1979. Then followed the lime and molybdenum plants started up in 1980 and 1982, respectively. Construction of the $45 million sulfuric acid plant to control air pollution in the U.S.-Mexican border areas was scheduled to begin in mid-1986 and be ready in late 1987. The proposed copper refinery to be constructed at Guaymas continued to be postponed for financial reasons. During the year, the ore flotation plant of La Caridad's concentrator was expanded from 72,000 to 90,000 tons per day by installation of larger flotation cells.

Mexico's second most important copper producer after Mexicana de Cobre was Cananea, also situated in northern Sonora, northwest of La Caridad and close to the Arizona border. Cananea continued its major expansion program involving increased capacities of its mine, concentrator, smelter, and electrowinning facilities. The 50,000-ton-per-day flotation plant was planned for startup by yearend 1986, and by yearend 1985, the first line of flotation cells was tested. Construction of the new electrowinning plant was 20% completed and expected to be in operation in early 1987. This new plant will have an annual capacity of 20,000 tons of cathode copper. Cananea operates the only electrowinning facility in Mexico.

Data available from CRM for 1984 show that La Caridad and Cananea accounted for 90% of Mexico's total mine output of copper. La Caridad in 1985 produced 584,000 tons of concentrate with 32% copper content yielding about 187,000 tons of copper. Cananea produced 37,570 tons of blister copper and 8,034 tons of cathode copper from the old electrowinning plant. Both La Caridad and Cananea produced gold and silver as byproducts. Together in 1984, they produced 8% of Mexico's total gold output and 7% of its silver output.

Mexico's consumption of copper increased by 33% from 87,300 tons in 1984 to 116,300 tons in 1985. Imports of electrolytic copper more than doubled to 55,200 tons.

Gold.—Output of gold continued its upward trend after the low point of 1973 when only 133,000 troy ounces was produced. Refined gold output increased by 12% in 1985 relative to that of 1984. But mine output at the estimated level of 297,000 troy ounces was considerably below the historic high of 921,000 ounces mined in 1938.

Gold was mined in 150 municipalities in 21 of Mexico's 31 States; however, the States of Guanajuato, Durango, Sonora, Zacatecas, and Chihuahua, in order of importance, accounted in 1984 for 80% of national output. The 10 mining companies that are notable gold producers are listed in table 4. Fresnillo and Cía. Minera del Cubo S.A. each increased output by 26% over that of 1984, while Peñoles increased output by 73% over that of 1984. The major part of Fresnillo's output came from three subsidiary companies in the Guanajuato Group that control the mines of Cebada, Cedros, Las Torres, Peregrina, and Bolanitos in the Guanajuato District—famous for gold and silver since colonial times. Minera del Cubo is also in this district.

Table 4.—Mexico: Principal gold producing companies

(Troy ounces)

Company	1984	1985
Cía. Fresnillo S.A. de C.V.	44,360	55,740
Minas de San Luis S.A. de C.V.[1]	42,860	41,470
Cía. Minera del Cubo S.A.	29,700	37,260
Cía. Real del Monte y Pachuca S.A.[2]	12,540	13,940
Industrial Minera México S.A.[3]	11,280	9,680
Mexicana de Cobre S.A. (La Caridad)	9,450	7,880
Sociedad Cooperativa Minero-Metalúrgica Sta. Fe de Guanajuato S.C.L.	7,010	7,450
Cía. Minera de Cananea S.A	6,240	6,370
Empresas Frisco S.A. de C.V	4,050	3,550
Minas Peñoles S.A. de C.V.[4]	1,220	2,100
Other	102,288	[e]111,560
Total	270,998	[e]297,000

[e]Estimated.
[1]Subsidiary of Grupo Sanluis, formerly Cía. Minera MSL S.A. de C.V.
[2]Subsidiary of Comisión de Fomento Minero.
[3]Subsidiary of Grupo Industrial Minera México S.A. de C.V., 34% owned by ASARCO Incorporated through México, Desarrallo Industrial Minero S.A.
[4]A subsidiary mining company, 100% owned by Peñoles, which excludes output of the Fresnillo Group.

It should be noted that production of refined gold by Peñoles and IMMSA at their processing plants was, respectively, 143,780 and 61,250 troy ounces, considerably above the gold output of their own mines.

One of Mexico's oldest mining companies with beginnings in the colonial period, Real del Monte y Pachuca, announced the shutdown of five unproductive gold-silver mines in the Real del Monte y Pachuca District of Hidalgo State. La Rica and San Juan Mines of the company will remain in operation. The overall financial situation of the company was under close review by the Government.

CRM continued to explore the El Barqueño gold deposit in Jalisco State. About 3 million tons of ore with an average grade of 4 grams per ton have been blocked out to date from exploration efforts. Exploration of the entire mineralized area may require 3 more years. Meanwhile, a decision was made to install a heap leaching facility at the mine with a capacity of 100 tons per day. The Government made plans to transfer control of El Barqueño operations from CRM to CFM, another leading Federal agency in the mineral sector.

Practically all of Mexico's gold output is consumed domestically; marketing is controlled by the Banco de México. The only gold exported is that combined in concentrates of copper, lead, and zinc, which are exported by private companies.

Iron Ore.—The small decrease in iron ore production was in line with the reduced level of iron and steel output during 1985. The six major iron ore producers had mixed results. The 53% decline in the Siderúrgica Lázaro Cárdenas-Las Truchas S.A. (SICARTSA) operations from 4.4 million tons in 1984 to 2.1 million tons of run-of-mine ore in 1985 was caused by financial and technical problems. This drop was compensated in part by large increases in output at the La Perla and Hércules Mines in Coahuila. The Hércules Mine, operated by Fundidora de Monterrey S.A. had the benefit of its new concentrator, which went on-stream before yearend, providing for a 120% increase over that of 1984 in iron ore output to 924,000 tons. Mexico's total mine output of almost 8 million tons was well below its estimated mine capacity of 15.5 million tons.

Production of iron ore pellets was mostly lower for Mexico's pellet plants with the exception of the 40% increase over that of 1984 by the new 3-million-ton-per-year pellet plant at Monclova as detailed in the following table, in tons:

Plant and location	1984	1985
Peña Colorada, Colima	2,513,000	2,468,000
Hylsa, Monterrey	1,365,000	1,283,000
Sicartsa, Michoacán	1,510,000	1,080,000
Monclova, Coahuila	635,000	892,000
Fundidora, Monterrey	784,000	703,000
La Perla, Coahuila	293,000	173,000
Total	7,100,000	6,599,000

The Monclova pellet plant received its ore via a 382-kilometer slurry pipeline inaugurated in June 1983 from La Perla and Hércules Mines. Mexico's pellet capacity at yearend was 11.6 million tons.

Iron and Steel.—Relative to that of 1984, Mexico's small decline in crude steel output was contrary to the average trend in the entire Latin American region where steel output in 1985 increased 7% over that of 1984, primarily because of Brazil's increase in steel production to almost 21 million tons. Mexico's three Government-owned steel companies, grouped under the holding company Siderúrgica Mexicana (SIDERMEX), accounted for 57% of the country's output, while private companies accounted for 43% of the total. The five Government and private integrated steel plants produced 6.1 million tons or 83% of the total; the large number of semi-integrated plants produced 1.2 million tons. Utilization of installed steel capacity was 65% compared with 68% in 1984.

Mexico's reduced output in 1985 was mostly due to lower output by SIDERMEX. This was caused by the shutdown of the blast furnace for maintenance and subsequent labor problems of SIDERMEX's third and newest subsidiary steel company, SICARTSA in Michoacán. Production of steel products or semimanufactures was also slightly lower, but especially seamless tubes, which decreased 9% to 297,000 tons compared with the record high of 326,000 tons in 1984.

In line with the economy's positive growth in 1985, apparent steel consumption increased to 7.9 million tons, but was well below the record high of 12.5 million tons in 1981 when the Mexican economy grew strongly at the rate of 8%. The lower consumption level required steel imports of only 564,000 tons compared with 3,100,000 tons imported in 1981. Steel exports dropped sharply from 913,000 tons in 1984 to 437,000 tons in 1985, caused in part by the steel-export-restraint accord signed with the United States in December 1984.

The steel industry was seriously affected by the Government's rigid price control that allowed product price increases of 37% over that of 1984 when the general rate of inflation was 63% over the previous year. Profits in this sector were reduced by this cost inflation. It was reported that one of the five integrated plants, Tubos de Acero de México S.A. (TAMSA), had a 28% drop in profits from that of 1984 as profit margins decreased from 10.7% in 1984 to 5.9% in 1985. TAMSA was Mexico's largest manufacturer of seamless tubes. Employment in the steel sector fell to 84,700 persons, compared with the record-high level of almost 90,000 in 1984. Reduced employment was caused chiefly by the suspension of several expansion projects as required by the Government's austerity program.

Ferroalloys.—Production and exports of ferroalloys decreased, reflecting reduced steel output in Mexico as well as the United States, an important market. Ferroalloy exports fell to 13,000 tons compared with 57,000 tons in 1984 and 73,000 tons in 1983—the historic high for Mexico.

In response to a contraction of demand, Minera Autlán, the largest single producer of ferroalloys in Latin America, reported a 12% drop in output to 143,600 tons representing 62% of Mexico's total output. Minera Autlán had reduced output at its Teziutlán plant in Veracruz as well as its Tamos plant in Puebla, which suffered equipment failure and a serious accident. Minera

Autlán's varied ferroalloy output was dominated by high- and medium-carbon ferromanganese derived from its manganese ore mined in the Molango District in Hidalgo State.

The second largest ferroalloy producer, Ferroaleaciones de México S.A. (FERROALMEX), in Gómez Palacios, Durango State, rebounded from the depressed level of 1983, increasing output by 26% over that of 1984 to a record high for the company of 29,140 tons. Like Minera Autlán, FERROALMEX produced chiefly ferromanganese, but in addition produced ferrovanadium and ferromolybdenum, which are not produced by Minera Autlán. On the other hand, Minera Autlán produced ferrochromium not produced by FERROALMEX. Ferroalloy capacity of FERROALMEX was 35,000 tons per year. It is owned 66.7% by SIDERMEX and 33.3% by International Minerals Corp. of the United States.

Lead and Zinc.—The great majority of mines in Mexico, which are important for silver, also produce lead and zinc as coproducts or byproducts with small quantities of gold. The notable increase in lead and zinc output in Mexico over the last 5 years was a direct result of the substantial increase in silver output that between 1981 and 1984 increased 42%. In 1985, the financial performance of these mines was affected by lower world prices for gold, lead, silver, and zinc. Low prices forced Peñoles to abandon the mining of some low-grade zinc and lead deposits in the Fresnillo Mine in Zacatecas and to close the Gochico unit until prices recover.

Although IMMSA was second as a silver producer, it continued as the leading mine producer of lead and zinc with output, respectively, of 58,400 and 144,650 tons in 1985. IMMSA's new zinc refinery at San Luis de Potosí operated at 80% capacity during its third full year of operation. IMMSA's production of refined zinc decreased from 82,100 tons in 1984 to 74,400 tons in 1985. On the other hand, Peñoles' refined zinc output for the same period increased from 76,500 to 85,300 tons. Production costs at Mexico's two electrolytic refineries were becoming less competitive because of increased domestic electricity rates. Frisco reported for 1985 a 24% increase in lead output to 37,800 tons and a 37% increase in zinc output to 30,600 tons—all relative to 1984 output.

Regarding new facilities, IMMSA completed construction of its new beneficiation plant at its Charcas unit in San Luis Potosí, which increased capacity from 1,250 to 3,450 tons per day of concentrate. Startup of the new plant was in December. IMMSA's entirely new mining unit at Rosario, Sinaloa State, was practically completed by yearend and scheduled for startup in early 1986. The Rosario unit will process 600 tons per day of ore to produce concentrates of lead-silver and zinc-silver.

Manganese.—Minera Autlán, with mining operations in the Molango District, continued as Mexico's leading producer of manganese ore and ferroalloys. Minera Autlán's operating results were affected by controlled domestic prices, lower international prices, and a contraction of demand both domestic and worldwide. Relative to that of 1984, Minera Autlán's mine output of manganese carbonate ore decreased by 6% to 608,000 tons, while production of manganese nodules decreased by 22% to 337,400 tons. The nodule furnace at Ayotetla, Hidalgo, near the mine had an annual capacity of 525,000 tons. During the year, the concentration plant for fine ore was completed with an annual capacity of 96,000 tons. This new plant will enable the company to optimize its ore reserves. In 1985, total sales of manganese nodules decreased by 17% to 348,300 tons. Exports, in order of importance, went mostly to the United States, Japan, France, the Federal Republic of Germany, Singapore, Norway, Canada, and Venezuela. The nodules were trucked to La Barra, Cuidad Madero Port, Tamaulipas State, for export.

Minera Autlán Nonoalco unit, which produces battery-grade ore, increased output from the Cerro Prieto surface mine by 58% to 30,300 tons, compared with that of 1984. This major increase is attributed to the startup of concentration plant No. 2. Minera Autlán continued research on its diversification projects to produce annually 6,000 tons of electrolytic manganese dioxide and 20,000 tons of manganese sulfate.

Proven reserves of manganese carbonate ore was reported by Minera Autlán at the corrected level of 31 million tons, adequate for 26 years of operation at current production levels.

Molybdenum.—After remarkable growth from 1980 to 1983, output of molybdenum concentrate again decreased. The two major molybdenum producers operated in Sonora State and accounted for 87% of national output. The balance was supplied mostly from small miners in Sonora.

Mexicana de Cobre produced molybdenum concentrate as a byproduct from its La Caridad copper operations with a 58% metallic content providing 2,388 tons of molybdenum. This was a considerable reduction from the 4,600 tons produced in 1983. The other important producer, Minera Cumobabi S.A. de C.V., a subsidiary of Frisco, reported an output of 874 tons, compared with 1,182 tons in 1984, at its San Judas surface mine. Frisco's reported average sales price was $4.17 per pound, down from $4.35 in 1984.

Silver.—Most of the large silver producers reported lower mine output except Minera Real de Ángeles from its Real de Ángeles surface mine in Zacatecas. Fresnillo and IMMSA reported decreases of 11% and 8%, respectively, while Real de Ángeles reported a sizable increase of 22% following a 16% increase in 1984. The notable achievement by Real de Ángeles in its third full year of operation was the result of a greater volume of ore mined, high average grade of ore crushed, and improved rate of recuperation in its processing plant. The company thus doubled its net profit at a time when most Mexican mining companies reported lower net profits. Real de Ángeles has become Mexico's third ranking silver producer, as shown in table 5. Its output has made Zacatecas Mexico's leading producing State and Noria de Ángeles as the leading municipality in the country, ahead of Fresnillo and Sombrerete, both well-established historic silver areas also in Zacatecas. This State thus accounted for 26% of national silver output.

Table 5.—Mexico: Principal silver producing companies

(Thousand troy ounces)

Company	1984	1985
Cía. Fresnillo S.A. de C.V.	14,855	13,229
Industrial Minera México S.A.[1]	14,151	13,022
Minera Real de Ángeles S.A. de C.V	9,349	11,417
Minas Peñoles S.A. de C.V.[2]	5,020	5,419
Empresas Frisco S.A. de C.V	3,825	3,705
Minas de San Luis S.A. de C.V.[3]	2,787	2,684
Cía. Real del Monte y Pachuca S.A	2,412	2,440
Mexicana de Cobre S.A	1,658	1,312
Sociedad Cooperativa Minero-Metalúrgica Sta. Fe de Guanajuato S.C.L.	798	880
Cía. Minera del Cubo S.A.	503	601
Cía. Minera de Cananea S.A	511	468
Other	19,471	[e]13,823
Total	75,340	[e]69,000

[e]Estimated.
[1]Subsidiary of Grupo Industrial Minera México S.A. de C.V., 34% owned by ASARCO Incorporated through México, Desarrallo Industrial Minero S.A.
[2]Excludes output of the Fresnillo Group.
[3]Subsidiary of Grupo Sanluis, formerly Cía. Minera MSL S.A. de C.V.

In 1985, Minas de San Luis S.A. began its $12 million modernization project at its Tayoltita Mine in Durango. Its refinery, with a rated capacity of 5 million ounces, produced doré with a metal content of 2.68 million troy ounces of silver and 41,500 ounces of gold. The company's lower silver and gold output was due to the closing of La Libertad Mine in February, because ore grades mined were uneconomical. At its new San Antonio project, 600,000 tons of ore were blocked out with average grades per ton of 8.9 grams of gold and 324 grams of silver. Construction of the beneficiation plant was planned to begin in April 1986 for startup during 1987. The San Antonio project was expected to increase the company's output of silver by 38% and gold by 65%.

Silver refining in Mexico was primarily in the hands of Peñoles and IMMSA. This output is based on concentrates produced by their own mines as well as ore and concentrates from small and medium miners operating in their respective mine areas. In 1985, Peñoles' output of refined siiver, amounting to 41.3 million troy ounces, decreased slightly from that of 1984, while IMMSA's refined output increased almost 7% above that of 1984 to 21.7 million ounces.

Mexico's total estimated mine output

represented about 15% of world silver output of 452 million ounces from mines and secondary sources. This compares with the 18% share in 1984 when world output was 430 million ounces.

Since the average price for silver was $6.14 an ounce, 25% lower than the 1984 average price of $8.14, Mexico's earnings from silver exports decreased from $338 million in 1984 to $300 million in 1985. Detailed data available from CRM for 1984 show that 74% of Mexico's silver production was exported, of which 70% went to the United States, followed, in order of importance, by Japan and Switzerland. Mexico continued minting the new 1-ounce, 0.99-fine "Libertad" silver coin for the foreign investor market.

Fresnillo temporarily abandoned sections of mine operations at its Fresnillo Mine in Zacatecas where veins had low silver grades. Mining of high-grade silver ore was expected to become intensified during 1986 because of low silver prices. The Fresnillo Mine has about 3.5 million tons of ore grading 400 grams of silver per ton with up to 700 grams per ton in some mine sections. Such high ore grades provide for low mining costs reportedly estimated at $1.20 per ounce. At the Fresnillo beneficiation plant, 4.35 million ounces of silver, 2,700 tons of lead, 2,800 tons of zinc, and small quantities of copper and gold were recovered. At Fresnillo's Las Torres flotation plant in Guanajuato, 3.79 million ounces of silver and 48,515 ounces of gold were recovered.

IMMSA's San Martín unit near Sombrerete in Zacatecas operated an underground mine with the most advanced mining techniques and equipment. Operations reached the 14th level, 547 meters below surface. By yearend, its recently expanded flotation plant operated at 75% of its rated ore treatment capacity of 6,800 tons per day. Ore reserves at the San Martín Mine are estimated at 22 million tons with an average grade of 120 grams of silver per ton and 0.5% lead, 5.0% zinc, and 1% copper. In some mine areas, the silver grade increased to 200 grams per ton.

Peñoles continued development of its new mine at Sultepec, México State. By yearend, construction of the flotation and cyanidation plants was completed. Operations will be initiated in early 1986 with a capacity to produce 932,400 ounces of silver as well as some gold, lead, and zinc.

INDUSTRIAL MINERALS

Barite.—Production of barium sulfate continued its upward trend and set another record high. As a result of the exploitation of new barite deposits, Mexico has become the fourth ranking world producer after China, the U.S.S.R., and the United States and the leader in the Latin American region. Barite produced in the districts of Sahuaripa, Sonora; Coalcomán, Michoacán; Galeana, Nuevo León, and Gómez Farías, Coahuila, accounted for 76% of national output in 1985. The balance came from numerous small mines throughout México. The leading barite producer, situated in the Sahuaripa District, was Barita de Sonora S.A. (controlled by FNMM), which increased its output to 109,400 tons. By contrast, the second-ranked producer, Minera Capela S.A. de C.V. in the Coalcomán District, had an output of 94,300 tons, which was 21% below that of 1984. The parent company, Peñoles, reported that Minera Capela's La Minita Mine operated at only about 50% capacity because of the reduced drilling activity of PEMEX. La Minita's flotation plant also produced lead and zinc concentrates having silver values totaling 678,900 ounces.

Clays (Bentonite).—Mexico was the leading producer in Latin America and ranked fifth worldwide after the United States, Greece, Japan, and Italy. Mexico produced three types of bentonite. One type, with high swelling properties used by PEMEX for drilling purposes, is produced by five bentonite operators in the Nazas area, Durango. They reported production of 153,000 tons for 1985, a 53% increase over that of 1984. Two medium-size operators in Puebla produced a total of 55,000 tons of the second type, sodium bentonite, to fabricate raw materials for decoloring, filtering, and other purposes. Of that amount, Química Sumex S.A. de C.V. produced 35,000 tons and exported about 65% of its 1985 production. Minerales La Cruz del Sur S.A. produced about 20,000 tons of the third type of bentonite, which is suitable for casting operations in the foundry industry.

Fluorspar.—In Mexico, a group of eight important fluorspar producers was dominated by Cía. Minera Las Cuevas S.A., which operated the world's largest fluorspar mine in Zaragoza, San Luis Potosí. Las Cuevas was owned 51% by private Mexican investors and 49% by Noranda Inc. of Canada. Output from Las Cuevas increased sharply from 178,700 tons in 1984 to 328,000 in 1985 but was still below its capacity of 450,000 tons per year. Las Cuevas produced three of the four grades marketed—mostly acid- and metallurgical-grade with smaller amounts of ceramic-grade fluorspar. Las Cuevas reserves were estimated at 12 million tons with an average grade of 70% calcium fluoride. The National Association of Medium and Small Fluorspar Producers, mostly operating in northern Coahuila, was the only producer of submetallurgical-grade fluorspar. Because of competition from the Republic of South Africa, total fluorspar exports decreased slightly to 532,000 tons, of which 266,000 tons went to the United States. Domestic sales fell by 22% from that of 1984 to 220,000 tons, reflecting in part reduced activity in the steel industry.

To benefit from value added to its raw material output, Mexico has been increasing its capacity to produce hydrofluoric acid. By yearend, four plants were operating in Mexico supplying 67,100 tons of hydrofluoric acid. The dominant producer, Química Fluor S.A. in Matamoros, Tamaulipas, across the Texas border, produced 45,400 tons.

Magnesium Compounds.—Peñoles reported a record high in its output of magnesia (magnesium oxide) of 121,700 tons from its two chemical plants in Laguna del Rey, Coahuila, and Ciudad Madero, Tamaulipas. As a result of its research efforts, Peñoles obtained a product of high chemical purity with greater density that gained new export markets at higher prices over the standard product.

Salt.—Exportadora de Sal S.A. de C.V. (ESSA), the largest salt producer-exporter in the world, produced 5 million tons in 1985, an increase of almost 8% compared with that of 1984. ESSA is 50% owned by CFM and 50% by Mitsubishi Corp. of Japan. Salt production for domestic consumption was maintained at 1 million tons, the same level as that of 1984. Salt production value in 1985 increased 10% compared with that of 1984. ESSA's salt was produced by natural evaporation process in Baja California Sur. The salt is barged to Cedros Island for overseas shipments. During 1985, the United States imported about 30% of Mexican salt exports, and the balance was shipped principally to Japan and Canada. ESSA continued research to produce industrial salt byproducts.

Sodium Compounds.—Mexico's dominant producer of natural sodium sulfate, Peñoles, reported a drop in output to 364,100 tons. Exports of sodium sulfate to traditional markets continued at a low level, including those to the United States where new detergent formulations have been introduced.

Sulfur.—The total value of sulfur output increased 20% because of increased quantity and an improvement in world prices. In 1984, Mexico exported 80% of its sulfur output. Imports of sulfur from Mexico by the United States in 1985 decreased sharply to 724,000 tons valued at about $86 million. Mexico was the leading sulfur producer in the Latin American region and was in fifth place as a world producer.

Elemental sulfur was obtained by the Frasch process from four salt domes: Coachapa, Jáltipan, Petapa, and Texistepec in the Isthmus of Tehuantepec. The Frasch sulfur was produced by two companies with the majority of the equity held by Government entities. Cía. Exploradora del Istmo S.A. (CEDI) operated the Texistepec Mine, the largest sulfur producer. Azufrera Panamericana S.A. (APSA) controlled Frasch production from the Coachapa, Jáltipan, and Petapa domes. APSA initiated production from the Petapa dome in 1985. Increased production from Petapa was expected to compensate for diminishing output from Jáltipan, Mexico's second largest Frasch producer. APSA continued the feasibility study of its Otapán Mine. In 1985, APSA accounted for 868,275 tons of the Frasch sulfur produced, while CEDI accounted for 682,528 tons. APSA is 100% owned by the Government, while CEDI is 64% owned by the Government and 36% by Texasgulf Inc., acquired by Elf Aquitaine S.A. in 1981. The Government interest in both companies is controlled by CFM.

Increased amounts of sulfur was recovered by PEMEX from its oil and gas operations. Sulfur in the form of sulfuric acid was recovered by Peñoles from its metallurgical plants in Coahuila, 280,000 tons, and by IMMSA from its new zinc refinery in San Luis Potosí, 96,000 tons. Sulfur will also be recovered at La Caridad's new copper smelter in Sonora when the sulfuric acid plant becomes operational in late 1986 or early 1987.

MINERAL FUELS

Coal.—The three Government agencies responsible for coal exploration and development, CRM, CFM, and MICARE, were involved in a geological and economic feasibility study of a coal deposit in the northern State of Coahuila, the source of practically all of Mexico's current production of metallurgical and steam coal. Mexico's coal potential was estimated at 5 billion tons,[5] of which 2.3 billion tons is considered proven reserves, most of which is in Coahuila. Other coal exploration was being carried out in the States of Chihuahua, Nuevo León, and Sonora, in the north, and Oaxaca in the south.

The Government was planning to increase the share of coal-based electric power from 3% at present to 10% by the year 2000, requiring the increase of coal-based plant capacity from 600 to 5,500 megawatts. In 1985, Mexico's total installed generating capacity was increased to 19,980 megawatts based mostly in oil- and gas-fired plants, 62%, and hydropower, 31%. To diversify its coal sources, Mexico joined Brazil in talks with Colombia on a proposal to form a three-nation company to develop Colombia's large coal reserves—the largest in Latin America, estimated at 17 billion tons, of which 3.9 billion are proven reserves.

Reduction in output of metallurgical coal in 1985 resulted from decreased output by the SIDERMEX steel companies, which operated their own coal subsidiaries, chiefly Minerales Monclova S.A. and Cía. Minera la Florida de Múzquiz S.A. in Coahuila; and a 23% drop from 1984 levels by IMMSA, operating in the Nueva Rosita area, Coahuila. IMMSA was the only private mineral company producing significant amounts of coking coal, IMMSA operated two underground mines and a surface mine through its subsidiary Carbonífera de México S.A. The new 480,000-ton-per-year underground mine, Pasta de Conchos, in its first phase of development, had a lower output than planned and was responsible for IMMSA's drop in production to 580,000 tons, almost one-half of its 1979 output. IMMSA also operated coal washing and coking plants in Coahuila. IMMSA's coke output was 179,300 tons.

The most important investment in coal was the $6.4 million investment by SIDERMEX to development the Mimosa IV and Mimosa V Mines in Coahuila.

Mexicc's coal consumption was 9.2 million tons, of which 472,000 tons had to be imported, primarily coking coal. The 366,000 tons imported in 1984 came chiefly from Colombia and Canada.

Natural Gas.—Production of natural gas continued its declining trend since the record high in 1982. Gross natural gas output averaged 3,604 million cubic feet per day in 1985, 4% less than that of 1984 when output also dropped by 7.2% below 1983 levels. Output of natural gas associated with crude oil was 84% of the national total compared with the 79% share in 1983. The Huimanguillo area in the Southeastern Zone (comprising mostly the Chiapas-Tabasco Mesozoic Basin) contributed the major part, 41%, of total gas output. Mexico's proven gas reserves predominate in almost equal amounts in the zones of Chicontepec and the Southeastern. Domestic demand for gas from the industrial and electrical generating sectors and from PEMEX proper decreased slightly.

Natural gas was distributed by a subsidiary company, Distribuidora de Gas Natural del Estado de México S.A. (DIGANAMEX), owned 51% by PEMEX and 49% by the Federal Government. DIGANAMEX increased its gas consumers by 6,800 to 110,400. The amount of flared gas was 7.7% of the total compared with the 19% share in 1982.

Petroleum.—Production of crude oil in 1985 averaged 2.63 million barrels per day (bbl/d), slightly lower than that of 1984. Mexico exported 55% of its crude oil output at a rate of 1.44 million bbl/d, below the record-high rate established in 1983 of 1.54 million bbl/d. Exports of petroleum products, chiefly unfinished crude oil, fuel oil, and gasoline, were at the rate of 135,400 bbl/d.

Crude oil was supplied mostly by wells in the Marine Zone in the Bay of Campeche, 65%, and by wells in the Southeastern Zone at Villahermosa, 28%. Of 21 countries receiving Mexican crude oil, 5 were the dominant markets: the United States, 52.2%; Spain, 12.6%; Japan, 11.0%; France, 5.9%; and the United Kingdom, 4.6%. The United States was also the major market for Mexico's surplus of petroleum products.

In August, Mexico and Venezuela agreed to continue for the sixth year the San José Agreement regarding oil shipments on a favorable basis to countries of Central America and to the Caribbean. Exports were comprised of 42% Isthmus light crude and 58% Maya heavy crude, a proportion similar to that of 1984.

Mexico continued its oil policy in force since 1982 of limiting crude oil exports to 1.5 million bbl/d and using posted prices with oil sold only on long-term contracts rather than dealing with the spot market. To obtain a diversified market, no single country was to receive more than 50% of total crude exports. Although not a formal member of the Organization of Petroleum Exporting Countries (OPEC), Mexico took care to cooperate with other oil producing countries to achieve price stability in world markets. However, in February, Mexico lowered its price for light crude to $27.75 per barrel by an amount greater than OPEC's price change for its benchmark crude. For the first time in recent history, Mexico led the world in dropping prices and established a three-market pricing system with different prices for its U.S., West European, and Asian markets. The intent was to make Mexican oil more attractive by eliminating the transportation cost differential.

Mexico suffered from a significant downward trend in oil prices because of lower demand and a worldwide oversupply situation. Isthmus light crude, for example, decreased in price from $29.00 per barrel in January in the U.S. market to $25.85 in December. In early 1981, Isthmus light had been $38.50 per barrel. Mexico's crude oil production costs were reportedly estimated at $7.70 per barrel.

PEMEX operated nine refinery centers with a nominal capacity of 1.8 million bbl/d, the largest of which are at Cadereyta, Nuevo León; Salamanca, Guanajuato; and Minatitlán, Veracruz. This capacity covers treatment of crude oil, 1.35 million bbl/d, and the balance for fractioning natural gasoline. The amount and variety of petroleum products produced was sufficient to meet domestic demand and provide surpluses for export. Petroleum imports were comprised mostly of liquid gas (63%), fuel oil, and lubricants.

Exploration activities were focused on the promising areas in the Gulf of Mexico and the Gulf of California. To carry out its exploration program, PEMEX operated 92 drilling units, which had 69 completed wells with a 41% success ratio. Exploration activity, however, did not result in any significant new discoveries to compensate for the amount of hydrocarbons extracted during the year. For the second consecutive year, total proven hydrocarbon reserves were lower at 70.9 billion barrels equivalent as detailed in table 8.

Table 6.—Mexico: Petroleum and natural gas production

Zone and district	Natural gas (million cubic feet)			Crude oil[1] (thousand 42-gallon barrels)		
	1983	1984	1985	1983	1984	1985
Marine Zone: Bay of Campeche	328,999	348,383	348,387	610,947	636,074	621,646
Southeastern Zone:						
Villahermosa[2]	735,279	664,609	665,344	268,228	263,878	260,963
Comalcalco District	5,217	7,410	7,144	5,047	6,047	6,202
Ciudad Pemex	120,551	101,033	79,630	5	5	4
Total[3]	861,047	773,052	752,118	273,279	269,929	267,168
Central Zone:						
Posa Rica	41,289	35,575	30,977	32,856	28,267	27,193
Cuenca Papaloapan	23,134	21,909	22,181	3,688	2,843	2,467
Nueva Faja de Oro	15,948	9,870	2,606	--	--	--
Total	80,371	67,354	55,764	36,544	31,110	29,660
Southern Zone:						
Aqua Dulce District	19,942	16,865	14,157	17,782	15,711	14,525
El Plan District	19,489	17,476	15,079	15,374	12,229	10,473
Nanchital District	1,427	1,397	1,162	1,578	1,477	1,433
Total[3]	40,858	35,738	30,398	34,734	29,417	26,430
Northern Zone:						
Northern District	15,231	14,020	13,056	10,054	9,161	8,444
Southern District	9,418	7,589	7,162	7,145	6,629	6,667
Northeastern Frontier District	143,636	127,321	108,452	219	198	99
Total[3]	168,285	148,930	128,670	17,418	15,987	15,210
Grand total	1,479,560	1,373,457	1,315,337	972,922	982,517	960,114

[1]Does not include condensate as was the practice up to 1980.
[2]Referred to as Mesozoic.
[3]Data may not add to totals shown because of independent rounding.

Source: Petróleos Mexicanos, Memoria de Labores, 1983, 1984, and 1985.

Table 7.—Mexico: Salient crude oil statistics[1]

	1981	1982	1983	1984	1985
Production ______ thousand 42-gallon barrels	843,933	1,002,430	972,922	982,517	960,114
Exports:					
Quantity ______ do	400,778	r544,617	561,005	556,479	524,943
Value ______ millions	$13,305	$15,623	$14,821	$14,968	[2]$13,296
Share of total Mexican exports ______ percent	69	74	r69	62	61
To the United States:[3]					
Total ______ thousand 42-gallon barrels	177,510	r264,988	r279,703	r252,454	299,011
Share of total U.S. imports ______ percent	10	19	23	19	19

rRevised.
[1]Based on annual reports of Petróleos Mexicanos, Memoria de Labores.
[2]In addition, exports of petroleum products and much smaller amounts of petrochemicals were valued at $1.31 billion.
[3]Based on U.S. Department of Commerce import data.

Table 8.—Mexico: Proven hydrocarbon reserves

(Million 42-gallon barrels unless otherwise specified)

Zone	Dry natural gas (billion cubic feet)	Liquid hydrocarbons				
		Crude oil	Conden-sate	Dry natural gas liquid equiva-lent	1985 Total	1984 Total
1984 total	76,702	49,260	7,150	15,340	XX	71,750
1985:						
Marine (Bay of Campeche)	12,166	27,914	3,159	2,433	33,506	34,288
Chicontepec	26,700	10,912	1,315	5,340	17,567	17,578
Southeastern	24,508	7,301	1,986	4,901	14,188	14,226
Northern	8,374	414	263	1,675	2,352	2,326
Central	3,618	1,246	187	724	2,157	2,150
Southern	1,170	825	71	234	1,130	1,182
Total	76,536	48,612	6,981	15,307	70,900	XX

XX Not applicable.

Source: Petróleos Mexicanos, Memoria de Labores, 1984 and 1985.

Uranium and Nuclear Energy.—Mexico currently has two nuclear power units under construction at Laguna Verde in Veracruz State with a total electrical generating capacity of 1,250 megawatts. At yearend, Unit I was about completed and was scheduled for fuel loading in December 1986 with full commercial operation likely before December 1987. Unit II was about 50% completed and not expected to be ready before 1992. Ebasco Services Inc. of New York City has been the construction manager since 1975. The two boiling water reactors were supplied by the General Electric Co. of the United States. Mexico has already spent $1.9 billion on the two units estimated to cost $3.5 billion with interest. The cost per installed kilowatt is estimated at $2,200.

In August, the Government announced its intentions of continuing with future efforts to develop its nuclear industry. This became evident with the official publication announcing the legal responsibilities assigned to SEMIP. Among the most important responsibilities are the production, processing, and storage of nuclear fuels and wastes, as well as the approval, installation, and operation of nuclear ore processing plants.

Nuclear research was carried on by the Instituto Nacional de Investigaciones Nucleares (ININ). ININ's program included a project to train individuals to insert fuel in a boiling water reactor.

[1]Physical scientist, Division of International Minerals.
[2]Banco de México. Informe Anual—1985. 1986, p. 73.
[3]Where necessary, values have been converted from Mexican pesos (Mex$) to U.S. dollars at the average controlled rate for 1985 of Mex$254.70=US$1.00. The average free rate in 1985 was Mex$318.35=US$1.00. At yearend, the free rate had increased to Mex$450.00=US$1.00.
[4]Consejo de Recursos Minerales. Anuario Estadístico de la Minería Mexicana—1984. P. 26.
[5]Verdugo Diaz, F. and F. Arriaga. A. Exploración del Carbon en México. Symposium Latino Americano del Carbon (Piedras Negras, Coahuila, México). 1984, p. 916.

The Mineral Industry of Morocco

By Kevin Connor[1]

As in previous years, Morocco's only major mineral contribution to world markets was phosphate rock and chemical fertilizers derived from phosphate. Morocco was the world's leading exporter of phosphate rock in 1985 and ranked second worldwide in phosphoric acid exports. Morocco along with the Western Sahara contained the world's largest estimated reserves of phosphate rock. Production and exports of barite, fluorspar, iron ore, and lead metal, plus concentrates of lead, manganese, and zinc, were also significant, accounting for approximately 15% of the country's total mineral export receipts. These commodities, along with the phosphate exports, accounted for $570 million[2] in export revenues for the year.

The mining and mineral processing sectors of Morocco remained a major employer in 1985 with an estimated 52,000 salaried workers, and an additional 14,000 artisanal workers. The Office Cherifien des Phosphates (OCP), responsible for phosphate exploration, production, processing, and marketing, was the largest mineral agency employer, accounting for almost 45% of the sector's total employment.

The Government continued its policy aimed at replacing fuel oil with coal as an energy source for industrial plants and power stations. A project to convert the Mohammedia power station's third and fourth electrical generating units, estimated to cost $350 million, was nearing completion at yearend. The two units were to have a generating capacity of 350 megawatts, and were expected to start up by mid-1986. Also during the year, the Roches Noires 150-megawatt powerplant in Casablanca was being converted from oil to coal firing.

PRODUCTION AND TRADE

As a general reflection of depressed international markets, Morocco's mineral industry experienced a slowdown in 1985, particularly in exports. Mineral production decreased 2.5% in total tonnage, mainly owing to a 2.4% decrease in phosphate rock production. As a specific reflection of the depressed international demand and oversupply of phosphate products, production of phosphoric acid, the main phosphate derivative export, declined 12% to about 1 million tons. For ores other than phosphate, the total tonnage extracted increased 16%. However, tonnages exported were 11.1% less than in 1984.

Exports of phosphate rock concentrates declined slightly in 1985 to 14.8 million tons. Phosphoric acid exports, which had risen steadily over the past several years, also declined, falling 14% from the 1984 level. Exports of triple superphosphate and monoammonium phosphate improved 33% and 170%, respectively, and domestic sales of ammonium phosphate sulfate and nitrogen-phosphorus-potassium improved 70% and 34%, respectively. However, the export declines of the other phosphate products resulted overall in a 5% drop in the value of phosphate rock and chemical derivatives traded.

Morocco's major mineral trading partners remained Western European countries, particularly France, the Federal Republic of Germany, Italy, and Spain. Exports of phosphate rock and chemical fertilizers in 1985 were destined mainly for

Western Europe, Eastern Europe, the U.S.S.R., and Asia. A wide variety of both metal and industrial mineral commodities were imported from Western Europe, as well as petroleum products, coal, and coke. Saudi Arabia continued to be the major supplier of crude petroleum to Morocco, followed by the U.S.S.R. and Iraq. The only significant mineral trade between Morocco and the United States was U.S. coal exports to Morocco.

Almost all of Morocco's cement manufacture was used internally, with domestic sales amounting to 3.65 million tons. Total cement production for 1985 was slightly higher than that of 1984; however, output from the country's nine cement manufacturing installations was still well below their combined capacity of 6.3 million tons. New investment codes were expected to stimulate growth in production in 1986.

With the Government's continued emphasis on converting from fuel oil to coal wherever possible, coal and coke imports more than doubled in 1985 to approximately 450,000 tons. The major supplier of coal and coke was the United States. Total energy consumption for the country grew at the same rate in 1985 as in 1984, approximately 4.6%. About 35 million barrels of imported crude petroleum continued to supply 85% of the country's energy requirements. All of the country's requirements for kerosene, gasoline, gas, oil, fuel oil, and lubricants were supplied by the country's two petroleum refineries at Sidi Kacem and Mohammedia.

Table 1.—Morocco: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984[p]	1985[e]
METALS					
Antimony concentrate:					
Gross weight	1,140	2,011	1,008	2,209	[3]1,749
Metal content	513	905	454	972	690
Cobalt concentrate:					
Gross weight	6,265	6,338	--	--	--
Metal content	789	792	--	--	--
Copper:					
Concentrate, gross weight	[r]22,558	[r]64,364	71,020	65,470	[3]61,804
Matte, gross weight	2,663	3,286	2,544	1,361	[3]2,481
Copper content, concentrates and matte	8,232	23,269	25,396	22,093	[3]22,014
Iron and steel:					
Iron ore:					
Gross weight	73,112	223,820	173,010	162,984	[3]190,528
Iron content[e]	45,329	138,768	105,536	101,050	118,000
Metal:[e]					
Pig iron	12,000	12,000	15,000	15,000	15,000
Steel, crude	6,000	6,000	6,000	6,000	6,000
Lead:					
Concentrate:					
Gross weight	168,078	147,959	139,796	143,890	[3]152,549
Metal content	[r]117,655	103,571	97,857	100,723	[3]106,784
Metal:					
Smelter, primary only[e]	50,100	56,500	[r]55,200	46,100	59,500
Refined:					
Primary	50,149	56,533	55,173	46,054	59,470
Secondary[e]	2,100	2,100	2,000	2,000	2,000
Total[e]	52,249	58,633	[r]57,173	48,054	[3]61,470
Manganese ore, largely chemical-grade	109,647	96,529	73,515	56,786	[3]43,690
Nickel, Ni content of cobalt ore[e]	130	127	--	--	--
Silver, mine output, metal content thousand troy ounces	2,120	2,640	2,850	2,410	[3]2,733
Zinc concentrate:					
Gross weight	14,720	22,442	14,610	21,092	[3]27,153
Metal content[e]	[r]7,200	11,200	[r]7,500	[r]10,900	13,600
INDUSTRIAL MINERALS					
Barite	[r]465,660	515,672	288,414	425,200	[3]500,000
Cement, hydraulic thousand tons	3,606	3,739	3,848	3,588	[3]3,697
Clays, crude:					
Bentonite	2,906	4,457	4,096	1,825	[3]2,877
Fuller's earth (smectite)	19,750	24,604	27,385	33,406	[3]24,425
Montmorillonite (ghassoul)	8,670	4,271	6,037	3,382	[3]4,656
Feldspar	2,156	1,025	[e]1,000	[e]1,000	1,000
Fluorspar, acid-grade	66,700	50,200	60,300	65,900	[3]74,350
Gypsum[e]	400,000	420,000	440,000	450,000	450,000

See footnotes at end of table.

Table 1.—Morocco: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984[p]	1985[e]
INDUSTRIAL MINERALS —Continued					
Mica	1,805	512	[e]500	1,200	[3]1,440
Mineral water cubic meters	70,240	70,575	74,827	[e]70,000	70,000
Phosphate rock (includes Western Sahara) thousand tons	18,562	17,754	20,106	21,245	[3]20,737
Pyrites and pyrrhotite, gross weight	78,938	--	--	--	--
Salt, all types	55,197	56,556	69,800	62,740	[3]92,263
Sulfur, S content of pyrites	22,105	--	--	--	--
MINERAL FUELS AND RELATED MATERIALS					
Coal, anthracite thousand tons	703	735	751	834	[3]774
Gas, natural:[e]					
Gross million cubic feet	3,000	2,900	2,800	2,700	2,600
Marketed do	2,400	2,300	2,200	2,100	2,000
Petroleum:					
Crude[e] thousand 42-gallon barrels	300	290	280	270	260
Refinery products:					
Gasoline do	3,650	2,920	3,285	[e]3,300	3,300
Jet fuel do	1,825	1,460	1,460	[e]1,500	1,500
Kerosene do	365	365	730	[e]750	750
Distillate fuel oil do	9,125	10,950	9,490	[e]9,500	9,500
Residual fuel oil do	11,680	12,045	13,140	[e]13,000	13,000
Other do	2,920	2,190	2,190	[e]2,100	2,100
Refinery fuel and losses do	1,460	1,095	1,460	[e]1,500	1,500
Total do	31,025	31,025	31,755	[e]31,650	31,650

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Includes data available through June 4, 1986.
[2]In addition to the commodities listed, a variety of crude construction materials is produced, but available information is inadequate to make reliable estimates of output levels. Limestone quarried for cement manufacture is substantial; however, information is inadequate to make accurate estimates of output levels.
[3]Reported figure.

Table 2.—Morocco: Exports and reexports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS				
Aluminum: Metal including alloys:				
Scrap	1,002	1,189	--	France 707; Netherlands 176.
Semimanufactures	--	181	--	France 148; Senegal 17.
Antimony: Ore and concentrate	1,105	2,152	--	Yugoslavia 851; Belgium-Luxembourg 694; United Kingdom 348.
Cobalt: Ore and concentrate	1,852	([2])	--	All to France.
Copper:				
Ore and concentrate	69,531	72,174	--	Spain 49,973; West Germany 10,097; East Germany 6,157.
Matte and speiss including cement copper	3,270	1,363	--	All to Belgium-Luxembourg.
Oxides and hydroxides	4	2	--	Mainly to France.
Sulfate	2	10	--	Libya 5; Tunisia 5.
Metal including alloys, scrap	2,539	2,376	--	Belgium-Luxembourg 736; France 794; West Germany 292.
Iron and steel:				
Iron ore and concentrate including roasted pyrite	139,706	117,838	--	France 46,646; Albania 42,062; Spain 19,406.
Metal, scrap	[3]68,412	9,840	--	Spain 7,700; West Germany 2,000.
Lead:				
Ore and concentrate	72,119	85,272	--	Spain 31,017; West Germany 27,599; France 14,275.
Metal including alloys, unwrought	55,696	46,107	1,000	Italy 28,253; Turkey 4,401; Portugal 2,750.

See footnotes at end of table.

Table 2.—Morocco: Exports and reexports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued				
Manganese: Ore and concentrate, metallurgical-grade	57,860	69,665	123	France 27,950; West Germany 20,420; Spain 7,370.
Silver: Metal including alloys, unwrought and partly wrought thousand troy ounces	2,591	2,370	--	France 1,643; Switzerland 727.
Zinc:				
Ore and concentrate	14,149	24,072	--	West Germany 8,210; Belgium-Luxembourg 6,200; France 5,632.
Blue powder	7	--		
Matte	169	340	--	France 226; Italy 38.
Metal including alloys, scrap	264	340	--	All to France.
INDUSTRIAL MINERALS				
Barite and witherite	372,319	570,973	325,307	Norway 70,754; Netherlands 61,305.
Cement	3,902	105	NA	Spain 65; unspecified 40.
Chalk	--	37	--	All to Liberia.
Clays, crude	23,520	42,678	--	Spain 30,296; West Germany 6,034; Tunisia 2,880.
Feldspar, fluorspar, related materials	56,452	74,199	--	Canada 33,750; West Germany 23,250; Norway 8,463.
Fertilizer materials: Manufactured:				
Ammonia	198,382	65,700	--	Italy 31,935; Spain 15,055; Belgium-Luxembourg 11,410.
Phosphatic	609,035	479,649	--	U.S.S.R. 114,603; Burma 99,000; China 77,930.
Gypsum and plaster	109,398	127,106	--	Japan 30,220; Ivory Coast 26,082; Cameroon 23,020.
Lime	263	107	NA	NA.
Mica, crude including splittings and waste	--	1,434	--	Gibraltar 734; France 700.
Phosphates, crude thousand tons	13,976	14,951	--	Spain 2,620; France 1,953; Belgium-Luxembourg 1,648.
Pigments, mineral: Iron oxides and hydroxides, processed	--	1	NA	NA.
Stone, sand and gravel:				
Dimension stone, crude and partly worked	5,561	1,977	NA	Italy 1,859; West Germany 47.
Gravel and crushed rock	41,386	47,010	NA	NA.
Quartz and quartzite	1	--		
Sand other than metal-bearing	31,899	24,908	NA	NA.
MINERAL FUELS AND RELATED MATERIALS				
Coal: Anthracite and bituminous	40,200	65,940	--	France 44,055; United Kingdom 13,180.
Petroleum refinery products:				
Liquefied petroleum gas thousand 42-gallon barrels	92	58	--	Portugal 30; France 28.
Gasoline:				
Aviation do.	4	--		
Motor do.	2,017	2,582	--	Netherlands 2,580.
Kerosene and jet fuel do.	239	18	--	Mainly from ship's stores.
Distillate fuel oil do.	30	--		
Residual fuel oil do.	23	12	--	Do.

NA Not available.
[1]Table prepared by Virginia A. Woodson.
[2]Less than 1/2 unit.
[3]This figure was inadvertently reported as ferroalloys last year.

Table 3.—Morocco: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984 United States	Sources, 1984 Other (principal)
METALS				
Aluminum:				
Ore and concentrate	2,000	3,200	--	All from Guyana.
Oxides and hydroxides	2,793	2,036	(2)	France 1,901; Czechoslovakia 54.
Metal including alloys:				
Scrap	28	27	--	All from West Germany.
Unwrought	1,520	1,081	--	Netherlands 801; France 176.
Semimanufactures	5,860	6,211	NA	France 4,103; Spain 583.
Chromium:				
Ore and concentrate	238	--		
Oxides and hydroxides	15	11	--	United Kingdom 6; West Germany 4.
Copper:				
Oxides and hydroxides	6	14	--	Norway 12.
Sulfate	3	6	--	Mainly from France.
Metal including alloys:				
Scrap	5	--		
Unwrought	724	774	--	Italy 280; France 263; West Germany 225.
Semimanufactures	9,038	9,760	NA	France 3,788; Belgium-Luxembourg 2,561; United Kingdom 1,216.
Gold: Metal including alloys, unwrought and partly wrought value, thousands	$277	--		
Iron and steel: Metal:				
Pig iron, cast iron, related materials	68	2,943	--	Belgium-Luxembourg 1,064; France 955; United Kingdom 500.
Ferroalloys:				
Ferrochromium	99	68	--	Italy 40; France 18.
Ferromanganese	206	133	--	France 93; Belgium-Luxembourg 40.
Ferromolybdenum	--	4	--	Belgium-Luxembourg 2; Austria 1.
Ferrosilicochromium	--	764	--	All from France.
Ferrosilicomanganese	30	20	--	Do.
Ferrosilicon	176	126	--	France 56; West Germany 30; Portugal 30.
Unspecified	2,298	2	--	All from France.
Steel, primary forms	53,754	198,262	--	West Germany 84,916; Spain 63,926; United Kingdom 24,457.
Semimanufactures:				
Bars, rods, angles, shapes, sections	369,289	294,982	2	Spain 218,285; France 43,769.
Universals, plates, sheets	116,572	133,132	--	France 39,986; Spain 27,514; West Germany 26,681.
Hoop and strip	10,475	11,069	--	France 6,155; Italy 1,206; Spain 1,202.
Rails and accessories	3,149	26,177	--	France 26,131.
Wire	3,708	22,019	--	France 9,517; Spain 7,068.
Tubes, pipes, fittings	26,859	30,586	8	France 20,073; Spain 7,546.
Castings and forgings, rough	2,505	161	--	France 60; Belgium-Luxembourg 54; Spain 34.
Lead:				
Oxides	314	501	--	France 440; Italy 30.
Metal including alloys:				
Unwrought	79	82	--	Netherlands 47; France 35.
Semimanufactures	175	69	NA	Netherlands 35; France 23.
Manganese:				
Ore and concentrate, metallurgical-grade	316	286	--	Gabon 278; Japan 7.
Oxides	574	497	--	Belgium-Luxembourg 307; Ireland 180.
Mercury 76-pound flasks	232	232	--	Mainly from Spain.
Molybdenum: Metal including alloys, all forms value, thousands	--	$18	--	France $9; Netherlands $4.
Nickel:				
Matte and speiss	9	3	--	All from France.
Oxides and hydroxides	--	1	--	All from West Germany.
Metal including alloys:				
Unwrought	16	271	2	Belgium-Luxembourg 252.
Semimanufactures	735	725	--	West Germany 452; Switzerland 83; France 72.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value	$266	--		
Selenium, elemental	1	(2)	--	Mainly from France.

See footnotes at end of table.

Table 3.—Morocco: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Silicon, high-purity	5	15	--	Mainly from France.
Silver: Metal including alloys, unwrought and partly wrought ---troy ounces	26,042	23,534	32	Italy 10,417; France 8,712.
Tin: Metal including alloys:				
Unwrought	114	133	--	Malaysia 57; Thailand 30.
Semimanufactures	21	17	--	France 5; Netherlands 5; West Germany 3.
Titanium:				
Ore and concentrate	53	125	--	All from Australia.
Oxides	1,940	2,296	17	Belgium-Luxembourg 1,084; Spain 977.
Tungsten: Metal including alloys, all forms ---value, thousands	--	$45	--	France $35; Netherlands $4.
Zinc:				
Oxides	722	574	(2)	France 371; Spain 96; Portugal 70.
Blue powder	150	--		
Metal including alloys:				
Unwrought	2,628	2,944	--	France 1,849; Belgium-Luxembourg 559.
Semimanufactures	118	309	--	France 238; Belgium-Luxembourg 38.
Other:				
Ores and concentrates	70	168	--	All from Australia.
Base metals including alloys, all forms	48	--		
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	64	129	--	Italy 111; France 12.
Artificial: Corundum	285	446	--	France 190; Spain 110; West Germany 54.
Dust and powder of precious and semiprecious stones including diamond ---value	$1,204	--		
Grinding and polishing wheels and stones	276	442	(2)	Italy 197; United Kingdom 42; West Germany 41.
Asbestos, crude	6,590	4,702	15	Canada 2,625; Botswana 1,107; Greece 820.
Boron materials:				
Crude natural borates	469	(2)	--	All from France.
Oxides and acids	25	22	--	Turkey 13; Belgium-Luxembourg 4.
Cement	31,703	46,334	--	Spain 14,617; France 14,360; Belgium-Luxembourg 5,167.
Chalk	1,053	833	--	France 640; Belgium-Luxembourg 140.
Clays, crude:				
Bentonite	(2)	--		
Kaolin	5,610	NA		
Unspecified	7,228	14,262	5	France 6,437; United Kingdom 5,515.
Cryolite and chiolite	7	16	--	All from Denmark.
Diamond: Industrial stones ---value	--	$61	--	All from United Kingdom.
Diatomite and other infusorial earth	107	247	--	Spain 190; West Germany 28.
Feldspar, fluorspar, related materials	1,521	1,798	--	France 1,452; Switzerland 200.
Fertilizer materials: Manufactured:				
Ammonia	83,801	46,663	--	U.S.S.R. 36,498; Venezuela 6,065.
Nitrogenous	207,080	281,497	22	Romania 88,910; France 40,889; West Germany 33,177.
Potassic	76,336	84,309	--	Spain 41,250; U.S.S.R. 22,028; East Germany 12,830.
Unspecified and mixed	788	735	--	Belgium-Luxembourg 530; West Germany 181.
Graphite, natural	98	12	--	France 11.
Gypsum and plaster	20	5	--	All from Spain.
Iodine	(2)	1	--	Mainly from France.
Lime	2,350	600	NA	NA.
Magnesium compounds:				
Magnesite, crude	42	162	--	Austria 136; Spain 19.
Oxides and hydroxides	43	81	1	Netherlands 34; Ireland 16; France 15.
Mica:				
Crude including splittings and waste	21	19	8	Norway 8.
Worked including agglomerated splittings	5	1	--	Mainly from Spain.
Pigments, mineral: Iron oxides and hydroxides, processed	998	1,040	--	West Germany 552; United Kingdom 187; France 115.

See footnotes at end of table.

Table 3.—Morocco: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Precious and semiprecious stones other than diamond:				
Natural ——— value	$515	--		
Synthetic ——— do	$1,964	--		
Pyrite, unroasted	--	13	--	West Germany 6; Spain 6.
Quartz crystal, piezoelectric kilograms	--	7	--	All from France.
Salt and brine	8	45	--	France 38; West Germany 4.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	8,773	11,236	--	Spain 6,306; United Kingdom 1,858.
Sulfate, manufactured	2,596	5,002	--	France 2,544; Spain 2,081.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	11	10	--	All from France.
Worked	64	2	--	Italy 1; Spain 1.
Dolomite, chiefly refractory-grade	149	196	--	France 115; Spain 60.
Gravel and crushed rock	603	646	--	Belgium-Luxembourg 568; France 78.
Quartz and quartzite	919	1,076	--	Belgium-Luxembourg 1,051.
Sand other than metal-bearing	23,940	19,179	--	Belgium-Luxembourg 11,070; Portugal 3,320; United Kingdom 2,950.
Sulfur:				
Elemental, crude including native and byproduct ——— thousand tons	1,350	1,419	64	Saudi Arabia 565; Canada 402; Poland 284.
Sulfuric acid	2,015	51,031	--	Spain 39,737; Portugal 11,276.
Talc, steatite, soapstone, pyrophyllite	1,209	1,552	--	France 929; Belgium-Luxembourg 454; Spain 128.
Other: Crude	18,184	18,236	--	France 9,565; Spain 2,802; Netherlands 2,668.
MINERAL FUELS AND RELATED MATERIALS				
Carbon black	4,982	4,928	--	Spain 3,499; West Germany 899.
Coal:				
Anthracite and bituminous	216,804	155,759	--	United Kingdom 99,606; France 36,618; Belgium-Luxembourg 13,291.
Briquets of anthracite and bituminous coal	--	4	--	All from Spain.
Lignite including briquets	1	--		
Coke and semicoke	27,607	22,944	--	All from West Germany.
Peat including briquets and litter	22	42	--	West Germany 33; Netherlands 9.
Petroleum:				
Crude ——— thousand 42-gallon barrels	29,935	32,985	--	Saudi Arabia 14,479; Iraq 10,510; Kuwait 3,785.
Refinery products:				
Liquefied petroleum gas ——— do	1,817	1,459	--	United Kingdom 283; Italy 204; Spain 200.
Gasoline ——— do	349	61	--	Netherlands 49; Belgium-Luxembourg 12.
Kerosene and jet fuel ——— do	39	1	--	All from Netherlands.
Lubricants ——— do	214	115	([2])	France 85; Netherlands 11.
Residual fuel oil ——— do	--	115	--	All from West Germany.
Bitumen and other residues ——— do	55	1	([2])	Mainly from France.
Petroleum coke ——— do	193	219	219	

NA Not available.
[1]Table prepared by Virginia A. Woodson.
[2]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Lead and Zinc.—The Government agency for developing small mining enterprises within the Provinces of Errachidia, Figuig, and Ouarzazate, Centrale d'Achat et de Developpement de la Region Minière du Tafilalet et de Figuig, acquired a $2 million portable lead-zinc processing plant from Sala International AB of Sweden, a subsidiary of Allis-Chalmers Corp. of Milwaukee, Wisconsin, United States. The diesel-powered caravan plant combined four processing sections—crushing, jigging, grinding, and flotation—and had a design capacity of 20 tons per hour. The system also incorporated a feed hopper and feeder, primary and secondary crushing, vibrating screen, and necessary belt conveyors and surge bins. The plant was initially located near the town of Errachidia on the eastern side of the Atlas Mountains, approximately 500 kilometers northeast of Agadir. The limited ore reserves near Errachidia required selective mining by local artisans. Average grades of 7.6% lead and 5% zinc were produced. When the area's reserves become depleted, the portable plant would be disassembled and moved to a new site. This was the fifth caravan plant to be bought by the Moroccan Government.

INDUSTRIAL MINERALS

Cement.—Work continued on converting the industry's cement manufacturing installations to coal firing and dry processing, in an attempt to reduce energy costs. Conversion of the Société Ciments Artificiels de Meknes plant from wet to dry processing was completed in January, and coincided with the reopening of the plant's coal facilities. Asment de Temara began conversion of its plant at Charbon to coal firing, and Morocco's old Lafarge-Maroc cement plant, which utilized wet processing, continued to be phased out. Production at Lafarge-Maroc was reduced from approximately 830,000 tons in 1983 to 310,000 tons in 1985. An expansion program at the Ciments d'Agadir plant for adding a 1,200-ton-per-day production line was well under way at yearend and was expected to be completed by the end of 1986. Completion of this third production line at Agadir would increase the plant's total manufacturing capacity to 1 million tons per year. F. L. Smidth of the United Kingdom was to supply the dry process kiln and Folax cooler for the production line.

Phosphate.—In recent years, Morocco's phosphate monopoly, OCP, has concentrated on two key aspects of developing the country's phosphate reserves: additional reserves to replace or augment existing mine operations, and the development of reserves in virgin territory. Following extensive exploration activities, OCP has been able to reassess its phosphate rock resources, with reported estimated reserves to exceed 56 billion tons. Approximately one-half of this total is accounted for in the Oulad Abdoun Plateau of the Khouribga District. The other major reserve area is Meskala, with over 35% of the country's estimated reserves.

During 1985, OCP operated phosphate mines in four regions of Morocco. Two open pit mines were active on the Oulad Abdoun Plateau within the Khouribga mining district. Five underground mines were also operated within the Khouribga District. Located on the Ganntour Plateau, the Youssoufia mining district had two underground mines producing white rock, and two underground mines producing black rock. On the northern edge of the Ganntour Plateau, the Ben Guerir Mine, commissioned in 1980, produced rock concentrate in 1985 for the chemical fertilizer industry at Safi. A fourth active phosphate-producing area was the Bu Craa Mine in northern Western Sahara.

Construction of a classification plant at OCP's Khouribga phosphate preparation complex was completed and operational by yearend. The plant consisted of four cyclone air classifiers operating in two preparation lines. Each line was capable of processing 400 tons of phosphate material per hour. Construction of the plant was contracted out by OCP and built by KHO Humboldt Wedag AG of the Federal Republic of Germany.

Two of the planned eight 500-ton-per-day phosphoric acid units at the Atlantic Ocean port city of Jorf Lasfar were completed in 1985. The units were part of OCP's Moroc Phosphore III and IV fertilizer complexes, the construction of which began in 1984 and was scheduled for completion in 1987. Construction work on all eight of the phosphoric acid units was under way during 1985. The two units completed were expected to begin production early in 1986. At the same time, production of sulfuric acid was to begin at a new 750,000-ton-per-year plant within the Moroc Phosphore III complex.

The construction contractor for the phosphoric acid units was Rhône Poulenc Inc. of France, with engineering supplied by Société Marocaine de Realisation Techniques et Ingenierie, 65% owned by OCP. Also under construction during the year at the Jorf Lasfar fertilizer complex was a 1-million-ton-per-year diammonium phosphate plant and a 184,000-ton-per-year triple superphosphate plant.

MINERAL FUELS

Coal.—Work began on the modernization of the Jerada anthracite mine in 1985. The principal contractor was the mine operator, Charbonnages du Moroc (CdM), with Union Minière SA of Belgium as project consultant. In the first phase, 25 deep boreholes and 15 shallow boreholes were to be drilled in the eastern portion of the Jerada coal basin to prove out reserves and identify a location for a new vertical shaft. A second shaft was to be sunk in the center of the coalfield. Within the underground mine, an estimated 14 kilometers of new development tunnels were to be driven, and mechanized mining equipment was to be installed throughout the mine. Aboveground project work was to include installation of coal screening and washing equipment, as well as construction of a 2-kilometer-long coal conveyor belt. Financing of the project was being provided through four sources: a $27 million loan from the International Bank for Reconstruction and Development (World Bank); $26.5 million from the Government coal agency, CdM; $12.9 million from the Federal Republic of Germany; and $7.9 million from France.

Natural Gas.—The Government continued with plans to install a gas gathering and treatment complex in the Essaouira Basin. Four completed gas wells in the Mescala Field were expected to supply 200,000 cubic meters of gas per hour to the proposed treatment plant. Condensate liquids separated out at the plant were slated to be piped to the Youssoufia phosphate beneficiation plant to power drying and calcination units. The cost of the project, which included laying of pipe to Youssoufia, was estimated by ONAREP at $6 million. A contract for the project was expected to be awarded by ONAREP early in 1986.

Oil Shale.—Another energy feasibility study of the Timahdit oil shale deposits in northern Morocco was begun at yearend by Kraftwerk Union (KWU) of the Federal Republic of Germany. The project could last from 2 to 6 years, depending on results from the study's phase I laboratory analyses, scheduled for completion in 1987. The contract for the study was signed with Morocco's state agency, Office Nationale de Recherches et de l'Exploitation des Pétroles (ONAREP), which had been actively involved in researching the energy potential of the country's oil shale and tar sand deposits since 1981. Through funds secured from the World Bank, Davy McKee Ltd. of the United Kingdom studied developing the Timahdit deposits in the early 1980's. Owing to falling petroleum prices, Davy McKee closed out its experimental operations in 1984 stating that an extraction operation of any size would be uneconomical for the foreseeable future.

The first phase of the KWU program was to study the oil shale's chemical properties at KWU's laboratories at Erlangen in the Federal Republic of Germany. If the test resulted in the development of an economical bench-scale extraction process, then second-phase activities were to entail operating a 100-ton-per-day pilot plant. The pilot operation would be undertaken by KWU at Timahdit. The cost of both phases was estimated to be $7 million, and was to be financed solely by KWU.

Petroleum.—Australia's Broken Hill Pty. Co. Ltd. (BHP Petroleum) signed an exploration agreement in July with Morocco's state agency, ONAREP, for a 5,000-square-kilometer concession offshore Western Sahara. The agreement for the offshore Dakhla concession was the first petroleum exploration contract involving the disputed Western Sahara territory. BHP Petroleum was committed to conduct 1,000 line kilometers of seismic survey work, which was to cover an estimated 18-month period. Upon completion and analysis of the survey results, a decision on whether to do exploratory drilling or relinquish the concession would be made. The contract between BHP Petroleum and ONAREP was the 1st venture for BHP outside of Australia and North America, and the 14th exploration contract signed by ONAREP since the agency's establishment by the Moroccan Government in 1981.

In an area immediately to the north of the Dakhla concession, ONAREP contracted with the Geophysical Co. of Norway to conduct a preexploration study of all available geotechnical data. Followup studies could include 10,000 square kilometers of area in the North Dakhla and

Boujdour waters, with seismic studies covering a minimum of 1,500 line kilometers. Also, during July, an exploration agreement between ONAREP and a consortium consisting of Pennzoil International and Rutherford Inc. of the United States and Maersk Olie og Gas of Denmark, was signed for a 5,000-square-kilometer area in the high plateau of northeastern Morocco. Also during the year, Amoco International completed drilling two offshore exploration wells. One was in a southern concession off the coast of Tan-Tan, while the other was along the northern coastline. Both wells were dry.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Moroccan dirhams (DH) to U.S. dollars at the rate of DH10.46=US$1.00.

The Mineral Industry of Namibia

By George A. Morgan[1] and Francis E. Shafer[2]

In 1985, the Namibian mining industry performed well in terms of increased output and sales of mineral commodities such as lead, tin, lithium minerals, silver, and salt. Diamond, copper, and zinc production declined slightly. The value of mineral sales increased, owing to the lower rand-U.S. dollar exchange rate.[3] The industry's contribution to the gross domestic product (GDP) in 1985 was estimated to be in excess of 30%, compared with 26% of a GDP of about $1.4 billion in 1984. Mining constituted 39% of total private sector contribution to the GDP in 1984, the latest year available. Direct taxes to the state were up, owing to generally higher corporate profits. Taxes paid to the state in 1985, including special diamond taxes, increased 23% in terms of rand value, and made up 21% of the $711.5 million in total taxes collected. Base metal mines pay 42% of their taxable profit to the National Treasury. Contributions from the Republic of South Africa to total revenue collected was about $200 million, and this was in addition to total taxes collected.

Despite the unsettled political situation, there were no strikes or work stoppages in 1985 in the mining industry under the transitional government. The Chamber of Mines proposed changes in the Wage and Industrial Conciliation Ordinance, and the Department of Economic Affairs was involved in updating the mines, works, and minerals regulations, but suspended the action pending the report of a commission studying mining practices in Namibia.

Employment in mines and quarries was 14,869 compared with 15,624 (revised) in 1984. Basic salaries and wages paid, excluding fringe benefits, were up almost 10% in rand to nearly $70 million. Total expenditures in Namibia by mining companies for operations and capital investment were $148 million. About $8.4 million was spent on education and community development. Expenditures for exploration fell from $10.5 million in 1984 to $2.9 million in 1985, partly owing to restrictions on purchases of new equipment and the completion of trenching and drilling programs in 1984. New concession grants issued rose to 33, mainly in the Karibib area for possible gold occurrences. New claims registered had been at the level of about 217 for each of the past 3 years, and prospecting licenses issued rose to 210 compared with 167 in 1984. Many of these licenses were issued to private miners and prospectors who were being encouraged to work small mineral occurrences that would not qualify for major capital investment.

PRODUCTION AND TRADE

There were 33 operational mines in Namibia producing 30 minerals, and the mines ranged in size from the largest open pit uranium mine in the world to small single prospector and miner operations. The major mineral commodities in decreasing order of production value were diamond, uranium, copper, silver, lead, tin, zinc, gold, and salt. Multinational corporations such as Rio Tinto Zinc Corp. Ltd. (RTZ), Newmont Mining

Corp., Gold Fields of South Africa Ltd., Anglo American Corp., and South African Iron and Steel Industrial Corp. Ltd. (Iscor) continued to be the main sources of capital for capacity expansion, exploration, infrastructure, and education. Production of many minor commodities such as agate, dioptase, gypsum, marble, rose quartz, and tourmaline was by private ownership. Production statistics for this expanding sector of the mining industry were generally unavailable. Most semiprecious minerals were cut or otherwise upgraded and then exported.

Detailed data on foreign trade were unavailable. Namibia is part of the Customs Union, which includes Botswana, Lesotho, the Republic of South Africa, and Swaziland. Total merchandise exports in 1984, the latest year available, were valued at $1.08 billion, nearly matching imports valued at $1.09 billion. Total Namibian exports to the United States in 1984 were valued at $2.6 million, of which $2.2 million was mineral related. Exports of minerals to the United States in 1985 were valued at $5.4 million, and U.S. exports of mineral commodities to Namibia were valued at less than $200,000.

Table 1.—Namibia: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984[p]	1985[e]
METALS					
Arsenic, white[3]	1,370	1,895	1,126	2,504	2,471
Cadmium metal, refined	--	110	51	40	58
Columbium and tantalum:					
Tantalite concentrate, gross weight __ kilograms	11,000	8,900	2,800	6,600	4,600
Copper:					
Mine output, metal content of concentrate	46,185	49,800	50,447	47,406	48,036
Metal, blister	39,719	49,767	54,238	46,436	43,295
Gold, metal content of smelter products _ troy ounces	[e]6,000	7,395	7,459	6,302	6,237
Lead:					
Mine output, metal content of concentrate	46,900	32,900	38,467	33,255	34,640
Metal, refined	41,729	40,590	35,416	28,930	38,511
Silver: Mine output, metal content of concentrate thousand troy ounces	3,456	2,812	3,535	3,255	3,400
Tin, mine output, metal content of concentrate	1,228	1,326	[e]1,400	906	984
Uranium, U_3O_8 content of concentrate	4,681	4,454	[e]4,450	4,400	4,000
Zinc, mine output, metal content of concentrate	29,600	[e]32,200	33,526	32,195	30,232
INDUSTRIAL MINERALS					
Diamond:[4]					
Gem[e] __ thousand carats	1,186	963	915	884	865
Industrial[e] __ do	62	51	48	46	45
Total __ do	1,248	1,014	963	930	910
Lime	NA	1,150	600	--	--
Limestone and marble	18,400	[r]21,400	15,400	23,400	31,600
Lithium minerals:					
Amblygonite	NA	80	50	60	50
Lepidolite	NA	60	30	20	110
Petalite	NA	900	700	800	1,800
Total	1,263	1,040	780	880	1,960
Mica	[e]--	--	100	90	--
Quartz	--	3,500	150	20	300
Salt	193,000	184,000	136,900	88,000	152,300
Sulfur, S content of pyritic concentrate	8,361	58,209	80,719	104,454	100,000
Wollastonite	--	1,300	1,100	--	--

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.

[1]Table includes data available through May 15, 1986.

[2]Data are compiled from the Annual Report of the Chamber of Mines of South West Africa/Namibia and from operating company annual reports as follows: Tsumeb Corp. Ltd. (TCL), South African Iron and Steel Industrial Corp. Ltd. (Iscor), Falconbridge Nickel Mines Ltd., Rio Tinto Zinc Corp. Ltd. (RTZ), and others as available.

[3]White arsenic equivalent of all arsenic products reported as being produced.

[4]Total figures reported by De Beers Consolidated Mines Ltd. in company annual reports for calendar years. Details on gem and industrial diamonds are estimates, assuming output to be 95% gem quality.

COMMODITY REVIEW

METALS

In addition to the major mineral commodities listed in table 1, and for which production data were generally available, there were a number of minerals produced by small private enterprises for which no statistics were published. Among these were agate, amethyst, aragonite, dioptase, gypsum, marble, and tourmaline.

Copper.—Tsumeb Corp. Ltd. (TCL) was the largest copper producer in Namibia, and operated the Asis West, Kombat, Otjihase, and Tsumeb Mines in 1985. TCL also opened the Asis East Mine in the Kombat ore complex. TCL's blister copper sales totaled 41,281 tons compared with 38,618 tons in 1984, and company net earnings rose to $9.4 million compared with a loss of $5.56 million in 1984. A single reverberatory furnace operated at full capacity, producing 43,295 tons of blister copper. An excess of 4,316 tons of copper in concentrates was shipped to the Republic of South Africa for smelting by O'okiep Copper Co. Ltd. Small private copper producers generally sold their concentrates to TCL for processing.

The Tsumeb Mine continued to expand ore production, with the underground crushing, milling, and pulp-pump section in the upper levels yielding 78,000 tons of finely ground ore. Recovery had declined because of an increased proportion of nonflotable oxide copper minerals in fine ore. A trial gravity separation process was being tested to improve recovery. The Matchless Mine, closed for the second consecutive year, was allowed to flood after removal of shaft and pump station equipment. Mill plant and equipment purchased from the closed Oamites Mine was installed at the Tsumeb smelter for processing reverberatory slags containing copper and silver. Cost of the slag reprocessing plant was $1.1 million, and mill throughput at yearend 1985 was 20,000 tons per month. Initial head grades were reported at 1.3% copper and 3.2 troy ounces of silver per ton.

Exploration costs were about $1.4 million, and total ore reserves in thousand tons and average percent copper content at yearend were Otjihase Mine, 8,297 at 2.3%; Tsumeb Mine, 5,498 at 3.27%; Matchless Mine, 2,076 at 2.33%; Asis West Mine, 2,015 at 4.16%; Kombat Mine, 1,481 at 1.48%; and the Asis East Mine, 329 at 2.5%.

Metorex Mining Co. shut down the Oamites Mine owing to depletion of ore reserves, but continued to operate the Klein Aub Mine. The Klein Aub Mine produced about 20,000 tons of ore per month at a grade of 2% copper.

Lead.—The Tsumeb Mine of TCL was the main supplier of lead, followed by the Rosh Pinah Mine of Imcor Zinc (Pty.) Ltd. Lead concentrate production from the two mines was up over 13,000 tons. All smelting was by the Tsumeb smelter, which also processed custom concentrates from offshore suppliers. A $1 million plant was under construction at the smelter to improve the recovery of lead and silver. Other products expected to be recovered by the plant were antimony, tin, and sodium hydroxide. Operation of the plant was planned for late 1986. Total proved ore reserves for the Tsumeb Mine were 2.9 million tons grading 4.57% lead, and total proved, probable, and possible reserves for the combined Asis East, Asis West, and Kombat Mines were 3.8 million tons grading 2.03% lead.

Tin.—The Uis Mine was owned and operated by Industrial Minerals Mining Corp. (Pty.) Ltd., a 100% subsidiary of Iscor. All concentrates produced, grading about 68% tin, were shipped to Iscor for smelting at prices determined by the average of London Metal Exchange prices. The tin was primarily for use in tinplating at the company's Vanderbijlpark works near Johannesburg. The waste-to-ore ratio of the pegmatite material mined was 3.5 to 1, yielding about 1 kilogram of recoverable tin metal per ton of ore. About $250,000 was paid annually to about 200 tribute workers who recovered tin by hand cobbing and winnowing in inactive quarries, waste dumps, and small high-grade pockets in and around the main working areas. Because of the low grade of the deposit and costs for infrastructure, the operation has only broken even for the past 10 years, with no dividends paid over that period. Proven reserves were 60 million tons averaging 0.142% tin. Iscor was spending about $3 million to increase mine and concentrator output 30% by midyear 1986.

Metorex Mining purchased the Tintan Mine of Tintan (Pty.) Ltd. in August 1984, and formally opened the mine in June 1985. The Tintan Mine was near Uis in southern Damaraland. Ore reserves as of February were 100,000 tons, mainly in the existing mining area.

Drilling was planned for recently mapped surface areas. Output was about 10,000 tons per month of ore yielding 14 to 15 tons per month of concentrate, which was bagged and sold to Iscor's Uis Mine.

Zinc.—The Rosh Pinah Mine and the Tsumeb Mine were the only producers of zinc in Namibia. Most of Rosh Pinah's output was shipped to Iscor's Vanderbijlpark works for refining and use. Some spot sales of concentrate were made to overseas customers and were shipped via Walvis Bay. A successful exploration program at the Rosh Pinah Mine was followed by commencement in April of a 25% increase in mine production capacity at a cost of about $2.05 million. Completion was planned for March 1986. The Rosh Pinah Mine had proved and probable reserves sufficient for 20 years of production at current output levels.

Table 2.—Namibia: Gross weight and elemental content of ore and concentrate produced in 1985, by mine

(Metric tons unless otherwise specified)

Mine	Gross weight	Elemental content: Copper	Lead	Zinc	Sulfur	Silver (troy ounces)
Asis East:						
Ore	5,446	89	28	--	NA	NA
Concentrate: Copper	211	56	10	--	NA	3,656
Asis West:						
Ore	182,679	8,074	2,868	--	NA	NA
Concentrate:						
Copper	21,845	7,403	1,523	--	NA	159,429
Lead	1,938	221	987	--	NA	6,542
Klein Aub:						
Ore[e]	240,000	4,700	--	--	NA	NA
Concentrate: Copper	10,400	4,200	--	--	--	225,055
Kombat:						
Ore	143,963	5,111	1,828	--	NA	NA
Concentrate:						
Copper	13,564	4,541	852	--	NA	142,166
Lead	1,320	146	666	--	NA	4,880
Otjihase:						
Ore	832,741	15,739	--	--	146,896	NA
Concentrate:						
Copper	55,006	14,918	--	--	19,054	123,794
Pyrite	174,363	331	--	--	88,664	--
Rosh Pinah:						
Ore[e]	147,000	--	11,600	33,800	NA	NA
Concentrate:						
Lead	17,490	--	8,273	[e]670	NA	450,110
Zinc	55,167	--	[e]4,400	30,232	NA	[e]510,000
Tsumeb:						
Ore	615,063	18,882	23,495	7,381	NA	NA
Concentrate:						
Copper	41,896	11,764	3,737	--	NA	1,136,856
Lead	58,864	4,456	14,475	1,931	NA	641,564
Total:						
Ore	XX	52,595	39,819	41,181	146,896	NA
Concentrate	XX	48,036	34,923	32,833	107,718	3,404,052

[e]Estimated. NA Not available. XX Not applicable.

INDUSTRIAL MINERALS

Diamond.—Output was by Consolidated Diamond Mines (Pty.) Ltd. (CDM), a wholly owned subsidiary of De Beers Consolidated Mines Ltd. Marketing of diamonds was by De Beers Central Selling Organization. Production of ore was 8,178,000 tons in 1985 compared with 7,550,000 tons in 1984, and overall mine grade was 11.12 carats per 100 tons compared with 12.32 carats per 100 tons in 1984. Overburden stripping amounted to 20.54 million tons in 1985 compared with 19.33 million tons in 1984.

CDM's No. 3 conglomerate crushing and treatment plant remained closed, and the No. 4 conglomerate treatment plant was operated at a reduced rate, treating heavy-medium-separated cone tailings. Also closed were two field screening plants and a sampling plant. There was no overburden stripping, mining, or treatment of run-of-mine ore in the No. 4 plant area. Mining in the area was projected to recommence in early 1986 following depletion of the tailings dumps. CDM constructed a trial suction dredge for mining deep waterlogged overburden, and commissioned two bedrock vacuum cleaning units for increased security in addition to higher productivity. Small reconcentrating plants were installed in the heavy-medium sections of the Nos. 1 and 4 plants to improve recovery. A unit to treat high specific-gravity tailings from the central recovery plant was also under construction and was due to be commissioned in midyear 1986. Overall, CDM's mining and recovery methods were projected to recover about 98% of the original estimated caratage of a mining area during mine life.

Lithium.—Output of lithium minerals was up sharply following the purchase of SWA Lithium Mines (Pty.) Ltd. by United Technical Equipment Co. (UTEC) of the Republic of South Africa in April 1984. UTEC purchased the company from its major shareholder Klöckner & Co. of the Federal Republic of Germany, with 10% remaining with the mine manager. The company operated the Rubicon Mine near Karibib. UTEC's initial investment was about $50,000, mainly for labor and supplies. About 90 workers were employed in mainly hand-cobbing operations from 4 pegmatite deposits at the rate of 150 to 200 tons per month. Petalite was the main lithium mineral mined, followed by lepidolite and amblygonite.

MINERAL FUELS

Namibia remained totally dependent upon imported refined petroleum products for domestic use. Possible local sources of crude petroleum and coal were under study.

Rossing Mine, operated by RTZ, had a lower uranium production and a reduced labor force in 1985, owing to the weak international market for uranium. Output was exported under long-term contracts. Based on 1985 reserves and the production rate, the mine had a life of 25 years. The Industrial Development Corp. (IDC) of the Republic of South Africa sold an undisclosed number of its shares in the operation to the Central Authority of the Territory of Namibia. The latter administration was expected to be turned over to a group of Namibian political parties that would subsequently own a portion of the Rossing Mine. RTZ held 46.5% of the equity and about 26.5% of the voting rights in the mine, with the IDC reportedly holding over 50% of the voting rights owing to the weighted per-share value. The sale was another step in the transfer of control in the territory to Namibian authorities.

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[1]Physical scientist, Division of International Minerals.

[2]Regional Resource Officer for Southern Africa, U.S. Department of State.

[3]Where necessary, values have been converted from South African rands (R) to U.S. dollars at the rate of R1=US$0.6954 for 1984 and R1=US$0.4564 for 1985.

The Mineral Industry of the Netherlands

By George A. Rabchevsky[1]

The metals processing industries of the Netherlands, especially those of steel, aluminum, cadmium, lead, and zinc contributed significantly to the total gross national product (GNP). Mining, on the other hand, played only a small role in the minerals economy owing to the lack of indigenous base minerals resources, except for some cement raw materials. Natural gas was the Netherlands only plentiful natural resource, which continued to be exploited effectively and which continued to be of great economic importance to the country. The sales of natural gas to neighboring European Economic Community (EEC) member countries, and of processed metals, transsshipped through excellent shipping facilities, made up a sizable portion of the Netherlands income. The Hoogovens IJmuiden BV (HI), the Netherlands only major steel producer, is situated on the coast with its own docking and shipping facilities. Without its foreign trade and its aggressive marketing efforts, the mineral industry of the Netherlands would not be as significant.

The Netherlands total GNP continued its moderate growth, about 2% in 1985, and amounted to over $128 billion[2] at current prices. Following a rise in business investment in 1984, private consumption has also contributed toward the increases in real GNP, while unemployment at 790,000 workers dropped slightly, although still high at 12.5% of the labor force. Inflation at 2.5% was at its lowest level since the 1950's, but the budget deficit remained at about 7%. The Government remained the largest spender, taking almost 62% of national income.

The Netherlands Government and private firms invested over $3 billion in research, which was 2.1% of the country's GNP. The scientific research budget as a share of the GNP rose continuously from 1.96% in 1980 to a projected 2.13% in 1986, mostly within the industrial sector, including the minerals industry.[3]

PRODUCTION

Reports attributed the moderate performance of the Netherlands mining industry and public utilities to the severe winter. Production peaked in the first quarter, but decreased over the next two quarters. Industrial production rose by about 2.5% in the first 9 months of 1985, with manufacturing production, excluding mining and public utilities, up almost 3.5% over this period. The production of metals and energy decreased, however, and some performed even more poorly than in 1984. The production of pig iron, crude steel, and steel semimanufactures declined slightly, after all had posted significant gains in 1984. The production of lead increased for the second consecutive year, but that of zinc subsided after an escalation for the past 9 years. The Netherlands lacked sophisticated facilities for special and rare metals and was not a significant producer of such commodities on the world basis.

Table 1.—Netherlands: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984[p]	1985[e]
METALS					
Aluminum:					
Primary	261,983	250,925	235,351	249,170	[3]250,603
Secondary	50,217	49,825	58,199	59,894	[3]62,315
Cadmium metal	518	497	513	636	600
Iron and steel:					
Ore sintered (from imported ore) thousand tons	3,042	2,512	2,669	3,516	[3]3,742
Metal:					
Pig iron do	4,600	3,617	3,447	4,926	[3]4,819
Steel, crude do	5,472	4,346	4,477	5,739	[3]5,517
Semimanufactures do	4,732	3,882	4,066	4,928	[3]4,868
Lead:					
Smelter[e]	2,500	2,500	2,500	2,500	3,000
Refined:					
Primary	([4])	[r]4,800	2,000	([4])	--
Secondary	[r]33,900	[r]27,700	23,600	33,600	[3]37,600
Total	33,900	[r]32,500	25,600	33,600	[3]37,600
Tin, refined:					
Primary	3,500	2,800	5,398	6,517	[3]6,033
Secondary	180	180	180	180	[3]204
Zinc (slab), primary	177,363	186,022	187,519	209,657	[3]201,712
INDUSTRIAL MINERALS					
Cement, hydraulic thousand tons	3,316	3,103	3,107	3,176	[3]2,911
Nitrogen: N content of ammonia do	1,814	1,655	1,747	2,311	[3]2,396
Salt, all types do	3,578	3,191	3,124	3,674	[3]4,154
Sand, industrial do	20,000	17,359	19,399	[e]19,000	[3]18,994
Sodium compounds, n.e.s.:[e]					
Carbonate do	420	420	420	400	380
Sulfate, synthetic do	50	50	50	45	45
Sulfur:					
Elemental byproduct:[e]					
Of metallurgy do	90	100	100	([4])	--
Of petroleum and other forms do	55	65	105	[r]245	250
Total do	145	165	205	[r]245	250
Sulfuric acid, 100% H_2SO_4 do	1,726	1,609	1,420	1,609	[3]1,508
MINERAL FUELS AND RELATED MATERIALS					
Carbon black	97,800	82,700	91,200	102,300	[3]103
Coke thousand tons	2,242	2,428	2,126	2,726	[3]2,958
Gas:					
Manufactured, all types[5] million cubic feet	220,463	272,739	288,445	298,631	[3]267,609
Natural, gross do	2,988,165	2,543,844	2,702,792	2,728,041	[3]2,850,581
Natural gas liquids thousand 42-gallon barrels	2,970	2,981	3,608	3,818	4,000
Peat[e] thousand tons	400	400	400	450	450
Petroleum:					
Crude thousand 42-gallon barrels	9,188	11,158	17,647	21,143	[3]27,734
Refinery products:					
Gasoline, motor do	55,939	62,008	60,597	56,568	[3]53,049
Jet fuel do	24,064	26,824	28,288	28,968	[3]27,800
Kerosene do	3,061	3,410	4,487	4,487	[3]3,550
Distillate fuel oil do	104,149	101,613	107,461	120,039	[3]111,303
Residual fuel oil do	96,976	89,424	103,743	102,744	[3]85,901
Lubricants do	3,654	3,297	3,423	[e]3,500	[3]5,544
Liquefied petroleum gas do	16,646	17,934	21,912	[e]22,000	[3]22,562
Naphtha do	52,522	56,602	67,737	63,784	[3]50,133
Bitumen do	3,127	4,200	4,375	[e]4,500	[3]4,242
Total[6] do	360,138	365,312	402,023	406,590	364,084

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through June 1986.
[2]In addition to the commodities listed, a variety of crude construction materials (clays, gravel, and stone) are also produced, but output is not reported, and available information is inadequate to make reliable estimates of output levels.
[3]Reported figure.
[4]Revised to zero.
[5]Coke oven and blast furnace gas only.
[6]Total of listed products only; refinery fuel and losses included with listed products.

TRADE

The Netherlands is by tradition a trading country with over 60% of its national income derived from trade. Trade growth continued, led by the country's major trading partner, the Federal Republic of Germany. Exports were up 11% and imports were up 13% during the first three quarters of 1985. Exports growth was spread across a broad range of products with the strongest increase in exports of mineral commodities, steel products, organic chemicals, etc. Exports of metals, which accounted for almost 25% of total exports, increased by 9% in the first 9 months of 1985, compared with 10% in 1984.[4] The Netherlands continued to be a major exporter of indigenous natural gas to neighboring countries, and of steel, which it exported worldwide. Imports of raw materials and semimanufactures accounted for over 60% of total imports and increased 4% in 1985. Most of the trade traffic went through Rotterdam, the world's largest seaport. Other Netherlands ports also provided facilities for storage and stockpiling of raw materials, which were reexported by client countries.

The Netherlands remained an important trade and investment partner of the United States. U.S. exports included natural borates, coal, germanium, magnesium, molybdenum, petroleum coke, and other commodities. The Netherlands imported various metal and industrial mineral commodities from the United States, but in small quantities. The Netherlands was one of the few countries with which the United States had a large trade surplus.

Table 2.—Netherlands: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984	
			United States	Other (principal)
METALS				
Alkali and alkaline-earth metals:				
Alkali metals	7	5	--	NA.
Alkaline-earth metals	24	2	--	NA.
Aluminum:				
Ore and concentrate	3,490	5,509	342	Belgium-Luxembourg 2,827; United Kingdom 872; West Germany 529.
Oxides and hydroxides	51,883	65,039	45	West Germany 23,455; United Kingdom 8,492; Italy 8,217.
Ash and residue containing aluminum	7,095	9,847	--	West Germany 7,252; Spain 1,895; France 14.
Metal including alloys:				
Scrap	80,201	93,258	68	West Germany 56,050; France 18,244; Belgium-Luxembourg 10,720.
Unwrought	433,281	279,020	3,267	Belgium-Luxembourg 119,204; France 75,659; West Germany 48,666.
Semimanufactures	106,810	107,343	5,207	West Germany 43,247; Belgium-Luxembourg 14,375; United Kingdom 14,073.
Antimony:				
Oxides	226	134	NA	West Germany 103; France 20; India 6.
Metal including alloys, all forms	13	160	--	West Germany 58; Belgium-Luxembourg 50; Poland 29.
Arsenic:				
Oxides and acids	1	3	--	NA.
Metal including alloys, all forms	39	177	54	France 65; West Germany 24.
Bismuth: Metal including alloys, all forms	74	59	--	U.S.S.R. 33; West Germany 8; Spain 6.
Cadmium: Metal including alloys, all forms	782	841	--	France 331; West Germany 232; Belgium-Luxembourg 143.
Chromium:				
Ore and concentrate	18,603	21,377	--	France 6,639; West Germany 6,072; Belgium-Luxembourg 4,209.
Oxides and hydroxides	285	290	3	United Kingdom 125; West Germany 84; Belgium-Luxembourg 34.
Metal including alloys, all forms	58	518	12	West Germany 297; Romania 86; Sweden 86.

See footnotes at end of table.

Table 2.—Netherlands: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued				
Cobalt:				
Oxides and hydroxides	38	60	--	West Germany 18; United Kingdom 13; France 10.
Ash and residue containing cobalt	198	1,167	--	Finland 626; West Germany 209; Norway 177.
Metal including alloys, all forms	158	259	92	Japan 35; France 23.
Columbium and tantalum:				
Ore and concentrate	29	74	--	U.S.S.R. 71.
Ash and residue containing columbium and/or tantalum	20	1,149	--	All to Belgium-Luxembourg.
Metal including alloys, all forms, tantalum	9	1	([3])	Mainly to East Germany.
Copper:				
Ore and concentrate	--	1,118	--	West Germany 1,084; Portugal 20.
Oxides and hydroxides	143	163	NA	United Kingdom 42; Belgium-Luxembourg 40; Greece 15.
Sulfate	2,749	1,247	NA	Belgium-Luxembourg 450; West Germany 346; United Kingdom 261.
Ash and residue containing copper	4,308	6,548	8	Belgium-Luxembourg 3,218; West Germany 2,956; Sweden 175.
Metal including alloys:				
Scrap	59,055	62,443	7	West Germany 33,531; Belgium-Luxembourg 16,336; Italy 8,162.
Unwrought	6,573	7,535	1,403	West Germany 3,379; Italy 959.
Semimanufactures	53,793	59,150	17,947	West Germany 11,310; United Kingdom 5,249.
Germanium: Metal including alloys, all forms value, thousands	$372	$31	$25	NA.
Gold:				
Waste and sweepings do	$34,743	$20,551	$602	West Germany $17,038; Spain $1,253; Belgium-Luxembourg $881.
Metal including alloys, unwrought and partly wrought troy ounces	155,556	98,389	1,713	United Kingdom 50,785; West Germany 13,199; Switzerland 8,965.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite	13,795	45,316	18	West Germany 38,591; France 2,559; Malaysia 608.
Pyrite, roasted	55	76	23	Australia 24.
Metal:				
Scrap thousand tons	1,522	1,684	([3])	West Germany 624; Belgium-Luxembourg 336; India 179.
Pig iron, cast iron, related materials	13,203	8,977	NA	West Germany 7,457; Denmark 614; Morocco 200.
Ferroalloys:				
Ferrochromium	3,308	4,087	--	Belgium-Luxembourg 3,261; West Germany 770; Portugal 24.
Ferromanganese	74	562	--	All to Belgium-Luxembourg.
Ferromolybdenum	145	83	--	Poland 30; Hungary 17; France 12.
Ferronickel	650	8	--	All to Belgium-Luxembourg.
Ferrosilicochromium	4	([3])	--	NA.
Ferrosilicomanganese	--	115	--	East Germany 70.
Ferrosilicon	5,167	13	--	NA.
Silicon metal	3,026	153	25	West Germany 106; Japan 22.
Unspecified	229	203	--	West Germany 180.
Steel, primary forms thousand tons	1,686	2,319	257	West Germany 307; Italy 282; Greece 237.
Semimanufactures:				
Bars, rods, angles, shapes, sections do	456	458	19	Belgium-Luxembourg 120; West Germany 107; United Kingdom 40.
Universals, plates, sheets do	1,550	1,197	169	Belgium-Luxembourg 332; West Germany 298; United Kingdom 217.
Hoop and strip do	101	128	([3])	West Germany 54; Switzerland 36; Belgium-Luxembourg 11.
Rails and accessories do	40	28	([3])	Italy 23; West Germany 3; Portugal 1.
Wire do	61	71	2	West Germany 20; France 14; Belgium-Luxembourg 12.
Tubes, pipes, fittings do	388	446	29	West Germany 107; Belgium-Luxembourg 59; United Kingdom 46.

See footnotes at end of table.

Table 2.—Netherlands: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal —Continued				
Semimanufactures —Continued				
Castings and forgings, rough thousand tons	22	19	([2])	Belgium-Luxembourg 10; West Germany 5; United Kingdom 3.
Lead:				
Oxides	6,524	9,109	--	West Germany 5,705; Italy 1,264; United Kingdom 780.
Ash and residue containing lead	2,023	2,740	33	Denmark 1,136; Belgium-Luxembourg 1,060; West Germany 357.
Metal including alloys:				
Scrap	25,946	30,024	18	West Germany 21,570; Belgium-Luxembourg 6,608; France 749.
Unwrought	13,197	15,373	218	West Germany 11,274; Belgium-Luxembourg 1,390; United Kingdom 583.
Semimanufactures	1,784	1,951	1	Norway 898; West Germany 329; Belgium-Luxembourg 274.
Lithium: Oxides and hydroxides	145	14	NA	France 10.
Magnesium: Metal including alloys:				
Scrap	946	1,562	133	Italy 687; West Germany 503; United Kingdom 139.
Unwrought	7,608	8,069	72	West Germany 4,459; United Kingdom 2,281; Belgium-Luxembourg 889.
Semimanufactures	16	44	([2])	Belgium-Luxembourg 9.
Manganese:				
Ore and concentrate, metallurgical-grade	43,208	46,597	--	West Germany 11,360; Republic of South Africa 8,001; France 3,745.
Oxides	245	216	3	Finland 140.
Metal including alloys, all forms	2,257	1,490	--	West Germany 406; Norway 311; Switzerland 208.
Mercury 76-pound flasks	12,125	12,183	899	United Kingdom 2,089; West Germany 1,799; Hungary 1,740.
Molybdenum:				
Ore and concentrate	8,905	15,801	5	United Kingdom 3,816; Austria 3,751; West Germany 2,970.
Oxides and hydroxides	1,504	1,631	NA	Austria 1,245; Belgium-Luxembourg 94; United Kingdom 93.
Ash and residue containing molybdenum	121	482	NA	United Kingdom 160; West Germany 122; Belgium-Luxembourg 98.
Metal including alloys:				
Scrap	12	27	--	West Germany 6.
Unwrought	17	5	NA	United Kingdom 3.
Semimanufactures	155	90	NA	Belgium-Luxembourg 63; France 6; Spain 6.
Nickel:				
Matte and speiss	2,782	2,768	NA	NA.
Oxides and hydroxides	781	--		
Ash and residue containing nickel	2,317	2,244	--	West Germany 858; United Kingdom 607; France 255.
Metal including alloys:				
Scrap	2,206	3,015	13	Finland 1,462; West Germany 670; France 255.
Unwrought	2,013	426	--	Austria 69; France 67; West Germany 57.
Semimanufactures	1,514	235	2	West Germany 76; France 37; Italy 28.
Platinum-group metals:				
Waste and sweepings value, thousands	$16,340	$16,978	--	Belgium-Luxembourg $7,758; France $3,974; West Germany $2,644.
Metals including alloys, unwrought and partly wrought troy ounces	62,860	78,346	1,266	West Germany 43,953; France 9,470; Denmark 4,394.
Rare-earth metals including alloys, all forms	2	--		
Rhenium: Metal including alloys, all forms value, thousands	$3	$8	NA	NA.
Selenium, elemental	5	10	NA	United Kingdom 6.

See footnotes at end of table.

Table 2.—Netherlands: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984	
			United States	Other (principal)
METALS —Continued				
Silver:				
Waste and sweepings[3] value, thousands	$20,812	$9,211	$840	Spain $4,850; West Germany $2,150.
Metal including alloys, unwrought and partly wrought thousand troy ounces	5,120	3,880	18	West Germany 2,199; Belgium-Luxembourg 417; France 326.
Tin:				
Ore and concentrate	344	324	--	Belgium-Luxembourg 303; United Kingdom 20.
Oxides	13	14	NA	Belgium-Luxembourg 7; West Germany 4.
Ash and residue containing tin	856	1,762	NA	West Germany 1,360; Denmark 391; United Kingdom 5.
Metal including alloys:				
Scrap	177	225	--	West Germany 111; Denmark 48; Belgium-Luxembourg 30.
Unwrought	3,411	4,154	5	West Germany 1,823; France 1,053; Belgium-Luxembourg 400.
Semimanufactures	841	928	(2)	West Germany 594; Belgium-Luxembourg 140; Sweden 64.
Titanium:				
Ore and concentrate	41,600	47,659	NA	United Kingdom 14,764; West Germany 6,166; Romania 4,500.
Oxides	3,715	4,230	NA	Italy 2,458; Belgium-Luxembourg 320; West Germany 290.
Ash and residue containing titanium	--	121	--	United Kingdom 25.
Metal including alloys:				
Scrap	3	99	--	Italy 41; West Germany 40; United Kingdom 18.
Semimanufactures	33	16	(2)	West Germany 11; Belgium-Luxembourg 2; United Kingdom 1.
Tungsten:				
Ore and concentrate	629	451	--	West Germany 194; East Germany 189; Czechoslovakia 40.
Oxides and hydroxides	(2)	23	--	NA.
Ash and residue containing tungsten	29	29	NA	West Germany 16; United Kingdom 11.
Metal including alloys:				
Scrap	239	240	186	Belgium-Luxembourg 24; West Germany 22.
Unwrought	22	112	--	U.S.S.R. 85; Austria 19; France 2.
Semimanufactures	137	108	10	Belgium-Luxembourg 69; Bulgaria 8.
Vanadium:				
Ash and residue containing vanadium	20	87	--	All to West Germany.
Metal including alloys, all forms	7	1	--	All to Belgium-Luxembourg.
Zinc:				
Ore and concentrate	26	62	--	All to West Germany.
Blue powder	3,891	4,449	--	West Germany 31.
Matte	1,951	3,442	--	West Germany 2,193; Belgium-Luxembourg 827; France 234.
Ash and residue containing zinc	7,940	9,155	--	West Germany 4,303; Belgium-Luxembourg 3,263; France 1,153.
Metal including alloys:				
Scrap	9,509	11,500	--	West Germany 7,289; Belgium-Luxembourg 2,424; France 1,118.
Unwrought	184,078	186,197	14,542	West Germany 30,823; United Kingdom 28,992; Belgium-Luxembourg 25,530.
Semimanufactures	5,479	5,523	46	West Germany 3,159; France 1,099; Belgium-Luxembourg 548.
Zirconium:				
Ore and concentrate	22,699	39,582	NA	West Germany 22,028; France 5,764; United Kingdom 3,486.
Metal including alloys, all forms	2	4	4	NA.
Other:				
Ores and concentrates	76	227	--	West Germany 170; United Kingdom 26.
Oxides and hydroxides	6	27	NA	West Germany 12; East Germany 11.
Ashes and residues	r590	845	NA	West Germany 358; France 144; Finland 115.
Base metals including alloys, all forms	4	5	2	West Germany 1; United Kingdom 1.

See footnotes at end of table.

Table 2.—Netherlands: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	5,827	6,721	183	Thailand 1,853; Pakistan 804; United Kingdom 610.
Artificial, corundum	184	48	--	Belgium-Luxembourg 22; Australia 21.
Dust and powder of precious and semiprecious stones including diamond kilograms	99	91	([2])	Italy 18; West Germany 13; Sweden 12.
Grinding and polishing wheels and stones	3,858	4,699	7	United Kingdom 1,038; West Germany 690; France 653.
Asbestos, crude	243	217	([2])	France 154; West Germany 27; Guinea 10.
Barite and witherite	68,162	59,067	281	United Kingdom 31,085; Denmark 11,781; West Germany 6,901.
Boron materials:				
Crude natural borates	356,639	247,330	NA	Australia 1,782; Italy 1,755; undetermined 236,375.
Oxides and acids	788	586	--	West Germany 254; Venezuela 41; Belgium-Luxembourg 31.
Bromine	1,035	1,340	NA	France 960; West Germany 175; Belgium-Luxembourg 101.
Cement	474,397	709,444	21	West Germany 196,753; Belgium-Luxembourg 176,754; Bahrain 75,863.
Chalk	18,744	21,425	--	Belgium-Luxembourg 19,602; West Germany 1,498; Netherlands Antilles 125.
Clays, crude:				
Bentonite	22,238	23,916	NA	West Germany 5,442; United Kingdom 4,319; Egypt 2,809.
Chamotte earth	593	895	NA	West Germany 745.
Kaolin	108,861	106,473	NA	Belgium-Luxembourg 74,676; West Germany 22,691; France 4,264.
Unspecified	[r]108,324	63,834	NA	West Germany 35,058; Belgium-Luxembourg 21,883; Sweden 3,515.
Diamond:				
Gem, not set or strung carats	320,672	422,181	185,574	Switzerland 60,840; Israel 57,493.
Industrial stones do	480,787	661,750	79,252	Belgium-Luxembourg 246,900; Italy 58,483.
Diatomite and other infusorial earth	1,066	876	--	Belgium-Luxembourg 194; West Germany 132; United Kingdom 106.
Feldspar, fluorspar, related materials:				
Feldspar	1,124	2,179	--	West Germany 1,650; France 311.
Fluorspar	135	290	--	United Kingdom 228.
Unspecified	13,739	15,781	--	West Germany 12,391; Belgium-Luxembourg 2,044; France 663.
Fertilizer materials:				
Crude, n.e.s	73,894	84,443	--	Belgium-Luxembourg 62,600; West Germany 19,375; Austria 1,210.
Manufactured:				
Ammonia thousand tons	402	664	8	Belgium-Luxembourg 287; United Kingdom 113; Finland 83.
Nitrogenous (N content) do	1,175	1,286	82	France 329; West Germany 276; India 221.
Phosphatic (P_2O_5 content) do	153	165	NA	France 62; United Kingdom 32; West Germany 19.
Potassic (K_2O content) do	3	2	NA	Belgium-Luxembourg 1.
Unspecified and mixed do	1,010	1,339	([2])	France 316; West Germany 230; United Kingdom 135.
Graphite, natural	152	290	6	West Germany 204; Belgium-Luxembourg 27.
Gypsum and plaster	28,809	26,891	175	Belgium-Luxembourg 24,668; West Germany 1,153; Libya 168.
Iodine	34	17	NA	Egypt 6; Cuba 2; Czechoslovakia 2.
Kyanite and related materials	987	2,171	NA	West Germany 1,640; Belgium-Luxembourg 239; Spain 124.
Lime	5,288	6,478	43	West Germany 2,670; Belgium-Luxembourg 2,660.

See footnotes at end of table.

Table 2.—Netherlands: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984 United States	Destinations, 1984 Other (principal)
INDUSTRIAL MINERALS —Continued				
Magnesium compounds:				
Magnesite, crude	r1,875	1,554	NA	West Germany 1,066; Belgium-Luxembourg 278; France 97.
Oxides and hydroxides[4]	r27,481	25,860	59	West Germany 13,660; Belgium-Luxembourg 2,447; France 1,401.
Sulfate	8,257	4,758	NA	France 3,922; Belgium-Luxembourg 803.
Mica:				
Crude including splittings and waste	2,834	773	--	West Germany 138; Belgium-Luxembourg 104; Italy 69.
Worked including agglomerated splittings ___ value, thousands	$22	$42	--	Belgium-Luxembourg $23; West Germany $7.
Nitrates, crude	83	427	--	Belgium-Luxembourg 326; West Germany 90.
Phosphates, crude	39,478	32,944	--	West Germany 13,406; United Kingdom 11,627; Belgium-Luxembourg 6,376.
Pigments, mineral:				
Natural, crude	213	223	41	Belgium-Luxembourg 80; Saudi Arabia 54.
Iron oxides and hydroxides, processed	6,927	7,976	3,111	West Germany 2,207; France 1,233.
Potassium salts, crude (K_2O content)	--	543	--	France 539.
Precious and semiprecious stones other than diamond:				
Natural ___ kilograms	2,422	2,121	NA	West Germany 2,109; Belgium-Luxembourg 11.
Synthetic ___ do	99	25	NA	NA.
Pyrite, unroasted	--	7	--	All to Belgium-Luxembourg.
Salt and brine ___ thousand tons	2,193	2,594	NA	Belgium-Luxembourg 649; France 7; United Kingdom 4.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	159,573	209,570	NA	West Germany 61,844; Belgium-Luxembourg 21,121; Denmark 14,595.
Sulfate, manufactured[5]	16,342	13,935	NA	West Germany 6,014; France 2,467; Belgium-Luxembourg 1,964.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	9,454	12,149	17	West Germany 9,482; Belgium-Luxembourg 2,066; United Kingdom 178.
Worked	39,273	54,834	55	Belgium-Luxembourg 28,256; West Germany 25,022; United Kingdom 1,472.
Dolomite, chiefly refractory-grade	18,741	29,671	--	Belgium-Luxembourg 13,149; West Germany 9,507; France 2,670.
Gravel and crushed rock	2,676,030	3,001,132	92	Belgium-Luxembourg 2,651,770; West Germany 328,902; France 14,080.
Limestone other than dimension	468	2,236	--	Kuwait 2,129.
Quartz and quartzite	16,014	16,298	34	West Germany 10,674; Austria 1,585; Saudi Arabia 735.
Sand other than metal-bearing	7,008,260	7,255,570	--	Belgium-Luxembourg 6,748,764; West Germany 439,671; France 41,029.
Sulfur:				
Elemental:				
Crude including native and byproduct	15,100	26,415	--	Belgium-Luxembourg 19,903; West Germany 6,425.
Colloidal, precipitated, sublimed	20	3	NA	Belgium-Luxembourg 1.
Dioxide	1,106	701	NA	Belgium-Luxembourg 412; Israel 140; Saudi Arabia 68.
Sulfuric acid	170,306	261,795	75	Belgium-Luxembourg 170,438; West Germany 64,783; United Kingdom 16,751.
Talc, steatite, soapstone, pyrophyllite	17,551	10,791	--	West Germany 4,002; Norway 2,003; Belgium-Luxembourg 1,877.
Vermiculite, perlite, chlorite	489	380	NA	Belgium-Luxembourg 157; West Germany 131; Austria 91.
Other:				
Crude	r224,937	220,739	337	Belgium-Luxembourg 111,636; West Germany 67,013; France 20,798.
Slag and dross, not metal-bearing	587,940	570,300	270	Belgium-Luxembourg 324,904; United Kingdom 119,152; West Germany 29,415.

See footnotes at end of table.

Table 2.—Netherlands: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	4,413	1,717	--	West Germany 1,057; Belgium-Luxembourg 623.
Carbon black	86,533	94,991	1,503	France 28,504; West Germany 19,019; Belgium-Luxembourg 15,371.
Coal:				
Anthracite thousand tons	186	170	--	Belgium-Luxembourg 67; United Kingdom 47; France 26.
Bituminous do.	648	1,095	--	West Germany 285; United Kingdom 235; Belgium-Luxembourg 215.
Lignite including briquets do.	2	5	--	Belgium-Luxembourg 2; United Kingdom 2; West Germany 1.
Coke and semicoke do.	687	963	--	Belgium-Luxembourg 413; France 310; West Germany 126.
Gas, natural: Gaseous million cubic feet	1,444,599	1,398,996	--	West Germany 730,074; France 263,135; Belgium-Luxembourg 208,105.
Peat including briquets and litter	166,096	193,169	2	Belgium-Luxembourg 78,504; France 54,443; West Germany 44,578.
Petroleum:				
Crude thousand 42-gallon barrels	1,735	3,648	--	Belgium-Luxembourg 2,893; West Germany 748; France 7.
Refinery products:				
Liquefied petroleum gas do.	6,874	6,488	57	Belgium-Luxembourg 3,135; West Germany 1,688; United Kingdom 597.
Gasoline, motor do.	81,596	80,617	3,294	West Germany 45,783; Belgium-Luxembourg 10,824; France 8,926.
Mineral jelly and wax do.	404	468	10	West Germany 191; France 71; United Kingdom 27.
Kerosene and jet fuel do.	25,067	24,792	495	West Germany 11,325; Denmark 3,112; United Kingdom 1,547.
Distillate fuel oil do.	84,059	91,213	406	West Germany 54,313; Belgium-Luxembourg 18,324; France 6,484.
Lubricants do.	4,890	5,249	39	Belgium-Luxembourg 1,086; West Germany 627; United Kingdom 492.
Residual fuel oil do.	105,634	98,528	2,369	West Germany 23,780; United Kingdom 21,110; bunkers 25,715.
Bitumen and other residues do.	3,407	2,236	--	United Kingdom 635; West Germany 529; Norway 414.
Bituminous mixtures do.	242	327	(2)	West Germany 262; Belgium-Luxembourg 15; United Arab Emirates 7.
Petroleum coke do.	659	511	2	West Germany 315; Belgium-Luxembourg 119; Romania 29.

[r]Revised. NA Not available.
[1]Table prepared by staff, Branch of Geographic Data.
[2]Less than 1/2 unit.
[3]May include other precious metals.
[4]Data excludes undetermined secret amounts of sintered magnesite.
[5]Includes cadmium sulfate.

Table 3.—Netherlands: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS				
Alkali and alkaline-earth metals:				
Alkali metals	98	104	--	West Germany 97.
Alkaline-earth metals	35	26	1	West Germany 13; Canada 8; France 4.
Aluminum:				
Ore and concentrate	135,623	130,784	540	Greece 17,258; China 6,206; Guyana 4,833.
Oxides and hydroxides	531,389	598,105	10,372	Suriname 189,997; Greece 124,071; West Germany 79,190.
Ash and residue containing aluminum	5,426	10,119	NA	West Germany 3,455; Belgium-Luxembourg 2,069; East Germany 1,787.
Metal including alloys:				
Scrap	48,280	57,473	2,620	West Germany 20,520; Belgium-Luxembourg 7,984; France 5,449.
Unwrought	284,637	132,985	36	Norway 49,332; West Germany 30,274; U.S.S.R. 24,494.
Semimanufactures	116,970	120,499	2,291	West Germany 43,429; Belgium-Luxembourg 29,628; France 3,334.
Antimony:				
Oxides	1,053	1,131	7	France 488; Belgium-Luxembourg 389; United Kingdom 166.
Metal including alloys, all forms	34	191	--	Belgium-Luxembourg 59; Turkey 50; Yugoslavia 50.
Arsenic:				
Oxides and acids	110	83	--	United Kingdom 79.
Metal including alloys, all forms	63	164	NA	Sweden 155; Belgium-Luxembourg 8.
Beryllium:				
Oxides and hydroxides	--	1	--	NA.
Metal including alloys, all forms	([2])	2	([2])	West Germany 1.
Bismuth: Metal including alloys, all forms	25	64	1	United Kingdom 30; Belgium-Luxembourg 23; West Germany 6.
Cadmium: Metal including alloys, all forms	286	239	3	West Germany 74; China 46; Republic of Korea 42.
Chromium:				
Ore and concentrate	20,554	23,802	--	Republic of South Africa 22,014; Finland 1,393; West Germany 213.
Oxides and hydroxides	1,292	1,431	387	West Germany 575; Italy 229.
Metal including alloys, all forms	132	814	1	West Germany 383; China 183; Japan 127.
Cobalt:				
Oxides and hydroxides	246	282	30	Belgium-Luxembourg 175; Finland 66.
Ash and residue containing cobalt	207	446	14	West Germany 197; Brazil 181; Spain 17.
Metal including alloys, all forms	240	313	3	West Germany 139; United Kingdom 101; France 30.
Columbium and tantalum:				
Ore and concentrate	5	59	10	West Germany 44; Australia 4.
Metal including alloys, all forms:				
Columbium (niobium) value, thousands	$68	$26	$13	West Germany $6; Belgium-Luxembourg $3.
Tantalum do	$143	$204	$37	West Germany $101.
Copper:				
Ore and concentrate	1,146	167	--	Belgium-Luxembourg 118; West Germany 30; Portugal 15.
Oxides and hydroxides	430	794	NA	Italy 274; West Germany 206; Belgium-Luxembourg 130.
Sulfate	5,882	5,367	NA	Belgium-Luxembourg 1,877; Poland 1,056; West Germany 1,031.
Ash and residue containing copper	744	1,485	41	West Germany 591; Portugal 235; Cuba 227.
Metal including alloys:				
Scrap	38,047	43,123	1,232	West Germany 14,274; Belgium-Luxembourg 7,449; United Kingdom 6,209.
Unwrought	26,493	24,929	104	East Germany 4,568; Belgium-Luxembourg 3,920; West Germany 3,440.
Semimanufactures	71,806	89,461	269	West Germany 40,546; Belgium-Luxembourg 28,151; France 10,004.

See footnotes at end of table.

Table 3.—Netherlands: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Germanium: Metal including alloys, all forms ------- value, thousands--	$350	$172	$19	Belgium-Luxembourg $136.
Gold:				
Waste and sweepings -----do----	$2,259	$4,774	--	Belgium-Luxembourg $2,002; Denmark $1,836; West Germany $486.
Metal including alloys, unwrought and partly wrought -troy ounces--	223,390	151,468	53	United Kingdom 74,772; West Germany 35,452; Switzerland 20,039.
Hafnium: Metal including alloys, all forms ------- value, thousands--	$10	$7	$2	West Germany $3; France $1.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite thousand tons--	4,980	7,237	(2)	Brazil 2,355; Sweden 1,451; Spain 735.
Pyrite, roasted------------	14	1,205	--	Belgium-Luxembourg 1,190; Austria 15.
Metal:				
Scrap -----------------	363,733	479,712	2,670	West Germany 206,941; United Kingdom 143,132; Belgium-Luxembourg 83,787.
Pig iron, cast iron, related materials-----------------	37,675	54,074	58	West Germany 17,227; Brazil 15,903; France 8,441.
Ferroalloys:				
Ferrochromium ---------	3,406	5,523	--	Albania 4,309; West Germany 1,031; Sweden 61.
Ferromanganese--------	12,065	26,629	--	Norway 12,050; France 9,152; West Germany 5,307.
Ferromolybdenum-------	147	122	--	West Germany 83; Sweden 18; Austria 13.
Ferronickel-----------	1,148	890	28	Brazil 720; Canada 127.
Ferrosilicochromium -----	66	57	--	All from West Germany.
Ferrosilicomanganese ----	3,758	6,656	--	Norway 4,302; France 1,476; West Germany 867.
Ferrosilicon-----------	8,683	5,203	--	West Germany 2,348; Norway 2,019; France 564.
Silicon metal ----------	4,695	2,376	--	West Germany 1,302; France 487; Norway 347.
Unspecified-----------	858	940	--	France 308; West Germany 273; United Kingdom 71.
Steel, primary forms --------	418,264	445,714	7	West Germany 160,151; Norway 123,055; Italy 67,727.
Semimanufactures:				
Bars, rods, angles, shapes, sections- thousand tons--	1,058	1,211	(2)	Belgium-Luxembourg 435; West Germany 410; France 98.
Universals, plates, sheets do----	904	1,040	(2)	Belgium-Luxembourg 421; West Germany 361; United Kingdom 39.
Hoop and strip ----do----	193	220	(2)	West Germany 142; Belgium-Luxembourg 47; Austria 7.
Rails and accessories do----	51	50	--	West Germany 36; France 10; Belgium-Luxembourg 4.
Wire ----------do----	100	110	(2)	West Germany 53; Belgium-Luxembourg 38; France 9.
Tubes, pipes, fittings do----	512	693	4	West Germany 395; France 84; Belgium-Luxembourg 53.
Castings and forgings, rough do----	18	23	(2)	West Germany 13; Belgium-Luxembourg 6; United Kingdom 1.
Lead:				
Ore and concentrate-----------	2	7	--	France 4; Austria 3.
Oxides ------------------	4,174	5,006	8	West Germany 4,020; Belgium-Luxembourg 775; France 202.
Ash and residue containing lead----	1,442	2,347	NA	West Germany 867; Belgium-Luxembourg 844; Ireland 346.
Metal including alloys:				
Scrap -----------------	15,220	22,045	898	West Germany 9,405; United Kingdom 4,743; Belgium-Luxembourg 3,936.
Unwrought--------------	36,739	32,200	107	Belgium-Luxembourg 14,431; West Germany 8,851; France 3,669.
Semimanufactures ---------	5,143	9,212	(2)	Belgium-Luxembourg 7,571; West Germany 952; United Kingdom 468.

See footnotes at end of table.

Table 3.—Netherlands: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS—Continued				
Lithium:				
Oxides and hydroxides	143	68	47	West Germany 11; United Kingdom 10.
Metal including alloys, all forms	2	21	NA	West Germany 1; undetermined 19.
Magnesium: Metal including alloys:				
Scrap	502	1,494	41	Taiwan 462; West Germany 371; France 163.
Unwrought	8,404	9,800	8,305	France 762; Norway 530.
Semimanufactures	218	302	4	West Germany 152; United Kingdom 96; Switzerland 19.
Manganese:				
Ore and concentrate, metallurgical-grade	44,389	50,386	NA	Belgium-Luxembourg 4,618; Italy 894; undetermined 44,196.
Oxides	714	443	54	Belgium-Luxembourg 273; West Germany 43.
Metal including alloys, all forms	2,170	1,714	78	Republic of South Africa 1,000; Mozambique 372; France 190.
Mercury 76-pound flasks	9,979	4,931	--	Sweden 2,176; Finland 2,031; Turkey 203.
Molybdenum:				
Ore and concentrate	13,816	20,741	17,351	Chile 2,927; Canada 297.
Oxides and hydroxides	29	9	--	All from West Germany.
Ash and residue containing molybdenum	102	163	--	Italy 85; Austria 43.
Metal including alloys:				
Scrap	3	7	--	West Germany 6.
Unwrought	175	130	--	West Germany 129.
Semimanufactures	57	41	6	Belgium-Luxembourg 23; Austria 7.
Nickel:				
Ore and concentrate	8	--		
Matte and speiss	4,279	NA		
Oxides and hydroxides	267	152	NA	United Kingdom 17.
Ash and residue containing nickel	1,138	1,442	77	West Germany 591; France 312; Albania 252.
Metal including alloys:				
Scrap	1,320	3,737	274	West Germany 1,222; Canada 790; United Kingdom 729.
Unwrought	3,116	1,634	17	United Kingdom 595; Canada 238; West Germany 177.
Semimanufactures	2,013	1,006	96	West Germany 353; United Kingdom 290.
Platinum-group metals:				
Waste and sweepings value, thousands	$4,182	$1,293	--	Belgium-Luxembourg $590; Denmark $271; Turkey $177.
Metals including alloys, unwrought and partly wrought troy ounces	69,129	92,126	14,678	Switzerland 21,133; West Germany 17,824.
Rare-earth metals including alloys, all forms	81	1	NA	NA.
Rhenium: Metal including alloys, all forms	(²)	2	--	All from West Germany.
Selenium, elemental	15	31	1	United Kingdom 4; Belgium-Luxembourg 3.
Silicon, high-purity	6	15	--	West Germany 9; Italy 6.
Silver:				
Waste and sweepings[3] value, thousands	$2,868	$1,035	--	Denmark $591; Belgium-Luxembourg $247; France $92.
Metal including alloys, unwrought and partly wrought thousand troy ounces	4,326	4,548	88	Switzerland 867; United Kingdom 855; West Germany 838.
Tin:				
Ore and concentrate	8,910	12,982	NA	NA.
Oxides	112	149	NA	United Kingdom 91; West Germany 28; Italy 27.
Ash and residue containing tin	609	432	50	West Germany 141; Belgium-Luxembourg 71.
Metal including alloys:				
Scrap	186	368	--	West Germany 148; Italy 59; Belgium-Luxembourg 41.
Unwrought	2,753	2,254	33	Malaysia 556; Thailand 340; United Kingdom 287.
Semimanufactures	250	328	3	United Kingdom 130; West Germany 92; Denmark 40.

See footnotes at end of table.

Table 3.—Netherlands: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Titanium:				
Ore and concentrate	53,702	51,868	--	Australia 17,339; Sierra Leone 15,873; Republic of South Africa 8,090.
Oxides	5,850	6,849	255	West Germany 3,469; United Kingdom 851; Belgium-Luxembourg 776.
Ash and residue containing titanium	41,055	45,419	NA	Canada 45,352.
Metal including alloys:				
Scrap	20	109	41	United Kingdom 46; Taiwan 7.
Unwrought	18	35	4	Japan 31.
Semimanufactures	206	109	7	West Germany 37; United Kingdom 36; Portugal 10.
Tungsten:				
Ore and concentrate	1,317	674	--	Portugal 207; Burma 120; Canada 102.
Oxides and hydroxides	2	1	NA	NA.
Ash and residue containing tungsten	17	14	NA	West Germany 9.
Metal including alloys:				
Scrap	112	11	--	West Germany 8; France 2.
Unwrought	312	301	273	Austria 20; West Germany 8.
Semimanufactures	66	30	1	Belgium-Luxembourg 18; West Germany 5.
Uranium: Metal including alloys, all forms	1,009	1,456	108	United Kingdom 872; France 373.
Vanadium:				
Oxides and hydroxides	25	10	--	Finland 5; West Germany 2.
Ash and residue containing vanadium	--	396	NA	NA.
Metal including alloys, all forms	(³)	15	(³)	Belgium-Luxembourg 12; Finland 2.
Zinc:				
Ore and concentrate	381,329	422,732	--	Canada 113,835; Australia 88,596; Ireland 82,409.
Oxides	3,638	4,343	10	West Germany 1,723; France 1,230; Belgium-Luxembourg 499.
Blue powder	2,841	3,505	--	Belgium-Luxembourg 1,885; West Germany 1,032; United Kingdom 384.
Matte	2,139	3,996	NA	West Germany 1,693; Belgium-Luxembourg 1,193; France 584.
Ash and residue containing zinc	7,665	13,350	NA	Belgium-Luxembourg 10,139; France 1,830; West Germany 607.
Metal including alloys:				
Scrap	13,074	13,764	20	Belgium-Luxembourg 6,955; West Germany 4,267; United Kingdom 1,001.
Unwrought	18,526	20,677	1,803	West Germany 7,729; Belgium-Luxembourg 5,264; France 2,844.
Semimanufactures	4,525	5,078	1	West Germany 3,031; Belgium-Luxembourg 976; France 730.
Zirconium:				
Ore and concentrate	26,076	45,424	--	Australia 36,421; Republic of South Africa 8,222; West Germany 510.
Metal including alloys, all forms	31	13	6	France 6; West Germany 1.
Other:				
Ores and concentrates	322	666	17	Canada 358; West Germany 118; France 72.
Oxides and hydroxides	1,039	309	30	Belgium-Luxembourg 92; Spain 71; West Germany 69.
Ashes and residues	r2,648	1,103	NA	West Germany 715.
Base metals including alloys, all forms value, thousands	$328	$371	NA	West Germany $93; France $86; United Kingdom $61.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	259,168	386,495	94	West Germany 346,302; Italy 14,949; Turkey 9,440.
Artificial:				
Corundum	5,593	6,454	14	West Germany 5,185; France 413; Belgium-Luxembourg 287.
Silicon carbide	1,906	1,750	11	West Germany 1,005; Norway 524; Belgium-Luxembourg 129.
Dust and powder of precious and semiprecious stones including diamond kilograms	281	268	2	Belgium-Luxembourg 172; Switzerland 46; Ireland 40.

See footnotes at end of table.

Table 3.—Netherlands: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Abrasives, n.e.s. —Continued				
Artificial —Continued				
Grinding and polishing wheels and stones	2,323	2,887	55	West Germany 1,081; France 673; Austria 453.
Asbestos, crude	5,751	8,357	2	Canada 2,502; Italy 2,239; West Germany 2,064.
Barite and witherite	148,833	88,490	--	Morocco 70,292; Belgium-Luxembourg 7,074; China 5,455.
Boron materials:				
Crude natural borates	326,816	264,917	247,247	Turkey 11,549; Belgium-Luxembourg 6,107.
Elemental ____ value, thousands	$6	$26	$18	NA.
Oxides and acids	2,003	2,109	--	France 1,152; Italy 566; Turkey 297.
Bromine	4,053	6,933	--	Israel 6,876; United Kingdom 54.
Cement ____ thousand tons	2,978	2,983	(²)	West Germany 1,484; Belgium-Luxembourg 1,462; France 18.
Chalk	79,436	100,293	--	West Germany 43,543; France 40,184; Belgium-Luxembourg 13,681.
Clays, crude:				
Bentonite	70,786	90,934	24,980	Greece 38,553; Spain 20,193.
Chamotte earth	14,412	15,955	641	West Germany 9,989; France 4,894.
Kaolin	460,289	453,660	61,623	United Kingdom 186,299; West Germany 95,611.
Unspecified	354,369	504,974	548	West Germany 454,891; Belgium-Luxembourg 21,662; France 10,365.
Cryolite and chiolite	10	39	--	Austria 25; Denmark 11.
Diamond:				
Gem, not set or strung ____ carats	503,485	595,530	28,675	Switzerland 284,524; United Kingdom 177,619; Belgium-Luxembourg 44,128.
Industrial stones ____ do	237,469	545,383	72,852	United Kingdom 169,837; Belgium-Luxembourg 162,661; Ireland 93,549.
Diatomite and other infusorial earth	16,150	24,376	2,190	Denmark 10,759; Belgium-Luxembourg 9,528.
Feldspar, fluorspar, related materials:				
Feldspar	12,931	21,609	NA	Norway 14,877; France 3,381; West Germany 2,077.
Fluorspar	18,684	18,330	NA	West Germany 5,767; United Kingdom 664; France 394.
Unspecified	38,669	34,455	--	Norway 19,363; Canada 14,574; West Germany 256.
Fertilizer materials:				
Crude, n.e.s	91,698	120,478	--	West Germany 106,055; Belgium-Luxembourg 13,064; France 979.
Manufactured:				
Ammonia	134,175	46,259	NA	United Kingdom 12,400; Belgium-Luxembourg 6,207; France 2,129.
Nitrogenous (N content)	208,639	212,654	NA	France 79,298; West Germany 51,945; Belgium-Luxembourg 46,750.
Phosphatic (P_2O_5 content)	45,102	51,523	NA	Israel 27,764; Belgium-Luxembourg 10,936; Tunisia 5,667.
Potassic (K_2O content)	202,413	221,103	--	West Germany 69,873; U.S.S.R. 34,138; East Germany 30,416.
Unspecified and mixed	199,568	242,676	754	Belgium-Luxembourg 80,990; West Germany 50,985; Israel 40,360.
Graphite, natural	564	954	--	West Germany 538; China 217; United Kingdom 103.
Gypsum and plaster	373,182	417,563	29	France 185,623; West Germany 164,593; Belgium-Luxembourg 60,042.
Iodine	322	367	NA	West Germany 18; France 16; Canada 5.
Kyanite and related materials	1,677	7,773	99	Republic of South Africa 3,966; West Germany 1,955; Switzerland 364.
Lime	690,534	799,178	40	Belgium-Luxembourg 580,770; West Germany 216,440; France 1,485.
Magnesium compounds:				
Magnesite, crude	r3,187	4,408	NA	Turkey 1,995; Greece 1,140; Italy 662.
Oxides and hydroxides	r57,006	62,296	459	Greece 17,257; China 16,890; Austria 9,718.
Sulfate	40,529	43,973	--	West Germany 38,523; East Germany 4,094; Belgium-Luxembourg 1,331.

See footnotes at end of table.

Table 3.—Netherlands: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984	
			United States	Other (principal)
INDUSTRIAL MINERALS —Continued				
Mica:				
Crude including splittings and waste	4,052	1,919	254	United Kingdom 507; West Germany 428.
Worked including agglomerated splittings	21	24	1	Switzerland 8; Japan 5; Belgium-Luxembourg 3.
Nitrates, crude	31,857	21,481	--	Chile 20,111; Belgium-Luxembourg 1,340.
Phosphates, crude ___ thousand tons	2,159	2,366	698	Morocco 661; Israel 582.
Phosphorus, elemental	187	50	--	West Germany 48.
Pigments, mineral:				
Natural, crude	825	804	NA	Austria 778.
Iron oxides and hydroxides, processed	10,608	13,579	106	West Germany 11,565; United Kingdom 580; Italy 439.
Potassium salts, crude (K_2O content)	[r]322	209	--	West Germany 179.
Precious and semiprecious stones other than diamond:				
Natural ___ kilograms	33,043	47,874	6,008	West Germany 19,703; Brazil 6,000.
Synthetic ___ do	4,888	5,262	503	Belgium-Luxembourg 3,178; Japan 1,500.
Pyrite, unroasted	223	311	--	West Germany 166; Austria 95.
Salt and brine	134,917	222,924	(3)	Belgium-Luxembourg 104,127; West Germany 44,949; France 15,496.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	55,798	59,963	1	West Germany 45,846; France 6,655; East Germany 2,873.
Sulfate, manufactured[4]	29,089	31,919	NA	Belgium-Luxembourg 20,402; West Germany 8,349; Austria 2,046.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked ___ thousand tons	2,202	2,165	(3)	West Germany 1,082; Belgium-Luxembourg 546; Sweden 398.
Worked ___ do	44	51	(3)	Italy 26; West Germany 9; Belgium-Luxembourg 6.
Dolomite, chiefly refractory-grade ___ do	980	888	(3)	Belgium-Luxembourg 602; West Germany 102; Norway 32.
Gravel and crushed rock ___ do	17,288	17,119	2	West Germany 10,546; Belgium-Luxembourg 4,851; France 1,132.
Limestone other than dimension ___ do	973	835	--	Belgium-Luxembourg 798; West Germany 29; France 8.
Quartz and quartzite ___ do	36	37	(3)	West Germany 16; Norway 15; Belgium-Luxembourg 4.
Sand other than metal-bearing ___ do	6,811	6,949	3	West Germany 5,606; Belgium-Luxembourg 1,117; Norway 220.
Sulfur:				
Elemental:				
Crude including native and byproduct	299,006	373,997	14,657	West Germany 215,350; Poland 90,042; France 51,328.
Colloidal, precipitated, sublimed	280	396	--	West Germany 216; United Kingdom 168.
Dioxide	10,294	9,102	--	West Germany 6,646; France 2,289; Belgium-Luxembourg 167.
Sulfuric acid	422,946	541,713	3	West Germany 227,238; Norway 92,308; Finland 76,436.
Talc, steatite, soapstone, pyrophyllite	45,455	40,751	82	Austria 7,016; France 4,413; Belgium-Luxembourg 2,845.
Vermiculite, perlite, chlorite	4,983	5,476	NA	Greece 2,568; Republic of South Africa 2,194; West Germany 439.
Other:				
Crude	[r]926,330	663,310	8,222	West Germany 461,371; Belgium-Luxembourg 176,748.
Slag and dross, not metal-bearing ___ thousand tons	1,377	1,077	--	West Germany 560; Belgium-Luxembourg 494; France 17.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	6,517	7,802	1,016	Belgium-Luxembourg 6,128; West Germany 489.
Carbon black	14,620	14,914	936	West Germany 560; Belgium-Luxembourg 494; France 17.

See footnotes at end of table.

Table 3.—Netherlands: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Coal:				
Anthracite ______ thousand tons__	225	240	6	Republic of South Africa 110; West Germany 95; Belgium-Luxembourg 18.
Bituminous ____________do____	7,512	9,825	4,009	Australia 2,637; Poland 1,489.
Briquets of anthracite and bituminous coal ______________do____	8	7	--	West Germany 4; Belgium-Luxembourg 3.
Lignite including briquets __do____	112	144	--	West Germany 140; Australia 3; East Germany 1.
Coke and semicoke __________do____	564	813	56	West Germany 594; Poland 110.
Gas, natural_____ million cubic feet__	99,646	120,418	--	West Germany 114,508; Norway 5,910.
Peat including briquets and litter _____	520,841	574,311	--	West Germany 540,988; Finland 18,803; U.S.S.R. 6,326.
Petroleum:				
Crude_ thousand 42-gallon barrels__	297,038	330,916	--	Iran 62,495; United Kingdom 54,400; U.S.S.R. 30,645.
Refinery products:				
Liquefied petroleum gas _do____	15,416	22,497	NA	Saudi Arabia 7,089; United Kingdom 5,967; Algeria 4,154.
Gasoline __________do____	45,829	42,280	103	U.S.S.R. 8,577; Algeria 6,451; Belgium-Luxembourg 6,102.
Mineral jelly and wax __do____	483	483	2	France 149; West Germany 119; United Kingdom 75.
Kerosene and jet fuel___do____	2,724	1,676	1	Belgium-Luxembourg 808; France 572; U.S.S.R. 147.
Distillate fuel oil _____do____	46,610	26,117	55	U.S.S.R. 18,525; Belgium-Luxembourg 1,682; Kuwait 156.
Lubricants _________do____	2,315	2,942	76	Belgium-Luxembourg 682; France 365; United Kingdom 339.
Residual fuel oil______do____	44,604	27,006	11	Belgium-Luxembourg 4,441; Spain 3,165; Netherlands Antilles 1,463.
Bitumen and other residues do____	1,188	674	--	Belgium-Luxembourg 422; West Germany 248; Hungary 2.
Bituminous mixtures___do____	177	236	2	West Germany 187; Belgium-Luxembourg 40.
Petroleum coke ______do____	2,537	2,706	1,344	West Germany 628; Norway 383.

[r]Revised. NA Not available.
[1]Table prepared by staff, Branch of Geographic Data.
[2]Less than 1/2 unit.
[3]Includes waste and sweepings of other precious metals.
[4]Includes cadmium sulfate.

COMMODITY REVIEW

METALS

Aluminum.—Alumined BV, a subsidiary of the Hoogoven Group, has taken over the 13% share in the Belgian rolling and extrusion company Société Industrielle de l'Aluminium NV (Sidal), and thus became its sole owner. Alumined previously owned 87% of Sidal. Rolled product capacity of Sidal was being increased and modernized with the construction of a new cold-rolling mill, to be completed in the second half of 1986.

Hoogovens became the sixth West European steel company to produce Galvalume, aluminum-zinc coated sheets, after signing a licensing agreement with the process owner, Bethlehem Steel Corp., at the Hannover Fair in April. Hoogovens is to install a new coil-coating line at its works in IJmuiden, capable of producing either Galvalume or conventional hot-dipped galvanized sheet.

Iron and Steel.—The iron and steel industry of the Netherlands slowed down in 1985 after a record-high performance in

1984. HI, the only major steel producer, ranked 21st in the world with a 5.3-million-ton output. Almost 97% of the steel was produced by the oxygen process, and about 35% of it by the continuous cast method. Considerable emphasis was placed by HI on continuous casting, and when it commissions a new slab caster, ordered from the Federal Republic of Germany's Demag AG, it should operate 100% continuous casting for flat products. The company also announced plans to install two new continuous billet casters in its No. 1 Linz-Donawitz (LD) shop. Hot-rolled steel made up 90% of HI's output, over 60% of which was flat-rolled products. HI's crude steel capacity was 7.73 million tons, and pig iron and blast furnace ferroalloy capacity was 6.58 million tons. About 19,500 workers were employed by the steel industry.

The Netherlands exported over 90% of its domestic production, but also imported about 3.5 million tons. HI's exports to the United States amounted to about 60,000 tons, mainly billets and blooms, out of total EEC exports of about 1 million tons. The company signed a licensing agreement with Bethlehem Steel of the United States allowing it to produce Galvalume. A new coil-coating line is to be installed, capable of producing either Galvalume or conventional hot-dipped galvanized sheet at the IJmuiden plant. The company decided, however, to terminate the activities of its California steel service center subsidiary, Capital Metals Inc., after substantial losses.

The conversion of the two-strand rod mill at Thyssen AG's subsidiary Nedstaal BV to a single-strand mill was in the final stage of a restructuring program implemented in 1983.[5] HI finally terminated its 14.5% joint ownership in Estel AG, a subsidiary of the Federal Republic of Germany's Hoesch AG. HI held an interest in Hoesch since the early 1970's. Estel was broken up in 1982. Nedstaal, a 100% subsidiary of the West German parent company Thyssen, restructured its wire rod mill, which began in 1983 in the Netherlands. Considerable emphasis was placed by HI on continuous casting, and when it commissions a new slab caster ordered from Demag of the Federal Republic of Germany, it will operate 100% continuous casting for flat products. The company also announced plans to install two new continuous billet casters in its No. 1 LD shop. Effective rolling capacity at the plant was reduced to 500,000 tons per year, although production quotas in the EEC have kept the actual level of rod output at about 225,000 tons per year. Nedstaal's riverside site at Alblasserdam, 15 kilometers southeast of Rotterdam, was handling oceangoing vessels of up to 20,000 deadweight tons for incoming raw materials and semimanufactures, as well as transporting the mill's finished products, especially wire rod. Nedstaal operated two 35-ton electric arc furnaces; two other similar furnaces were shut down in 1982. The company relied on Netherlands and West German ferrous scrap for its production. Nedstaal was partially subsidized by the Government of the Netherlands and its parent company Thyssen.

The Port of Rotterdam increased its handling capacity of iron ore from 30 million tons in 1983, to 38.7 million tons in 1984, and more in 1985. About 80% of West German iron ore imports went through Rotterdam, about 71% in 1980.

Lead and Zinc.—The production of lead and zinc was higher in 1984 than predicted, and the output of lead in 1985 increased. The improved performance was the result of the installation of a battery crusher at Arnhem in 1984, which supplied scrap for the refining of secondary lead. The Netherlands, as its neighbor Belgium, had no lead or zinc mines, and all concentrates and much of the scrap were imported.

Vanadium.—Exxon Corp.'s refinery at Rotterdam was shut down on June 15, 1985, for extensive reconstruction, scheduled for completion in mid-1986 at a cost of $800 million. The new facility is to be equipped with the Exxon-developed refining process called Flexicoking. The 32,000-barrel-per-day unit is to use thermal cracking rather than traditional catalytic cracking to convert inferior, heavy feedstock into high-quality liquid and gaseous fuels. The new process, under development by Exxon for more than 13 years, is to produce only small quantities of vanadium- and nickel-rich residual coke, about 1% of the heavy feedstock, instead of the typical 25% residue. More than 95% of the vanadium and nickel contaminants in the original feedstock will be concentrated in this coke. The Rotterdam Flexicoking facility and a similar unit that was being installed by Baytown, Texas, in the United States, are expected to become significant sources of low-cost feed material for U.S. and European vanadium producers.

Ferrovanadium was produced in the Netherlands by Pechiney-Nederland N.V. with headquarters situated in Amsterdam.

INDUSTRIAL MINERALS

Limestone, industrial sand, and some gravel were the only industrial minerals mined in the Netherlands on a sizable scale. The country reexported, however, large quantities of various raw and processed materials, such as phosphatic fertilizer, through its Amsterdam and Rotterdam seaports.

Fertilizer Materials.—In a world market context, the Netherlands as a phosphate manufacturer, trader, and consumer was only of marginal significance. Within Western Europe, however, the Netherlands was a key supplier of the region's phosphorus pentoxide (P_2O_5) fertilizer needs. Of the total production of about 420,000 tons in 1984-85, triple superphosphate accounted for 180,000 tons P_2O_5; diammonium phosphate and monoammonium phosphate, for 94,000 tons; and other nitrogen-phosphorus and nitrogen-phosphorus-potassium (NPK) compounds, for 146,000 tons. The growth of the Netherlands fertilizer industry was determined as much by its trade with neighboring countries as by domestic demand. The competitiveness of Netherlands fertilizer manufacturers has been enhanced in recent years also by the availability of natural gas. Although this has principally benefited the Netherlands nitrogen industry, inexpensive nitrogen for the NPK compound sector has indirectly helped subsidize the P_2O_5 industry, thereby enabling the Netherlands to establish its position as a key P_2O_5 fertilizer producer within Western Europe.[6]

Salt and Sodium Compounds.—The production of salt has remained relatively steady for the last 10 years. Akzo Zout Chemie Nederland was the only salt producer, and the Netherlands was the largest exporter of it in Western Europe, with about 2.6 million tons in 1984. Akzo also had worldwide affiliates with a total capacity of 13 million tons of crystallized salt, including Norddeutsche Salinen AG in the Federal Republic of Germany, Dansk Salt I/S in Denmark, Cia. Industrial do Rio Grande do Norte in Brazil, International Salt Co. Inc. in the United States, Antilles International Salt Co. Inc. in the Netherlands Antilles, and Iroquois Salt Products Ltd. in Canada. Salt producing plants in the Netherlands were situated at Delfzijl and at Hengelo with 2 million tons capacity each, at Mariager with 500,000 tons, and at Stade with a 350,000-ton capacity. Akzo was a major chemical company and used much of the salt itself. At Hengelo, most was used in the manufacture of chloralkali hydrocarbons and methylamines. The company was at Delfzijl with good harbor facilities and exported the salt to the Scandinavian countries, but also to Belgium, the Federal Republic of Germany, and Italy. Over 52% was exported to the latter three countries in 1984.[7]

Akzo was also the country's sole producer of soda ash and sodium sulfate. The plant at Delfzijl had a capacity of 380,000 tons of soda ash. Sodium sulfate was produced at Delfzijl from salt brines and at Arnhem as a byproduct of rayon manufacture, with a combined capacity of 50,000 metric tons.

MINERAL FUELS

The production of all mineral fuels in the Netherlands continued to do well. The production of crude oil increased for the 15th year and was at its highest level. Exxon initiated the largest refinery construction project in its history by virtually rebuilding by 1986 the 25-year-old refinery in Rotterdam.[8]

At the December 4-6, 1985, meeting of the International Energy Agency's Standing Group on Long-Term Cooperation, the Netherlands delegation reported on the improvements in the fuel mix in the power sector, including the conversion to coal of 1,700 megawatts, and construction of at least two new nuclear power reactors. The Government planned to offset the increasing fuel costs for power generation after 1987 with temporary imports of electricity until new nuclear capacity is on-line in the mid-1990's. The Netherlands gas depletion policy is to continue to favor development of smaller gasfields and to encourage active exploration efforts in the North Sea.

Although the overall energy demand increased, oil demand dropped and gas use increased 3.6%. The Netherlands continued to be dependent on oil and gas, which together accounted for 87.4% of energy consumption in 1984 (52.3% gas and 35.1% oil). A major effort was initiated by the Government to restructure the Netherlands utilities. The aim is to change the organizational base in order to improve the efficiency and to reduce the costs of electricity generation.

Trade in mineral fuels was another significant aspect of the Netherlands energy industry. The Rotterdam Port market played an important role for the supply and pricing of freely traded crude oil and oil products. In 1984, 50% of Netherlands indigenous gas production was exported, and oil exports exceeded by far total indigenous oil requirements.

Coal.—Coal utilization increased by 5% in 1985, mainly in the electricity generation, raising the total coal share to only 9.5%. Coal use in industry was relatively modest, mainly because of the strong competition from gas, the difficulty of fuel-switching, and restrictive environmental considerations.

All of the Netherlands coal requirements were imported, mostly through the Port of Rotterdam. Coal has been handled by the port for many years. In 1985, coal traffic increased sharply from that of 1984, with 9.1 million tons unloaded; coal transshipments reached a volume of 14.3 million tons, or up 32.4% from that of 1983.[9] Some coal also came through the Port of Amsterdam. In 1984, over 44% of Netherlands coal was imported from the United States, 29% from Australia, 23% from the Federal Republic of Germany, and the remainder from Poland.

A Netherlands energy memorandum of 1980 emphasized the diversification and conservation of energy resources. The Government's coal policy is detailed in chapter 2 of the memorandum, including an ambitious program to stimulate the future use of coal. The policy assigns priority to the reintroduction of coal in the power generating and manufacturing sectors.

Natural Gas.—The Netherlands was the third largest gas producer in the world, after the Soviet Union and the United States, putting out 4.47% of production in 1984.[10] Netherlands gas policy had a predominant influence on the energy sector because gas was the main indigenous energy resource and an important source of the country's revenue. The policy was revised a number of times since the Groningen Field was discovered in 1959. In the mid-1970's, a policy was developed to slow down the depletion of domestic gas resources and to restrict gas to premium uses. Since 1983, gas sales have been governed mainly by a system of market prices, and the impediments for new export contracts were removed after the reevaluation of gas reserves, sales, and budgetary needs.

Gas was the Netherland's main energy source, with its share increasing slightly to 52.3% in 1985. Gas provided 61.2% of fuel inputs to electricity generation, 40.2% to industry, and 71.3% to residential and commercial sectors.

The bulk of Netherlands gas reserves were in the Groningen Field, which supported the development of Netherlands and continental European natural gas use in the 1960's and 1970's. In recent years, additional smaller gasfields have been discovered in Netherlands offshore areas. As a consequence, the share of Groningen gas was expected to fall sharply, from almost 60% to below 40% in 1990. According to the Netherlands Geological Survey, gas reserves totaled 71,860 billion standard cubic meters on January 1, 1985, compared with 73,453 billion in 1984. Estimated proven gas reserves were at 67,100 billion standard cubic feet in 1985 and 68,500 billion in 1984. The Netherlands possessed the 10th largest reserves in the world, accounting for 2.01% of the world total.[11]

Netherlands gas is an important supply source for West European countries, particularly because of its flexibility, which can be used in the event of natural gas supply disruptions elsewhere. Netherlands gas was exported to the Federal Republic of Germany, France, Belgium, Italy, and Switzerland, in decreasing order.[12] To meet the capacity obligations in domestic and export markets, Nederlandse Gasunie NV, the sole distributor of natural gas, has taken the following measures: (1) Approximately 12% of total gas sales are based on interruptible contracts. (2) There is an average shut-in production capacity of approximately 10.5 billion cubic feet per day, even though actual maximum production capacity in the domestic fields is about 17.5 billion cubic feet per day, which is in line with the requirements for the Netherlands and export markets. The actual production in 1985 was just under 10 billion cubic feet per day. (3) There is a provision for flexibility in transport capacity outside severe winter weather. During the extremely cold winter of 1984-85, transport capacities were used at maximum levels, about 6.4 billion cubic feet per day. (4) Because of existing supply flexibilities, there are no storage facilities; there is, however, a liquefied petroleum gas installation with a total capacity of 2.7 billion cubic feet in Groningen quality gas. This capacity is generally not used in normal winters, but reserved for extreme situations.

Nuclear Power.—In June 1985, the Netherlands parliament endorsed the construction of at least two new nuclear power reactors between 900 and 1,300 megawatts, under the condition that a solution is found for the waste disposal problem. Six sites were being considered, with construction of the first plant to start in 1988 and to become operational by 1995. Of the two plants in the Netherlands, the last reactor went into operation more than a decade ago.

The Netherlands had no uranium resources and had no exploration plans. Natural, enriched, and depleted uranium was kept in stockpiles and inventories. There were no tariff barriers with respect to the import of uranium products. Imports were regulated through the Supply Agency of the European Community (Euratom). The Netherlands uranium export policy applied only to exports of enriched uranium, which were bound by the Netherlands obligations with respect to nonproliferation.

Petroleum.—Oil remained the second important energy source in the Netherlands. It provided 35.1% of consumption in 1984. Oil use in industry decreased slightly in 1985 and was nearly completely replaced by gas in the electricity generation sector.

The refinery industry in the Netherlands had fewer problems than in other European countries. Closure of some distillery capacity in recent years and increase of conversion capacity helped to improve refinery utilization rates to 70%.

Oil production from onshore and offshore fields was built up to an average of about 80,000 barrels per day (bbl/d), following the late December startup of Amoco Netherlands Petroleum Co.'s offshore Rijn Field. Rijn, in block P/15, about 25 miles northwest of the Hague, was flowing about 10,000 bbl/d initially but was expected to reach a plateau rate of 25,000 bbl/d in 1986, thus boosting Netherlands offshore production by about 50%. Union Oil Co. of the Netherlands and Royal Nedlloyd's Helm-Helder-Hoorn Oilfield complex was flowing at 22,500 bbl/d, while the Conoco Inc.-headed group's Kotter-Logger development was averaging 30,600 bbl/d. Additionally, there was 27,000 bbl/d of onshore output.

Netherlands oil reserves totaled 472 million barrels on January 1, 1985, down from 491 million in 1984. Proven reserves fell to 170 million barrels in 1985 from 189 million in 1984. Cumulative Netherlands oil production was 406 million barrels.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Netherlands guilders (f.) to U.S. dollars at the rate of f.2.85=US$1.00, the average for 1985.

[3]AFP Sciences (Paris, France). Oct. 31, 1985, p. 20.

[4]ABECOR Country Report. Barclays Bank. Algemene Bank Nederland NV, Amsterdam, Dec. 1985.

[5]Metal Bulletin Monthly (London). Apr. 1986, p. 109.

[6]Phosphorus & Potassium. The Netherlands, Western Europe's Leading P_2O_5 Trader. No. 142, Mar.-Apr. 1986, pp. 22-24.

[7]Industrial Minerals (London). Salt in the European Market. Sept. 1985, p. 62.

[8]Wilson, W. K. Revamping the Rotterdam Refinery. The Lamp, Winter 1985, pp. 11-16.

[9]International Mining. Massive Coal Port, Rotterdam. Feb. 1986, pp. 36-38.

[10]Oil & Gas Journal (Tulsa, Oklahoma). July 15, 1985, p. 76.

[11]Ministry of Economic Affairs, The Hague. Natural Gas and Oil of the Netherlands. 1984 Annual Report. July 1985, p. 52.

[12]Petroleum Economist (London). Feb. 1985, pp. 45-47.

The Mineral Industry of New Zealand

By Travis Q. Lyday[1]

The modest extractive mineral industry, contributing about 1% to the gross national product (GNP) estimated to be $22 billion,[2] of the island nation of New Zealand mainly consisted of the mining of coal, construction materials (clays, sand and gravel, and stone), limestone for agriculture and construction, and titaniferous magnetite sand (iron sand). Crude mineral production also included natural gas, natural gas liquids, and petroleum (condensate). The mineral processing sector, contributing about 5% to the country's GNP, consisted chiefly of the production of primary aluminum, manufactured fertilizers, petroleum refinery products, and crude steel produced from imported raw materials.

Government Policies and Programs.—The Government continued an extensive review of its petroleum exploration policy for much of the year. Near yearend, the review was completed, resulting in the issue of new petroleum laws, lifting of the exploration licensing moratorium, and the offering of new exploration license blocks in the Taranaki Basin off the west coast of North Island. Also, the energy resources levy was waived for all new gas discoveries.

PRODUCTION

Gold production more than doubled and was expected to increase to about 100,000 troy ounces after 1990 as hard-rock mining develops on North Island. Production of most other principal nonfuel mineral commodities declined in 1985 from 1984 levels. Crude petroleum, natural gas, and natural gas liquids production continued to increase. The production of coal remained at approximately the level of the previous two years.

Table 1.—New Zealand: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984[p]	1985[e]
METALS					
Aluminum metal, smelter:					
Primary	153,979	[r]163,420	[r]218,610	242,851	240,000
Secondary	3,000	2,700	[r]1,200	1,500	1,600
Total	156,979	[r]166,120	[r]219,810	244,351	241,600
Gold, mine output, metal content troy ounces	6,071	7,775	9,667	21,605	[2]45,011
Iron and steel:					
Iron ore, gross weight[3]	197	166	156	2,645	2,000
Iron sand (titaniferous magnetite):					
Gross weight thousand tons	3,253	2,791	2,203	2,414	2,500
Iron content do.	1,854	1,591	1,256	1,376	1,425
Pig iron (sponge iron)[e] do.	150	150	[r]155	170	170
Steel, crude do.	[r]231	252	233	274	[2]228
Lead, refinery output, secondary[e]	7,000	6,000	6,000	6,000	6,000
Silver, mine output, metal content troy ounces	--	--	31	--	--

See footnotes at end of table.

Table 1.—New Zealand: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984[p]	1985[e]
METALS —Continued					
Tungsten, mine output (scheelite):					
Gross weight	20	14	11	13	10
Tungsten content	10	7	6	6	5
INDUSTRIAL MINERALS					
Cement, hydraulic thousand tons	[r]888	[r]1,066	[r]956	1,010	1,100
Clays:					
Bentonite	1,885	6,220	1,958	6,418	6,000
Kaolin (pottery)	49,307	23,957	23,917	25,098	25,000
For brick and tile	132,226	129,924	97,944	146,840	145,000
Lime[e]	170,000	170,000	165,000	[r]150,000	160,000
Magnesite	308	--	--	--	--
Nitrogen: N content of ammonia	--	--	43,200	58,000	60,000
Perlite	999	2,163	1,008	--	--
Pumice	33,834	50,183	16,799	15,182	20,000
Salt	55,500	70,000	81,000	57,000	60,000
Sand and gravel:					
Silica sand (glass sand)	129,146	160,009	148,357	133,235	50,000
Other industrial sand	363,446	245,349	234,403	387,209	350,000
For roads and ballast thousand tons	13,548	14,154	15,489	16,501	15,000
For building aggregate do	4,084	4,169	4,359	5,029	5,000
Stone:					
Dolomite	25,112	14,900	17,033	18,124	18,000
Greenstone kilograms	5,985	8,100	435	3,052	3,000
Limestone and marl:					
For agriculture thousand tons	1,829	1,592	1,460	1,524	1,500
For cement do	1,458	1,483	[r]1,497	1,621	1,500
For other industrial uses do	178	184	207	214	215
For roads do	312	375	274	359	350
Serpentine	65,714	45,644	64,055	76,900	75,000
Unspecified:					
Dimension	30,791	22,493	22,585	36,359	35,000
Rock for harbor work thousand tons	2,891	2,325	2,254	2,520	2,500
Sulfur	90	156	1,090	862	1,000
MINERAL FUELS AND RELATED MATERIALS					
Carbon dioxide, liquefied	6,066	9,797	[e]10,000	[e]10,000	10,000
Coal:					
Anthracite thousand tons	1	(4)	2	--	(4)
Bituminous do	475	428	[r]496	582	609
Subbituminous do	1,510	1,595	1,752	1,709	1,573
Lignite do	212	222	235	235	227
Total do	2,198	2,245	[r]2,485	2,526	2,409
Coke:					
Coke oven	4,004	2,263	2,060	[e]2,100	2,000
Gashouse	20,953	7,037	6,129	[e]6,200	6,000
Total	24,957	9,300	8,189	[e]8,300	8,000
Fuel briquets	6,551	6,144	4,453	[e]4,500	5,000
Gas:					
Manufactured (from gasworks)[e] million cubic feet	1,708	1,168	845	609	517
Natural:					
Gross production[e] do	56,600	[r]108,450	[r]105,000	[r]127,200	150,000
Marketed production do	48,691	[r]94,502	[r]91,465	110,817	131,134
Natural gas liquids:[e]					
Liquefied petroleum gas thousand 42-gallon barrels	248	315	532	483	854
Natural gasoline do	44	56	94	85	151
Total do	292	371	626	568	1,005
Petroleum:					
Crude do	3,381	5,373	5,268	6,635	7,000
Refinery products:					
Gasoline do	10,736	9,801	10,668	10,965	[2]7,219
Distillate fuel oil do	5,058	4,125	4,551	4,588	[2]2,964
Residual fuel oil do	3,623	2,637	2,331	2,311	[2]2,300
Other do	630	483	784	931	[2]567
Refinery fuel and losses do	910	735	805	798	[2]427
Total do	20,957	17,781	19,139	19,593	[2]13,477

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through July 15, 1986.
[2]Reported figure.
[3]Not used for manufacture of iron; reportedly consumed for gas purification, preparation of stock licks, and manufacture of brick. Because of these uses, iron content is not reported.
[4]Less than 1/2 unit.

TRADE

Among mineral commodity imports, crude petroleum, partly refined petroleum, and petroleum refinery products dominated. Other prominent mineral commodity imports were alumina, fertilizer materials, and steel semimanufactures. Aluminum ingots remained the dominant mineral commodity export, followed by steel products, mainly semimanufactures, and iron ore (iron sands).

Table 2.—New Zealand: Exports and reexports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS				
Aluminum: Metal including alloys:				
Scrap	3,803	2,540	--	Japan 2,387.
Unwrought	182,087	208,902	--	Japan 169,167; Republic of Korea 18,017; China 11,024.
Semimanufactures	7,015	9,810	10	Australia 3,511; Republic of Korea 1,504; Indonesia 1,454.
Copper: Metal including alloys:				
Scrap	1,606	1,340	--	India 817; Australia 484.
Unwrought and semimanufactures	3,625	3,420	974	Australia 1,255; Singapore 215.
Iron and steel:				
Iron ore and concentrate, excluding roasted pyrite thousand tons	2,462	2,223	--	All to Japan.
Metal:				
Scrap	2,434	3,375	--	Japan 2,075.
Steel, primary forms	28,805	31,713	--	China 14,799; Malaysia 10,223.
Semimanufactures:				
Bars, rods, angles, shapes, sections	46,353	51,007	335	China 38,970; Fiji 2,525; French Polynesia 2,040.
Universals, plates, sheets	45,755	30,177	10,708	Australia 6,903; Papua New Guinea 2,860.
Hoop and strip	2,005	113	--	Australia 76.
Rails and accessories	64	8	--	Norfolk Island 6.
Wire	14,043	14,870	2,443	Australia 8,005; Hong Kong 1,739; Fiji 1,430.
Tubes, pipes, fittings	3,553	4,377	99	Papua New Guinea 1,599; Australia 755; Singapore 525.
Castings and forgings, rough	120	140	1	Australia 123.
Lead: Metal including alloys:				
Scrap	505	393	--	NA.
Unwrought and semimanufactures	743	320	--	Australia 280.
Magnesium: Metal including alloys, scrap	6	--		
Nickel: Metal including alloys, semimanufactures	23	([2])	--	All to Australia.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$58	$2,608	$10	Australia $2,584.
Silver:				
Waste and sweepings do.	$976	$1,574	--	Australia $1,349.
Metal including alloys, unwrought and partly wrought do.	$1,120	$26	--	Australia $22.
Tin: Metal including alloys, all forms	146	165	--	French Polynesia 141.
Titanium: Oxides	14	--		
Tungsten: Ore and concentrate	--	14	--	All to Netherlands.
Zinc: Metal including alloys:				
Scrap	687	531	--	Australia 187; Japan 114; India 79.
Unwrought and semimanufactures	163	75	--	Japan 51; Republic of Korea 16.
Other:				
Oxides and hydroxides	206	513	--	Papua New Guinea 350; Fiji 160.
Ashes and residues	1,025	1,710	--	Japan 815; India 352; Australia 307.
Base metals including alloys, all forms value, thousands	$2	$3	--	Australia $2; Japan $1.

See footnotes at end of table.

Table 2.—New Zealand: Exports and reexports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984 United States	Destinations, 1984 Other (principal)
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	93	101	--	Australia 99.
Grinding and polishing wheels and stones ----- value, thousands	$97	$5	--	Australia $1; Singapore $1; United Kingdom $1.
Barite and witherite	16	16	--	Fiji 8; Singapore 7.
Cement	226,069	198,510	--	French Polynesia 63,619; Australia 59,950; Papua New Guinea 34,893.
Chalk	99	21	--	Fiji 13; Western Samoa 5.
Clays, crude	11,814	14,183	--	Japan 9,550; Republic of Korea 970; Philippines 402.
Diamond: Gem, not set or strung value, thousands	$65	$125	$41	Australia $51; United Kingdom $29.
Fertilizer materials:				
Crude, n.e.s	121	255	--	Malaysia 200.
Manufactured:				
Ammonia	16	3	--	Papua New Guinea 1.
Nitrogenous	9,010	223	--	Cook Islands 123; Kiribati 15.
Phosphatic	218	440	--	Fiji 285; Australia 47; Norfolk Island 46.
Potassic	34	231	--	Fiji 113; Cook Islands 67.
Unspecified and mixed	915	([3])	NA	NA.
Gypsum and plaster	180	867	--	Vanuatu 534; Indonesia 195.
Lime	609	1,155	--	Indonesia 551; Fiji 288; New Caledonia 197.
Phosphates, crude	2	19	--	Singapore 16.
Pigments, mineral: Iron oxides and hydroxides, processed	4	11	--	Australia 5; Fiji 5.
Precious and semiprecious stones other than diamond:				
Natural ----- value, thousands	$190	$499	$17	Fiji $224; Australia $220.
Synthetic ---------- do	$7	$15	--	All to Australia.
Salt and brine	3,722	3,331	--	Australia 1,653; American Samoa 936.
Sodium compounds, n.e.s.: Carbonate, manufactured	7	1,044	--	Fiji 1,043.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	69	61	4	Australia 35.
Worked --- value, thousands	$92	$60	--	Western Samoa $21; Cook Islands $14.
Dolomite, chiefly refractory-grade do	$44	--		
Gravel and crushed rock	430	1,186	12	Australia 961; Indonesia 168.
Limestone other than dimension	197	202	--	New Caledonia 185.
Quartz and quartzite	--	10	--	Fiji 9.
Sand other than metal-bearing	399	303	--	Australia 183; Fiji 54.
Sulfur: Sulfuric acid	771	209	--	Fiji 105; Papua New Guinea 56.
Talc, steatite, soapstone, pyrophyllite	27	44	--	Fiji 43.
Other: Crude	562	395	--	Australia 346.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	25	124	--	French Polynesia 101; Australia 20.
Coal: Anthracite and bituminous	187,268	372,318	102	Japan 357,450.
Peat including briquets and litter	2,217	2,239	--	Australia 1,901.
Petroleum refinery products:				
Liquefied petroleum gas value, thousands	$5	$8	--	Solomon Islands $4; Fiji $2.
Gasoline ------ 42-gallon barrels	400	178	--	Cook Islands 128.
Mineral jelly and wax ----- do	212	134	--	Fiji 79; Australia 31.
Kerosene and jet fuel ----- do	2,054	1,201	--	Papua New Guinea 519; Fiji 356.
Distillate fuel oil -------- do	157	298	--	NA.
Lubricants ---- value, thousands	$1,327	$1,260	--	Fiji $594; Western Samoa $237.
Residual fuel oil 42-gallon barrels	--	33	--	All to Cook Islands.
Bitumen and other residues do	--	54	--	Western Samoa 42.
Bituminous mixtures ----- do	6,878	4,842	--	Fiji 1,715; Papua New Guinea 624; Western Samoa 624.

NA Not available.
[1]Table prepared by Audrey D. Wilkes.
[2]Unreported quantity valued at $2,000.
[3]Unreported quantity valued at $338,000.

Table 3.—New Zealand: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS				
Alkali and rare-earth metals value, thousands	$9	$55	$5	Poland $40.
Aluminum:				
Ore and concentrate	1,000	1,200	--	All from Guyana.
Oxides and hydroxides	448,471	465,082	93	Australia 457,151; Japan 6,600.
Metal including alloys:				
Scrap	39	31	--	Papua New Guinea 16; French Polynesia 13.
Unwrought	6,726	1,690	(2)	Australia 1,483.
Semimanufactures	3,651	4,548	159	Australia 2,054; Japan 767; Switzerland 480.
Chromium:				
Ore and concentrate	145	291	(2)	Republic of South Africa 264.
Oxides and hydroxides	241	263	30	West Germany 110; United Kingdom 85.
Cobalt: Oxides and hydroxides	9	8	1	Finland 4; United Kingdom 2.
Copper: Metal including alloys:				
Scrap	2	55	--	Australia 54.
Unwrought	2,205	2,686	7	Australia 2,121; West Germany 418.
Semimanufactures[3]	12,223	16,267	52	Australia 13,920; Japan 780; United Kingdom 486.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite	93	37	--	All from Australia.
Pyrite, roasted	19	--		
Metal:				
Scrap	2,507	2,898	--	French Polynesia 1,828; Fiji 854.
Pig iron, cast iron, related materials	1,174	1,428	1	Australia 690; United Kingdom 445.
Ferroalloys:				
Ferromanganese	1,045	293	--	Australia 206; United Kingdom 48.
Unspecified	2,138	3,960	37	Australia 3,736.
Steel, primary forms	2,649	6,745	2	Australia 6,742.
Semimanufactures:				
Bars, rods, angles, shapes, sections	72,559	107,232	383	Japan 65,103; Australia 29,512.
Universals, plates, sheets	318,687	444,659	638	Japan 343,756; Australia 78,445.
Hoop and strip	12,457	19,125	62	Australia 9,593; Japan 7,547.
Rails and accessories	14,780	15,291	7	United Kingdom 12,538; Japan 2,053.
Wire	14,586	17,800	65	Japan 6,805; United Kingdom 4,703; Australia 3,692.
Tubes, pipes, fittings	40,793	42,862	533	Japan 23,037; Australia 12,740.
Castings and forgings, rough	128	189	(2)	United Kingdom 175.
Lead:				
Oxides	102	109	4	United Kingdom 55; Australia 50.
Metal including alloys:				
Scrap	25	--		
Unwrought	5,354	5,046	--	Australia 4,932.
Semimanufactures	95	188	(2)	Australia 171.
Magnesium: Metal including alloys:				
Unwrought value, thousands	$298	$733	$131	Norway $588.
Semimanufactures do.	$46	$80	$4	Canada $57.
Manganese:				
Ore and concentrate	643	69	--	All from Singapore.
Oxides	882	824	2	Japan 391; Australia 359.
Mercury value, thousands	$15	$12	--	Australia $4; Japan $3; Netherlands $3.
Molybdenum: Metal including alloys, all forms do.	$115	$90	$11	United Kingdom $62.
Nickel: Metal including alloys:				
Unwrought	41	171	--	Canada 112; Norway 54.
Semimanufactures	132	61	17	Australia 24.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$526	$705	$84	United Kingdom $490.
Silver:				
Waste and sweepings[4] do.	$249	$225	$2	Australia $218.
Metal including alloys, unwrought and partly wrought do.	$2,831	$3,190	$77	Australia $2,901.
Tin: Metal including alloys, all forms	172	217	1	Australia 112; Malaysia 87.
Titanium: Oxides	2,339	1,877	311	Australia 952; Finland 301; West Germany 203.

See footnotes at end of table.

Table 3.—New Zealand: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Tungsten: Metal including alloys, all forms ------- value, thousands--	$464	$378	$25	United Kingdom $289.
Zinc:				
Ore and concentrate -----------	10	--		
Oxides ------------------	27	39	--	West Germany 24.
Metal including alloys:				
Unwrought---------------	18,256	26,501	--	Australia 17,560; Canada 8,939.
Semimanufactures[5] --------	36	106	3	Australia 52; West Germany 41.
Other:				
Ores and concentrates----------	864	935	--	Japan 428; Australia 297; China 200.
Oxides and hydroxides ---------	1,976	1,289	16	Australia 1,146.
Ashes and residues------------	14	14	--	All from Australia.
Base metals including alloys, all forms value, thousands--	$320	$519	$41	Canada $214; Australia $107.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc --------------------	185	244	143	Italy 60; France 18.
Artificial: Corundum ----------	71	171	56	United Kingdom 55; Australia 40.
Dust and powder of precious and semiprecious stones including diamond value, thousands--	$253	$422	$307	United Kingdom $48.
Grinding and polishing wheels and stones -------------do----	$1,836	$2,113	$588	Australia $452; Japan $313; United Kingdom $295.
Asbestos, crude ----------------	1,897	1,861	18	Canada 1,841.
Barite and witherite--------------	4,641	3,665	--	Australia 1,464; Thailand 725.
Boron materials:				
Crude natural borates value, thousands--	$149	$97	$57	Netherlands $40.
Oxides and acids -------------	475	1,931	1,799	China 131.
Cement---------------------	5,242	5,184	21	Australia 2,150; Japan 892; Spain 637.
Chalk----------------------	664	1,011	--	United Kingdom 951.
Clays, crude -----------------	11,760	12,831	2,239	Australia 8,033; United Kingdom 2,173.
Cryolite and chiolite -------------	966	13	--	All from Denmark.
Diamond:				
Gem, not set or strung value, thousands--	$3,840	$3,251	$46	India $2,311; United Kingdom $383; Israel $252.
Industrial stones --------do----	$125	$239	$12	Australia $110; Ireland $64; Zaire $27.
Diatomite and other infusorial earth ---	1,343	1,109	1,016	Japan 52; Australia 22.
Feldspar, fluorspar, related materials --	1,299	1,169	1	Canada 513; Norway 513; Australia 71.
Fertilizer materials: Manufactured:				
Ammonia -----------------	679	326	1	Australia 324.
Nitrogenous--- value, thousands--	$7,022	$6,884	$2,509	Japan $2,133; West Germany $1,047; Australia $850.
Phosphatic ---------------	71,258	22,267	22,092	West Germany 157.
Potassic -----------------	132,450	235,720	107,465	Canada 56,176; U.S.S.R. 42,073.
Unspecified and mixed value, thousands--	$20,466	$17,419	$12,765	West Germany $3,391.
Graphite, natural --------------	116	59	3	United Kingdom 36; Sri Lanka 9.
Gypsum and plaster -------------	67,164	161,200	38	Australia 144,334; Mexico 16,500.
Lime ---------------------	12	80	48	United Kingdom 32.
Magnesium compounds: Magnesite, crude including sintered ------------	3,385	6,401	63	China 3,886; Australia 2,381.
Mica:				
Crude including splittings and waste value, thousands--	$155	$178	$10	India $52; China $31.
Worked including agglomerated splittings -----------do----	$84	$198	--	United Kingdom $78; Belgium-Luxembourg $50.
Nitrates, crude ----------------	54	54	--	Australia 36; West Germany 10.
Phosphates, crude --------------	980,532	910,279	47,308	Nauru 388,674; Christmas Island 380,100; Jordan 65,896.
Pigments, mineral: Iron oxides and hydroxides, processed-----------	1,276	2,213	20	West Germany 1,901.
Potassium salts, crude------------	3,304	7,363	7,363	

See footnotes at end of table.

Table 3.—New Zealand: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Precious and semiprecious stones other than diamond:				
Natural ----- value, thousands--	$1,528	$1,964	$6	Thailand $682; Australia $464; Hong Kong $226.
Synthetic ------------do----	$85	$736	$580	West Germany $82; Thailand $47.
Pyrite, unroasted	2	--		
Salt and brine	94,891	62,176	2	Netherlands Antilles 37,704; Australia 22,897.
Sodium compounds, n.e.s.: Carbonate, manufactured	25,487	29,800	27,479	United Kingdom 2,080.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	3,067	5,331	18	Republic of South Africa 2,107; China 1,080; India 730.
Worked --- value, thousands--	$181	$546	$2	Italy $294; Australia $72; Philippines $62.
Dolomite, chiefly refractory-grade	9	42	--	West Germany 41.
Gravel and crushed rock	79	103	18	Australia 43; France 40.
Quartz and quartzite	347	170	15	Australia 48; Sweden 48.
Sand other than metal-bearing	445	430	81	Australia 261; Japan 69.
Sulfur:				
Elemental:				
Crude including native and byproduct	193,771	222,011	58,728	Canada 163,263.
Colloidal, precipitated, sublimed	206	358	21	Australia 313.
Sulfuric acid	32	32	1	United Kingdom 27.
Talc, steatite, soapstone, pyrophyllite	4,851	2,710	36	Australia 2,065.
Other:				
Crude------- value, thousands--	$335	$451	$13	Austria $209; Republic of South Africa $88; France $44.
Slag and dross, not metal-bearing	106	141	--	Australia 125.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	57	40	4	Trinidad and Tobago 36.
Carbon black	4,972	6,738	260	Australia 6,321.
Coal:				
Anthracite and bituminous	210	894	518	United Kingdom 152; Japan 115; Australia 109.
Briquets of anthracite and bituminous coal	486	531	247	Japan 250.
Lignite including briquets	9	44	41	Australia 2.
Coke and semicoke- value, thousands--	$339	$367	$12	Australia $354.
Gas, natural: Liquefied ------do----	$16	$30	$4	Netherlands $22.
Petroleum:				
Crude- thousand 42-gallon barrels--	10,659	10,411	--	Indonesia 5,217; Saudi Arabia 4,698.
Refinery products:				
Gasoline -- value, thousands--	$231,980	$171,510	$26,809	Australia $81,289; Singapore $17,375; Netherlands $16,564.
Mineral jelly and wax --do----	$2,405	$2,802	$321	Japan $1,051; China $574; Australia $392.
Kerosene and jet fuel---do----	$99,153	$96,863	$806	Australia $48,169; Singapore $47,598.
Distillate fuel oil -----do----	$161,082	$124,474	$11,144	Australia $69,485; Singapore $36,936.
Lubricants ---------do----	$27,215	$27,272	$2,839	Australia $12,985; Singapore $7,626.
Residual fuel oil------do----	$56,928	$50,082	$4,664	Singapore $20,521; Australia $11,740.
Bitumen and other residues 42-gallon barrels--	291	3,648	97	Singapore 3,551.
Bituminous mixtures---do----	3,630	1,424	30	Australia 970; United Kingdom 382.
Petroleum coke ------do----	469,557	665,055	657,525	Australia 7,508.

[1]Table prepared by Audrey D. Wilkes.
[2]Less than 1/2 unit.
[3]Excludes unreported quantity valued at $2,104,000 in 1983 and $2,793,000 in 1984.
[4]May include other precious metals.
[5]Excludes unreported quantity valued at $775,000 in 1983 and $701,000 in 1984.

COMMODITY REVIEW

METALS

Aluminum.—New Zealand Aluminium Smelters Ltd. (NZAS), a 58.72%-owned subsidiary of Comalco Ltd. of Australia, and the Government of New Zealand arrived at an agreement in August over the pricing of electricity charges to its 244,000-ton-per-year Tiwai Point primary aluminum smelter. NZAS was considering closing the facility after being faced with a Government-imposed 25% increase in electricity charges in April. Other partners in NZAS were the Japanese firms Showa Light Metal Co. Ltd., a subsidiary of Showa Denko K.K., and Sumitomo Aluminium Smelting Co. Ltd., both having a 20.64% interest.

Gold and Silver.—New Zealand's Commission for the Environment tentatively accepted the development plans of Waihi Gold Co. for a $65 million gold and silver mine in the historic goldfields at Martha Hill on the Coromandel Peninsula, North Island. Waihi Gold's discovery of gold and silver came after more than 4 years of intensive drilling. Estimated reserves total 14.7 million tons of ore grading 3.5 grams of gold and 32 grams of silver per ton to a depth of 270 meters. Some 8 million tons of ore grading 3.0 grams of gold per ton was amenable to open pit mining. When the mine comes on-stream, scheduled to be in 1988, it will be New Zealand's first volume gold mine, at 1 million tons of ore per year, using modern technology. Interest in the project was held by Amax Exploration Inc., 38.33%; Mineral Resources (N.Z.) Ltd., 27%; Goodman Mining, 15%; Green McCahill, 16.67%; and United Gold Mines, 3%.

British Petroleum Mining Ltd. entered into a joint venture with New Zealand Forest Products Ltd., New Zealand's largest forest products company, to explore for gold and silver over a 250-square-kilometer forested area geologically associated with the Coromandel region. Initial prospecting was to be ground magnetometer and geochemical surveys.

Iron Ore and Iron Sands.—Small annual production of iron ore from the Onekaka deposits in the north of South Island and certain small deposits on the coast of North Island near Auckland continued during the year for use in gas purification, the preparation of stock licks, and in the brickmaking industry. No iron ore was used for the production of metallic iron.

Waipipi Ironsands Ltd. continued to produce titanomagnetite concentrates for direct export to Japan through offshore bulk-loading facilities from its Waverley placer mining operations on the southwestern coast of North Island, as did New Zealand Steel Mining Ltd., a wholly owned subsidiary of New Zealand Steel Ltd., from its Taharoa operation on North Island's west coast. Waikato North Head Mining Ltd., also a wholly owned subsidiary of New Zealand Steel, produced iron sand ore from its North Head operation near the Waikato River for domestic use in the production of steel billets at the Glenbrook steelworks.

Iron and Steel.—The nearly $1 billion expansion and modernization program at New Zealand Steel's Glenbrook plant continued during 1985. The first phase of expansion expected to be completed by yearend, but delayed owing to construction delays due to industrial action will increase annual primary production capacity to 750,000 tons per year early in 1986. A second-phase expansion, slated to raise flat production rolling capacity to 550,000 tons per year, also began during the year. Ishikawajima-Harima Heavy Industries Co. Ltd. of Japan will provide and install the rolling mills, targeted for completion in 1987.

In August 1985, New Zealand Steel announced it would install a second pipe mill as part of a $5 million program to boost pipe output. The new mill, to be supplied by the Federal Republic of Germany's Mannesmann AG, will double capacity to 65,000 tons per year. Installation was planned for completion in late 1986.

Following a review of the Glenbrook steelworks expansion program by both the Government of New Zealand and New Zealand Steel, an agreement was announced in December in which the Government would take an 81.2% stake in New Zealand Steel and assume responsibility for the $650 million of outstanding loans. The agreement, which must be approved by the shareholders, envisages the enlarged company taking over New Zealand Steel Development Ltd., which was formed to carry out the expansion program. The Government previously held a 60% interest in the development company, with the balance held by New Zealand Steel. According to New Zealand Steel, the restructuring plan was drawn up because the prospects for the expansion had been delayed during the year owing to higher coal and electricity prices, a planned reduction in protection of the local steel market, serious capital cost overruns because of construction delays, and higher-than-expected interest charges. The combined impact of the changes indicated the need for a major injection of new equity capital. The Government will take 291 million shares of the enlarged company, although it intended to sell its shares under certain conditions as soon as possible. At yearend, The Broken Hill Pty. Co. Ltd. and Fletcher Challenge Ltd. were the leading contending potential buyers.

MINERAL FUELS

Coal, Lignite, and Peat.—As part of New Zealand's national energy policy emphasizing the reduction of its dependence on imported oil, investigations continued into the range of potential uses of South Island lignite, including its gasification-synthesis to produce liquid fuels; the use of pyrolysis liquids (obtained from the chemical decomposition through heat) from peat as a refinery feedstock; and methods of increasing coal production from the fields on North Island.

The Chatham Islands, about 850 kilometers east of Wellington, peat investigations were aimed at determining the suitability of the pyrolysis products as a refinery feedstock. Both the South Island lignite and the Chatham Islands peat investigations were developed to evaluate the respective resources, determine the characteristics of the individual deposits and their minability, and to investigate the various conversion processes to obtain and/or produce liquid fuels. State coal mines accounted for 65% of production in 1984, the latest year for which official data were available.

Natural Gas and Petroleum.—On December 16, New Zealand lifted its moratorium on new awards for petroleum exploration licenses, in place since October 1984 while the Government reviewed its exploration policy. As a result of its 15-month review, new petroleum laws were promulgated. The policy review was prompted by the Government's desire to cut its budget deficit, partly through reduced spending on exploration by the state oil company, Petroleum Corp. of New Zealand Ltd. (Petrocorp).

Under the new petroleum policy, all licenses were to be awarded from the best geophysical and geochemical work program offered. However, cash bidding for license blocks would still be considered by the Government for the most promising exploration areas. In addition, the new policy gave the Government the option of taking up to a 26% interest in any license issued, the first 11% of which would be noncontributory interest during the exploration phase, becoming contributory upon granting of the development license. The remaining 15% or less interest, which must be taken at the time the exploration license is granted, would be fully contributory, and the Government would meet its full share of costs in proportion to this percentage during both the exploration and development stages. Previously, the Government could secure as much as a 51% interest.

Increases in annual rental and application fees were planned, but the new charges were not announced by yearend. Previous charges were last set in 1978. New tax concessions, including the possibility of allowing exploration cost deductions from taxable income and accelerated depreciation for development, were still being studied at yearend.

The Government also agreed to abolish the energy resources levy of $NZ0.45 per gigajoule for all new gas discoveries made from any new fields. The royalty rate of 12.5% on the selling value of any petroleum discovered will remain unchanged, however. In special circumstances, there was a provision in the Petroleum Act for the Minister of Energy to waive or reduce the royalty.

Concurrent with the lifting of the exploration license moratorium, the Government offered 50 license blocks in the Taranaki Basin off the southwestern coast of North Island. The blocks, consisting of the unlicensed portion of New Zealand's potentially most productive offshore area, totaled 37,284 square kilometers. Under the new law, Petrocorp must compete for its licenses the same as other domestic and foreign companies.

Petrocorp continued development of several small oil and gas/condensate fields onshore, including McKee, Pouri, and Toe Toe. When the McKee production station becomes fully operational and all the fields are linked to it, expected production will be 9,000 to 10,000 barrels per day. Also slated for development were the Pukemai and Tuhua oil and gas fields north of McKee and the Kaimiro gas/condensate field to the west.

New Zealand Synthetic Fuels Corp. Ltd. (New Zealand Synfuel), owned by the Government (75%) and Mobil Oil Corp. (25%) of the United States, began commercial production of gasoline from natural gas at its $1.2 billion Montunui plant on October 16, several weeks ahead of schedule and almost 20% under budget. The plant, on North Island's west side, converted natural gas from the offshore Maui Field to methanol, then to gasoline, using a catalyst developed by Mobil Oil. When fully operational, scheduled for early 1986, production will be about 14,500 barrels per day of gasoline, about one-third of New Zealand's demand.

Additional process equipment was installed on Platform A in the Maui Field to accommodate the increased production for New Zealand Synfuel's gas to gasoline plant. The Government's Offshore Mining Co. Ltd. held a 50% interest in the field, Shell Petroleum Mining Co. Ltd. and BP Oil Exploration Co. of New Zealand Ltd. each held 18.75%, and Todd Petroleum Mining Co. Ltd. held 12.5%.

At yearend, the Government was still studying additional uses for gas from the Maui Field, 1 of the 10 largest natural gas reservoirs in the world. When completed, the study will aid in settling such issues as possible gas exports, petrochemical development, and the need for a second platform.

Although exploration drilling and seismic activity expenditures were maintained at about 1984 levels, they were only about one-half of those spent in 1983. However, the moratorium on new exploration licenses did not have any noticeable impact on exploration activity in existing permit areas. Exploration companies completed 17 exploration wells, of which 12 were onshore and 5 were offshore. Three development wells were completed, all onshore. Seismic activity included 2,750 line kilometers being shot, of which 2,000 kilometers were offshore.

New Zealand Oil and Gas Ltd. continued its shallow drilling program in Petroleum Prospecting License (PPL) 075 on the west coast of South Island, attempting to tap the source of the Kotuku Seep, believed to be the largest active seep in Australasia. Offshore activity was centered in the deep waters off the east coast of South Island in permit area PPL 203.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from New Zealand dollars ($NZ) to U.S. dollars at the rate of $NZ0.57=US$1.00 as of Dec. 31, 1985.

The Mineral Industry of Nigeria

By Ben A. Kornhauser[1]

Crude oil sales provided about 97% of Nigeria's foreign exchange earnings and over 70% of the federal budget. The country continued to shun International Monetary Fund (IMF) commitments, embarking on countertrade deals involving oil to reduce its economic difficulties.

Expansion of the secondary lead smelting plant was planned and a solder-wire plant came on-stream at Makeri. Work resumed at the Ajaokuta steelworks following negotiations with the concerned contractors, but the estimated completion date was set for 1989 at a cost of $7 billion.[2] Delta Steel Co. was producing no more than 40% of its 1-million-ton-per-year rated capacity. The Nigerian Tin Mining Co. (NTMC) was formed by merger with the various tin companies and the Government-owned Nigerian Mining Corp. (NMC), with the Government retaining the majority control.

An agreement was signed to start the fourth oil refinery at Port Harcourt at a projected cost of $535 million. Nigerian National Petroleum Corp.'s (NNPC) refining capacity, with expansions at other plants, was expected to rise to 445,000 barrels per day. Development of the petrochemical industry continued, but at a slower pace, with the objective still the generation of more foreign exchange and the utilization of domestic natural gas.

PRODUCTION AND TRADE

Nigeria achieved a merchandise trade surplus of nearly $3 billion with exports of approximately $10.7 billion and imports of $7.8 billion. Imports were reduced from $10.2 billion in 1984 as the result of factors such as the import licensing system, continued austerity, and the inability to obtain foreign credits. Most of the export revenue was accounted for by the $10.5 billion from oil, compared with $11.5 billion in 1984, with an additional 2.7% coming primarily from cocoa. Crude oil sales continued to provide about 97% of foreign exchange earnings and over 70% of federal budget resources. Oil production averaged 1.47 million barrels per day compared with 1.37 million barrels per day in 1984.

Nigeria's total external debt in 1985 was $20 billion, which amounted to 159% of exports of goods and services. Debt service and interest payments absorbed 40% and 15%, respectively, of export income. The gross domestic product was estimated at $58.3 billion, a decrease of 5.6% from that of 1984. Nigeria continued to avoid IMF commitments, pursuing instead countertrade of about $2.5 billion in oil deals with Austria, Brazil, Italy, and France. Countertrade would cause the United Kingdom to lose its historical position as Nigeria's supplier to either Brazil or France. Barter deals also would diminish the West German and United States share of the Nigerian market. The question was whether countertrade would generate new customers for the oil or only displace existing sales.

The U.S. trade deficit with Nigeria widened owing to imports from the United States rising to a total value of $3.1 billion, a 19% increase compared with $2.6 billion in 1984, even though U.S. exports increased 13% to a total value of $652 million compared with

$575 million in 1984. U.S. imports from Nigeria primarily were oil (99%) and cocoa beans (0.8%). U.S. exports totaled $652 million and were mainly oil equipment (6%) and wheat (35%). The United Kingdom remained Nigeria's largest trading partner, increasing its exports to about $1.25 billion from $1 billion in 1984, while imports were estimated to increase to $850 million from $500 million.

Table 1.—Nigeria: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984[p]	1985[e]
METALS					
Columbium and tantalum concentrates, gross weight:					
Columbite	377	180	87	120	100
Tantalite	2	1	1	1	1
Iron and steel: Steel, crude	15,000	100,000	140,000	180,000	254,000
Lead:					
Mine output, metal content[e]	204	260	260	260	260
Metal, refined, secondary	2,000	2,000	2,000	2,000	3,000
Tin:					
Mine output, cassiterite concentrate:					
Gross weight (73.5% Sn)	3,172	2,355	1,560	1,844	1,850
Sn content	2,300	1,708	1,130	1,340	1,360
Metal, smelter	2,485	1,800	1,190	1,400	1,020
Zinc ore and concentrate, metal content	100	100	100	100	100
INDUSTRIAL MINERALS					
Cement, hydraulic thousand tons	2,700	3,600	3,600	3,600	3,600
Clays:					
Kaolin	635	700	700	286	300
Unspecified	39,835	20,900	20,000	20,000	20,000
Feldspar[e]	5,000	5,000	5,000	--	5,000
Stone:					
Limestone thousand tons	1,535	1,400	1,400	1,890	1,800
Marble	3,735	3,300	3,000	1,200	1,200
Shale thousand tons	140	140	140	127	120
MINERAL FUELS AND RELATED MATERIALS					
Coal do.	116	NA	NA	76	55
Gas, natural:					
Gross million cubic feet	700,000	685,000	655,000	174,000	96,000
Marketed do.	19,000	19,000	18,000	18,000	18,000
Petroleum:					
Crude thousand 42-gallon barrels	525,000	472,000	452,000	502,000	537,000
Refinery products:					
Gasoline do.	21,250	22,100	11,100	22,000	
Jet fuel do.	360	400	400	400	
Kerosene do.	6,355	6,432	6,200	6,400	NA
Distillate fuel oil do.	13,428	14,174	14,547	14,547	
Residual fuel oil do.	8,658	9,324	9,990	9,990	
Other, unspecified do.	792	920	1,048	1,563	
Total do.	50,843	53,350	43,285	54,900	NA

[e]Estimated. [p]Preliminary. NA Not available.
[1]Includes data available through July 30, 1986.

COMMODITY REVIEW

METALS

Gold.—Gold deposits of about 200,000 troy ounces were discovered in Ilesha, Oyo State, in western Nigeria. Trial exploitation was started.

Lead.—The Makeri Smelting Co. Ltd. of Nigeria planned to expand its secondary lead smelting capacity to 6,000 tons per year from 1,500 tons per year in 1985. A change from a reverberatory furnace to a rotary system was being considered because of the possible use of the lead sulfide mineral, galena, in the feedstock for the expanded plant. The proven reserves of 700,000 tons of lead and zinc in Abakaliki and Ririwei in eastern Nigeria were expected to be exploited. If the expansion were completed, about 75% of the feed would remain secondary material with improving domestic lead scrap supplies. The expansion was estimated to cost $400,000 to $500,000.

Makeri established the first solder-wire plant in west Africa at its lead smelter plant, which was to be in production in August. The plant used local materials and had a capacity of 600 tons per year.

Steel.—Estimated completion of the $7 billion Ajaokuta steelworks was set back to 1989. Originally, $5 billion had been allocated to establish the integrated steel plant.

Work on the much-delayed Ajaokuta steelworks resumed following contract negotiations with the main contractors: U.S.S.R.'s Techpromeksport, France's Dumez & Fougirolle S.A., and Julius Berger Nigeria Ltd. (an associate of West Germany's Bilfinger & Berger GmbH). An element of countertrade could be involved in the civil engineering contract renegotiated with Julius Berger. Brazilian steel companies, Usina Siderúrgica da Bahia S.A. and Cia. Siderúrgica da Guanabara S.A., began supplying billets to Nigeria as part of a $1 billion barter deal involving the Brazilian trading company Cooperativa Agricola de Cotia (Cotia). About 105,000 tons of billets was to be delivered to Nigerian rolling mills in 1985.

The domestic steel industry satisfied less than 50% of the country's estimated steel demand of 2 million tons. Of that demand, 50% was imported flat products, and the balance was produced domestically as rod, wire, and light section production.

Delta planned to produce 400,000 tons of raw steel in 1985 compared with 184,000 tons in 1984. Production at the 1-million-ton-per-year-capacity plant suffered from difficulties such as the inability to import spare parts and raw materials owing to the lack of foreign exchange. Although both of Delta's Midrex 600,000-ton-per-year-capacity direct-reduction iron (DRI) plants had been commissioned, only one had been in operation because of the low demand for DRI. However, Delta was shipping trial tonnages of DRI to other Nigerian steel companies because steel scrap generally was in short supply. A shipbreaking company was established in 1985 in Warri to provide 120,000 tons per year of steel scrap to Delta. The Government also was setting up a scrap processing plant in Bendel State to handle abandoned automobiles. Delta was using a mixture of 20% steel scrap and 80% DRI in its steel production. Delta did not have hot briquetting facilities, which would make a more stable product and facilitate shipping DRI in rainy weather.

Tin.—NTMC, which was organized in January 1985, was controlled by the Government-owned NMC through 54% of the shares. Employees of NTMC owned 6%, and 40% was owned by the former five independent companies: Amalgamated Tin Mining Co. Nigeria (Holdings) Ltd., Ex-lands Nigeria Ltd., Bisichi-Jantar Nigeria Ltd., Gold & Base Metal Mines of Nigeria Ltd., and Kaduna Prospecting Nigeria Ltd. The Government merged the above companies to create a more viable financial and technological company to better address the more costly mining of alluvial and subbasalt reserves, which were at depths of 50 to 100 feet of hard consolidated basalt rock.

INDUSTRIAL MINERALS

Fertilizers.—In 1985, construction started at Port Harcourt on a Nigerian fertilizer project being built under the general supervision of Kellogg Nigeria Inc. for the National Fertilizer Co. of Nigeria. Kellogg was the lead company in the United States-Japanese consortium building the plant. Three hundred and fifty million dollars was being furnished by United States and Japanese Export-Import Banks. Under a $50.6 million contract, Daewoo Corp. of the Republic of Korea in 1985 began laying pipe and installing furnaces, heat exchangers, drums, and compressors. The plant would be based on natural gas and would have a capacity of 1,000 tons of ammonia per day, 1,000 tons of nitrogen-phosphorus-potassium fertilizer per day, and 1,500 tons of urea per day. The complex was expected to be on-stream by the end of 1986.

MINERAL FUELS

By yearend, crude oil production averaged 1.47 million barrels per day, with output ranging from 1.1 to 1.3 million barrels per day in January to 1.7 million barrels per day in December. The wide fluctuations during the year from the production limits established by the Organization of Petroleum Exporting Countries resulted from the drop in oil prices, the availability of customers, and the need to generate foreign exchange to meet Nigeria's expenditures. In Nigeria's efforts to offset depressed oil prices and low demand and in the belief that barter arrangements would not affect its normal oil contracts, $2.5 billion in contracts were reported to have been negotiated with Austrian, Brazilian, French, and Italian companies. The countertrade agreements involved exchanging oil for equipment, automobiles, spare parts, food, and other goods. By yearend, the new military government, which came into power in August, was suspicious of some of the agreements and planned to review and/or renegotiate oil barter contracts concluded under the former military regime. The $1 billion countertrade arrangement with the Brazilian state-owned oil company, Petróleo Brasileiro S.A., and Brazil's largest trading company, Cotia, apparently would remain in effect. The barter increased the lifting of Nigeria's oil to Brazil from 50,000 barrels to 90,000 barrels per day in exchange for spare parts and goods and would place Nigeria among Brazil's largest oil suppliers.

Ashland Oil (Nigeria) Co. expected to place two oilfields in operation at oil production lease-98 concession offshore Nigeria by yearend. The fields were to operate under a production-sharing contract and were expected to produce 20,000 barrels of crude per day, which would be piped into a tanker moored in the Adanga Field. Ashland held Nigeria's only other production-sharing contract, producing about 10,000 barrels per day from a platform in the Akam Field.

Gulf Oil Corp. (Nigeria) Ltd. discovered a new oilfield in its Escravos operations close to Warri, southwest of its West Isan Field in its oil mining lease (OML)-95 concession. The field was in a water depth of 40 feet and situated 5-1/2 miles offshore. Oil was found in 10 reservoirs. Tests performed on five showed a combined flow rate of 8,735 barrels per day. Pan Ocean Oil Corp. Nigeria tested a light oil discovery on the OML-98 block, 100 miles east of Lagos. A total of 7,200 barrels per day flowed from three zones in the Agbada Formation at the No. 2 South Asaboro strike. Pan Ocean was to test two more zones in the block, which was operated with NNPC.[3]

Major producers, including Shell Oil Co., Gulf Oil Corp., Mobil Oil Nigeria Ltd., Agip-Phillips S.p.A., and Texaco Inc.-Chevron Corp., signed contracts formalizing their joint venture arrangements with NNPC. Shares were unchanged at 20 to 80 in NNPC's favor for Shell and 40 to 60 for the others. The 60,000-barrel-per-day Port Harcourt refinery, owned originally by Shell-BP but held by NNPC 50%, the finance ministry 30%, Odu'a Investments 10%, and several states with 10%, was merged into NNPC.

NNPC expected its refining capacity to rise from 260,000 barrels per day to 445,000 barrels per day, following completion of a 150,000-barrel-per-day plant at Port Harcourt and refinery expansion of 25,000 barrels per day at Warri and 10,000 barrels per day at Kaduna. An agreement was signed between NNPC and a consortium of four companies: Japan Gasoline Corp. (JGC); the Japanese financing firm Marubeni Corp.; Spie Batignolles Nigeria Ltd. of France; and its local subsidiary Spebat Nigeria, for the fourth refinery, which would be in Alesa-Elemene, close to the refinery at Port Harcourt. The project was expected to cost $535 million. JGC was to build the refinery at a cost of $295 million while Spie would build the conversion units and additional buildings for $240 million. Construction awaited France's guarantee of the financing for the part to be built by Spie.

In 1985, 40% of imported industrial raw materials were petrochemical-based and amounted to about $500 million in foreign exchange. The rationale for a domestic petrochemical industry was to increase foreign exchange and to use Nigerian natural gas, a basic ingredient of the industry. Phase 1, largely completed in 1985 and managed by Lummus Co. of the United Kingdom and Technimont S.p.A. of Italy, consisted of four plants in Warri, Bendel State, and Kaduna. These plants were designed to use byproducts from the Warri and Bendel refineries as petrochemical feedstock and raw materials for products such as plastics, synthetic fibers, detergents, and paint solvents. Phase 2, managed by Foster Wheeler Corp., was designed to use natural gas as feedstock. It required a 9-square-kilometer plant to be built at Eleme, Port Harcourt, and would consume about 100 million cubic feet of gas per day. The products would be ethylene, propylene, and their downstream products. The construction cost was projected between $2 and $3 billion. Because of this huge investment cost and the drop in Nigeria's foreign exchange, phase 2 probably would be divided into stages of construction but not shelved. Construction on this phase was expected to start in 1986.[4]

[1]Physical scientist, Division of International Minerals.
[2]Where necessary, values have been converted from Nigerian naira (N) to U.S. dollars at the rate of N1.00=US$1.00.
[3]Oil and Gas Journal. V. 83, No. 40, Oct. 7, 1985, p. 63.
[4]The Triumph (Kano). Nov. 9, 1985, p. 13.

The Mineral Industry of Norway

By Richard H. Singleton[1]

Norway's energy-intensive metals production decreased in 1985, notably in the major aluminum and ferroalloy industries, as a result of industry rationalization. Production increases occurred, however, for a few metals, including magnesium and silicon. An extensive program was under way in the mining and smelting industries to improve efficiency and productivity by modernization, including computerized remote control and equipment redesign. A widespread modernization and expansion of the primary aluminum industry and, to some extent, the aluminum fabrication industry, was in progress. Elkem A/S continued to strengthen its position as a world leader in ferroalloys by acquisition of domestic and foreign facilities. Substantial losses were sustained by Elkem's U.S. ferroalloys industry because of reduced demand and the strong U.S. dollar, which decreased export sales. Expansion of Norway's nickel-copper refinery began in anticipation of future imports of matte from Botswana to supplement the supply from Canada. Modernization of the sole zinc smelter-refinery complex began. Capacity of the magnesium smelter was being further increased. Production of copper concentrate continued to decrease because of ore depletion.

A 10-year downward trend in cement production was reversed in 1985. Norsk Hydro A/S began construction of another large fertilizer plant in Norway and continued its acquisition of foreign fertilizer production facilities. Norway's production of graphite was halted because its only concentrator was destroyed by fire. Construction of a high-purity-quartz mine-plant unit began.

Production and export of crude oil continued. Increased output from the Statfjord Field more than offset a decrease from the Ekofisk Field during 1985. A serious subsidence problem was identified in the Ekofisk Field. Heavy activity continued in the development of a number of North Sea fields. The Statpipe system for transportation of North Sea gas to Norway and continental Western Europe was completed.

As hope dwindled further regarding discovery of other large oil deposits in the North Sea, promising earlier discoveries of gas in the Norwegian Sea, further north, were augmented in 1985 by discovery there of two significant and promising oilfields. Also, much gas and one oilfield were discovered offshore north of the Arctic Circle.

Norway's real gross domestic product increased 3% while the consumer price index increased 6% and wages increased 10%. The external account remained in surplus.

PRODUCTION

Significant increases continued in the production of cadmium, cobalt, pig iron, magnesium, nickel, and silicon. Production of aluminum and ferroalloys decreased in accordance with industry rationalizations. Production of copper concentrate and iron ore decreased because of ore depletion and a strike at an iron mine. A 10-year reduction in cement production was reversed in 1985 and olivine production increased for the second year. Production of graphite was halted because the concentrator was destroyed by fire.

Table 1.—Norway: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984	1985^{p}
METALS					
Aluminum:					
Primary	633,585	636,091	^{r}713,014	765,083	712,406
Secondary	^{r}2,900	^{r}2,800	^{r}700	2,200	2,200
Cadmium metal, smelter	117	104	117	150	159
Cobalt metal	1,444	992	879	1,191	1,637
Copper:					
Mine output, metal content	28,123	27,590	^{r}22,568	22,310	18,969
Metal:					
Smelter, primary only	31,952	^{r}24,358	^{r}25,658	36,821	38,242
Refined:					
Primary	^{r}26,776	^{r}18,564	22,705	30,323	31,073
Secondary	^{e}6,000	2,323	1,976	$^{r\ e}$2,000	^{e}2,000
Total	^{r}32,776	20,887	^{r}24,681	32,323	33,073
Iron and steel:					
Iron ore and concentrate:					
Gross weight thousand tons	4,138	3,545	^{r}3,545	3,837	3,468
Iron content do.	2,690	2,304	^{r}2,304	2,420	2,254
Metal:					
Pig iron do.	^{r}587	^{r}456	565	546	610
Ferroalloys:					
Ferrochrome	11,437	$^{r\ e}$10,000	$^{r\ e}$4,000	$^{r\ e}$4,000	--
Ferrosilicochromium	985	^{e}1,000	$^{r\ e}$400	$^{r\ e}$300	--
Ferromanganese	233,390	203,256	^{r}283,492	285,169	215,272
Ferrosilicon (75% basis)	^{r}313,736	296,071	^{r}368,817	437,164	385,855
Ferrosilicomanganese	214,534	215,732	^{r}194,784	280,953	242,113
Other	4,530	$^{r\ e}$4,170	$^{r\ e}$4,630	$^{r\ e}$3,939	^{e}2,786
Total	^{r}778,612	^{r}730,229	^{r}856,123	1,011,525	846,026
Steel, crude thousand tons	848	768	^{r}895	915	930
Semimanufactures:					
Rolled do.	568	496	561	615	664
Finished castings do.	8	5	4	5	4
Lead:					
Mine output, metal content	2,973	$^{r\ e}$3,600	^{e}4,100	$^{r\ e}$3,500	3,300
Magnesium, primary	47,455	35,923	^{r}29,844	49,299	54,704
Nickel:					
Mine output, metal content	500	^{r}350	^{r}360	320	450
Metal, primary	36,954	25,833	^{r}28,619	35,548	37,513
Platinum-group metals[2] troy ounces	34,080	33,180	40,832	44,529	^{e}45,000
Silicon metal	^{e}55,000	64,882	76,856	^{e}91,000	^{e}102,000
Vanadium, mine output, metal content	345	110	--	--	--
Zinc:					
Mine output, metal content	28,500	31,800	32,300	28,700	27,800
Metal, primary	80,279	79,016	^{r}90,668	94,248	92,693
INDUSTRIAL MINERALS					
Cement, hydraulic thousand tons	1,837	1,786	^{r}1,666	1,547	1,601
Feldspar[3]	58,311	62,812	57,960	67,820	^{e}65,000
Graphite	8,665	7,451	^{r}8,063	10,067	2,275
Lime, hydrated, and quicklime^{e} thousand tons	130	130	130	130	100
Nitrogen: N content of ammonia	544,793	520,411	561,856	631,136	532,123
Olivine sand thousand tons	1,341	1,376	^{r}1,354	1,600	2,000
Pyrite do.	435	425	^{r}357	428	381
Sodium carbonate^{e}	(4)	(4)	(4)	--	--
Stone, crushed:					
Dolomite thousand tons	^{r}458	547	422	534	555
Limestone do.	3,832	4,515	4,303	3,995	^{e}4,000
Nepheline syenite do.	217	212	^{r}220	226	228
Quartz and quartzite do.	633	624	^{r}582	828	^{e}800
Sulfur:					
Pyrite, S content do.	^{r}218	^{r}213	^{r}179	209	191
Byproduct of:					
Metallurgy do.	^{r}37	^{r}83	^{r}95	58	64
Petroleum do.	8	8	8	8	8
Total do.	^{r}263	^{r}304	282	275	263
Talc, soapstone, steatite do.	86	^{e}100	^{e}100	143	^{e}140
Titania: Ilmenite concentrate do.	660	552	556	652	735
MINERAL FUELS AND RELATED MATERIALS					
Coal, all grades	409,729	440,000	^{r}502,000	451,327	569,482
Coke, all grades	345,223	340,589	^{r}314,316	314,444	318,289

See footnotes at end of table.

Table 1.—Norway: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984	1985[p]
MINERAL FUELS AND RELATED MATERIALS —Continued					
Gas:					
Manufactured _______ million cubic feet__	[r]410	[r]268	[r]171	73	--
Natural:					
Gross ___________________do____	[e]958	933	932	1,144	1,202
Marketable[5] _______________do____	924	925	[r]912	964	983
Marketed[6] _______________do____	890	896	875	933	953
Peat:[e]					
For agriculture__________ thousand tons__	[r]30	[r]30	[r]30	[r]30	30
For fuel ___________________do____	1	1	1	1	1
Petroleum:					
Crude ______ thousand 42-gallon barrels__	175,361	183,010	[r]226,911	260,861	285,919
Refinery products:					
Liquefied petroleum gas_______do____	1,380	1,415	1,578	1,833	1,322
Gasoline, motor_____________do____	[r]9,308	[r]9,648	[r]10,124	11,484	11,314
Jet fuel__________________do____	[r]3,320	[r]3,640	[r]4,272	1,280	2,128
Kerosene_________________do____	[r]356	[r]178	[r]388	3,616	4,704
Distillate fuel oil ____________do____	[r]23,245	[r]23,171	[r]25,110	26,058	26,886
Residual fuel oil ____________do____	[r]8,465	[r]7,080	[r]5,641	5,734	5,341
Naphtha _________________do____	4,666	3,476	4,072	3,340	2,338
Other___________________do____	[r]1,940	[r]2,344	[r]2,016	2,224	1,726
Refinery fuel and losses _______do____	2,315	[r]2,017	[r]1,995	1,757	2,397
Total ________________do____	[r]54,995	[r]52,969	[r]55,196	57,326	58,156

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through July 31, 1986.
[2]Data represent exports, a part of which may be derived from imported materials.
[3]Excludes nepheline syenite, which is included with stone.
[4]Revised to zero.
[5]Gross less gas reinjected and flared.
[6]Marketable less gas used as fuel during production.

TRADE

Exports of primary copper and nickel increased in 1984, as did exports of ferrosilicon, ferrosilicomanganese, and silicon. Most exports were to Western Europe. Imports of cobalt alloys, nearly one-half from Finland, nickel-copper matte from Canada, and platinum-group metals, about two-thirds from the Federal Republic of Germany, increased. Imports of zinc concentrates, mostly from Sweden, increased while exports decreased. Imports of chromium ore ceased, reflecting the apparent termination of the ferrochrome industry.

Barite imports increased in 1984 reflecting the continuing increase of petroleum industry activity in the North Sea. Cement imports, mostly from Western Europe but only a small percentage of domestic demand, increased sharply in 1984. Imports of fluorspar, lime, and quartz continued to increase. Imports of cryolite decreased. Feldspar exports continued to increase.

Exports of oil, two-thirds to the United Kingdom, continued to increase in 1984 as did exports of natural gas, mostly to the United Kingdom and the Federal Republic of Germany. Imports of coke, mostly from Western Europe, continued to increase.

Table 2.—Norway: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984 United States	Destinations, 1984 Other (principal)
METALS				
Aluminum:				
Ore and concentrate	101	--		
Oxides and hydroxides	7	220	--	Sweden 201; Denmark 19.
Metal including alloys:				
Scrap	27,517	27,138	--	West Germany 11,334; Sweden 8,708; Finland 2,227.
Unwrought	637,339	638,675	22,109	West Germany 212,313; United Kingdom 110,637; Netherlands 94,802.
Semimanufactures	92,596	82,360	14,517	United Kingdom 16,927; Denmark 9,577; Sweden 9,455.
Antimony: Metal including alloys, all forms	(2)	5	NA	NA.
Cadmium: Metal including alloys, all forms	106	137	20	Sweden 62; West Germany 20; United Kingdom 18.
Chromium: Oxides and hydroxides	(2)	8	--	All to Denmark.
Cobalt: Metal including alloys, all forms	816	1,270	440	Netherlands 516; West Germany 97; United Kingdom 57.
Copper:				
Ore and concentrate	92,465	72,619	--	West Germany 33,282; Sweden 22,252; Finland 17,085.
Oxides and hydroxides	3,857	4,689	NA	NA.
Sulfate	112	375	--	All to Sweden.
Ash and residue containing copper	2,116	2,525	--	Spain 1,920; West Germany 490; Sweden 105.
Metal including alloys:				
Scrap	7,730	5,761	19	West Germany 2,799; Sweden 1,374; Italy 543.
Unwrought	26,782	35,384	2,293	West Germany 13,022; United Kingdom 5,527; France 4,205.
Semimanufactures	2,544	3,727	6	Sweden 1,870; West Germany 874; United Kingdom 365.
Gold:				
Waste and sweepings value, thousands	$1,980	$1,408	NA	United Kingdom $1,051; Switzerland $144; Sweden $121.
Metal including alloys, unwrought and partly wrought troy ounces	13,247	13,921	1,511	West Germany 7,813; United Kingdom 1,254; Hong Kong 1,093.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite thousand tons	2,945	3,083	--	West Germany 1,378; United Kingdom 914; France 340.
Pyrite, roasted do.	143	136	--	West Germany 70; United Kingdom 24; Denmark 20.
Metal:				
Scrap	35,212	21,305	8	West Germany 9,734; Sweden 3,980; Netherlands 2,781.
Pig iron, cast iron, related materials	43,648	27,873	--	United Kingdom 21,193; Sweden 3,299.
Ferroalloys:				
Ferrochromium	6,632	601	NA	West Germany 444; United Kingdom 116.
Ferromanganese	198,288	204,540	26,296	West Germany 40,572; United Kingdom 21,470; Belgium-Luxembourg 21,386.
Ferrosilicochromium	732	349	--	Belgium-Luxembourg 231; West Germany 117.
Ferrosilicomanganese	172,893	217,817	15,791	West Germany 56,579; Belgium-Luxembourg 27,875; France 26,734.
Ferrosilicon	347,911	427,489	27,945	West Germany 123,536; Japan 116,152; United Kingdom 63,555.
Silicon metal	74,951	81,443	NA	West Germany 27,470; U.S.S.R. 14,855; United Kingdom 11,233.
Unspecified	12,078	10,842	2,793	United Kingdom 4,726; Sweden 1,112; West Germany 792.
Steel, primary forms	233,955	199,149	--	Netherlands 97,280; China 45,039; Malaysia 30,514.

See footnotes at end of table.

Table 2.—Norway: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal —Continued				
Semimanufactures:				
Bars, rods, angles, shapes, sections	241,744	306,628	51,963	West Germany 58,285; United Kingdom 44,439; Sweden 32,668.
Universals, plates, sheets	162,123	154,856	5,760	Denmark 43,466; Sweden 40,180; United Kingdom 36,128.
Hoop and strip	12,048	16,146	1	Sweden 13,783; Denmark 1,492; United Kingdom 824.
Rails and accessories	2,713	1,153	--	Italy 704; Sweden 373.
Wire	6,675	9,128	2,449	United Kingdom 1,239; Iraq 730; West Germany 612.
Castings and forgings, rough	5,607	4,797	1	Sweden 4,212; Denmark 331.
Lead:				
Ore and concentrate	6,898	6,732	--	All to West Germany.
Oxides	102	56	--	Sweden 54.
Metal including alloys:				
Scrap	6,706	8,159	129	Denmark 3,986; Sweden 3,210; West Germany 569.
Unwrought	131	28	--	All to Sweden.
Semimanufactures	34	7	--	Finland 2; Iceland 2; Sweden 1.
Magnesium: Metal including alloys:				
Scrap	38	23	--	Switzerland 14; West Germany 8.
Unwrought ___ value, thousands	$98,603	$120,942	NA	NA.
Semimanufactures	54	113	--	West Germany 68; Sweden 28; Switzerland 17.
Manganese:				
Ore and concentrate, metallurgical-grade	1,522	5	--	All to Sweden.
Metal including alloys, all forms	--	1	NA	NA.
Mercury ___ 76-pound flasks	1,827	1,653	--	Spain 1,624; Sweden 29.
Nickel:				
Ore and concentrate	9,952	8,231	--	All to Finland.
Metal including alloys:				
Scrap	107	49	35	West Germany 8; United Kingdom 6.
Unwrought	30,014	37,812	15,908	Netherlands 7,612; Japan 5,303.
Semimanufactures	5	15	--	Denmark 5; Sweden 4; United Kingdom 4.
Platinum-group metals:				
Waste and sweepings[3] value, thousands	$3,564	$5,990	NA	West Germany $5,725; United Kingdom $160.
Metals including alloys, unwrought and partly wrought _ troy ounces	40,832	44,529	10,513	West Germany 23,824; Netherlands 6,269; Sweden 1,511.
Silver:				
Waste and sweepings[3] value, thousands	$3,316	--		
Metal including alloys, unwrought and partly wrought thousand troy ounces	1,010	864	30	Sweden 416; West Germany 165; United Kingdom 60.
Tin: Metal including alloys:				
Scrap	52	30	--	West Germany 13; United Kingdom 11; Denmark 6.
Unwrought	8	17	--	Denmark 15; Sweden 1.
Semimanufactures	1	5	--	West Germany 4; United Kingdom 1.
Titanium:				
Ore and concentrate	519,611	599,214	--	West Germany 246,293; Poland 86,044; United Kingdom 72,604.
Oxides	2,996	2,474	1,016	Sweden 1,073; Denmark 350.
Zinc:				
Ore and concentrate	25,658	10,989	--	West Germany 9,052; Belgium-Luxembourg 1,937.
Oxides	991	2,817	2	United Kingdom 1,429; West Germany 809; Sweden 232.
Blue powder	--	5,785	NA	West Germany 1,124; Singapore 727; Denmark 397.
Ash and residue containing zinc	3,030	832	--	West Germany 371; United Kingdom 368; Netherlands 69.

See footnotes at end of table.

Table 2.—Norway: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued				
Zinc —Continued				
Metals including alloys:				
Scrap	327	395	--	Sweden 197; West Germany 125; Netherlands 68.
Unwrought	79,981	81,891	12,518	United Kingdom 18,654; Sweden 16,663; West Germany 15,613.
Semimanufactures	6,048	100	NA	Denmark 88.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	24	9	--	All to Iceland.
Artificial:				
Corundum	5	7	--	United Arab Emirates 2; Denmark 1; Sweden 1.
Silicon carbide	56,203	69,640	NA	NA.
Grinding and polishing wheels and stones	913	956	21	Sweden 236; Finland 205; France 105.
Asbestos, crude	--	7	--	All to Ivory Coast.
Barite and witherite	166	3,515	--	United Kingdom 2,800; Denmark 600.
Cement	74,621	80,722	--	NA.
Chalk	1	12	--	All to Malaysia.
Clays, crude:				
Bentonite	254	709	--	United Kingdom 564; Tanzania 117.
Kaolin	100	2	--	NA.
Unspecified	14	3	--	NA.
Cryolite and chiolite	--	6	--	All to Sweden.
Diamond: Gem, not set or strung value, thousands	$736	$165	--	Belgium-Luxembourg $113; West Germany $11; Sweden $11.
Diatomite and other infusorial earth	36	35	--	Japan 33; Sweden 2.
Feldspar, fluorspar, related materials:				
Feldspar	71,040	81,026	--	West Germany 18,369; United Kingdom 16,990; Netherlands 13,520.
Unspecified	217,878	231,757	--	Netherlands 97,706; United Kingdom 50,624; West Germany 26,729.
Fertilizer materials: Manufactured:				
Ammonia value, thousands	$3,364	$15,133	NA	NA.
Nitrogenous do	$81,672	$91,204	NA	NA.
Phosphatic do	$16	--		
Potassic	--	1,790	--	All to Denmark.
Unspecified and mixed value, thousands	$144,442	$169,896	NA	NA.
Graphite, natural	7,311	8,888	NA	NA.
Gypsum and plaster	22	2,380	--	Liberia 2,341; Sweden 24.
Kyanite and related materials	5	16	--	NA.
Lime	10,624	7,073	--	Liberia 3,795; Denmark 2,075; Sweden 1,139.
Magnesium compounds: Magnesite	9,575	9,870	NA	NA.
Mica:				
Crude including splittings and waste	2,009	2,009	--	Netherlands 557; West Germany 508; United Kingdom 113.
Worked including agglomerated splittings	2	3	(³)	Switzerland 2.
Pigments, mineral: Iron oxides and hydroxides, processed	55	66	--	Netherlands 50; Thailand 4; Sweden 3.
Precious and semiprecious stones other than diamond: Natural kilograms	1,051	895	--	West Germany 880.
Pyrite, unroasted	186,867	167,974	--	West Germany 63,895; Italy 61,884; Turkey 25,339.
Salt and brine	3,523	4,091	--	Sweden 2,380; West Germany 1,264; Spain 293.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	18	5	--	Switzerland 2.
Sulfate, manufactured	628	48	NA	NA.

See footnotes at end of table.

Table 2.—Norway: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	93,603	98,178	326	France 29,017; Italy 24,756; West Germany 9,375.
Worked	12,012	13,809	11	Netherlands 12,316; Belgium-Luxembourg 407; West Germany 383.
Dolomite, chiefly refractory-grade	136,471	149,302	NA	NA.
Gravel and crushed rock	2,358,593	3,066,979	11,383	West Germany 1,379,669; France 347,787; Denmark 274,650.
Quartz and quartzite	87,215	99,654	--	Iceland 86,963; Sweden 8,562; Denmark 2,372.
Sulfur:				
Elemental:				
Crude including native and byproduct	7,525	4,307	--	Sweden 2,374; United Kingdom 1,933.
Colloidal, precipated, sublimed	--	1,904	--	All to Sweden.
Dioxide	5,914	7,446	NA	Sweden 6,590; West Germany 551.
Sulfuric acid ___ value, thousands	$3,974	$4,624	NA	NA.
Talc, steatite, soapstone, pyrophyllite	50,693	48,830	--	United Kingdom 13,112; West Germany 9,373; Netherlands 8,116.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	630	1,509	--	Sweden 1,452; Denmark 26; Kenya 25.
Carbon black	42	47	--	Sweden 31; West Germany 16.
Coal:				
Anthracite	3,204	7,028	--	West Germany 3,393; United Kingdom 2,905; India 569.
Bituminous	124,288	180,807	--	West Germany 105,482; Sweden 50,795; Netherlands 21,170.
Briquets of anthracite and bituminous coal	--	2,645	--	All to Sweden.
Lignite including briquets	--	2,235	--	United Kingdom 2,180; Denmark 55.
Coke and semicoke	159,902	123,566	--	Sweden 34,372; Iceland 26,923; West Germany 16,341.
Gas, natural: Gaseous ___ million cubic feet	866,178	926,658	--	United Kingdom 483,105; West Germany 443,553.
Petroleum:				
Crude ___ thousand 42-gallon barrels	190,740	223,119	7,394	United Kingdom 145,500; Sweden 18,348; West Germany 8,932.
Refinery products:				
Liquefied petroleum gas ___ do.	1,059	1,156	290	United Kingdom 183; Portugal 181; Netherlands 168.
Gasoline ___ do.	5,615	5,386	85	United Kingdom 1,328; Netherlands 1,147; West Germany 862.
Mineral jelly and wax ___ do.	12	7	(2)	Sweden 6.
Kerosene and jet fuel ___ do.	890	1,097	--	Denmark 682; West Germany 294; Sweden 81.
Distillate fuel oil ___ do.	6,612	42,301	372	Denmark 38,213; West Germany 1,159; France 824.
Lubricants ___ do.	61	50	(2)	Sweden 22; Netherlands 12; West Germany 7.
Residual fuel oil ___ do.	5,766	6,479	--	Sweden 1,518; West Germany 1,235; Netherlands 1,125.
Bitumen and other residues ___ do.	126	50	--	Denmark 39; Sweden 10.
Bituminous mixtures ___ do.	(2)	5	--	Kenya 4.
Petroleum coke ___ do.	464	579	--	Netherlands 334; United Kingdom 79; Denmark 68.

NA Not available.
[1]Table prepared by Jozef Plachy.
[2]Less than 1/2 unit.
[3]May include other precious metals.

Table 3.—Norway: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS				
Aluminum:				
Ore and concentrate	4,480	5,420	--	All from Greece.
Oxides and hydroxides thousand tons	1,434	1,492	57	Australia 373; Suriname 313; Panama 242.
Metal including alloys:				
Scrap	1,724	2,874	--	Denmark 1,752; Sweden 948; Finland 101.
Unwrought	11,234	31,511	67	U.S.S.R. 10,109; Sweden 5,051; West Germany 4,138.
Semimanufactures	41,915	46,581	117	West Germany 26,406; Sweden 5,852; Belgium-Luxembourg 3,086.
Antimony: Metal including alloys, all forms	--	71	NA	Netherlands 51; China 12.
Arsenic: Metal including alloys, all forms	13	--		
Beryllium: Metal including alloys, all forms	(3)	47	21	Sweden 21; West Germany 5.
Cadmium: Metal including alloys, all forms	2	(3)	NA	NA.
Chromium:				
Ore and concentrate	8,800	538	--	Republic of South Africa 437; Finland 97.
Oxides and hydroxides	76	101	--	West Germany 44; China 20; Italy 20.
Metal including alloys, all forms	--	10	--	All from United Kingdom.
Cobalt:				
Oxides and hydroxides	120	11	--	All from Belgium-Luxembourg.
Metal including alloys, all forms	166	2,290	234	Finland 1,070; Brazil 279; United Kingdom 216.
Copper:				
Matte and speiss including cement copper	6,367	3,604	--	Finland 3,078; Zimbabwe 500.
Oxides and hydroxides	51	11	NA	NA.
Sulfate	841	541	NA	U.S.S.R. 375; Belgium-Luxembourg 160.
Metal including alloys:				
Scrap	71	92	--	Sweden 33; West Germany 25; Denmark 21.
Unwrought	1,630	2,042	1	Sweden 637; United Kingdom 550; Belgium-Luxembourg 476.
Semimanufactures	28,609	27,356	85	West Germany 10,554; Sweden 7,121; Belgium-Luxembourg 4,310.
Gold: Metal including alloys, unwrought and partly wrought troy ounces	19,966	18,712	2,154	West Germany 10,417; United Kingdom 3,504.
Iron and steel:				
Iron ore and concentrate, excluding roasted pyrite	225,640	39,813	--	Sweden 37,671; Netherlands 2,142.
Metal:				
Scrap	15,139	12,887	--	United Kingdom 9,298; Denmark 2,839.
Pig iron, cast iron, related materials	9,330	8,249	4	Canada 4,071; Sweden 1,646; United Kingdom 759.
Ferroalloys:				
Ferrochromium	167	477	--	Sweden 424; West Germany 23.
Ferromanganese	19	(3)	--	All from United Kingdom.
Ferromolybdenum	41	48	--	Sweden 23; United Kingdom 15.
Ferrosilicomanganese	25	--		
Ferrosilicon	5,261	553	--	West Germany 547.
Silicon metal	4	2	--	Mainly from Denmark.
Unspecified	176	207	(3)	Belgium-Luxembourg 75; West Germany 56; United Kingdom 51.
Steel, primary forms	144,293	144,095	8	Netherlands 104,282; West Germany 23,052.

See footnotes at end of table.

Table 3.—Norway: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal —Continued				
Semimanufactures:				
Bars, rods, angles, shapes, sections	216,595	237,381	12	Sweden 65,786; West Germany 43,698; Belgium-Luxembourg 32,772.
Universals, plates, sheets	437,934	493,823	59	Sweden 107,628; West Germany 99,150; Belgium-Luxembourg 70,077.
Hoop and strip	26,265	30,245	1	West Germany 7,809; Sweden 7,061; Finland 6,122.
Rails and accessories	17,650	19,199	([2])	Sweden 15,843; West Germany 1,910.
Wire	20,176	19,703	91	Belgium-Luxembourg 7,984; Sweden 6,861; Finland 1,646.
Tubes, pipes, fittings	183,357	203,799	566	West Germany 57,796; Japan 39,847; United Kingdom 27,266.
Castings and forgings, rough	3,390	2,677	68	Sweden 953; Denmark 888; West Germany 204.
Lead:				
Oxides	545	533	14	West Germany 302; United Kingdom 144; Sweden 71.
Metal including alloys:				
Scrap	61	79	--	Denmark 78.
Unwrought	12,237	14,150	25	Sweden 7,291; United Kingdom 3,417; Denmark 3,343.
Semimanufactures	1,556	1,477	([2])	Netherlands 895; West Germany 386; Belgium-Luxembourg 100.
Magnesium: Metal including alloys:				
Scrap	12	21	20	United Kingdom 1.
Unwrought	325	195	195	
Semimanufactures	19	32	1	West Germany 17; Sweden 12.
Manganese:				
Ore and concentrate, metallurgical-grade	623,305	737,061	--	Republic of South Africa 291,829; Gabon 237,535; France 54,800.
Oxides	603	796	--	Netherlands 638; Sweden 70; Belgium-Luxembourg 54.
Metal including alloys, all forms	1,579	1,121	98	Republic of South Africa 420; Netherlands 327; Belgium-Luxembourg 239.
Mercury .... 76-pound flasks	116	261	--	Netherlands 203; Sweden 58.
Nickel:				
Matte and speiss	63,140	93,459	1,670	Canada 86,530; Republic of South Africa 4,391.
Metal including alloys:				
Scrap	8	73	67	United Kingdom 4.
Unwrought	281	146	94	Canada 42; United Kingdom 5.
Semimanufactures	201	281	10	United Kingdom 124; West Germany 94; Japan 24.
Platinum-group metals: Metals including alloys, unwrought and partly wrought troy ounces	14,597	25,271	643	West Germany 16,107; Switzerland 3,730; United Kingdom 2,186.
Silver:				
Waste and sweepings[3] value, thousands	$3,344	$1,776	--	Sweden $1,261; Finland $204; Turkey $150.
Metal including alloys, unwrought and partly wrought thousand troy ounces	1,359	1,524	([2])	West Germany 828; United Kingdom 335; Switzerland 236.
Tin: Metal including alloys:				
Scrap	4	--		
Unwrought	396	472	--	United Kingdom 354; Denmark 67; Malaysia 20.
Semimanufactures	222	202	([2])	West Germany 58; Denmark 57; Sweden 20.
Titanium: Oxides	935	452	--	West Germany 413; United Kingdom 23; Belgium-Luxembourg 15.
Tungsten: Metal including alloys, all forms	2	3	([2])	United Kingdom 1.
Uranium and thorium: Metals including alloys, all forms	([2])	2	--	Japan 1; United Kingdom 1.

See footnotes at end of table.

Table 3.—Norway: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Zinc:				
Ore and concentrate	87,894	115,477	--	Sweden 61,330; Canada 20,100; Ireland 17,593.
Oxides	1,787	1,777	--	East Germany 608; West Germany 475; China 263.
Blue powder	1	21	--	NA.
Ash and residue containing zinc	29,859	24,375	--	Sweden 23,361; Denmark 1,012.
Metal including alloys:				
Scrap	3,966	5,278	--	Denmark 2,128; Sweden 1,592; Finland 1,369.
Unwrought	877	928	--	Poland 359; Netherlands 327; Sweden 101.
Semimanufactures	790	662	1	Netherlands 220; France 185; West Germany 114.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	17,344	18,610	42	Iceland 18,103; West Germany 210; France 168.
Artificial:				
Corundum	767	914	--	West Germany 692; Austria 170; France 41.
Silicon carbide	566	83	52	West Germany 19.
Dust and powder of precious and semiprecious stones including diamond kilograms	10	514	--	NA.
Grinding and polishing wheels and stones	790	885	9	West Germany 245; Austria 230; Sweden 181.
Asbestos, crude	58	([2])	--	All from West Germany.
Barite and witherite	90,574	107,994	--	Morocco 50,795; Ireland 39,935; Belgium-Luxembourg 8,756.
Boron materials:				
Crude natural borates	6,542	4,333	4,327	Sweden 6.
Oxides and acids	325	221	4	France 188; China 24.
Cement	18,788	65,928	9	West Germany 28,421; Poland 23,671; East Germany 6,275.
Chalk	9,441	7,985	([2])	Denmark 4,575; Sweden 2,517; France 642.
Clays, crude:				
Bentonite	31,374	38,128	8,212	Italy 22,298; Greece 2,990; Netherlands 1,553.
Kaolin	67,224	75,477	166	United Kingdom 6,627; Spain 5,305.
Unspecified	17,631	22,900	285	United Kingdom 6,997; France 4,440; Czechoslovakia 4,334.
Cryolite and chiolite	7,982	3,665	--	Denmark 2,140; Greenland 1,305; East Germany 200.
Diamond:				
Gem, not set or strung value, thousands	$3,283	$2,854	$2	Belgium-Luxembourg $1,435; United Kingdom $476; Republic of South Africa $322.
Industrial stones do	$6	$4	--	Denmark $3.
Diatomite and other infusorial earth	1,578	1,640	91	Iceland 1,033; West Germany 78; Spain 76.
Feldspar, fluorspar, related materials:				
Feldspar	132	125	--	NA.
Fluorspar	39,084	43,925	--	Spain 28,324; East Germany 7,002; Morocco 6,328.
Fertilizer materials: Manufactured:				
Ammonia	90,848	30,191	--	U.S.S.R. 22,115; France 5,007; Netherlands 3,024.
Nitrogenous	5,703	3,979	8	East Germany 3,508; Netherlands 237; West Germany 106.
Phosphatic	4,983	4,291	15	Sweden 2,595; West Germany 801; Belgium-Luxembourg 558.
Potassic	313,718	375,652	--	West Germany 116,049; Spain 62,670; France 59,940.
Unspecified and mixed	16,899	43,501	23	West Germany 15,261; Sweden 2,488; Netherlands 1,133.
Graphite, natural	496	573	2	Sweden 294; United Kingdom 272.
Gypsum and plaster	142,710	179,210	--	France 89,172; Sweden 65,928; Spain 19,177.

See footnotes at end of table.

Table 3.—Norway: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Kyanite and related materials	380	915	NA	Sweden 524; Republic of South Africa 142.
Lime	26,275	56,430	5	Denmark 40,112; Sweden 13,090; Iceland 2,056.
Magnesium compounds	86,276	88,941	3	West Germany 77,252; East Germany 5,540.
Mica:				
Crude including splittings and waste	1,953	2,291	74	India 2,128; Netherlands 41; Austria 30.
Worked including agglomerated splittings	57	74	--	Switzerland 47; Belgium-Luxembourg 12; United Kingdom 7.
Nitrates, crude	298	137	--	West Germany 126; France 11.
Phosphates, crude	414,847	507,213	16,457	U.S.S.R. 127,450; Sweden 99,085; Togo 95,566.
Phosphorus, elemental	10	([2])	--	NA.
Pigments, mineral: Iron oxides and hydroxides, processed	2,175	2,553	--	West Germany 2,456; Spain 25; Sweden 24.
Precious and semiprecious stones other than diamond:				
Natural kilograms	12,333	17,389	NA	Brazil 7,008; West Germany 3,899; Belgium-Luxembourg 569.
Synthetic do.	43	10	NA	NA.
Salt and brine	505,514	554,410	12	Netherlands 374,063; Spain 58,007; United Kingdom 39,179.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	40,350	40,384	--	Poland 12,398; Netherlands 10,967; West Germany 7,507.
Sulfate, manufactured	8,431	9,216	NA	Sweden 8,813; West Germany 214.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	9,764	11,099	6	Sweden 4,510; Italy 2,287; Republic of South Africa 1,300.
Worked	10,054	12,114	([2])	Portugal 5,973; Sweden 3,547; Italy 947.
Dolomite, chiefly refractory-grade	10,128	9,531	14	United Kingdom 6,775; Sweden 2,357.
Gravel and crushed rock	82,749	83,155	2	Sweden 78,515; Denmark 2,297.
Limestone other than dimension	184,975	210,200	--	United Kingdom 168,776; Sweden 26,209; Denmark 14,966.
Quartz and quartzite	491,572	674,663	([2])	Sweden 435,615; Spain 193,942.
Sand other than metal-bearing	198,424	224,552	987	Belgium-Luxembourg 152,241; Sweden 56,761.
Sulfur:				
Elemental:				
Crude including native and byproduct	3,886	5,599	--	Sweden 5,289; West Germany 187.
Colloidal, precipitated, sublimed	16	420	--	Denmark 326; Sweden 92.
Dioxide	2,369	2,099	--	All from Sweden.
Sulfuric acid	176	156	--	Denmark 104; Sweden 22; Netherlands 19.
Talc, steatite, soapstone, pyrophyllite	5,675	8,127	31	Finland 3,655; India 3,396; Belgium-Luxembourg 413.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	54	103	98	Bahamas 5.
Carbon black	4,671	6,039	23	Sweden 2,728; Netherlands 1,303; West Germany 1,186.
Coal:				
Anthracite	85,685	94,982	35,509	West Germany 46,986; United Kingdom 12,342.
Bituminous	461,980	673,209	112,669	Poland 201,703; France 93,178; West Germany 85,589.
Briquets of anthracite and bituminous coal	2	3,476	--	Belgium-Luxembourg 1,587; Australia 1,187.
Lignite including briquets	4	--		

See footnotes at end of table.

Table 3.—Norway: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984 United States	Sources, 1984 Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Coke and semicoke	521,197	624,030	--	West Germany 219,755; United Kingdom 169,163; France 84,679.
Peat including briquets and litter	15,185	16,622	--	Sweden 16,054; Finland 288; U.S.S.R. 244.
Petroleum:				
Crude thousand 42-gallon barrels	12,828	14,787	--	United Kingdom 8,928; U.S.S.R. 3,088; Saudi Arabia 2,250.
Refinery products:				
Liquefied petroleum gas do	9,745	11,647	([2])	NA.
Gasoline do	5,081	3,855	131	Sweden 1,716; United Kingdom 549; Netherlands 465.
Mineral jelly and wax do	80	80	([2])	West Germany 49; China 10; Hungary 6.
Kerosene and jet fuel do	834	930	2	United Kingdom 455; Netherlands 297; Sweden 164.
Distillate fuel oil do	6,328	6,604	3	West Germany 1,743; U.S.S.R. 1,481; East Germany 1,269.
Lubricants do	582	641	16	Sweden 183; United Kingdom 157; Denmark 126.
Residual fuel oil do	6,081	6,048	28	East Germany 3,879; West Germany 598; U.S.S.R. 598.
Bitumen and other residues do	969	976	6	Sweden 589; Netherlands 350; Belgium-Luxembourg 17.
Bituminous mixtures do	96	161	([2])	Sweden 155; United Kingdom 2.
Petroleum coke do	1,922	2,099	1,802	United Kingdom 178; West Germany 69; Denmark 32.

NA Not available.
[1]Table prepared by Jozef Plachy.
[2]Less than 1/2 unit.
[3]May include other precious metals.

COMMODITY REVIEW

METALS

Aluminum.—Production of primary aluminum decreased as a result of an industry-wide rationalization, after having peaked in 1984. Producer stocks also decreased. Industry profits decreased because of lower world prices for aluminum, particularly during the second half of the year, and rising prices and higher taxes on hydroelectrical power. Approximately 85% of the country's primary aluminum production continued to be exported. All of Norway's alumina raw material was imported and the excess world capacity and low price of this commodity continued to favor Norway's aluminum industry.

A one-third expansion of production capacity, including modernization, began at the Karmöy aluminum smelter owned by Norsk Hydro. New potlines were being built to a modified Pechiney design. Completion, expected in 1987, was expected to make Karmöy the largest aluminum smelter in Europe, with an annual primary capacity of 215,000 tons. The expansion and modernization was expected to increase productivity by one-third, to 200 tons of aluminum per worker year. The Karmöy plant included a cold-rolling mill and an extrusion facility. Norsk Hydro's worldwide expansion into the profitable aluminum semimanufactures area continued. It acquired its ninth extrusion facility, this one in France, from the Aluminum Co. of America (Alcoa).

Årdal og Sunndal Verk A/S (ASV), the largest aluminum producer in Norway, continued modernizing its pot rooms and prebaked anode facilities to improve efficiency and productivity and to decrease fluoride emissions. Extension of a potline at its Sunndal Verk was completed and production began thereby increasing capacity by about 6,000 tons. Aluminum cells with Soderberg anodes at Årdal were being doubled in size to 112,000 amperes and those with prebaked anodes were being more than doubled in size to 230,000 amperes.

ASV closed its oldest potline at its Årdal smelter in May. This 22,000-ton-per-year potline had been constructed in 1956. Renewal of the potline began at a projected cost of $75 million.[3] Five newly designed cells, with an annual capacity of 44,000 tons, were being built with completion scheduled for early 1986.

Elkem began modernization and expansion of its Mosjoen aluminum smelter, jointly owned with Alcoa. The two oldest potlines were being replaced by larger and more energy-efficient cells with better air-pollution control. The modifications were scheduled to be completed in 1988 at a total cost of $140 million.

Cobalt.—Cobalt production, all from the Falconbridge Nikkelverk A/S refinery in Kristiansand, increased significantly for the second successive year as more superalloy scrap was used to augment the cobalt contained in nickel-copper matte imported from Canada.

Copper.—Reserves of copper ores, mostly complex, continued to decrease. Outokumpu Oy, the large Finnish metals producer, reopened its Bidjovagge Mine, which had closed in 1976. Planned annual production at this Norwegian mine was 5,000 to 6,000 tons of copper concentrate with some byproduct gold. Reserves were limited. Reserves at its small Lokken copper-zinc mine at Meldal were nearing exhaustion. The Grong copper-zinc mine at Joma was purchased by Folldal Verk A/S and Orkla Industrier A/S. Total production of Norwegian copper concentrate continued to decrease.

Falconbridge Nikkelverk, Norway's only producer of copper metal, produced a record-high quantity of copper at its refinery in Kristiansand. To augment its supply of nickel-copper matte from Canada, Falconbridge Nikkelverk signed a 20-year contract with Bamangwato Concessions Ltd. of Botswana to purchase and refine annually 42,000 tons of matte containing 36% nickel and 41% copper, beginning in 1987. Approximately 70,000 tons of matte containing 35% to 40% nickel, 30% to 35% copper, and 0.9% to 1.0% cobalt had been received annually from Canada. Completion of a $43 million expansion of the refinery to accommodate the additional matte was scheduled for yearend 1985.

Ferroalloys.—Norwegian ferrosilicon producers claimed one-quarter of the world market and one-half of the West European market. Elkem announced in December that it had reached an agreement in principle with Orkla to acquire Orkla's ferrosilicon plant, Thamshav Verk at Orkanger, as well as Orkla's 51% interest in Bjolvefossen A/S, which operated a ferrosilicon plant at Alvik. These pending acquisitions were to nearly double Elkem's ferrosilicon production capacity in Norway and give it controlling interest in about one-half of Norwegian capacity. Norway's ferroalloy production was curtailed during the second half of 1985 by mutual agreement of the four producers, Elkem, the Fesil Group, Orkla, and Tinfos Jernverk A/S, in response to low world prices and demand, world overcapacity, and high prices for Norwegian spot electrical power. Elkem continued to expand its ferroalloy capacity worldwide, acquiring the balance of its partly owned U.S. and Canadian companies as well as 20% of the Italian ferroalloy producer, Officine Elettrochimiche Trentine Calusco S.p.A. The strong dollar and reduced demand caused a substantial financial loss in Elkem's ferroalloy industry in the United States, particularly during the second half of 1985.

Iron Ore.—The Norwegian Parliament ratified a restructuring plan for the Government's debt-ridden A/S Sydvaranger, Norway's largest producer of iron ore. One of the two pellet plants was to be permanently closed and production nearly halved to about 1.3 million tons of pellets containing about 65% iron. Virtually all of Sydvaranger's concentrate was pelletized. The open pit mining and beneficiation operations are in the far north, near the Soviet border. The most easily minable reserves were estimated to last about 12 years at the slower mining rate. A miners' strike caused by Parliament's decision to reduce the planned level of mining in the Bjornevatn deposit halted all of Sydvaranger's mining operations for 5 weeks in the spring. However, mining of the deposit began in June at a reduced level, and its production accounted for 27% of the company's concentrate production in 1985. The controversy had been precipitated by Parliament's refusal to grant extra funding for removal of overburden to expose a richer ore bed. Parliament's position prevailed.

A/S Norsk Jernverk (NJ), also Government-owned and Norway's second largest iron ore producer, continued to operate satisfactorily. It had invested about $60 million over a 4-year period in its open pit mine at Mo i Rana. This included a new magnetic concentrating plant, a new crusher, and a rail link between the two. An additional investment of $6 million was for construction of an ocean shipping terminal to permit increased exports, to nearly 1 million tons of concentrate. NJ also had plans to expand mine production by about one-third to about 1.8 million tons per year of concentrate containing 65% iron. The mine apparently had reserves sufficient to last 40 years at this higher mining rate using the current mining method. A special concentrating technique produced a magnetite fraction containing 71% iron, which was sold to a Swedish company for production of iron powder. Annual production capacity for this special product was 70,000 tons. Most of NJ's iron concentrate, about 900,000 tons per year, was consumed by the company's pig iron plant.

Total iron ore production in Norway decreased about 10% in 1985 to approximately 3.5 million tons; of this, 26% was sinter fines concentrate, 4% was a special magnetite for direct reduction and heavy medium use, and the balance was pellets.

Magnesium.—Norsk Hydro's newly renovated primary magnesium plant at Porsgrunn operated at full capacity, but a sales increase caused a reduction in inventories. Capacity was being increased to 60,000 tons per year, and there were long-range plans for further expansion. A materials research center for magnesium was established at Porsgrunn by Norsk Hydro. The company, together with the Canadian Government and the Quebec Provincial government, awarded a $1.5 million contract to a Canadian engineering group to conduct a feasibility study on construction of a 50,000-ton-per-year primary magnesium plant at Becancour, Quebec, Canada. A final decision was expected in 1986.

Nickel.—Production of nickel from Falconbridge Nikkelverk's refinery at Kristiansand increased for the third successive year. Refinery capacity was being increased by one-third to about 55,000 tons per year to accommodate an increase in nickel-copper matte feed material beginning in 1987. (See "Copper.") Worker productivity in the refinery had tripled during the previous 12 years and this, combined with increased efficiency through technical innovations, lowered production costs significantly.

Silicon.—Production of silicon metal increased for the fourth successive year. Elkem operated three plants, Fiskaa at Kristiansand, Meraker at Meraker, and Bremenger at Svelgen, with a total annual capacity of about 90,000 tons. One of the two largest furnaces at Fiskaa blew up in October and was being rebuilt to the same design. Ila og Lilleby Smelterverker A/S operated a smaller silicon smelter at Lilleby, and Tinfos Jernverk was converting part of its ferrosilicon capacity at Notodden to silicon.

Steel.—The merger of Elkem's Christiania Spigerverk A/S with NJ was completed June 15 as Elkem withdrew from steel manufacturing in favor of energy-intensive materials, especially ferroalloys and aluminum. Effectively, Elkem sold its minimill in Oslo and associated steel production facilities in Norway in return for a 20% interest in NJ. A need to reduce reinforcing bar (rebar) capacity was recognized. Rebars were the merged company's major product with both companies contributing capacity, but the market was limited and prices depressed. The market was good for structural steel sections for offshore oil rig construction. A decision was made to build in 1986 a $6 million pilot plant at Mo i Rana based on Elkem's semisteelmaking process, a direct-reduction method. Assuming full viability could be developed, by the early 1990's, the process would replace the current electrical pig iron furnaces at Mo i Rana.

Titanium.—Construction of the 200,000-ton-per-year titania slag plant at Tysedal was partially completed and on schedule, and the plant was expected to be fully operational by early 1987.

Zinc.—Norzink A/S, Scandinavia's sole producer of zinc metal, began modernization and expansion of its zinc smelter and refinery on a fjord near Odda scheduled for completion in late 1986 at a total cost of $65 million. The project, which included a new roast-leach facility and a new cell house, was to effect a one-third increase in annual capacity to 130,000 tons of electrolytic zinc accompanied by an increase in productivity. The sulfuric acid plant and the zinc foundry were also being renovated. The complex was owned 50% by Sweden's Boliden AB and 50% by British Petroleum (BP) Minerals International Ltd. Raw material was supplied as concentrate and clinker from Boliden's mines and smelter, 50% to 60%; about 30% as concentrate from several small Norwegian mines; and the balance was concentrate imported from other countries.

Construction by Norzink of a cavern in a granite mountain for depositing jarosite waste and leach residues began and was scheduled to be completed in May 1986 at a cost of $5 million. These wastes had formerly been discharged into the fjord. The jarosite waste resulted from a novel process developed by Norzink in which iron is precipitated as a jarosite-like complex ammonium iron hydrous sulfate, thereby significantly improving zinc recovery during the roast-leach operation. The process had been licensed worldwide. Another of Norzink's licensed processes was for removal of mercury vapor evolved with sulfur dioxide during roasting of the zinc sulfide concentrate. Norzink placed 2 more licenses in 1985 for this process, thereby increasing to 10 its total licenses for mercury removal. Norzink had conducted much research and development in the past and maintained a recognized and marketable worldwide position in zinc production technology.

Norzink treated zinc scrap in its small plant at Larvik on the southeast coast to produce zinc dust and zinc oxide pigments for the paint and rubber industries. One of the furnaces was replaced in 1985, and an investment was made in a new zinc dust condenser.

Elkem closed its small Skorovas Gruber zinc mine permanently.

INDUSTRIAL MINERALS

Cement.—A/S Norcem was reported to have installed precalciners at its Dalen cement plant, thereby increasing capacity and efficiency. A 10-year downward trend in production was reversed in 1985.

Fertilizer Materials.—Norsk Hydro began construction of a new 450,000-ton-per-year fertilizer plant at its giant fertilizer complex at Porsgrunn. This addition, scheduled for completion during the second half of 1987, would increase complex fertilizer production capacity at Porsgrunn to about 1.6 million tons per year. Norsk Hydro has become a major European producer and marketer of complex fertilizers by acquisition of most of Sweden's production capacity in 1981 and of the fertilizer operations of Fisons in the United Kingdom in 1982. In 1985, the company acquired the fertilizer operations of the West German Veba Group thereby gaining control of about 20% of the West German fertilizer industry. An agreement was reached by yearend to purchase an 80% interest in Compagnie Française de l'Azote, France's second largest fertilizer manufacturer. Pending approval by the French Government, this action would consolidate Norsk Hydro's position as the major European producer of mixed fertilizers with a total NP/NPK annual capacity of nearly 6 million tons. Of this, the country breakdown was France, 37%; Norway, 30%; the United Kingdom, 14%; Sweden, 14%; and the Federal Republic of Germany, 5%. In addition to NPK fertilizers, Norsk Hydro had a large European production capacity in the nitrogen fertilizers, ammonia, urea, and ammonium nitrate (see "Nitrogen").

Graphite.—A/S Skaland Grafitverk's 10,000-ton-per-year flake graphite concentrator 400 kilometers north of the Arctic Circle was destroyed by fire in April. The mine area and the stock of this sole Norwegian graphite operation remained intact. Approximately 99% of the product, which contained 75% to 94% graphite, had been exported. Reserves were limited and an exploration program had been under way in the area. A decision whether to rebuild the concentrator was contingent upon discovery of sufficient reserves in Skaland's continuing exploration and upon the results of a feasibility study. It was indicated by Skaland that the mine and concentrator site might be relocated to another part of the same geological area and that an improved flake graphite would be produced. Deposits in other parts of Norway were known but all were of less purity. Skaland was a subsidiary of the Atlantic Richfield Co. of the United States.

Nitrogen.—Total Norwegian ammonia production decreased in 1985 by 16%, to about 650,000 tons, largely due to an explosion in the smaller of Norsk Hydro's two ammonia plants at Porsgrunn in July. A decision whether to rebuild the destroyed ammonia plant was scheduled for spring 1986.

Ammonia was manufactured from electrolytic hydrogen by Norsk Hydro, Norway's sole ammonia producer, at its Rjukan Works in Telemark in southern Norway and at the Glomfjord Works in northern Norway; annual production capacities were 120,000 and 115,000 tons, respectively. The remaining ammonia capacity, at Porsgrunn and based on oil, naphtha, and natural gas liquids (NGL), was 500,000 tons per year. The Scandinavian countries provided the major markets for this ammonia. Manufactured nitrogen products included ammonium nitrate at Rjukan, urea at Porsgrunn, and complex fertilizers at Glomfjord and Porsgrunn. Extensive overseas holdings brought Norsk Hydro's total ammonia production capacity to approximately 3.5 million tons; the approximate country breakdown was the Netherlands, 35%; Norway, 21%; Qatar, 17%; the Federal Republic of Germany, 14%; France (pending), 11%; and Sweden, 2%. Major urea production capacities were owned in the Netherlands, Qatar, the Federal Republic of Germany, and Norway, in order of volume. Major ammonium nitrate capacities, in order of volume, were owned in the Netherlands, France (pending), the Federal Republic of Germany, the United Kingdom, and Sweden.

Quartz.—A mine and plant for production of high-purity quartz for use in the manufacture of semiconductor and fiberoptic materials was under construction near Narvik in northern Norway by Minnor, a joint 50-50 venture of Elkem and Norcem. The plant was scheduled to be on-stream near yearend 1986. A small purification plant was operating temporarily near Oslo.

Silica.—Sales of a new microsilica material, developed at Elkem's research center at Kristiansand as an additive to concrete and plastics, increased 45% in value to nearly $7 million in 1985. This was below expectations and a decision was made to further emphasize the marketing of this byproduct of Elkem's ferrosilicon and silicon metal industries.

MINERAL FUELS

Norway's crude oil production, all from the North Sea, increased by approximately 10%, mainly as a result of a significant increase from Statfjord, the largest field. Statfjord's platform C, a near copy of its platform A, went on-stream in July, and the entire Statfjord development was completed in early autumn. The yearend production rate of the field, which straddles the United Kingdom-Norway boundary line, was 740 million barrels per day and, of this, 84% was Norwegian and the balance was British. All Statfjord oil was shipped by tanker.

Effective July 1, Den Norske Stats Oljeselskap A/S (Statoil) became a joint operator of the Ekofisk Field with Mobil Oil A/S Norge, the previous sole operator. Statoil, a large Government-owned firm, was scheduled to become the sole operator, effective January 1, 1987. Oil production from Ekofisk, the second largest field in Norway, continued to decline and water injection was to begin in 1987 to prolong field life. It was first discovered in November 1984 that the seabed above the Ekofisk Field was subsiding at a rate of about 1.5 feet per year. Accumulated subsidence at yearend 1985 was 8.5 feet. Phillips Petroleum Co. Norway, the operator, determined that a subsidence of 13 feet would threaten the safety of many of the working components of the platform, and a 1987 temporary summer closure was being considered. Ekofisk was an important pipeline terminal as well as a production complex. During 1985, some of the natural gas product sold previously to West European distributors was being reinjected into Ekofisk in an unsuccessful attempt to slow the subsidence. Phillips was studying the feasibility of injecting nitrogen from a proposed offshore production facility. Statoil and the Norwegian Government favored development of the nearby Tommeliten Gasfield to supply natural gas for injection into Ekofisk. The Government declared Tommeliten to be commercial at yearend. Production from Valhall, the third largest producing oilfield, remained at the 1984 level. Its oil product was piped to Ekofisk and then to Teeside in the United Kingdom, as well as to the Mongstad refinery in Norway.

Production of natural gas, 94% from the North Sea Frigg and Ekofisk Fields, increased only slightly in 1985. The increased output from Frigg was about equal to the decrease from Ekofisk. Statfjord began introducing gas into the new Statpipe system in October. Its gross gas production, equal to about 40% of that from the Frigg Field in 1985, had previously been nearly all reinjected. The 546-mile Statpipe system was completed in late summer at a total cost of $2.3 billion. Wet gas from Statfjord was then sent through the pipeline to the Karsto terminal north of Stavanger on the Norwegian mainland where condensates were removed for subsequent shipment by tanker. The dried gas was sent through another portion of Statpipe to a riser platform junction north of Ekofisk and then to Ekofisk where it was finally transported to Emden, Federal Republic of Germany, via the old Norpipe system. Gas from the Heimdal Field, scheduled to go on-stream in mid-1986, was to join the dried Ekofisk gas at the riser platform junction. Also, gas from the developing Gullfaks Field was scheduled to begin entering the Statpipe system in

1987 through Statfjord. Full annual gas production from the three fields was expected to be about 280 billion cubic feet, sustainable for 10 years.

Yearlong negotiations continued between Norway and natural gas distributors in the Federal Republic of Germany, led by Ruhrgas AG, and a distributor in each of Belgium, France, and the Netherlands regarding major long-term contractual deliveries of Norwegian natural gas to Western Europe. The major source was to be the large reservoir contained in the Troll and Sleipner Fields in the North Sea. These fields remained undeveloped pending a finalization of a long-term sales contract.

The annual capacity of the Mongstad petroleum refinery was being expanded by 63% to about 48 million barrels, scheduled for completion in 1989. This included a new 14-million-barrel-per-year catalytic cracker.

The Petroleum Activities Law, which became effective July 1, 1985, gave the Government wider powers over rates of oil exploration, production, and secondary recovery. It nevertheless supported open trading of petroleum products, which in turn would control production, except that all NGL were to be first offered for sale to Norwegian industries. Also, no petroleum product sales were to be made to the Republic of South Africa. Exploration licensing favored oil over gas because gas discoveries had outnumbered oil discoveries in Norwegian waters. Nevertheless, exploration in far northern Norwegian waters was promoted, even though past discoveries indicated more gas than oil in those regions. Statoil's petroleum activity was to be shared with another Government entity, with Statoil continuing as the operator.

A Government-supported development program to improve oil recovery and reservoir technology was initiated in 1985 by the Ministry of Petroleum and Energy. The 1985 budget was $1.1 million, and planned program funding was nearly $12 million over a 5-year period. The study program highlights were water injection, improvement of reservoir data, and extraction from thin oil zones. It was recognized that much essential knowledge was held as proprietary information by multinational oil companies.

North Sea petroleum development proceeded on schedule. Norsk Hydro's three-platform, $8 billion Oseberg Field was expected to be on-stream by 1989 producing an estimated 240,000 barrels of oil per day. Estimated reserves were 5.7 billion barrels of oil and 2.5 trillion cubic feet of gas. The oil was to be transported to Sture, north of Bergen on the Norwegian mainland, through a pipeline that was under construction. All of the gas was to be reinjected during the first few years to enhance oil recovery. Water injection was also to be used for this purpose.

Statoil's development of the Gullfaks Field included a third platform, platform C, a near duplicate of platform A, scheduled to be on-stream in 1990. The oil was to be taken by tanker to a Norwegian terminal being built at Monkstad and scheduled for completion in 1988. A phase 2 development of Gullfaks was approved by the Government in June and first expected production from this phase was in 1990. Estimated oil reserves were 48 and 26 billion barrels of oil and 280 billion cubic feet of gas each from phase 1 and phase 2. Ula, a smaller oilfield operated by BP Petroleum Development of Norway A/S near Ekofisk, and Heimdal, a gasfield operated by Elf Aquitaine Norge A/S south of the Griss Gasfield, were both scheduled to go on-stream during 1986. The Ula product was to be piped to Ekofisk. The Heimdal gas was to be transported to Emden via Statpipe and Norpipe, and the condensate was to be piped to Guiden Bay in Scotland via the Brae Field complex.

Hopes of finding a large new reservoir of oil in the Statfjord-Gullfaks area were dashed near yearend when Norsk Hydro Produksjon A/S found only small amounts of oil and gas in block 34/8. Promising North Sea petroleum fields, in addition to Troll, the world's largest ocean gasfield, and the large Sleipner Gasfield, were Norsk Hydro's Brage oil and gas field near the Oseberg Field and Saga Petroleum A/S promising Snorre Oilfield near Statfjord. Norsk Hydro aimed at a Brage production decision in 1986 after some final evaluation including seismic and well drilling. Some significant discoveries were made in satellite fields surrounding the Oseberg Field.

Petroleum field evaluations continued in the Haltenbanken area of the Norwegian Sea 120 miles south of the Artic Circle. These included, in order of discovery, the Tyrihan gas condensate field (Statoil), estimated to contain 60 million tons of oil equivalent; the Smorbukk and Midgar gas condensate fields; the Draugen Field (A/S Norske Shell), estimated to contain 250 million barrels of oil; and the largest, the Heidrun Field (Norske Conoco A/S), estimated to contain 750 million barrels of oil. All were considered to be promising and Statoil stated that field developments in Haltenbanken were certain. Conoco indicated that Heidrun might be declared commercial by the summer of 1987 after drilling several more appraisal wells. Shell drilled five exploratory wells in Draugen in 1985. One other field discovered in the Haltenbanken area contained mostly gas. Total discoveries in the area showed an average gas-to-oil ratio of 3 to 1. The Tromsoflaket area off the northwest coast of Norway and well inside the Arctic Circle was explored by Statoil and Norsk Hydro. Ten wells were drilled, and several substantial gas discoveries were made. Total gas reserves in the area were considered to be approximately 10 trillion cubic feet. Interest in the area had been rekindled when oil was first discovered there, in October 1984, by Statoil in the Snohvit gas and oil field. The Norwegian Government expressed optimism at yearend that gas could be extracted from extreme northern Norwegian waters and shipped in tankers in liquefied form, perhaps by the late 1990's. However, the operation appeared to industry to be economically controversial. Explorations in the Traenebanken area just south of the Arctic Circle were negative.

The ninth round of Norwegian offshore exploration licensing, allocated in February, included 13 blocks with 60% participation by Norwegian firms. Four licenses were awarded in the North Sea, three on Haltenbanken in the Norwegian Sea, and four on Tromsoflaket north of the Arctic Circle. Statoil and Norsk Hydro were each nominated for three licenses. Five foreign companies including two U.S. companies, Conoco and Esso Exploration and Production Norway A/S, were each given one license. The 10th round of licensing, later in 1985, included 10 blocks in the North Sea and 30 blocks in a new area, Nordland II, between Haltenbanken and Traenabanken. Conoco discovered hydrocarbons in a deepwater wildcat in May about 150 miles northwest of Trondheim near the Nordland II area. This was expected to stimulate interest in the Nordland II exploration.

Two prototype wave power devices of different design were installed on the island of Toftestallen and began supplying about 400 kilowatts of electrical power to the grid in November. Both reportedly performed better than expected. Parliament asked the Government to provide data by 1990 that would enable it to decide whether wave power is a viable alternative to hydropower.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values were converted from Norwegian krone (NKr) to U.S. dollars at the rate of NKr8.60=US$1.00 for 1985.

The Mineral Industry of Pakistan

By Charles L. Kimbell[1]

Developments in the mineral fuel sectors in 1985 were again the most noteworthy facets of Pakistan's overall mineral industry, reflecting a continued quest for energy self-sufficiency. The discovery of gas and condensate in offshore waters, although not evaluated as commercial by the first well drilled, was sufficiently promising to provide impetus for additional offshore exploration and drilling. Onshore, a near doubling of crude oil output and more modest gains in production of coal and natural gas were positive results from the Government's efforts to reduce the foreign exchange drain for fuel materials.

Although somewhat less dramatically reported in the press, accomplishments in the steel sector were also significant. Pakistan's first integrated steel plant completed its first full year of operation during 1985. This facility also made a contribution toward reduction of the foreign exchange deficit. In the nonferrous metals sector, investigations and studies relating to the practicability of developing the large, low-grade Saindak porphyry copper deposits continued, partly stimulated by interest expressed by a Romanian organization. Whether this possible venture would be developed or not seemed to be more a function of the worldwide copper market and the low grade of the deposit.

Among industrial minerals and their products, there seemed to be some restraint. Although increasing slightly, cement production remained below the 1983 record-high level. Upturns were apparently registered by other construction materials and by fertilizer plant products.

PRODUCTION

There was no overall pattern to the changes in levels of production of Pakistan's mineral commodity products except in the case of energy commodities, all of which showed an upturn. The Government, concerned with the nation's growing foreign trade deficit, was making efforts to stimulate the output of those commodities that made the largest impact, dollarwise, on this debt—cement, fertilizer materials, fuels, and iron steel among mineral commodities.

It should be noted that the table accompanying this section contains numerous revisions that were necessary to make the production figures reflect actual calendar year figures for each year shown as reported in the most recent official statistical publications of the Government of Pakistan. All data presented in the table now represent actual calendar year production, unless otherwise specified, for individual lines of entries.

Table 1.—Pakistan: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984[p]	1985[e]
METALS					
Aluminum: Bauxite, gross weight	[r]1,712	[r]4,187	3,161	2,720	1,800
Antimony ore:					
Gross weight	90	(2)	(2)	5	--
Antimony content[e]	20	(2)	(2)	[r]1	--
Chromium:					
Chromite, gross weight	[r]1,389	[r]3,425	5,959	2,997	3,200
Chromium content[e]	458	1,071	1,966	989	1,050
Iron and steel:					
Pig iron[e] thousand tons	[r]182	[r]430	[r]472	[r]566	[3]803
Steel, crude[e] do.	350	350	550	[r]610	700
Lead, refined, secondary[e]	1,000	1,000	1,000	1,000	1,000
Manganese ore:					
Gross weight	96	(2)	(2)	8	150
Manganese content[e]	29	--	--	2	45
INDUSTRIAL MINERALS					
Abrasives, natural: Emery	862	[r]429	1,689	1,393	3,200
Barite	[r]26,985	[r]22,196	26,018	31,341	38,000
Cement, hydraulic thousand tons	[r]3,587	[r]3,698	4,938	4,697	[3]4,728
Chalk	[r]1,267	[r]1,796	2,217	1,360	2,100
Clays:					
Bentonite	[r]1,048	[r]1,426	667	1,740	1,600
Fire clay	[r]64,986	[r]67,095	87,740	77,492	78,000
Fuller's earth	[r]17,571	[r]13,794	21,136	19,139	17,000
Kaolin (china clay)	[r]40,934	[r]44,849	12,834	17,869	4,900
Other	86,000	[r]149,000	87,000	130,000	190,000
Feldspar	10,494	[r]7,712	5,280	5,466	4,900
Fluorspar	[r]5	[r]814	336	2,724	3,200
Gypsum, crude	[r]317,000	[r]331,000	318,000	375,000	430,000
Magnesite, crude	1,551	[r]1,158	1,998	4,153	4,000
Nitrogen: N content of ammonia	[r]705,600	[r]936,700	1,098,400	1,127,700	1,150,000
Pigments, mineral, natural: Ocher	[r]1,389	411	1,077	1,093	520
Salt:					
Rock thousand tons	[r]512	[r]539	571	598	575
Marine do.	[r]183	[r]223	[e]189	[r] [e]180	303
Total do.	[r]695	[r]762	760	778	878
Sand and gravel:					
Gravel	(2)	[r]223,000	234,000	74,000	23,000
Sand:					
Bajri and common	[r]48,250	[r]449,916	[e]131,000	299,730	390,000
Glass	[r]76,000	[r]111,000	90,000	100,000	105,000
Sodium compounds, n.e.s.:					
Caustic soda	[r]39,064	[r]42,456	40,096	[r] [e]38,100	[3]44,072
Soda ash, manufactured	101,158	[r]99,114	102,000	[r] [e]121,000	120,000
Stone:					
Aragonite and marble	[r]98,000	[r]108,000	116,000	80,000	60,000
Dolomite	[r]50,186	[r]94,778	92,874	121,750	105,000
Limestone thousand tons	[r]3,301	[r]3,694	4,194	5,184	5,280
Other (reported as "ordinary stone") do.	724	3,833	[e]385	525	330
Strontium minerals: Celestite	[r]288	[r]465	135	564	550
Sulfur:					
Native	480	[r]768	628	926	800
Byproduct, all sources[e]	14,000	19,000	[r]25,700	26,000	26,000
Total	14,480	[r]19,768	26,328	26,926	26,800
Talc and related materials: Soapstone	[r]24,934	[r]20,565	15,956	15,568	18,000
MINERAL FUELS AND RELATED MATERIALS					
Coal, all grades thousand tons	[r]1,563	[r]1,735	1,859	2,043	2,100
Coke[e] do.	173	358	345	533	[3]556
Gas, natural:					
Gross production million cubic feet	298,902	345,023	343,504	352,362	370,000
Marketed production (sales) do.	285,804	308,198	328,000	331,108	350,000
Natural gas liquids[e] thousand 42-gallon barrels	40	40	45	45	55
Petroleum:					
Crude do.	[r]3,474	[r]4,217	4,954	6,534	12,500
Refinery products:[4]					
Gasoline do.	4,024	3,320	4,608	5,205	NA
Jet fuel do.	4,323	4,041	3,748	3,796	NA
Kerosene do.	1,604	1,959	2,076	2,228	NA
Distillate fuel oil do.	8,321	9,573	10,010	10,001	NA
Residual fuel oil do.	9,945	11,117	9,718	10,219	NA

See footnotes at end of table.

Table 1.—Pakistan: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984[p]	1985[e]
MINERAL FUELS AND RELATED MATERIALS —Continued					
Petroleum —Continued					
Refinery products[4] —Continued					
Lubricants thousand 42-gallon barrels	1,659	1,640	1,660	1,641	NA
Other do.	1,652	2,067	1,883	1,526	NA
Total do.	31,528	33,717	33,703	34,616	35,000

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes a large number of figures that have been revised from those appearing in the corresponding table in the previous edition of this chapter; these revisions were necessary in order to correct all entries to reflect actual calendar year production quantities rather than fiscal year (July 1 through June 30) quantities, some of which were erroneously identified as calendar year data in the previous edition. Table includes data available through June 18, 1986.
[2]Revised to zero.
[3]Reported figure.
[4]Refinery fuel and losses apparently are distributed among listed products.

TRADE

Although official foreign trade statistics for 1985 were not available for examination prior to the completion of this chapter, it seems almost certain that crude oil imports, the dominant single component of Pakistan's total mineral imports, registered a sharp decline from those of 1984 owing to the near doubling of domestic production. A drop of about 5.7 million barrels, or nearly 20%, appears likely, and this decline in volume, coupled with the fall in world crude oil prices in 1985, presumably reduced the net deficits in both the mineral commodity and total commodity foreign trade balances.

In 1984, the most recent year for which comprehensive data are available, Pakistan recorded a net foreign trade deficit of $460.4 million[2] in total commodity trade and a deficit of $1,895.2 million in trade in mineral commodities. These figures are reduced from those of 1983 ($2,266.2 million and $1,921.0 million, respectively). The following tabulation, which summarizes the value of mineral commodity exports, reexports, and imports, demonstrates the very modest role of mineral commodities in Pakistan's total commodity export trade and the very substantial role of mineral commodities among Pakistan's total commodity imports.

	Million U.S. dollars	
	1983	1984
Mineral commodities:		
Exports	127.1	118.7
Reexports	.2	2.2
Total	127.3	120.9
Imports	2,048.3	2,016.1
All commodities:		
Exports	3,061.9	2,556.2
Reexports	12.9	35.8
Total	3,074.8	2,592.0
Imports	5,341.0	3,052.4

Crude oil and its products accounted for 72% of the nation's 1984 mineral commodity import value and 48% of the value of all commodity imports in that year; corresponding figures for 1983 were 74% for mineral imports and 28% for total commodities. If trade in other commodities in 1985 remained roughly on a par with that of 1984, the drop in crude oil imports anticipated as a result of increased domestic production, coupled with lower crude oil prices, could well have resulted in a savings of $200 million, an amount sufficient to reduce the 1984 total foreign trade deficit by 40%, if other imports did not advance and if exports did not fall appreciably. Nonetheless, even with the anticipated drop in crude oil imports, crude oil and its products would still remain the dominant mineral commodity import.

Table 2.—Pakistan: Exports and reexports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS				
Aluminum: Metal including alloys:				
Scrap	171	103	--	Japan 102.
Unwrought	11	--		
Semimanufactures	27	44	--	All to United Arab Emirates.
Chromium: Ore and concentrate	--	19,104	--	Philippines 10,000; Japan 4,700; Italy 1,839.
Copper:				
Ore and concentrate	--	32	--	All to Japan.
Metal including alloys:				
Scrap	549	(²)	--	NA.
Semimanufactures	80	75	--	Mainly to Iran.
Iron and steel: Metal:				
Scrap value, thousands	$388	$946	--	Japan $640; Belgium-Luxembourg $200.
Pig iron, cast iron, related materials	267,472	255,137	--	China 77,793; Indonesia 49,056; Japan 39,404.
Ferroalloys	--	131	--	All to Sweden.
Steel, primary forms	5,951	1,320	--	Sweden 1,280.
Semimanufactures:				
Bars, rods, angles, shapes, sections	870	4,415	--	China 4,000; Sri Lanka 353.
Universals, plates, sheets	8	5	--	All to West Germany.
Tubes, pipes, fittings	108	166	--	Afghanistan 150.
Lead: Oxides	--	2	--	All to Oman.
Nickel: Metal including alloys, scrap	328	622	--	Japan 497; Republic of Korea 50.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$2,729	--		
Silver: Ore and concentrate do.	--	$1,141	--	All to Japan.
Tin: Metal including alloys, scrap	20	35	--	Do.
Tungsten: Metal including alloys, all forms value, thousands	--	$4	--	All to United Kingdom.
Uranium and thorium: Ore and concentrate do.	$20	--		
Zinc:				
Oxides	2	--		
Metal including alloys, scrap	--	10	--	All to Bangladesh.
Other:				
Ores and concentrates	--	241	--	Belgium-Luxembourg 141; United Kingdom 60.
Ores and hydroxides	--	22	--	United Arab Emirates 20.
Ashes and residues	--	78	--	Belgium-Luxembourg 60; Japan 18.
Base metals including alloys, all forms	2	--		
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc value, thousands	$1	$6	--	Hong Kong $5.
Grinding and polishing wheels and stones	4	1	--	All to Bangladesh.
Barite and witherite	--	34	--	All to China.
Boron materials: Crude natural borates	30	--		
Chalk	5	--		
Clays, crude	133	12	--	NA.
Diamond: Gem, not set or strung value, thousands	$13	--		
Fertilizer materials:				
Crude, n.e.s	200,657	180,528	--	United Arab Emirates 162,964; Qatar 11,930.
Manufactured:				
Nitrogenous	95,583	237,213	--	China 151,289; Iran 60,601.
Phosphatic	320	--		
Unspecified and mixed	34	--		
Gypsum and plaster	72	--		
Mica:				
Crude including splittings and waste	10	10	--	All to Kuwait.
Worked including agglomerated splittings	5	5	--	Do.
Precious and semiprecious stones other than diamond: Natural value, thousands	$1,774	$1,510	$99	Hong Kong $787; West Germany $160.
Salt and brine do.	$472	$839	--	India $779.
Sodium compounds, n.e.s.: Carbonate, manufactured	--	1	--	All to Saudi Arabia.
Stone, sand and gravel:				
Dimension stone: Crude and partly worked	13,619	8,823	113	Singapore 2,265; Italy 1,640; Japan 1,228.
Dolomite, chiefly refractory-grade	--	50,000	--	All to Bangladesh.

See footnotes at end of table.

Table 2.—Pakistan: Exports and reexports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Stone, sand and gravel —Continued				
Gravel and crushed rock	395	95	--	Bangladesh 76; Singapore 18.
Sand other than metal-bearing	110	--		
Sulfur: Sulfuric acid	74	99	--	Afghanistan 96.
Talc, steatite, soapstone, pyrophyllite	5	--		
Other: Crude	55	--		
MINERAL FUELS AND RELATED MATERIALS				
Carbon black	789	275	--	Sri Lanka 153; Iran 100.
Coke and semicoke	50	410	--	All to Bangladesh.
Petroleum:				
Crude ----- 42-gallon barrels	(4)	365	--	Do.
Refinery products:				
Liquefied petroleum gas ----- do	(4)	12	--	All to Afghanistan.
Gasoline ----- do	450	--		
Lubricants ----- do	3,136	7	--	All to Qatar.
Residual fuel oil ----- do	r1,698,300	714,285	--	United Arab Emirates 204,795; Yemen (Aden) 199,800; Finland 104,895.

rRevised. NA Not available.
[1]Table prepared by Audrey D. Wilkes.
[2]Unreported quantity valued at $2,017,000.
[3]Unreported quantity valued at $17,000.
[4]Less than 1/2 unit.

Table 3.—Pakistan: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS				
Alkali and alkaline-earth metals	20	5	--	Mainly from Republic of Korea.
Aluminum:				
Oxides and hydroxides	1,307	2,041	26	China 1,403; West Germany 309.
Metal including alloys:				
Scrap	13,948	14,694	125	Kuwait 3,408; United Arab Emirates 3,188; West Germany 2,302.
Unwrought	2,004	1,756	2	U.S.S.R. 556; Romania 470; Australia 196.
Semimanufactures	13,093	12,863	1,779	Canada 2,167; Hungary 1,353; Switzerland 1,121.
Chromium:				
Ore and concentrate	--	36	--	All from Netherlands.
Oxides and hydroxides	48	68	--	Poland 28; China 14; Italy 9.
Cobalt: Oxides and hydroxides	5	7	--	France 5.
Columbium and tantalum: Metal including alloys, all forms, tantalum ----- value, thousands	--	$1	--	All from France.
Copper: Metal including alloys:				
Scrap	502	210	--	United Arab Emirates 85; Kuwait 70.
Unwrought	287	251	2	Belgium-Luxembourg 119; Japan 47.
Semimanufactures	7,136	9,155	42	Japan 5,906; United Kingdom 1,422; U.S.S.R. 382.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite	913,621	921,557	--	Brazil 296,821; Canada 170,200; Liberia 162,029.
Pyrite, roasted	--	43	--	All from Australia.
Metal:				
Scrap	119,493	121,967	78,998	United Arab Emirates 19,348; United Kingdom 8,461.
Pig iron, cast iron, related materials	738	7,221	2	Singapore 6,696; Canada 262.
Ferroalloys:				
Ferromanganese	4,733	4,697	100	Switzerland 1,122; France 969; China 911.
Unspecified ----- value, thousands	$3,755	$6,607	$70	Japan $1,706; Yugoslavia $934; Norway $769.
Steel, primary forms	40,730	21,597	635	Japan 4,812; West Germany 4,367; Brazil 3,074.

See footnotes at end of table.

Table 3.—Pakistan: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal —Continued				
Semimanufactures:				
Bars, rods, angles, shapes, sections	61,281	41,036	148	Japan 16,819; West Germany 9,127; Spain 3,874.
Universals, plates, sheets	527,282	661,599	33,447	West Germany 224,923; Japan 118,856; Belgium-Luxembourg 50,967.
Hoop and strip	8,051	21,629	2	Japan 18,136; West Germany 2,040.
Rails and accessories	194	83	--	United Kingdom 75.
Wire	18,931	18,363	1	China 10,310; Japan 6,128.
Tubes, pipes, fittings	31,628	35,205	1,404	Japan 11,831; France 8,063; West Germany 3,208.
Castings and forgings, rough	691	1,460	14	United Kingdom 681; Turkey 551.
Lead:				
Ore and concentrate	219	291	--	Morocco 272.
Oxides	843	851	--	West Germany 522; Australia 130; China 127.
Metal including alloys:				
Scrap	66	844	--	Australia 488; United Kingdom 356.
Unwrought	1,851	2,447	166	U.S.S.R. 1,002; United Kingdom 953; Australia 137.
Semimanufactures	47	[3]24	--	United Kingdom 22.
Magnesium: Metal including alloys, all forms	3	13	--	Malaysia 9; United Kingdom 3.
Manganese:				
Ore and concentrate: Metallurgical-grade	5	25,112	--	Australia 25,017.
Oxides	548	258	--	Japan 120; China 68.
Mercury 76-pound flasks	2,408	1,624	([3])	China 725; Netherlands 551.
Molybdenum: Metal including alloys, all forms value, thousands	$48	$64	$31	Austria $16; Netherlands $13.
Nickel:				
Ore and concentrate	38	9	--	All from Belgium-Luxembourg.
Matte and speiss	429	59	--	Canada 32; United Kingdom 25.
Metal including alloys:				
Scrap	10	--		
Unwrought	107	86	([3])	United Kingdom 44; Canada 30.
Semimanufactures	88	174	([3])	France 38; West Germany 30; U.S.S.R. 28.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$64	$11	--	United Kingdom $8.
Silver:				
Ore and concentrate[4] do	$8	$58	--	Belgium-Luxembourg $39; Morocco $10.
Waste and sweepings do	$7	--		
Metal including alloys, unwrought and partly wrought do	$4	$159	--	West Germany $158.
Tin:				
Ore and concentrate	--	25	--	All from China.
Metal including alloys:				
Scrap	12	20	--	All from Sweden.
Unwrought	5	34	--	Malaysia 25.
Semimanufactures	27	330	--	Spain 201; Japan 127.
Titanium: Oxides	2,300	2,064	6	United Kingdom 776; Australia 725; West Germany 244.
Tungsten: Metal including alloys, all forms value, thousands	$457	$674	--	Netherlands $452; Hungary $74; Japan $69.
Uranium and thorium:				
Ore and concentrate do	$193	$157	--	All from Australia.
Metal including alloys, all forms do	--	$26	--	China $16; Japan $7.
Zinc:				
Ore and concentrate	NA	6	--	All from Australia.
Oxides	280	301	1	France 170; China 86.
Metal including alloys:				
Scrap	152	185	--	Spain 75; China 70; France 40.
Unwrought	10,841	12,417	296	Spain 4,054; United Kingdom 2,074; U.S.S.R. 1,591.
Semimanufactures	106	6	2	United Kingdom 4.
Other:				
Ores and concentrates	26	268	--	China 192; Australia 52.
Oxides and hydroxides	80	154	17	West Germany 40; Japan 22; China 17.
Base metals including alloys, all forms	53	43	([3])	United Kingdom 23; China 19.

See footnotes at end of table.

Table 3.—Pakistan: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	781	1,005	67	Netherlands 764; China 79.
Artificial: Corundum	162	174	--	West Germany 90; France 54.
Dust and powder of precious and semiprecious stones excluding diamond value, thousands	$4	--		
Grinding and polishing wheels and stones	432	608	2	West Germany 245; China 135; East Germany 84.
Asbestos, crude	2,987	2,381	--	Canada 1,407; United Kingdom 627; Republic of South Africa 205.
Barite and witherite	618	48	--	Switzerland 23; China 15.
Boron materials:				
Crude natural borates value, thousands	$31	$20	--	China $9; Singapore $6.
Oxides and acids	309	262	--	China 220.
Cement thousand tons	874	720	(³)	Japan 274; Spain 158; U.S.S.R. 95.
Chalk	7,231	9,093	34	Belgium-Luxembourg 7,428; United Kingdom 923.
Clays, crude	71,866	79,314	651	Japan 25,156; West Germany 23,515; Belgium-Luxembourg 19,768.
Cryolite and chiolite	64	2	--	All from West Germany.
Diamond: Gem, not set or strung value, thousands	--	$54	--	All from Hong Kong.
Diatomite and other infusorial earth	282	17,652	17,626	Philippines 16.
Feldspar, fluorspar, related materials	106	152	--	Spain 85; France 49.
Fertilizer materials: Manufactured:				
Ammonia	84	241	221	China 12.
Nitrogenous	42,329	--		
Phosphatic	422,621	410,010	284,050	Japan 60,160; Jordan 57,640.
Unspecified and mixed	73,267	107,358	10,498	Netherlands 42,460; Norway 30,000; Finland 14,400.
Graphite, natural	1,626	1,526	--	China 839; Sri Lanka 432.
Gypsum and plaster	228	427	10	United Kingdom 306; West Germany 110.
Lime value, thousands	$36	$4	$1	United Arab Emirates $2.
Magnesium compounds: Magnesite, crude	2,092	1,459	51	China 434; Singapore 375; Austria 188.
Mica:				
Crude including splittings and waste value, thousands	$4	--		
Worked including agglomerated splittings	3	6	(³)	China 1; Hong Kong 1; Japan 1.
Phosphates, crude	254,184	276,260	--	Jordan 276,148.
Pigments, mineral: Iron oxides and hydroxides, processed	1,484	2,657	1	China 1,750; West Germany 849.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$62	$305	--	Thailand $167; Switzerland $42; Hong Kong $39.
Synthetic do	$2	$21	--	West Germany $12; China $7.
Pyrite, unroasted	--	54	--	All from United Kingdom.
Salt and brine	60	16,669	4	West Germany 16,601.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	322	136	--	Italy 66; China 65.
Sulfate, manufactured	(³)	--		
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	1,171	952	--	India 616; Greece 201.
Worked	269	11,029	55	Italy 10,974.
Dolomite, chiefly refractory-grade	5,355	1,378	--	Italy 1,224; Norway 129.
Gravel and crushed rock	--	11	--	United Kingdom 10.
Limestone other than dimension	--	9	--	All from United Kingdom.
Quartz and quartzite	1	14	--	All from Netherlands.
Sand other than metal-bearing	76	77	--	Australia 51; United Kingdom 17.
Sulfur:				
Elemental:				
Crude including native and byproduct	15,551	26,518	6	Kuwait 12,062; Saudi Arabia 5,844; United Arab Emirates 3,610.
Colloidal, precipitated, sublimed	1,159	438	3	Republic of Korea 186; Afghanistan 137; Poland 73.
Sulfuric acid	30	19	--	Norway 11.
Talc, steatite, soapstone, pyrophyllite	2,401	56,449	5	China 46,331; Afghanistan 10,090.

See footnotes at end of table.

Table 3.—Pakistan: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984 United States	Sources, 1984 Other (principal)
INDUSTRIAL MINERALS —Continued				
Other:				
Crude	33,620	179,262	--	China 62,128; Japan 50,273; United Kingdom 50,067.
Slag and dross, not metal-bearing	98	525	415	United Kingdom 92.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	29,082	18,427	281	Hungary 9,636; China 7,178; Singapore 1,315.
Carbon black	991	944	3	China 379; Japan 205; West Germany 193.
Coal:				
Anthracite and bituminous	519,676	554,076	76,269	Australia 318,868; Canada 158,523.
Lignite including briquets	109	--		
Coke and semicoke	5	--		
Petroleum:				
Crude thousand 42-gallon barrels	31,061	29,975	--	Saudi Arabia 18,588; United Arab Emirates 9,412.
Refinery products:				
Liquefied petroleum gas value, thousands	$2	$3	$1	Switzerland $1; United Kingdom $1.
Gasoline thousand 42-gallon barrels	912	1,194	(3)	Kuwait 1,188.
Mineral jelly and wax do	124	65	1	China 36; Romania 13; Iraq 10.
Kerosene and jet fuel do	2,933	3,439	--	Mainly from Kuwait.
Distillate fuel oil do	9,529	9,826	--	Do.
Lubricants do	316	276	16	Japan 146; Singapore 80.
Residual fuel oil do	22	184	--	China 170.
Bitumen and other residues do	25	(5)	NA	NA.
Bituminous mixtures do	(6)	5	(3)	Singapore 4.

NA Not available.
[1]Table prepared by Audrey D. Wilkes.
[2]Excludes unreported quantity valued at $287,000, mainly imported from Romania.
[3]Less than 1/2 unit.
[4]May include platinum-group metals.
[5]Revised to zero.
[6]Unreported quantity valued at $3,163,000.

COMMODITY REVIEW

METALS

Copper.—The Saindak International Group (SIG) reportedly submitted the final version of its detailed project report in October, nearly 10 months late. The report reflected continued interest on the part of SIG to participate in a joint venture with Pakistan's Resource Development Corp. (RDC) to develop an open pit mine, associated beneficiation plant, and a metallurgical facility to produce either blister copper or matte. RDC commissioned a consultant to prepare an implementation plan involving the installation of a used plant and associated equipment. This equipment was apparently to be provided by a Romanian firm that had already expressed interest in providing it for the project on a credit basis. As a result of the delay in completion of the report, the start of actual development could not be expected prior to late 1986, and the initiation of production could not be expected until 1989 or 1990 at the earliest.

In Waziristan Agency, the Federally Administered Tribal Area Development Authority continued evaluation of copper deposits, drilling about 2,400 meters, raising the total for the area to over 6,000 meters. The average ore grade at this site is 0.39% copper, but the quantity of such ore was not reported.

Iron Ore.—It was claimed that a team of Chinese geologists confirmed the availability of 50 million tons of iron ore reserves in the Nokkundi area of Chagai District, Baluchistan. The reserves were evaluated as containing 50% iron, and the report suggested that an additional 50 million tons of ore might be available in the same area. The ores discovered were reportedly tested in Japan and Sweden. The tests suggested that the reserves could be used by the existing Pakistan Steel Mill Corp.'s blast furnaces, and it was claimed that if they were so used, an annual savings of about

$15.7 million in foreign exchange at the 1985 exchange rate could be achieved.

Iron and Steel.—According to the chairman of the corporation, the Bin Qasim integrated steelworks of Pakistan Steel reached fully operational status in December 1984. Owing to normal problems associated with bringing major facilities onstream, the plant had reached only 60% of capacity by mid-August. Reportedly, the facility would begin to show a profit when it reached 83% of capacity, a goal that officials hoped would be reached by December 1985.

Despite the claim that Pakistan Steel's products were being sold for 30% less than the landed charge for competitive imports, it seemed that there were at least some potential customers in Pakistan who had not yet decided to buy from the state corporation. At the same time, the Government indicated that it would be selling a part of its interest in the firm to the private sector as soon as the profitability of the company could be demonstrated, and this could not be accomplished until a sufficient number of the downstream steel-consuming private sector companies decided to obtain their steel from Pakistan Steel.

In late December, the Karachi press reported that the Government of Pakistan was "weighing the pros and cons of a multimillion-dollar loan offer by the U.S.S.R. for investment in the industrial sector."[3] The offer, reportedly first proposed about 2 years previous to the press report, supposedly was in the amount of about $500 million and was to be directed to certain additional facilities in steel manufacturing.

Lead and Zinc.—The Geological Survey of Pakistan was engaged in detailed mapping of the area around Khuzdar, a region where lead and zinc ore deposits have been identified previously. Detailed exploration of these deposits was slated by the Baluchistan Development Authority.

INDUSTRIAL MINERALS

Cement.—Pakistan's cement industry had 13 operating plants at yearend 1985, a number unchanged since the addition of the Pak Land Cement Co. plant at Dhabeji in February 1984. The collective output of the plants, modestly higher than the 1984 level, fell short of the record-high production level of 1983 and remained inadequate to meet national demand. Cement imports, although at a lower level in 1984, were apparently at a still lower level in 1985, judging from recorded exports to Pakistan from some trading partner countries. Cement stocks in Pakistan were very small in relation to demand, totaling 116,000 tons on January 1, 1985, with the stock at the beginning of each month varying between a low of 64,000 tons on March 1 and a high of 120,000 tons on August 1, and totaling 100,000 tons on December 1.

Fertilizer Materials.—Pakistan's nine chemical fertilizer plants collectively registered increases for the year ending June 30, 1985, in output of four of the five products for which statistics are reported on a monthly basis. Output figures, in tons, for these commodities were as follows, with results for the year ending June 30, 1984, in parentheses: ammonium nitrate, 406,357 (383,011); ammonium sulfate, 79,009 (72,985); nitrophosphate, 308,306 (316,450); superphosphate, 105,801 (105,690); and urea, 1,814,666 (1,797,553). Urea production, although higher than in the previous fiscal year, was slightly below the record high of 1,831,819 tons set in the year ending June 30, 1983; output of ammonium nitrate, ammonium sulfate, and superphosphate reached new record highs, while that of nitrophosphate was marginally below the record-high level set in the year ending June 30, 1984.

Early in the year, it was expected that phosphate rock mining would be started at Kakul by midyear, but if production began, it was not reported in official monthly production statistics. This, however, is not a guarantee that operations did not start; it could simply be that activities went unreported. While this mine's output capacity of 60,000 tons per year falls far short of the national demand level, it nevertheless will contribute toward reducing the foreign trade deficit.

MINERAL FUELS

Coal.—Increases in national coal output, directed toward lessening Pakistan's demand for imported energy sources, have been supported by exploration programs to develop additional reserves. In Sind Province, the Geological Survey of Pakistan has estimated reserves in the Sonda Coalfield at 280 million tons. The Sonda Seam, 117 to 240 meters below the surface and fairly consistent in thickness and lateral extent, contains about one-half the total coal; the balance is in the overlying Dhauri Seam and the underlying Jherruck Seam.

Elsewhere, six teams formed by the U.S.

Agency for International Development were continuing their studies of the Lakhra area coal deposits to firm up reserve estimates for this area that are planned as the basis for a 200,000-ton-per-year mine and associated coal-fired powerplant.

Petroleum and Natural Gas.—According to the Minister of State for Natural Resources, the energy crisis of the 1970's stimulated oil and gas exploration, resulting in a 96% increase in oil output in 2 years, an increase that saved 6.464 billion rupees[4] in foreign exchange. The Minister further noted that oil drilling rigs were now being fabricated in Pakistan, with 90% of the parts made in that country. Regarding the future, the Minister announced that a sum of $82.6 million of Government funds had been earmarked for oil and gas exploration in the current financial year (July 1, 1985, to June 30, 1986), and a separate Government fund of $39.6 million had been set aside to provide facilities for the petroleum sector. Moreover, the private sector was being encouraged to invest in this area. The Minister also suggested that restrictions should be placed on both automobile imports and on the use of cars already imported. Both measures were proposed as a means of lowering the demand for imported oil.

The national drilling program for the year beginning July 1, 1986, included 21 wells in addition to the single offshore operation.

The Asian Development Bank reportedly agreed to provide a substantial loan to assist in the development of phase 2 of the Pir Koh gas project. Overall cost of the project was set at $87 million—$37 million from domestic capital and $50 million from foreign exchange. The bulk of the latter was expected to come from the Asian Development Bank. This bank already loaned $55 million for phase 1 of the Pir Koh project, and an additional $35.6 million for other projects in the Pakistani gas industry—$19.3 million for gas purification and compression installations and $16.3 million for the Indus Right Bank pipeline project. The proven reserve of the Pir Koh Gasfield is reportedly 3.7 billion cubic feet, with indicated and inferred reserves of 11.2 billion cubic feet. The phase-2 project includes development of 9 to 11 wells that collectively will provide 80 million cubic feet of gas daily. In October, natural gas reserves were reported at 17 trillion cubic feet, sufficient to meet domestic requirements at present levels for 50 years.

On October 11, the 23,000-ton Danish drilling ship, *Danwood Ice,* commenced drilling operations 129 kilometers south of Karachi. This operation, the first offshore venture undertaken in waters off of Pakistan, was financed through a $21 million (Can$30 million) loan from the Canadian International Development Agency. The drilling site, named Pak-Can I, is within an area of 5,000 to 7,000 square kilometers that has been slated for further geological and geophysical investigations on the basis of the first well's discovery of significant gas and a small quantity of condensate. The well, drilled to a 3,700-meter total depth, encountered a 4-meter thick pay zone at a 2,743-meter depth. Although the initial discovery was classified by officials as uneconomic because of the cost of development of offshore production facilities, it was regarded as significant because it suggested a substantial potential. Pakistani officials reported that Petro-Canada had agreed to give the exploration vessel *MV Bernier* to Pakistan for the next round of survey and exploration.[5] This decision is apparently based on the relative success of the first test well.

In Sind Province, three new oilfields—Khaskjeli, Leghari, and Tando Alam—with combined reserves of 52 million barrels, were reported to be on-stream shortly after midyear, collectively producing 18,000 to 20,000 barrels of oil daily and contributing very substantially to total national output. Farther north, a roughly similar quantity of oil was being obtained from four other fields—Adhi, Dhurnol, Meyal, and Toot. Recent discoveries at Dabhi, Mazari, Mazari South, Nari, Tajedi, and Turk had not been placed into production by August 1985, and reserves were not fully evaluated.

In the Mazari South Oilfield, 47 kilometers southeast of Hyderabad, production tests in August established a combined flow rate of 2,128 barrels per day from two oil sand zones in a 20-meter thick section of the Lower Goru Formation (Cretaceous Age) at a depth of about 1,120 meters. This single addition could add about 6% to national annual production.

Without providing quantitative specifics, a November report indicated the discovery of new natural gas reserves at Loti, 45 kilometers from Sui Field, and of additional reserves at Pir Koh Gasfield. The new Loti Field reportedly will be linked to the network of the existing Sui Northern Gas

Pipelines Ltd. using pipe that was to be manufactured locally. The connection of the new field to the existing pipeline system, slated for completion by March 1988, would make possible expansion of the distribution system in upcountry Pakistan.

Also, there were unspecific reports in the local press of what was termed huge reserves of oil in the Sanghar District about 65 kilometers from Karachi, and the same sources indicated that additional unspecified oil reserves were expected to be proved in Hathongo, only 10 kilometers from Karachi.

An increase of nearly 30% in total national oil consumption in just 2 years was reported at midyear 1985; the primary causes behind the increase were reportedly the growth in use of electric power generation and in cement production.

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[1]Senior foreign mineral specialist, Division of International Minerals.

[2]Where necessary, values have been converted from Pakistani rupees (PRs) to U.S. dollars at the rate of PRs15.928=US$1.00, unless otherwise specified.

[3]Dawn. Dec. 20, 1985, p. 11.

[4]Not accurately convertible to U.S. currency because the total covers 2 years and is not distributed by year by the source used, nor is it clear whether fiscal or calendar years are meant. Thus, it is impossible to select the appropriate rupee value to multiply by the exchange rate, which varied between PRs13.117=US$1.00 for 1983, PRs14.046=US$1.00 for 1984, and PRs15.928=US$1.00 for 1985. The amount, in U.S. dollars, would be somewhere between $406 million and $493 million.

[5]Dawn. Feb. 12, 1986, p. 1.

The Mineral Industry of Peru

By Doris M. Hyde[1]

Peru's mineral sector struggled to survive through another year of low metal prices. Companies relied on mine and plant improvements, selective ore mining, and other measures to cut costs. The per-unit value of metals fluctuated throughout the year, but except for iron ore and copper, the average price received and volumes exported were lower than in 1984. Petroleum exports increased over those of 1984, but the per-barrel price was showing a disturbing downtrend.

Preliminary data indicated there was a 1.7% real growth in the overall economy. Peru was confronted with severe economic problems that were compounding because of high loan interest rates, persistent high inflation, reduced foreign exchange earnings, servicing the foreign debt, and internal pressures for increased social spending. In July, a newly elected Government entered office and began to introduce policy changes that affected all sectors of the economy.

Peru took two decisive actions that caught international attention. First, the Government declared it would not spend more than 10% of the value of total exports toward servicing or otherwise paying on its foreign debt. Secondly, the contracts of the three foreign petroleum-producing companies were suddenly and unexpectedly rescinded. The affected companies were subject to either successful contract renegotiations or face nationalization.

The Government initiated a new economic program that included freezing the official U.S. dollar exchange rate after a 12% devaluation, and creating a financial market exchange rate that averaged 24% above the official rate.[2] After increasing the price of petroleum and electricity by 30%, the Government placed a price freeze on goods and services, but not on wages and salaries. Loan interest rates were successively reduced from 280% to 45%.

Terrorist activities against mining operations continued and caused interruptions in production, transportation, and processing. Because of the importance of mining to Peru's foreign exchange earnings, relations between management and mine workers can have serious national consequences.

Government Policies and Programs.—Like many other countries where mining plays an important role in the economy through foreign exchange earnings, Peru's problems have been intensified by the continued soft world demand and prices for metals. Unable to control these outside influences, the Government took what measures were available to it for dealing with internal economic and social pressures.

In addition to taking actions to deal with immediate problems in the economy and the mining sector, the Government planned to enact a new law to replace The Mining Code, Decree Law 109. A new foreign investment law was also expected. The Government's stated mineral policy centered on maintaining existing mining programs, especially those promoting the financial and operational capacity of the small and medium sectors. A restructuring of the state-owned mining companies on a regional criteria was listed among the new Government's future priority actions.

One of the changes that negatively affected the minerals sector was that mining companies were obligated to purchase 1985 Treasury Bonds in an amount equivalent to 40% of their 1984 profits. Also having a negative impact was the frozen official exchange rate and the rising costs of wages and fuel. In December, Legislative Decree 362 modified the general income tax law, starting in 1986. One of the modifications eliminated the reinvestment of tax credits. This was partially offset by a 10% reduction in income tax. At the same time, a company net worth tax was imposed on the mining sector.

A change benefiting the minerals sector was an October authorization that allowed a mining company to receive 5% of the value of its exports at the financial market exchange rate. The Government also authorized mining companies to import used or rebuilt machinery and equipment for mining purposes.

Through Supreme Decree 014-85-EM/DGM of May 16, 1985, changes were made to the regulations pertaining to the Gold Mining Law, Decree Law 22178 of May 9, 1978. This new modification substituted Articles 35 and 36 and annulled Article 37 and the second paragraph of Article 45 of the regulations, Supreme Decree 003-79-EM/DGM. The modifications were made to attract investors by providing more flexibility to the gold mining law.

Without warning either Congress or the concerned companies, on August 28, 1985, the President of Peru suddenly rescinded the operating contracts of Occidental Petroleum Corp.; Belco Petroleum Corp., an HNG/InterNorth Inc. subsidiary; and an Occidental and Bridas Exploraciones y Producción S.A. consortium. The Ministry of Energy and Mines and Petróleos del Perú (Petroperú) were ordered to negotiate new contracts within 90 days.

The primary issue was that the foreign companies had failed to properly apply tax credits approved in December 1980 by Decree Law 23231. The Government's view was that these tax credits should have been spent on exploration instead of development. As a result, crude oil reserves steadily declined until at the beginning of 1985 they were estimated at 636 million barrels, or enough for slightly over 9 years of production. Both Belco and Occidental had sharply curtailed exploration, perhaps partly because of an unresolved tax dispute with the Government. Petroperú, the state-owned company, was also not aggressive in new exploration efforts because of limited funds.

New contract negotiations were to concern how much each company was to invest in exploration and within what time schedule the funds would be spent. During the negotiating period, which was eventually extended 30 days to December 28, the companies continued to act as operators at their concessions, but all production was owned by the Government. The companies were paid a flat fee for production on a per-barrel basis. The Occidental-Bridas consortium and Occidental reached a new contract agreement with the Government by the end of the extended negotiating period. Belco did not, and its offshore concessions in Blocks Z-1A, Z-2A, and Z-28 were nationalized. The operation of Belco's concessions was immediately assumed by Petróleos del Mar S.A. (Petromar), a newly created Petroperú subsidiary.

A new petroleum law was being drafted for possible legislative action in 1986. Reportedly, the new law would eliminate tax credits but introduce other incentives for exploration.

PRODUCTION

Overall mineral production increased 4%, compared with that of 1984, and represented the largest growth sector of the Peruvian economy. Production increases resulted from fewer labor strikes at the large- and medium-sized operations, improvements in plant efficiencies, capacity expansions, and the extraction of higher grade ores.

The 6% gain in total copper production was primarily because of a new mining technique at Southern Peru Copper Corp.'s (SPCC) Cuajone Mine, the initiation of production at Tintaya, and to a lesser extent, from a record output at Empresa Minera del Centro del Perú's (Centromín Perú) Cobriza mining unit.

The medium-sized mining companies contributed about 6% to total copper production, 51% of both lead and zinc, 61% of the silver, and 33% of the gold. The small mining companies were mostly concerned with alluvial gold production, and accounted for about 40% of the total output. Small companies added about 9% to total lead production and 5% to total zinc production.

A 25% increase in iron ore production was attributed to export demand and renewed domestic sales to Empresa Siderúrgica del Perú S.A., which reactivated its blast furnace operation in midyear.

Crude oil production rose slightly, but had it not been for midyear Government decisions, output might have maintained the 191,833 barrels per day averaged during the first 9 months, instead of finally averaging 188,500 barrels per day for the year. Production during December fell to about 168,000 barrels per day. This was mostly because of a sharp fall in Occidental's output. Peru expected production to gradually regain earlier levels since a new contract agreement was reached with Occidental, and after Peruvian personnel become more familiar with operating Belco's former offshore production areas.

Table 1.—Peru: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984[p]	1985[e]
METALS					
Antimony:					
Mine output, metal content	685	738	713	672	650
Metal	448	411	307	372	[2]377
Arsenic, white[3]	2,164	1,663	1,110	887	[2]1,320
Bismuth:					
Mine output, metal content	639	613	535	668	750
Metal	639	604	526	651	[2]738
Cadmium:					
Mine output, metal content	511	600	630	550	590
Metal	307	421	451	390	420
Copper:					
Mine output, metal content	342,058	356,632	322,169	375,064	[2]397,192
Sulfate (Cu content)	2,281	2,510	2,494	2,537	[2]2,542
Metal:					
Smelter	279,327	294,412	258,305	298,806	326,000
Refined	175,572	194,416	158,134	188,622	[2]200,566
Electrowon	33,806	33,907	33,008	30,833	[2]27,425
Gold:					
Mine output, metal content ___ troy ounces	161,590	157,667	165,576	198,691	[2]223,447
Metal ___ do	55,781	69,606	71,053	88,414	[2]84,942
Indium ___ kilograms	3,489	3,673	2,707	2,906	[2]3,867
Iron and steel:					
Iron ore and concentrate:					
Gross weight ___ thousand tons	6,069	5,774	4,358	4,076	[2]5,104
Iron content ___ do	4,007	3,811	2,869	2,715	[2]3,261
Metal:					
Pig iron[4] ___ do	187	161	113	--	[2]163
Ferroalloys	30	--	320	([5])	200
Steel ingots and castings ___ thousand tons	364	273	299	342	411
Lead:					
Mine output, metal content	192,667	175,771	212,600	205,333	[2]209,917
Metal	79,236	76,990	67,734	70,260	[2]81,890
Manganese: Mine output, metal content	--	--	--	273	308
Molybdenum, mine output, metal content	2,488	2,893	2,628	3,079	3,828
Selenium metal, refined ___ kilograms	22,478	20,851	19,553	20,800	[2]22,235
Silver:					
Mine output, metal content ___ thousand troy ounces	46,940	53,479	55,878	56,523	[2]60,395
Metal ___ do	23,853	24,704	21,725	23,676	[2]24,237
Tellurium metal ___ kilograms	21,310	20,726	15,116	14,094	[2]15,037
Tin, mine output, metal content	1,519	1,672	2,391	2,991	[2]3,777
Tungsten, mine output, metal content	521	[r]692	723	754	870
Zinc:					
Mine output, metal content	498,890	507,111	576,400	558,457	[2]588,558
Metal	126,159	160,733	154,030	148,579	[2]162,757
INDUSTRIAL MINERALS					
Barite	409,100	375,000	[e]163,300	[e]160,000	150,000
Boron materials, crude (borates)[e]	16,644	14,000	10,000	10,000	10,000
Cement, hydraulic ___ thousand tons	3,080	2,590	2,300	2,200	2,200
Chalk	475,000	470,000	470,000	470,000	470,000
Clays:					
Bentonite	30,500	31,000	31,000	32,000	32,000
Fire clay[e]	8,520	8,000	8,000	8,500	8,500
Kaolin[e]	6,000	6,000	6,000	6,000	6,000
Common clay[e]	[2]754,256	750,000	750,000	750,000	750,000
Diatomite[e]	7,300	7,300	7,300	7,300	7,300
Feldspar[e]	[2]21,600	25,000	25,000	25,000	25,000
Gypsum, crude	350,000	350,000	350,000	350,000	350,000
Lime[e]	[2]33,319	35,000	35,000	35,000	35,000
Mica[e]	[2]574	550	550	550	550
Nitrogen: N content of ammonia	97,500	84,700	[e]85,000	[e]85,000	85,000
Phosphates, crude	11,938	[r]29,101	2,510	13,000	12,200
Salt, all types	506,000	485,000	[e]490,000	[e]500,000	500,000

See footnotes at end of table.

Table 1.—Peru: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984[p]	1985[e]
INDUSTRIAL MINERALS —Continued					
Stone, sand and gravel:					
Dimension stone:[e]					
Marble	[2]3,072	3,000	3,000	3,000	3,000
Slate	19,000	18,000	18,000	18,000	18,000
Crushed and broken stone:					
Dolomite[e]	4,300	4,200	4,000	4,000	4,000
Limestone thousand tons	3,800	2,590	2,500	[e]2,500	2,500
Quartz and quartzite[e]	2,000	2,000	2,000	2,000	2,000
Silica sand thousand tons	[2]18	20	20	20	20
Sand and gravel do	2,538	2,850	[e]2,800	[e]2,800	2,800
Sulfur:					
Elemental:[e]					
Native	100	100	100	100	100
Byproduct of metallurgy	20,000	58,000	65,000	70,000	70,000
Sulfuric acid, gross weight	170,801	226,760	200,000	220,379	[2]213,057
Talc and related materials:[e]					
Talc	1,100	1,100	1,100	1,000	1,000
Pyrophyllite	8,000	7,500	7,500	7,000	7,000
MINERAL FUELS AND RELATED MATERIALS					
Carbon black	[r]4,197	[r]5,976	2,154	5,329	5,000
Coal: Anthracite, run-of-mine	157,000	[e]120,000	120,000	130,000	97,000
Coke, all types[e]	10,000	10,000	10,000	10,000	10,000
Gas, natural:					
Gross million cubic feet	71,600	51,800	42,100	45,484	45,000
Marketed[e] do	21,000	21,000	22,000	22,000	22,000
Natural gas liquids:					
Natural gasoline and other[6] thousand 42-gallon barrels	344	320	53	190	249
Propane do	86	59	6	49	81
Butane do	9	9	3	5	6
Total do	439	388	62	244	336
Petroleum:					
Crude do	70,431	71,197	62,454	67,374	68,788
Refinery products:					
Gasoline, motor do	13,960	13,069	10,835	11,539	12,000
Jet fuel do	3,307	2,891	2,718	2,654	3,000
Kerosene do	7,003	7,111	6,024	6,220	6,000
Distillate fuel oil do	13,071	12,177	9,591	12,020	12,000
Residual fuel oil do	16,907	18,866	21,637	26,617	27,000
Lubricants do	124	148	57	63	50
Liquefied petroleum gas do	1,410	1,525	1,170	1,429	1,400
Asphalt do	256	313	178	212	200
Refinery fuel and losses do	199	93	596	386	100
Unspecified do	318	1,292	2,090	1,074	1,250
Total do	56,555	57,485	54,896	62,214	63,000

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through June 25, 1986.
[2]Reported figure.
[3]Output reported by Empresa Minera del Centro del Perú S.A.
[4]Excludes sponge iron production as follows, in tons: 1981—53,967; 1982—42,853; 1983—27,024; 1984—61,800 (revised); and 1985—49,300.
[5]Revised to zero.
[6]Includes hexane.

TRADE

The export volumes of all major metals except copper and iron ore declined from 1984 levels. The total $1,263 million value of nonfuel mineral exports dropped 12% from the amount received in 1984, and the economic implications become even more serious when compared with that of 1983. Petroleum contributed an additional $646 million to total exports and represented a 5% gain over the 1984 value.

Copper, valued at $464 million, was second only to petroleum as the leading export earner. Exports of 22 million troy ounces of refined silver valued at about $140 million, fell almost 19% in volume and 38% in value from that of 1984. Refined silver sales to the United States and Canada increased, but exports to other geographic areas declined, except for Asia, which accounted for some sales in 1985 and none in 1984.

Lead exports, including any silver content, declined from 180,000 tons valued at $233 million in 1984 to 171,000 tons valued at $200 million in 1985. Zinc exports were reduced from 512,000 tons valued at $314 million in 1984 to 461,000 tons valued at $269 million in 1985. Iron ore exports increased in response to demand and reached about 5 million tons valued at $73 million; whereas in 1984, 4.2 million tons valued at $58 million was exported.

Minero Perú Comercial S.A. (Minpeco), the state-owned marketing company, maintained its 62% participation in the export of Peru's mineral production. One of Minpeco's major accomplishments was some continuation of financial assistance to private and state producers, even in the face of Peru's somewhat strained relations with the international financial community.

COMMODITY REVIEW

METALS

Copper.—Except for a 13-day strike, SPCC operated without undue problems at its Toquepala and Cuajone Mines in southern Peru. Total copper, silver, and molybdenum production increased. In mid-1985, the Government began a review of SPCC finances in respect to when the company could be expected to recover the $635 million investment made to develop the Cuajone Mine. In 1969, SPCC was granted a special tax abatement to endure for a period of 10 years from the date of mine opening or until such time as the investment was recovered, whichever came first. The mine opened in April 1976 at a tax rate of 47.5%. Total investment recovery was expected to occur during 1986, after which SPCC would be taxed at the rate of 54.5% on the Cuajone operation. In 1985, SPCC reduced some costs at Cuajone by making improvements at the concentrator and by altering the design of the mine pit to reduce the amount of overburden removal.

Centromín Perú, the second largest producer, operated without major problems, although terrorist activity caused some disruptions. About 79% of Centromín Perú's total copper production, including that from the Monterrosas Mine near Ica, came from the Cobriza mining unit. Centromín Perú's own mining units accounted for 77% of the copper concentrate refined at its La Oroya metallurgical complex. The balance was purchased from third parties.

Empresa Minera del Perú (Minero Perú) continued to operate the 32,500-ton-per-year copper cathode plant at its Cerro Verde I Mine, 24 kilometers southwest of Arequipa. The production of copper cathodes declined 11% from that of 1984 because of the depleting oxide ore reserves.

The Cerro Verde II project to mine and process the sulfide ore reserves underlying the oxide ore has been under various development schemes. The reduced-scale development plan under consideration in 1984 was discarded as uneconomic. Instead, Minero Perú settled on using a bacterial leaching process that tested out satisfactorily, and Cerro Verde II was officially inaugurated on December 7, 1985. Copper recovery was initially between 35% and 40%, but improvement was expected. Minero Perú projected it would produce 12,000 tons of copper cathodes in 1986 from the leaching process and 18,000 tons from remnants of the oxide ore in the mine and pads.

Minero Perú continued with a basic engineering study for using the Cerro Verde electrowinning facility to process the 11.4 million tons of 2% copper oxide ore from the Tintaya Mine overburden. The project envisions using this oxide ore to produce 77,000 tons per year of copper sulfate containing 23% copper and would ensure capacity operation of the Cerro Verde plant. This would also maintain Cerro Verde's consumption of the sulfuric acid produced at Minero Perú's Cajamarquilla zinc refinery.

The Tintaya Mine, about 250 kilometers from Arequipa in the Province of Espinar, Cuzco Department, went on-stream April 23, 1985. It was the first large-size mine to open since Cerro Verde I in 1977. Empresa Minera Especial Tintaya S.A. is owned 45% each by Minero Perú and Centromín Perú, and 10% by the Government's Corporación Financiera de Desarrollo. The concentrator plant was designed to treat 8,000 tons of ore per day and produce 500 tons per day of 33% copper. The plant encountered some technical problems and did not reach capacity until later in the year. In 1985, the plant produced 61,473 tons of concentrate. The company was considering a plan to increase production capacity to 600 tons per day of copper concentrate.

Minero Perú had several copper projects awaiting development. Of these, three appeared to be nearest to future exploitation. The La Granja copper-molybdenum project was under option to Kupferexplorationsgesellschaft mbH. It is in northern Peru in Cajamarca Department, but there has been no real progress for several years, probably because of low metal prices. The French Bureau de Recherches Géologiques et Minières (BRGM) still maintained its option on the polymetallic Tambo Grande project in Piura Department, near the Ecuadorian border. Congressional approval to develop this mine has not yet been granted. While awaiting approval, Minero Perú and BRGM began negotiating agreement modifications and other alternative measures to reduce the expected $185 million (in 1980 dollars) investment to mine at the rate of 8,000 tons of ore per day.

The Coroccohuayco copper deposit south of Tintaya in Espinar Province, Cuzco Department, was under a feasibility study by Minero Perú and the Japanese Overseas Mineral Resources Development for mine production estimated at 3,000 tons per day to yield 52,000 tons per year of 42% copper concentrate.

Cía. Minera Pativilca S.A., the largest medium-sized private copper producer, lost production time at its Raul Mine because of terrorist activity. This was one reason that Pativilca produced concentrates containing only 5,533 tons of copper, an amount similar to the 1984 level of output. About 75% of the concentrate was exported, and the rest was shipped to the La Oroya smelter. All concentrate was scheduled to be exported in 1986.

Most of the medium- and small-sized copper producers managed to at least maintain their 1984 production levels and sometimes survived financially through the presence of associated metals. Exploration to increase reserves was a high-priority activity. The medium-sized mining sector produced over 24,500 tons of copper in 1985, while the small-sized mining sector accounted for slightly less than 3,900 tons.

Gold.—Estimated gold production by source, in troy ounces, was as follows:

	1984	1985
In ores and concentrates	14,468	67,516
Refined	88,414	84,942
In placer gravels	95,809	70,989
Total	198,691	223,447

The 367% increase of gold in ores and concentrates in 1985 is subject to significant revision when more reliable data become available, but was based on information that some companies produced concentrates with higher than usual gold values.

The Banco Minero del Perú monopoly on gold marketing does not include gold exported in concentrates. The Banco Minero exported about 175,697 troy ounces of gold valued at more than $43 million. There were to be no refined gold exports in 1986 in order to increase the Central Reserve Bank's reserves of gold bullion.

Cía. Aurifera Río Inambari S.A., a subsidiary of South American Placers Inc. (SAPI), and Aurifera Sur Oriente S.A. (Ausorsa) signed a tax stability agreement with the Government to develop a concession in the Madre de Dios region. The International Finance Corp. approved a $6 million credit and subscribed $500,000 in equity capital to the project. The company continued metallurgical testing and drilling to more exactly define the deposits. A washing plant was installed to determine recovery levels. The deposit area reportedly contained an average of over 0.03 troy ounce of gold per cubic meter, and it was estimated that future production could be as much as 321 troy ounces per month.

Financial constraints restricted Centromín Perú's activities to some access trail construction at its concession areas on the Madre de Dios and Inambari Rivers. Minero Perú's need for a $20 million dredge at its San Antonio de Poto placer deposit in Sandia Province, Puno Department, was placed under review for further consideration. Operating at Pampa Blanca by artisan methods, but with improved working conditions and a good water supply, Minero Perú significantly increased placer gold production from this area of the San Antonio de Poto concession. The United Nations Revolving Fund concluded the first stage of its explorations in an area covering about 80% of Minero Perú's concession. Those areas favorable to dredging were to be explored further during the second stage of the project.

The largest private lode gold producer was the Ocoña group of companies, controlled by Asesoria Contable Minera S.A. (Acomsa). Acomsa's mines produced about 29,400 troy ounces of gold as the result of a continuing expansion program.

The largest single private gold producer was Cía. de Minas Orcopampa S.A., almost wholly owned by Cía. de Minas Buenaventura S.A. This mine produced concentrates containing 38,000 troy ounces of gold. Remaining reserves were estimated at 2.1 million tons averaging 0.176 troy ounce of gold and 18.3 troy ounces of silver per ton. Orcopampa was to start a $30 million expansion project to increase plant capacity to 1,000 tons per day, construct a new electric power facility, improve other infrastructure, and carry on with exploration and mine developments.

Other gold producers such as Oro de Los Incas S.A., Oro Peruano Alemán S.A., Minera Nueva California S.A., and Cía. Minera Poderosa S.A. were implementing expansions as financing arrangements permitted. Minero Perú's anode slimes plant, which went on-stream in November 1984, completed its first full year of operation and produced about 2,000 ounces of gold.

Iron Ore.—Increased sales allowed Empresa Minera del Hierro del Perú S.A. (Hierro Perú) to reverse a 2-year production downtrend. Production by category for 1984-85 was as follows, in thousand metric tons:

	1984	1985
Pellets	907	1,529
Low-silica pellets	87	256
High-grade sinter feed	1,849	2,026
Pellet feed in slurry form	98	223
Pellet feed in cake form	1,089	957
Oxide ore	46	113
Total	4,076	5,104

High freight costs continued and reduced the benefit of the increased sales. The Republic of Korea (32%) and Japan (30%) were the largest importers of Peruvian iron ore. Increased sales were made to Argentina and Yugoslavia, and China purchased iron ore for the first time. Domestic sales to Empresa Siderúrgica del Perú resumed as the company purchased pellets for its reopened blast furnace.

Hierro Perú improved the quality of its direct-reduction pellets through additional grinding and magnetic separation stages. The pellets were then more suitable for use in the Midrex process, and that may have accounted for some increase in sales.

Lead and Zinc.—Minero Perú's Cajamarquilla zinc refinery suffered from labor problems and disruptions in electricity supply because of terrorist attacks. Nevertheless, the refinery's output of zinc increased by 12%, although that of cadmium, lead-silver residues, and sulfuric acid declined. The toll refining contract with Minpeco lowered Minero Perú's working capital requirements for the refinery by $2 million. The La Oroya metallurgical complex of Centromín Perú produced increased volumes of lead and zinc. About 97% of the refined lead originated from Centromín Perú's own mining operations. The Cerro del Pasco mining unit accounted for 60% of the company's lead concentrate production and 63% of the zinc concentrate.

The Fundición de Concentrados S.A. (Fundeconsa) lead smelter at Sayán, Lima Department, encountered technical difficulties and did not commence operating in December as scheduled. Fundeconsa expected the 10,000-ton-per-year smelter to come on-stream in March 1986. The principal shareholder in Fundeconsa, Cía. Minera Santa Rita S.A., was to provide about 7,000 tons per year of concentrate to the smelter. Negotiations were under way with Minpeco for additional concentrate.

In the private sector, all the larger medium-sized lead producers increased output except Cía. Minera Santa Luisa S.A., Cía. Minera del Madrigal S.A., and Cía. Minera Huarón S.A. All of the larger medium-sized private zinc producers increased concentrate output except Cía. Minera del Madrigal.

The Madrigal operation at Caylloma in Arequipa Department was expected to cease mining in 1986 because of the depletion of economic reserves. Previously owned by Homestake Mining Co., the mine has been the property of St. Joe International Corp. since 1983. St. Joe also wholly owned Cía. Minerales Santander Inc., a zinc and copper mine in Huaral Province about 200 kilometers northeast of Lima. Santander usually ranks as the fifth largest zinc producer in Peru. In 1985, St. Joe International was the only U.S. company to wholly own medium-sized operations in Peru.

Another U.S. company, ASARCO Incorporated, owned 80% of Corp. Minera Nor Perú S.A., with 20% held by private Peruvian interests. Its polymetallic Quiruvilca Mine increased copper, lead, and zinc concentrate production in 1985. The silver content of concentrates also increased but, like other producers, overall financial results were poor because of low metal prices.

Cía. Minera Milpo S.A. remained the largest private lead producer and the second largest private zinc producer. Terrorist activity and a 26-day strike hampered Milpo's activity, but new mine workings and improved techniques allowed lead output to increase by about 16% and zinc production by about 11%.

Cía. Minera Atacocha S.A., the second ranking private lead producer, completed the first expansion of its No. 2 concentrator to 1,800 tons per day and initiated other operational improvements. Atacocha increased lead production by 13% to about 13,100 tons, and zinc increased by 27% to 20,600 tons.

The largest private zinc producer is San Ignacio de Morococha S.A. (SIMSA) from its San Vicente Mine near San Ramón in Chanchamayo Province, Junín Department. SIMSA's installed capacity was 1,800 tons per day, and in 1985, zinc-contained-in-concentrate production increased 9% to about 69,800 tons while contained-lead production increased 55% to about 5,300 tons. Ore reserves at yearend were estimated at about 4 million tons averaging 0.8% lead and 12.7% zinc.

A $20 million integral development program at the San Vicente Mine was approved by the Ministry of Energy and Mines. The program included new exploration work and expansion of the mine and plant capacity to 3,000 tons per day. The development part of the program included the construction of a module-type zinc refinery near the mine that would have the capacity to produce about 30,000 tons of zinc and 10,000 tons of elemental sulfur per year. The road between the mine and San Ramón was to be improved, and a clinic was to be constructed in San Ramón. The creation of a technological institute in San Ramón was included in the program, which together with the clinic would benefit the development of the whole Chanchamayo Valley. In 1985, SIMSA had a 6-megawatt hydroelectric capacity and a 3-megawatt thermoelectric plant. The new development program would increase hydropower capacity to 50 megawatts and place the thermoelectric plant in reserve status.

Sociedad Minera Gran Bretaña S.A. was considering closing down its Azulcocha zinc mine in Junín Department. Production fell more than 63% at this mine during 1985 because of labor problems and depleting reserves. In 1984, the mining unit produced 19,000 tons of a 60% zinc concentrate, but in 1985, concentrate production only reached 7,000 tons. Gran Bretaña brought its Contonga Mine northeast of Lima in Ancash Department on-stream in January. During its first year of operation, Contonga produced about 8,000 tons of 56% zinc concentrate and about 3,000 tons of lead-silver concentrates containing 70% lead and 100 troy ounces of silver per ton. A $5.8 million credit was approved by the Banco Minero to finance a capacity expansion from 500 tons of ore per day to 1,000 tons of ore per day. Proven and probable ore reserves at Contonga were estimated to be 3 million tons, with an additional 10 million tons of potential reserves.

Instituto Geológico Minero Metalúrgico signed an agreement with the Metal Mining Agency of Japan and the Japan International Cooperation Agency to conduct a feasibility study on the Izcay Cruz zinc deposit at Oyón, Cajatambo Province, Lima Department. The study was considering a project requiring an investment of at least $30 million to mine 1,000 tons per day. Ore reserves for this deposit were estimated at over 3 million tons averaging 18% zinc, almost 2% lead, 0.2% copper, and 1 troy ounce of silver per ton.

Manganese.—In 1984, Ceaco S.A., formerly the U.S.-owned Chemical Equipment Accessories Co., began producing pyrolusite manganese ore averaging 54% manganese dioxide at its mine in the Callejón de Huaylas, Ancash Department. Production capacity was about 600 tons per month, but actual output was based on market demand, and during 1984 and 1985, this averaged about 800 tons per year. Ore reserves were estimated at 450,000 tons. Most of the production was sold to the electrolytic zinc refineries at Cajamarquilla and La Oroya. Small quantities were also sold for use as a microelement in the preparation of bird feed. SIMSA started exploratory work on a manganese deposit in the central jungle area of Junín Department.

Molybdenum.—SPCC remained Peru's sole producer of molybdenum concentrates. Output from the Toquepala Mine increased over that of 1984 by almost 46%, while output from the Cuajone Mine increased about 8%.

Silver.—Once again silver producers faced declining market prices and increased labor and security costs. In general, companies continued to concentrate on exploration and mine and plant modifications to improve efficiency and reduce costs. With the exception of some smaller companies, the private silver producers generally surpassed their 1984 production levels. The increased silver production resulted mostly from additional output from Cía. de Minas Buenaventura and its Orcopampa subsidiary, Cía. Minera Arcata S.A., and Centromín Perú. Minero Perú's anode slimes plant at Ilo added more than 1 million ounces of silver to Peru's total output.

Centromín Perú's six mining units and the newly assumed Monterrosas Mine contributed about 64% to the refined silver production at the La Oroya metallurgical complex. Centromín Perú's mining units contributed almost 24% of Peru's total silver production. The medium-sized mining sector accounted for 61% of total production, and of that amount, Buenaventura and its Orcopampa subsidiary together produced 15%.

During 1985, Buenaventura completed several projects. At Julcani, the Herminia Mine was drained through the Gandolini Tunnel; at Uchucchacua, capacity was increased from 700 tons per day to 1,000 tons per day, and electrical capacity was increased from 1.3 megawatts to 3.3 megawatts. At the now-independent Orcopampa mining unit, capacity was increased from 500 tons per day to 700 tons per day in an eventual expansion to 1,000 tons per day. Electrical, infrastructural, and mine capacity increases by Buenaventura required an investment of $28 million and was mostly financed by a reinvestment of profits. The $30 million Orcopampa expansion project was partly financed with a $10 million participation by International Finance Corp. In addition to new exploration and mine development, the Orcopampa project also involves constructing a 3-megawatt hydroelectric plant and workers' housing.

Another Buenaventura subsidiary, Cía. de Minas Recuperada S.A., ceased producing and changed its status back to exploration in order to establish sufficient reserves to reinitiate mining. Buenaventura's Julcani mining unit produced lead concentrates containing about 1.9 million troy ounces of silver, and yearend reserves were 640,000 tons averaging 14 troy ounces of silver per ton. At the Uchucchacua unit, the silver content in lead concentrate amounted to over 3.8 million troy ounces. Yearend reserves were estimated at over 1.5 million tons containing about 13 troy ounces of silver per ton. The subsidiary Orcopampa mining company produced over 2.8 million troy ounces of silver. Buenaventura sold about one-half of its concentrates to Centromín Perú and the balance through U.S. and Canadian companies.

Arcata, the second largest private silver producer, did not expand its capacity during 1985, but directed its efforts at optimizing operations. Arcata's production amounted to over 3.5 million troy ounces of silver and about 9,281 troy ounces of gold. At yearend, reserves were estimated at just over 2 million tons averaging 14.8 troy ounces of silver per ton.

Cía. Minera de Caylloma S.A., about 35% owned by Arcata, produced over 2.5 million troy ounces of silver at its operation near Arequipa. Caylloma continued with exploration to increase its 1.2 million tons of reserves that averaged about 12 troy ounces of silver per ton.

Tungsten.—To reduce operating costs from about $24 per ton (without financing costs) to about $16 per ton in 1986, and then to $12 per ton in 1987, Fermín Málaga Santolalla e Hijos Negociacíon Minera S.A. planned a $1.3 million mine expansion project. Mine treatment capacity would be increased from the present level of 500 tons per day to 1,000 tons per day at the Pasto Bueno Mine in Ancash Department. Concentrate output of 75% tungsten trioxide would then increase from about 780 tons per year to 1,100 tons per year.

Minera Regina S.A. implemented the first stage of an expansion program to increase concentrate production from 30 tons per month to 120 tons per month at the Palca XI Mine near Puno. Completion of this $4.5 million project was scheduled for 1986. The second-stage expansion to double 1986 capacity has not yet been assigned a construction schedule.

Tungsten production by company was as follows, in metric tons of WO_3 content:

	1982	1983	1984	1985
Málaga Santolalla	397	475	533	590
Minera Regina	187	196	263	360
Centromín Perú	239	158	88	87
Sociedad Minera Puquio Cocha S.A	50	83	69	60
Total	873	912	953	1,097

INDUSTRIAL MINERALS

First discovered in 1955, a prefeasibility study for development of the Bayóvar phosphate deposits in the Sechura Desert of northwestern Piura Department was completed in 1985. Empresa Promotora de Bayóvar S.A. (Probayóvar) contacted companies interested in participating in the project. These included Norway's Norsk Hydro A/S, as well as companies from Italy, Japan, New Zealand, and the United Kingdom. Probayóvar also maintained contracts with companies interested in financing equipment and engineering studies, such as Société Chimique des Charbonnages, the China International Trust Development Corp., Tsvetmetproexport of the U.S.S.R., and also Japanese and U.S. companies. The final composition of any joint venture and financing sources remained undetermined while concerned Government representatives studied the multifaceted selection process.

A 30,000-ton-per-year pilot plant has been in operation at Bayóvar for 5 years, but output never reached capacity. Domestic sales of phosphate rock were about 6,508 tons.

MINERAL FUELS

Coal.—Empresa Promotora del Carbón S.A. (Procarbón) pressed forward on its objective of developing a domestic market for coal, especially among potential residential and industrial consumers. By mid-1985, the Government issued Decree Law 24178 that declared the substitution of coal for residual oil would be of national interest. Those areas close to coal-producing centers were to lead the substitution program. To enhance the attractiveness of conversion, the Government ruled that foreign machinery using coal as a fuel would be exempted from the usual import duties and that firms using coal would also receive other benefits. Electricidad del Perú and its affiliates were notified to initiate planning for the conversion of thermoelectric installations.

The Republic of Korea continued to lend support to Procarbón's anthracite briquet project. The first industrial-scale plant may be sited at Chimbote. The Republic of Korea may also import Peruvian anthracite for use in its own briquet industry. The Republic of Korea donated various models of briquet-burning household equipment to allow Procarbón to evaluate and demonstrate the process. The United Nations Development Program (UNDP) agreed to contribute $130,000 toward a study on coal mining promotion and another $118,700 for evaluations of the Santa and Alto Chicama coal basins. Procarbón was seeking the counterpart funds it must provide for each UNDP-funded study.

Petroleum and Natural Gas.—Drilling activity included 164 development wells and 12 exploration wells. Petroperú put down 112 of the development wells, and Belco, the remainder. Petroperú also drilled four of the exploration wells; Texaco Producing (Peru) Inc. made one test in Block 6 in the northern jungle area of Alto Amazonas; and Belco accounted for the remaining seven tests in its offshore concession.

The new contract between Petroperú and Occidental called for a total exploration investment of $49 million during 1986 and 1987. It included the drilling of three wells in Blocks 1A-A and 1B and one well in the newly acquired central southern jungle Ucayali Basin area of Block 36. This area is north of the Shell Exploradora y Productora del Perú BV Block 38 concession where a 1984 test well was dry and abandoned.

Shell Exploradora, a subsidiary of the Royal Dutch/Shell Group, planned to spend $50 million for exploration in 1986, including the drilling of two wildcats. The Shell area under exploration includes Blocks 38 and 42 in the south-central jungle and Blocks 49 and 51 in the southeast jungle. One well was to be in Block 42 where a natural gas and condensate discovery was made in 1984. The Government expected to continue Belco's scheduled drilling program for 1986, including 43 development wells and 7 wildcats.

The Government's rescission of the Occidental and Belco contracts did not affect new or existing exploration agreements with other companies because the action resulted from the failure to appropriately spend tax credits authorized in prior years. However, companies planning to form new ventures in Peru were expected to negotiate terms that would not lead to similar events. Several new exploration ventures were under tentative agreement, but it appeared that international companies were waiting for the promised new petroleum legislation to clarify policy before making a final commitment.

Peruvian oil companies have been restricted to service-oriented activities, but they believed that upcoming legislation would provide the opportunity to enter into exploration ventures. In anticipation of this action, V. G. Exploración Generales S.A., a division of one of Peru's largest construction companies, and Geopet Asociados S.A., an oil service company, submitted a proposal to Petroperú for a seismic option in the Titicaca Basin area. This concession, reported as northwest of Lake Titicaca and south of Cuzco, was also reported to have been first drilled around 1875. Maritime Petroleum Co. of Utah held a 6-month option in this area, but it expired at the end of August 1985. The Peruvian group proposed investing $2.65 million over 6 years to perform geological studies and drill six wildcats to a depth of about 3,500 feet.

Continental Oil Co. tentatively agreed to a seismic option in Block 35, an undeveloped central jungle area where gas was discovered 24 years ago in the Río Aguaytia Basin. Final agreement was not expected until 1986, after the Government clarifies its petroleum policy.

Petroperú gave preliminary approval to a proposed $2.45 million venture for a 2- to 4-year exploration of the Carpitas area on the northern coast. A consortium would be formed with Cía. Naviera Pérez Companc S.A. of Buenos Aires holding a 30% interest. Other shareholders were to include the Petroperú subsidiary Servicios Petróleros S.A. (Serpetro) 25%, and three local oil service companies, Cavelcas S.A., Cía. Petrólera Talara S.A., and Cía. Petrólera del Norte S.A., each with a 15% interest. Serpetro also sought approval from Petroperú to join with Bridas Producciones y Exploraciones of Buenos Aires to perform a secondary recovery operation at the La Brea y Parinas Fields in Talara.

Despite the structural upheaval in the petroleum sector, overall crude oil production was favorable compared with that of 1984, and even managed to end the year with a slight increase. This was deceptive, because by the end of 1985, the daily production rate had suffered a significant decline.

After the August 28 rescission of the petroleum contracts and during the period of renegotiations, Occidental and Belco continued to operate their former fields, but production belonged to Petroperú and the companies were paid a flat fee on a per-barrel basis for the crude oil. The Government was slow in making the production payments, which limited the companies' working capital for services and equipment. As a result, production steadily declined from Occidental's jungle fields, falling from about 83,000 barrels per day in September to 64,800 barrels per day in December. Belco's offshore production dropped from 27,000 barrels per day in September to about 24,100 barrels per day in November.

On December 27, 1985, Supreme Decree 036-85-EM authorized the Occidental-Bridas consortium to continue operating its northern secondary recovery program under the norms of its original July 1980 contract, but it would no longer receive any tax benefits granted through various earlier decrees. Also, a new payment rate for oil produced was to be established and would be retroactive from August 30, 1985. After the original contract rescission, the consortium was paid at the rate of $7.26 per barrel of oil produced.

Belco and the Government failed to come to an agreement, and on December 28, 1985, Belco's assets were nationalized. Control of Belco's assets was assumed by Petromar. The Government announced it would endeavor to achieve adequate and effective compensation for Belco.

On December 27, 1985, Occidental signed a letter of intent agreeing to the basic terms of new contracts to be negotiated with the Government. The final terms of the new contracts must be ratified by the Peruvian Congress. The new contract for Blocks 1A-A and 1B would be retroactive to August 30, 1985, and run until August 30, 2007. The contract for Block 36 would endure for 30 years from the date of signing. The final contracts were expected to include investment by Occidental of a total of $276 million in exploration during the period 1986-91. Of this, $32 million would be in Blocks 1A-A and 1B, with an additional $52 million exploration investment if justified by the initial explorations. In Block 36, about $53 million would be spent during the initial exploration period, and another $130.5 million if results warranted. If initial exploration efforts did not justify further investment, Occidental would invest the $182.5 million of additional exploration funding in Block 36 or other blocks that may be assigned.

The 50-50 production split in Blocks 1A-A and 1B under the old contracts would be replaced by a service fee to be paid by Petroperú to Occidental for each barrel of oil produced. The fee was set at $11.50 per barrel for production from developed proven reserves and $14.80 per barrel for that produced from undeveloped proven reserves and new reserves. A corporate tax rate of 68.5% per year would replace the former 41% rate for the northern jungle operations. The tax rate and the per-barrel fee for production from Block 36 were not defined, but would reflect exploration costs and any pipeline construction. In both of Occidental's contracts, the per-barrel fees were subject to adjustment. Petroperú was given the option of forming a 50% partnership with Occidental in Block 36 or any other blocks when a commercial discovery is confirmed. In addition, Occidental agreed to refund, in three annual installments, about $35 million in tax deductions that were received during 1982, 1983, and 1984, plus a tax assessment for 3.1 million barrels of crude oil that Occidental may apply against its 1985 income tax liability.

Uranium.—The Instituto Peruano de Energía Nuclear (IPEN) estimated that the 600-square-kilometer area under investigation in the Macusani District of Carabaya Province, Puno Department, contained 200,000 tons of uranium ore. IPEN reported that some samples have indicated purity levels as high as 60%. About $2 million has been invested in prospecting and research. Additional exploration would require about $15 million, and to develop deposits containing an estimated 3,400 tons of uranium oxide would require as much as a $200 million investment. Reportedly, IPEN may request development bids in the near future.

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[1]Physical scientist, Division of International Minerals.

[2]In 1984, the average exchange rate of Peruvian soles (S/) to U.S. dollars was S/3,476=US$1.00. On Feb. 1, 1985, Peru changed its currency from sol to inti (I). The inti was valued as equivalent to 1,000 soles. In July 1985, the exchange rate was about I/12=US$1.00. At the end of July 1985, after a 12% devaluation, the official exchange rate was frozen until December 1986 at I/13.9=US$1.00.

The Mineral Industry of the Philippines

By John C. Wu[1]

The Philippines remained an important world producer of chromium, cobalt, copper, gold, and nickel, despite the financial hardship suffered by the mining industry under the continuing economic difficulties of the country. Because of slight improvements in the world market prices of exported mineral commodities, several Philippine mining operations in chromium, copper, and other minerals were reopened. However, the mining industry was still far from recovery, as more major mining companies continued to incur losses because of increased production costs.

In early 1985, the Philippine Bureau of Mines and Geo-Sciences (BOMG) worked out a 5-year plan for assisting the mining industry in recovering from its depression. Under the plan, BOMG is to promote small-scale mining to intensify the Bureau's exploration activities, to improve the investment climate for mining, and to expand the Bureau's data collection facilities. On the other hand, the Chamber of Mines of the Philippines submitted a recommendation consisting of 11 proposals to the Ministry of Natural Resources and BOMG to help the mining industry to survive. The Chamber of Mines stressed that without tax relief, more copper producers would go bankrupt. According to the 1984 financial statistics obtained by the Chamber of Mines, five out of seven major mining companies have a negative rate of return on investment.[2]

Later in September, the Chamber of Mines formally filed a petition to the Prime Minister on behalf of the mining industry for a 50% reduction on both the royalty tax on mineral output and the tariff duties on mining equipment, spare parts, and supplies. An exemption from the 1% foreign exchange transaction tax and taxes on industrial fuels and the abolition of the real estate tax on mining claims and wharfage dues. However, the tax relief petition was rejected by the Prime Minister in November, except for the exemption of the 1% foreign exchange tax and the elimination of the 5% surcharge on imports.

Because of the slight increase in copper prices, three copper operations were reopened. However, the copper mining and milling operations at Toledo, Cebu, were cut back twice by Atlas Consolidated Mining and Development Corp. during the second half of 1985. The Hijo gold operations at Mabini, Davao del Norte, were suspended by North Davao Mining Corp. in July.

In the industrial minerals sector, the output of stone quarrying and sand pits, as well as that of cement, were down substantially because of the sluggish market conditions in the Philippine construction sector caused by a cutback in major industrial projects and the related infrastructure. However, 17 of the 19 cement plants reportedly completed their coal conversion projects by yearend. For production of phosphatic fertilizer, a small phosphate mining operation at Guihulngan on Negros Island was started by Vulcan Industrial & Mining Corp.

In the mineral processing sector, the copper smelter at Isabel, Leyte, operated by the Philippine Associated Smelting and Refining Corp. (PASAR), completed the second full year of operations. The copper smelter operated at 94% of its 138,000-ton-per-year capacity in 1985. PASAR recorded a $7.5 million net income in 1984. The nickel refinery on Nonoc Island, operated by Nonoc Mining and Industrial Corp. (NMIC), also completed a full year of operations for the first time since 1981. Production of ferrochromium by Ferrochrome Philippines Inc. at Tagoloan on Mindanao Island was near its capacity of 60,000 tons in 1985. Production of phosphate fertilizer by Philippines Phosphate Fertilizer Corp. (Philphos) at Isabel, Leyte, was started during the year with most of its phosphate rock supplied by its partner, Nauru Phosphate Corp. (NPC) of the Republic of Nauru. Philphos also commenced operation of a pyrite plant on Negros Island through its subsidiary, Philippine Pyrite Corp.

In the mineral fuels sector, coal production continued to increase as output of coal from the country's largest coal mining operations on Semirara Island reached the 1-million-ton-per-year capacity. Development of the new Galoc Oilfield offshore Palawan Island was postponed again in 1985, while output of crude petroleum from the three existing oilfields were lower than that of 1984. The oil reserves at the Nido Oilfield are expected to be depleted by 1986.

According to the National Economic and Development Authority (NEDA), in 1985 the Philippine economy contracted again by 3.9%, compared with a negative 5.3% real growth in gross national product in 1984. The country's gross domestic product (GDP) dropped 3.6%, compared with a negative 4.6% real growth in GDP in 1984. The sluggish domestic demand and low investor confidence in the economy remained the primary causes for the negative growth in the Philippine economy. The sectoral contribution of the mining and quarrying industry to the GDP at 1972 constant prices was 1.9%, compared with 1.8% in 1984, owing to a 0.5% gain in gross value added in the industry resulting from increased output of gold and nickel.

According to NEDA, the gross value added by the mining and quarrying industry in 1985 was estimated at $95 million[3] at 1972 constant prices, compared with $105 million in 1984, while GDP was estimated at $4.9 billion at 1972 constant prices, compared with $5.9 billion in 1984. During 1984-85, the growth rate and contribution of major subsectors to the value added in the mining and quarrying industry in 1972 constant pesos were as follows:[4]

Mining subsector	Growth rate (percent)	Contribution (percent)	
		1984	1985
Copper	-6.2	65.8	61.4
Gold	56.0	7.6	11.8
Nickel	111.1	1.0	2.1
Chromium	14.3	1.2	1.4
Other metals	100.0	1.3	2.5
Stone quarries and sand pits	-25.7	15.5	11.5
Other non-metallics	22.9	7.6	9.3
Total mining and quarrying	.5	100.0	100.0

According to the Central Bank of the Philippines, total exports dropped to $4,628 million in 1985 from $5,391 million in 1984, while total imports also declined to $5,114 million from $6,070 million. As a result, the Philippine merchandise trade deficit improved in 1985 with a decrease to $486 million from $679 million in 1984. Since the liberalization of foreign exchange regulations in October 1984, the Philippine peso (P) has stabilized between P18.3=US$1.00 in February, and P18.8=US$1.00 by the end of October. The country's inflation rate, as measured by the Consumer Price Index, decreased to only 5.7% compared with 50.8% in 1984.

PRODUCTION

The performance of the Philippine mineral industry was mixed. Despite a slight improvement in the world metal markets in 1985, most mineral production declined. However, mine production of refractory-grade chromite and gold was at a higher level than that of 1984 owing to improved recovery rates and mining of higher grade ore. Production of nickel ore also increased slightly because of improved mill throughput and good weather conditions during the first half of 1985. The continuing decline in mine production of copper was attributable to a drastic cutback in production capacity by Atlas in Cebu despite the reopenings of the Sipalay Mine on Negros Island by Maricalum Mining Corp. (MMC), as well as two other copper mines. Cement production was down to under 4 million tons owing to the depressed domestic and overseas markets.

In mineral processing, production of refined copper by PASAR reached 94% of its smelting capacity while production of nickel metal by NMIC achieved only 70% of its target production of 2,000 tons per month. Production of ferrochromium by Ferrochrome Philippines was at near capacity owing to increased demand from Japan and Western Europe countries.

In the mineral fuel sector, the output of coal reached another record high when the country's largest coal mining operation on Semirara Island reached its full capacity. However, the output of crude oil from three offshore oilfields dropped further to 7,918 barrels per day, while the development of a new major oilfield, the Galoc, failed to materialize in 1985.

Table 1.—Philippines: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984[p]	1985[e]
METALS					
Arsenic: White (equivalent of arsenic acid)	--	--	--	--	5,000
Chromium: Chromite, gross weight:					
Metallurgical-grade	156,237	142,186	136,347	128,384	[3]123,172
Refractory-grade	283,019	179,680	130,562	130,799	[3]134,411
Total	439,256	321,866	266,909	259,183	257,583
Cobalt, mine output, metal content	997	[r]466	165	64	[3]886
Copper:					
Mine output, metal content	302,328	292,086	271,403	233,359	[3]226,157
Metal, primary	--	--	38,800	99,230	[3]130,330
Gold troy ounces	[r]758,306	834,431	816,536	786,896	[3]809,735
Iron and steel:					
Iron ore and concentrate thousand tons	6	6	3	([4])	--
Ferroalloys:					
Electric-furnace ferrosilicon[e]	26,000	29,000	20,000	18,400	20,000
Electric-furnace ferrochromium[e]	10,000	12,000	21,500	32,800	40,000
Steel, crude thousand tons	350	350	200	250	200
Lead, mine output, metal content	1,066	--	--	--	--
Manganese ore and concentrate, gross weight	3,113	1,556	2,242	615	[3]293
Molybdenum, mine output, metal content	94	[r]80	40	--	--
Nickel:					
Mine output, metal content	29,247	[r]19,634	13,900	13,601	[3]27,653
Metal, smelter	21,485	[r]11,223	6,097	3,528	[3]16,656
Silver, mine output, metal content thousand troy ounces	2,024	1,984	1,823	1,574	[3]1,699
Zinc, mine output, metal content	5,289	3,003	2,275	2,189	[3]1,875
INDUSTRIAL MINERALS					
Barite	2,135	8,697	1,201	([4])	--
Cement, hydraulic thousand tons	4,090	4,350	4,383	3,665	[3]3,164
Clays:					
Bentonite	5,527	4,671	670	91,313	1,600
Red	6,613	400	532	200	300
White	10,543	6,632	19,990	8,543	10,000
Rock	613	390	([4])	([4])	--
Other	571,386	579,229	397,903	359,226	400,000
Feldspar	15,999	15,213	6,524	11,486	12,000
Gypsum and anhydrite:					
Natural	412	202	500	600	300
Synthetic[e]	110,000	110,000	110,000	[r]112,000	112,000
Lime	84,837	66,349	50,675	49,912	45,000
Magnesite	1,500	--	620	625	650
Nitrogen: N content of ammonia	32,400	14,800	20,300	16,200	15,000
Perlite	7,530	[r]3,582	2,020	15,641	3,000
Phosphate:					
Guano	2,055	15,259	610	508	600
Phosphate rock	8,413	5,944	4,135	6,680	7,000
Pyrite and pyrrhotite (including cuprous), gross weight	97,872	64,555	62,864	75,817	[3]232,478
Salt, marine	355,289	364,420	381,912	401,008	[3]421,058
Sand and gravel:					
Alumina sand	33,513	65,213	([4])	([4])	--
Silica sand thousand tons	472	480	408	413	[3]402
Other[5] thousand cubic meters	13,319	14,902	15,132	14,695	15,000
Stone:					
Andesite	22,484	334,915	([4])	([4])	--
Basalt cubic meters	602,529	737,365	([4])	([4])	--
Dacite	30,047	54,555	32,448	([4])	--
Diorite	77,782	56,215	47,895	([4])	--
Dolomite	90,095	353,342	336,043	367,992	350,000
Limestone[6] thousand tons	10,676	7,208	6,686	4,024	4,000
Marble (dimension), unfinished cubic meters	6,753	6,797	6,117	4,919	5,000
Volcanic cinder do.	1,050	1,100	482	([4])	--
Sandstone	36,593	32,616	47,234	5,340	40,000

See footnotes at end of table.

Table 1.—Philippines: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984[p]	1985[e]
INDUSTRIAL MINERALS —Continued					
Stone —Continued					
Serpentine	9,040	515	(4)	(4)	--
Tuff	122,788	81,008	117,772	29,269	30,000
Quartz	45,282	84,866	74,515	79,536	75,000
Crushed, broken, other[7] thousand cubic meters	1,489	1,031	1,857	590	1,000
Sulfur: S content of pyrite	45,511	30,018	29,232	38,505	[3]108,102
Talc	446	1,008	878	401	1,000
MINERAL FUELS AND RELATED MATERIALS					
Coal, all grades	318,170	556,755	1,019,594	1,194,673	[3]1,294,079
Petroleum:					
Crude thousand 42-gallon barrels	2,500	3,000	4,654	3,890	[3]2,890
Refinery products:					
Gasoline do	9,654	9,242	9,349	8,124	9,000
Jet fuel do	2,184	2,858	3,007	3,322	3,000
Kerosene do	3,152	3,142	3,441	2,382	2,500
Distillate fuel oil do	16,361	16,362	17,540	17,027	17,000
Residual fuel oil do	26,460	24,462	21,670	18,544	19,000
Other do	3,251	8,737	5,097	4,027	4,500
Refinery fuel and losses do	3,114	3,197	14,555	NA	NA
Total do	64,176	68,000	74,659	53,426	55,000

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through June 24, 1986.
[2]In addition to the commodities listed, the Philippines produces platinum-group metals as byproducts of other metals, but output is not reported quantitatively, and no basis is available to make reliable estimates of output levels.
[3]Reported figure.
[4]Revised to zero.
[5]Includes "pebbles" and "soil" not further described.
[6]Excludes limestone for road construction. Reported figures are as follows in cubic meters: 1981—24,092; 1982—30,697; 1983—84,742 (revised); 1984—17,722; and 1985—not available.
[7]Includes materials described as rock, crushed or broken; stones, cobbles, and boulders; rock aggregates; and broken adobe.

TRADE

According to estimates by the Central Bank of the Philippines, total merchandise exports dropped to $4.6 billion in 1985 from $5.4 billion in 1984, while imports also declined to $5.1 billion from $6.1 billion. Decline in export values of electronics, sugar, coconut products, and forest products, caused by the unfavorable world market conditions, had resulted in the overall reduction in export earnings. However, according to the National Census and Statistics Office, export earnings from copper rose by 21% to $254 million for the first 11 months of 1985. The reduced import bill was largely due to the decreased import bill for mineral fuels because of lower oil prices and cutbacks in import volume of crude petroleum and petroleum products.

According to BOMG, the values of Philippine mineral exports in 1984 were as follows, in millions of U.S. dollars: gold, 106.6; silver, 6.6; cobalt, 1.8; nickel, 2.9; copper concentrate, 151.8; refined copper, 140; chromite ore and concentrate, 18.5; nickel ore, 11.9; zinc concentrate, 1.2; cement, 3.9; and dolomite, 0.7. Gold and silver were exported mainly to Japan, Taiwan, and the United States; cobalt to Japan; nickel metal to the United States and the Netherlands; nickel ore to Japan; copper concentrate and refined copper to Japan, Taiwan, and the Republic of Korea; metallurgical-grade chromite to Japan and the Netherlands; refractory-grade chromite to Brazil, Japan, the Netherlands, Sweden, Thailand, and the United States; zinc concentrates to Japan; cement to Bangladesh; and dolomite to Japan.

In 1984, Saudi Arabia was the single largest supplier of Philippine petroleum. However, Malayasia became the leading crude petroleum supplier in 1985, accounting for 21% of the Philippine crude oil imports, followed by China (18%), Saudi Arabia (17%), and Kuwait (14%).

Table 2.—Philippines: Exports and reexports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1894: United States	Destinations, 1894: Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides kilograms	220	--		
Metal including alloys, all forms	3,121	388	--	Japan 282; Indonesia 60.
Arsenic: Oxides and acids	--	197	11	Australia 80; Malaysia 56; Taiwan 36.
Chromium: Ore and concentrate	146,826	244,028	57,680	Japan 53,160; Sweden 49,917.
Copper:				
Ore and concentrate	787,508	450,438	6,998	Japan 326,452; Taiwan 45,442; Republic of Korea 42,209.
Matte and speiss including cement copper	19	33	--	West Germany 17; Japan 12.
Metal including alloys:				
Scrap	2,062	9,313	114	Republic of Korea 7,821; Japan 934; Taiwan 422.
Unwrought	18,112	80,631	--	Japan 52,623; Taiwan 12,857; China 6,841.
Semimanufactures	424	2,216	--	Hong Kong 1,521; Singapore 587.
Gold:				
Waste and sweepings kilograms	2,296	--		
Metal:				
Contained in copper concentrates troy ounces	366,933	295,453	6,904	Japan 259,183; Taiwan 11,764; Republic of Korea 9,889.
Unwrought and partly wrought do	6,494	--		
Iron and steel:				
Iron ore and concentrate: Pyrite, roasted	15,408	13,709	--	All to Taiwan.
Metal:				
Scrap	1,014	844	--	Japan 664; Taiwan 160.
Ferroalloys:				
Ferromanganese	13	25	--	All to Malaysia.
Ferrosilicon	22,827	20,856	--	Japan 18,642; Indonesia 2,005.
Unspecified[2]	28,643	45,389	4,920	Japan 30,731; Netherlands 4,200.
Semimanufactures:				
Bars, rods, angles, shapes, sections	332	1	--	All to Singapore.
Universals, plates, sheets	25	14	--	All to Indonesia.
Hoop and strip	(3)	43	--	All to Australia.
Wire	4	--		
Tubes, pipes, fittings	2,604	239	78	Hong Kong 57; Australia 41.
Castings and forgings, rough	570	733	326	Australia 302; Singapore 70.
Manganese: Ore and concentrate	1,315	--		
Molybdenum: Ore and concentrate	122	--		
Nickel:				
Ore and concentrate	346,973	527,205	--	Japan 526,298; Netherlands 907.
Metal including alloys:				
Scrap	186	69	35	Japan 26.
Unwrought	10,362	2,344	265	Netherlands 2,078.
Semimanufactures	1,782	608	608	
Silver: Metal including alloys, unwrought and partly wrought troy ounces	596,211	95,563	1,119	West Germany 64,301; United Kingdom 30,143.
Zinc:				
Ore and concentrate	4,590	5,258	--	All to Japan.
Metal including alloys, all forms	204	123	3	Japan 102.
INDUSTRIAL MINERALS				
Barite and witherite	2,432	--		
Cement	154,020	125,166	--	Bangladesh 76,530; Indonesia 15,030; China 9,300.
Clays, crude	108	18,057	--	Malaysia 17,917; Taiwan 100.
Diamond: Industrial stones carats	--	8,494	--	All to United Kingdom.
Fertilizer materials:				
Crude, n.e.s	2,572	2,084	--	Taiwan 1,451; Japan 595.
Manufactured: Nitrogenous	150	4,537	--	Australia 2,590; Thailand 1,000; Indonesia 710.
Salt and brine	201	242	--	All to Guam.
Sodium compounds, n.e.s.: Carbonate, manufactured	1,000	--		
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	4,142	4,481	10	Japan 3,723; Taiwan 435; Singapore 234.
Worked	5,177	4,587	837	Japan 2,782; Taiwan 323.
Dolomite, chiefly refractory-grade	293,738	354,466	--	Japan 354,166.
Gravel and crushed rock	6,329	7,221	(3)	Japan 5,461; Hong Kong 1,412.
Limestone other than dimension	--	1,700	--	All to Malaysia.
Sand other than metal-bearing	2,368	2,436	525	Japan 696; Hong Kong 517.

See footnotes at end of table.

Table 2.—Philippines: Exports and reexports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1894: United States	Destinations, 1894: Other (principal)
INDUSTRIAL MINERALS —Continued				
Sulfur: Sulfuric acid	119,970	151,529	--	Taiwan 38,806; Turkey 38,281; Japan 20,385.
Other:				
Crude	4,293	6,713	--	Taiwan 6,214; Malaysia 230.
Slag and dross, not metal-bearing	1,732	2,683	--	Japan 2,346; West Germany 134.
MINERAL FUELS AND RELATED MATERIALS				
Carbon black	88	886	--	Indonesia 686; Thailand 160; Hong Kong 40.
Petroleum refinery products:				
Liquefied petroleum gas 42-gallon barrels	39,208	303,305	--	Hong Kong 297,807.
Gasoline do	642,372	343,794	229,629	Japan 76,981.
Naphtha including white spirit do	1,674,823	957,364	--	Japan 801,822; United Kingdom 96,042.
Kerosene and jet fuel do	727,504	557,985	--	Japan 330,966; Hong Kong 175,385.
Distillate fuel oil do	--	25,573	--	All to Guam.
Lubricants do	31,590	17,822	--	Republic of Korea 5,708; Saudi Arabia 3,068; Thailand 3,043.
Residual fuel oil do	172,708	252,434	--	All to Singapore.

[1]Table prepared by Audrey D. Wilkes.
[2]Mainly ferrochromium.
[3]Less than 1/2 unit.

Table 3.—Philippines: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS				
Alkali and alkaline-earth metals kilograms	678	630	--	Japan 611; West Germany 19.
Aluminum:				
Ore and concentrate	3,119	3,953	72	Malaysia 2,441; China 900; Japan 340.
Oxides and hydroxides	1,998	2,766	112	China 1,550; Japan 872; Taiwan 112.
Metal including alloys:				
Scrap	19	19	--	Hong Kong 15; Japan 3.
Unwrought	14,843	6,613	329	France 2,308; Australia 2,115; Indonesia 499.
Semimanufactures	8,861	7,355	170	Japan 3,419; Republic of Korea 1,331; France 484.
Arsenic: Oxides and acids	157	118	--	Malaysia 46; Belgium-Luxembourg 37; France 18.
Beryllium: Metal including alloys, all forms kilograms	211	--		
Chromium:				
Ore and concentrate	3,859	24,410	(3)	India 9,999; Pakistan 8,866; New Caledonia 5,545.
Oxides and hydroxides	75	47	--	Italy 18; West Germany 12; Japan 12.
Copper:				
Sulfate	263	147	(3)	Taiwan 56; Japan 39; Belgium-Luxembourg 18.
Metal including alloys:				
Scrap	104	--		
Unwrought	5,713	151	(3)	Singapore 121; United Kingdom 18.
Semimanufactures	4,423	2,489	375	Japan 1,235; France 238.
Gold: Metal including alloys, unwrought and partly wrought troy ounces	2,288	9,939	4,541	Singapore 4,627; Japan 370.

See footnotes at end of table.

Table 3.—Philippines: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Iron and steel: Metal:				
Scrap	142	1,568	--	Malaysia 1,565.
Pig iron, cast iron, related materials	763	516	18	Japan 313; Taiwan 94; Sweden 91.
Ferroalloys:				
Ferromanganese	3,315	894	--	Japan 251; France 210; United Kingdom 159.
Unspecified	1,235	452	7	Taiwan 160; United Kingdom 139; Japan 76.
Steel, primary forms	778,687	351,818	(2)	Republic of Korea 219,910; Japan 51,596; Australia 16,725.
Semimanufactures:				
Bars, rods, angles, shapes, sections	98,401	28,944	95	Japan 23,606; Taiwan 2,610; West Germany 1,156.
Universals, plates, sheets	282,542	161,962	2,470	Japan 134,790; Canada 11,320; Taiwan 5,317.
Hoop and strip	6,557	4,854	70	Japan 4,566; Australia 70; Sweden 70.
Rails and accessories	3,236	1,198	47	Japan 930; Belgium-Luxembourg 150; Taiwan 71.
Wire	10,399	6,979	158	Japan 3,823; Republic of Korea 2,274; Taiwan 563.
Tubes, pipes, fittings	39,867	8,667	292	Japan 7,233; West Germany 467.
Castings and forgings, rough	4	--		
Lead:				
Oxides	85	47	34	Australia 13.
Metal including alloys:				
Scrap	341	--		
Unwrought	9,599	2,756	25	Australia 1,744; Japan 814; Taiwan 144.
Semimanufactures	158	246	10	Taiwan 162; Japan 27.
Magnesium: Metal including alloys, all forms	27	12	11	Switzerland 1.
Manganese:				
Ore and concentrate: Metallurgical-grade	3,981	3,438	--	Singapore 2,751; Japan 651.
Oxides	1,653	912	(2)	Japan 700; Australia 119; Netherlands 67.
Mercury ... 76-pound flasks	52	489	21	Japan 323; Netherlands 65; United Kingdom 50.
Molybdenum:				
Ore and concentrate	--	11	--	All from Canada.
Metal including alloys, all forms	30	20	14	United Kingdom 5.
Nickel: Metal including alloys:				
Unwrought	100	12	2	Canada 5; Japan 5.
Semimanufactures	46	33	2	Japan 11; Australia 7; West Germany 6.
Platinum-group metals: Metals including alloys, unwrought and partly wrought ... troy ounces	231	436,073	436,073	
Silver: Metal including alloys, unwrought and partly wrought ... do	27,182	20,336	19,423	United Kingdom 537; Singapore 360.
Tin:				
Oxides ... kilograms	100	300	100	Netherlands 200.
Metal including alloys, all forms	688	693	5	Indonesia 600; Singapore 45.
Titanium:				
Ore and concentrate	973	713	--	Australia 696.
Oxides	2,648	1,409	134	Australia 546; Japan 274; Hong Kong 134.
Tungsten: Metal including alloys, all forms	20	4	(2)	Belgium-Luxembourg 2.
Zinc:				
Oxides	726	659	103	Taiwan 322; Japan 78.
Blue powder	221	215	177	Australia 31; United Kingdom 6.
Metal including alloys:				
Scrap	50	1	--	All from Taiwan.
Unwrought	24,669	17,933	52	Japan 7,344; Australia 4,604; Canada 4,075.
Semimanufactures	r121	106	36	Japan 39; Australia 25.

See footnotes at end of table.

Table 3.—Philippines: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Zirconium: Ore and concentrate	107	241	--	Japan 223.
Other: Ashes and residues	54,532	63,238	18	Japan 63,202.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	771	653	36	China 263; Taiwan 152; Netherlands 94.
Artificial:				
Corundum	25	68	(2)	Austria 54; Japan 13.
Silicon carbide	176	89	26	Hong Kong 38; West Germany 18.
Dust and powder of precious and semiprecious stones including diamond kilograms	907	1	--	All from Belgium-Luxembourg.
Grinding and polishing wheels and stones	720	472	8	Japan 153; Taiwan 82; West Germany 57.
Asbestos, crude	2,385	1,663	372	Canada 1,106; Botswana 97.
Barite and witherite	341	44	26	Thailand 18.
Boron materials: Oxides and acids	991	359	133	France 132; Belgium-Luxembourg 57.
Cement	9,405	1,267	1,135	Singapore 92; Japan 38.
Clays, crude	24,917	18,447	6,488	Thailand 4,000; Japan 2,932.
Diamond: Industrial stones:				
Natural carats	33,117	150,867	4,500	Belgium-Luxembourg 116,800; Australia 22,645; Israel 6,922.
Synthetic do	95,845	3,500	--	Belgium-Luxembourg 2,000; Australia 1,500.
Diatomite and other infusorial earth	1,093	473	277	Japan 190.
Feldspar, fluorspar, related materials	2,474	2,667	282	Thailand 744; Japan 483; Taiwan 445.
Fertilizer materials: Manufactured:				
Ammonia	31,483	34,704	10,577	Indonesia 9,131; Qatar 6,000.
Nitrogenous	462,663	378,461	117,213	Republic of Korea 74,414; Japan 68,518.
Phosphatic	56,431	15,087	3,408	Republic of Korea 10,499; Israel 1,095.
Potassic	64,215	51,414	3,348	Canada 37,402; U.S.S.R. 5,454; West Germany 4,572.
Unspecified and mixed	122,155	141,975	2,998	Republic of Korea 133,808; Romania 4,891.
Graphite, natural	141	199	(2)	China 72; Japan 48; Republic of Korea 47.
Gypsum and plaster	79,488	71,866	109	Thailand 62,336; Japan 6,085; West Germany 3,285.
Lime	375	270	236	United Kingdom 34.
Magnesium compounds: Magnesite, crude and calcined	6,051	6,039	65	Japan 4,531; China 1,005; United Kingdom 295.
Mica, all forms	108	75	49	Japan 15.
Phosphates, crude	10,588	13,574	4,975	Jordan 8,500.
Pigments, mineral:				
Natural, crude	2,741	2,103	40	India 1,824; United Kingdom 194.
Iron oxides and hydroxides, processed	1,065	532	7	West Germany 435; Spain 52; Japan 20.
Precious and semiprecious stones other than diamond: Natural carats	47	--		
Salt and brine	109,633	65,420	149	Australia 60,205; West Germany 2,206; United Kingdom 1,011.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	94,880	104,643	70,145	Kenya 24,051; Japan 5,140.
Sulfate, manufactured	11,323	11,364	3	Taiwan 7,852; Japan 1,200; China 1,105.
Stone, sand and gravel	34,934	11,165	231	Australia 7,015; United Kingdom 2,107; Taiwan 638.
Sulfur:				
Elemental:				
Crude including native and byproduct	1,719	917	94	Singapore 486; Taiwan 116.
Colloidal, precipitated, sublimed	17,884	16,245	7,548	Japan 5,020; Singapore 3,117.
Dioxide	2	29	--	Japan 27.
Sulfuric acid	2,057	1,024	3	Japan 1,000.
Talc, steatite, soapstone, pyrophyllite	9,709	5,011	446	Republic of Korea 2,976; Hong Kong 447.
Other:				
Crude	862	589	35	Japan 248; Australia 200; Finland 85.
Slag and dross, not metal-bearing	182,792	75,474	1	India 53,161; Taiwan 16,421; Japan 5,878.

See footnotes at end of table.

Table 3.—Philippines: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	397	1	1	
Carbon black	1,136	9,116	9,021	West Germany 64; Japan 29.
Coal, all grades including briquets	70,687	504,825	5	Australia 404,025; Canada 46,535; U.S.S.R. 25,000.
Coke and semicoke	193,566	352,966	58,795	Japan 273,242; Republic of Korea 18,367.
Petroleum:				
Crude thousand 42-gallon barrels	59,716	52,570	--	Saudi Arabia 14,846; Kuwait 11,754; Malaysia 7,361.
Refinery products:				
Liquefied petroleum gas do.	816	262	--	Kuwait 188; Indonesia 74.
Gasoline do.	36	21	(2)	Australia 20.
Mineral jelly and wax do.	109	67	6	China 35; Hong Kong 17.
Distillate fuel oil do.	12,710	4,521	--	Kuwait 2,139; Singapore 385; Oman 336.
Lubricants do.	90	62	25	Netherlands Antilles 9; Singapore 8.
Residual fuel oil do.	15	20	--	All from Singapore.

[r]Revised.
[1]Table prepared by Audrey D. Wilkes.
[2]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Chromium.—Despite improvements in the world market prices of chromite ore, the output of metallurgical-grade chromite ore continued its downward trend. According to BOMG, the decline was caused by the reduced efficiency in mining operations and the mining of deeper ores by underground mine operators. However, the output of refractory-grade chromite ore reversed its downward trend to a higher level than that of 1984.

Production of metallurgical-grade chromite ore and concentrate was principally by Acoje Mining Co. Inc., which accounted for 74% of total metallurgical-grade chromite production, and by Malayan Wood Products Inc., which accounted for 15%. The remaining 11% came from six small producers, including Philchrome Mining Corp., Rio Chico Mining Corp., Chrome Ore Mineral Exponents Inc., Loyalty Mining and Development Corp., Trion International Inc., and Velore Mining Corp. Most small producers restarted production in mid-1984 because of rising chromite prices. Acoje produced 76,024 tons of metallurgical-grade chromite concentrate and direct-shipping lumpy ore compared with 93,781 tons in 1984. Malayan Wood produced 25,306 tons compared with 19,037 tons in 1984. Malayan Wood, which exported all of its metallurgical-grade chromite concentrate and lumpy ore to China and Japan, reportedly was expected to increase capacity of its washing plant in Loreto on Dinagat Island, Surigao del Norte, from 200 to 650 tons per day in the spring of 1986.[5]

Benguet Corp., which operated under a 25-year leasing agreement with Consolidated Mines Inc., remained the dominant producer of refractory-grade chromite, accounting for 88% of total refractory-grade chromite output. Production of refractory-grade chromite by Benguet from the Masinloc Mine in Zambales, Luzon, was mostly by underground methods. Benguet stopped surface mining in April because the remaining ore bodies were depleted. The output of refractory-grade chromite concentrate rose to 127,317 tons in 1985 from 115,256 tons in 1984, owing to adoption of a new underground mining method that doubled the recovery rate and reduced the work force by 50%.

According to Benguet, the proven ore reserves at the Masinloc Mine, as of January 1985, were estimated at 8.5 million tons, averaging 24.74% Cr_2O_3 and 6.07% SiO_2. However, most reserves were only suitable for underground mining.

Table 4.—Philippines: Reserves at Masinloc Mine of Benguet Corp.

Ore body	Reserves (metric tons)	C_2O_3 (per cent)	SiO_2 (per cent)
LWOB	4,183,196	28.98	4.98
815	1,728,130	19.91	8.14
1111	1,037,605	20.34	6.46
WOB	415,805	24.53	4.60
Harding	256,621	21.34	7.97
909	241,133	20.25	4.28
G Layer	107,834	19.61	7.84
Wood	105,748	17.27	10.96
CLL	99,789	24.78	7.06
EOB	78,871	20.75	6.79
587	72,066	19.60	7.51
Hayden	69,635	17.50	6.79
787	48,052	22.41	6.81
1124	33,043	21.26	7.18
Murphy	10,333	22.25	6.09
Total or average	8,487,861	24.74	6.07

By 1985, the ore bodies for surface mining—CLL, Hayden, Murphy, Wood, 587, 787, and 909—were substantially mined out. During the year, underground mining by the semimechanized underhand cut-and-fill method reportedly was successfully implemented by Benguet at ore bodies 815 and 1111. Other refractory-grade chromite producers were Philchrome Mining, Amerasia Mining and Development Corp., North Zambales Mining Co. Inc., and Astronite Mining Corp.

Because of increased demand by Japan, Sweden, and the United States for chromite ore and concentrate, and improvements in the world market prices in the second half of 1984, export earnings of Philippine chromite rose to $19 million in 1984 from $13 million in 1983. Exports of metallurgical-grade chromite ore and concentrate were mainly to Japan, while exports of refractory-grade chromite were principally to Japan, the Netherlands, Sweden, and the United States.

Copper.—The depressed copper prices on the world market and increased production costs continued to affect the financially troubled copper industry. Despite the resumption of Lepanto copper operations by Lepanto Consolidated Mining Co. Inc. in February, and the reopenings of the Copper Shield project by Benguet Exploration Inc. in March and the Sipalay copper operations by MMC in July, mine production of copper dropped further by 3.1% from that of 1984. The substantial drop in the output of copper by Atlas was the major factor for the overall decline in copper mine production. The reduction in output of copper by Atlas was a direct result of two cutbacks in production capacity of its Cebu copper operations during the second half of 1985.

According to the Chamber of Mines of the Philippines, production of copper, by company, during 1984-85, in tons of copper, was as follows:

Company	1984	1985
Atlas Consolidated Mining and Development Corp	118,069	91,535
Marcopper Mining Corp	32,733	33,148
Philex Mining Corp	20,891	24,482
Benguet Corp	23,447	23,957
North Davao Mining Corp	21,829	20,399
Lepanto Consolidated Mining Co. Inc.[1]	9,045	13,604
Maricalum Mining Corp.[2]	--	12,039
Batong Buhay Gold Mines Inc	7,510	5,369
Benguet Exploration Inc.[3]	102	1,624
Total	233,626	226,157

[1]Shutdown production in Sept. 1984; resumed production in Feb. 1985.

[2]Reopened the Sipalay copper mine, formerly owned and operated by Marinduque Mining and Industrial Corp., in July 1985.

[3]The 1984 copper production was from the Thanksgiving Mine as a byproduct, the 1985 production was from the Thanksgiving Mine and from the Copper Shield Mine, formerly owned and operated by Black Mountain Inc., which was reopened in Mar. 1985.

Atlas, the largest copper producer in the Philippines and Southeast Asia, operated two open pit mines—Biga Pit and Carmen Pit, an underground mine—under a Second Lift project of the Lutopan deposit, and three concentrators—DAS, Biga, and Carmen—with a combined milling capacity of 110,000 tons per day in the Toledo area of Midwestern Cebu. After completion of the conversion of its boiler from oil to coal, Atlas reportedly had reduced its production cost of copper by 8 cents per pound. However, because of the low copper prices, Atlas was forced to shut down its Carmen Pit and Biga concentrator, reducing milling capacity by 28% in July. To cut costs and improve its cash flow position, Atlas cut back a further 30% of capacity by closing its Biga Pit and DAS concentrator in October. As a result, the total milling capacity was reduced to 46,200 tons per day by yearend.[6] According to Atlas' 1984 annual report, the ore reserves as of January 1, 1985, at its Cebu copper operations were estimated at 874 million tons, of which 833 million tons are positive reserves, averaging 0.45% copper. At the current production of 37 million tons of ore per year, the ore reserves are estimated to last for another 23 years.

Lepanto Consolidated, which suspended its Lepanto copper operations in Benguet in September 1984 because of a declaration of force majeure by ASARCO Incorporated of the United States, resumed mining operations in February. Lepanto Consolidated processed its high-arsenic concentrate into calcine for shipment to PASAR.

Benguet Exploration, which acquired Black Mountain Inc. (BMI) in September 1983, rehabilitated BMI's mine at Tuba, Benguet, before reopening it as the Copper Shield Mine in March. The ore reserves at the mine were estimated at 49 million tons, of which 47 million tons are positive reserves, averaging 0.41% copper.

The Sipalay Mine on Negros Island, the country's second largest copper mine, had suspended operations since October 1983 but was reopened by MMC in July after an agreement was reached in May between MMC and Marubeni Corp. of Japan. According to the agreement, Marubeni was to extend a $15 million loan under concessionary terms without Government guarantees. MMC was to repay the loan by shipping 90% of its yearly copper concentrate production to Japan through Marubeni over a 5-year period, with Mitsui Mining & Smelting Co. Ltd. of Japan being a prime buyer. MMC was to sell the remaining 10% of its output to PASAR, the domestic copper smelter.

MMC, which took over the Sipalay Mine from Marinduque Mining and Industrial Corp. (MMIC) in August 1984, is owned by the State-owned Development Bank of the Philippines and the Philippines National Bank, which foreclosed MMIC in July 1984. The Sipalay Mine had an estimated positive ore reserve of 566 million tons, averaging 0.48% copper. The normal output of copper concentrate per year was estimated at 180,000 tons, or about 50,000 tons of copper metal. The first shipment of 5,800 tons of copper concentrate reportedly was delivered to Japan in late August.[7]

The disputes between Benguet, a major copper producer that operated the Dizon copper-gold project in Zambales, and the Ministry of Trade and Industry (MTI) were finally resolved in late October. The disputes concerned the PASAR smelter's capability of processing copper concentrates from the Dizon project having a high mercury content, and on export clearance for shipping all of Benguet's copper concentrate to Mitsubishi Metal Mining Co. Ltd. of Japan. In September, Benguet was granted an export clearance to ship 5,200 tons of copper concentrate to Japan and representative ore samples to the PASAR smelter from Benguet's Dizon operation. This was to be accomplished under an earlier ruling by the Supreme Court directing MTI to grant an export clearance to Benguet despite the unresolved disputes over the capability of the PASAR smelter. After independent tests jointly conducted by the National Pollution Control Commission and Lurgi GmbH of the Federal Republic of Germany showed that the PASAR smelter was capable of treating Benguet's concentrates by blending them with concentrates from other local mines, Benguet finally agreed to supply 2,188 tons of copper concentrate to PASAR.[8]

The copper smelter, owned and operated by PASAR at Isabel in Southern Leyte, secured 510,000 tons of copper concentrates from six copper producers including Atlas, Batong Buhay Gold Mines Inc., Lepanto Consolidated, Marcopper Mining Corp., North Davao Mining, and Philex Mining Corp. in late 1984. In 1985, it went through its second full year of operation without any interruption. The smelter produced 130,330 tons of refined copper compared with 99,371 tons in 1984. According to an industry source, PASAR posted a net income of P127 million (US$7.5 million) in 1984 from sales of 99,400 tons of copper cathodes, 16,000 kilograms of gold and silver doré, and 327,000 tons of sulfuric acid.[9]

According to the data provided by PASAR, operation results for the period May 1983 to May 1984 were as follows:

Product	Production
Copper electrolytic cathodes (99.99% Cu) metric tons	83,380
Doré metal (29% Au, 69% Ag):	
Gold troy ounces	44,118
Silver do	104,550
Gypsum metric tons	1,500
Iron tailings do	73,000
Selenium do	40
Slag, granulated do	143,000
Sulfuric acid (98.5% H_2SO_4) do	291,000

Of the refined copper produced in 1985, PASAR was to deliver about 56,000 tons to Japan under a contract signed with Japanese companies in late 1984, 33,000 tons were to be distributed in domestic markets, and the remainder was to be marketed by the Japanese partners, led by Marubeni, on the spot market using London Metal Exchange (LME) prices as a base for price quotation. PASAR's copper cathodes won approval by the LME for trading on the exchange beginning in February.

According to BOMG, PASAR reduced its smelting charges by 5.91 cents per pound in January. The new smelting charges represented a 23.1% cut from the 25.58 cents per pound charged earlier to local copper concentrate suppliers. According to the company officials, the new rate was designed to bring it more in line with those of Japanese smelters. As a result, the six copper concentrate producers reportedly agreed to deliver 25% more concentrates to the smelter than the volume committed in the contract executed in late 1984.[10]

The bidding for the construction of the $248 million copper fabrication plant adjacent to the PASAR smelter at Isabel in Leyte was postponed again in March pending finalization of the Government's loan agreements with the creditor banks.

Gold.—Despite the generally lower world prices of gold, the output of gold rose slightly in 1985 from that of 1984 to about the 1983 level. The higher level of output was attributable to improved mill recovery and mining of higher grade ore by Surigao Consolidated Mining Co. and Manila Mining Corp. as well as to increased production by Philex Mining and Lepanto Consolidated of copper concentrates from which gold was recovered as a byproduct. However, the Hijo gold project of North Davao Mining was suspended at the end of July owing to the increased maintenance and operating costs.

Of the total output of gold, 38% was produced by the primary gold producers, and the remaining 62% by the major copper producers who recover gold as byproduct of their copper operations. According to the Chamber of Mines, gold production of the top 11 companies during 1984-85 was as follows, in troy ounces of gold:

Company	1984	1985
Benguet Corp. (primary and byproduct)	258,624	241,915
Philex Mining Corp. (byproduct)	145,362	188,075
Atlas Consolidated Mining and Development Corp. (primary and byproduct)	189,532	160,002
Lepanto Consolidated Mining Co. Inc. (byproduct)	37,249	58,375
Surigao Consolidated Mining Co. (primary)	18,603	34,987
Apex Mining Corp. (primary)	37,606	33,436
Marcopper Mining Corp. (byproduct)	25,368	25,828
North Davao Mining Corp. (primary and byproduct)	30,535	21,250
Itogon-Suyoc Mines Inc. (primary)	12,612	13,452
Benguet Exploration Inc. (primary and byproduct)	12,851	13,209
Manila Mining Corp. (primary)	5,777	9,767
Other (byproduct)	14,647	9,439
Total	788,766	809,735

Other gold producers in 1985 were Batong Buhay (byproduct) and MMC (byproduct). Vulcan, a primary gold producer, terminated its Marian gold mining operation in August 1984 because of the depressed gold price and increased operating costs.

According to the Chamber of Mines and local press reports, a substantial quantity of gold had been extracted by an estimated 40,000 gold panners in isolated sites in Boringot and on the slopes of Mount Diwata in Monkayo, both in Davao del Norte of southern Mindanao. According to officials of the Monkayo Small-Scale Mining Association Inc., about 4 to 5 kilograms of gold per day was produced by these small panners and prospectors. In October, a total ban was imposed by the Government because of two landslides in the gold mining areas of Davao del Norte, which were caused by heavy rain and killed over 300 people. However, the ban was lifted in December after the panners complied with the Government safety requirements.[11]

In July, Benguet, the largest gold producer in the Philippines, successfully gained a 54% controlling interest in Itogon-Suyoc Mines Inc. through acquistion of an additional 1.17 billion shares of Itogon-Suyoc stock in the Manila Stock Exchange for $1.4 million. According to Benguet, the acquisition was made for the purpose of reducing production costs and restoring profitability for both mining companies. Under the plan, the ore produced by both companies would be milled at Benguet's Balato cyanidation plant, but Itogon-Suyoc would continue to operate as a separate company. In October, Benguet set a minimum production target of 10,000 ounces of gold per month with selective mining of higher grade ore from its Antamok, Acupan Atok, and Kelly gold mines in Benguet in an attempt to reduce its production costs. During the 1984-85 period, Benguet's primary gold production was about 9,000 ounces per month.

Nickel.—Mine production of nickel increased sharply owing to the resumption of the Surigao nickel operations by NMIC on Nonoc Island. Two nickel ore producers, Rio Tuba Nickel Mining Corp., and Hinatuan Mining Corp., also reported a higher output than that of 1984 because of increased mill recovery and good weather conditions during the first half of 1985.

The Surigao nickel mining and refining complex finished a full year of operations without interruption for the first time since 1981. Production of nickel and cobalt, contained in nickel briquets and nickel-cobalt mixed sulfide, was estimated at 16,700 tons and 930 tons, respectively. The average monthly output of nickel was about 1,400 tons as opposed to the planned output level of 2,000 tons. According to industry sources, NMIC needed to produce between 1,800 and 2,000 tons of nickel per month at a market price of $2.20 per pound to break even, otherwise cash flow problems might severely affect the company's financial situation in the coming years. In early 1985, NMIC signed a 2-year contract with China Coal Corp. to import 60,000 tons per month of coal rated at 12,000 British thermal units (Btu) from China for consumption by its Surigao nickel refinery. The purchase price was about $45 per ton.

In March, Philipp Brothers Inc. (Phibro) of the United States filed an $8.6 million lawsuit in the Philippines against the former and current owners and operators of the Surigao nickel complex for breach of contract. The defendants included MMIC, NMIC, the Development Bank of the Philippines, and the Philippines National Bank. Phibro claimed that the $8.6 million it advanced to MMIC to reopen and improve operations on its complex in February 1984 has never been repaid by the defendants through delivery of nickel for sales by Phibro. However, according to the press reports in late October, the Philippine courts have sided with NMIC's contentions that, as a new entity, it is not liable for MMIC's old debts. Phibro was expected to appeal, believing that commercial contracts similar to that of Phibro usually include a clause that binds successors such as NMIC to all provisions and terms of original contracts.[12] In March, MMIC's nickel briquets were delisted by the LME. Late in May, NMIC's nickel metal was approved by the LME for trading as good delivery nickel.

In August, Marc Rich & Co. A.G., the sole sales agent of NMIC, signed an agreement with Sumitomo Metal Mining Co. Ltd. of Japan for toll refining portions of the 1,000 tons per month of NMIC's nickel-cobalt mixed sulfides containing 12% cobalt. The shipments of nickel-cobalt mixed sulfides to Japan began in late August.

The output of nickel ore by Rio Tuba Nickel from Bataraza on Palawan Island was 364,780 tons compared with 352,250 tons in 1984. The output of nickel ore by Hinatuan Mining from Hinatuan Island near the northeastern tip of Mindanao Island was 119,032 tons compared with 89,203 tons in 1984. The beneficiated ore from both mines, averaging between 2.0% and 2.3% nickel with less than 30% moisture, was exported to Japan.

INDUSTRIAL MINERALS

Cement.—Production of cement in the Philippines dropped to below 4 million tons per year during 1984-85. The primary causes of this underutilization of the industry's 7.2-million-ton-per-year capacity were the lower domestic consumption owing to the slump in the construction sector and reduced exports because of low export prices and keen competition among the southeast Asian countries.

According to local press reports, the industry was considering shutting down some of its old cement plants to increase capacity utilization from 50% to 78% while continuing its coal conversion programs. By mid-1985, 17 out of 19 existing cement plants reportedly had completed the coal conversion. As a result of the coal conversion program, coal consumption by the cement industry more than doubled that of 1983 to over 800,000 tons, accounting for 50% of the country's coal consumption.[13]

Fertilizer Materials.—The phosphate fertilizer complex at Isabel in Southern Leyte became fully operational during the year. NPC of the Republic of Nauru, which owned 40% of Philphos, supplied most of the required phosphate rock for production of phosphatic acid. In an effort to use indigenous resources as part of the plant's raw material requirements, Philphos reportedly was undertaking an exploration and development program at Bantigue on Leyte Island. However, the phosphate rock from Bantigue required further beneficiation through a process developed by the International Fertilizer Development Center to remove the impurities of iron, magnesium, and dolomite. The construction of the beneficiation facilities has been planned by Philphos.

Vulcan reportedly commenced a small phosphate mining operation at its Guihulngan Mine in Negros Occidental. About 70% of the planned 1,000-ton-per-year output was expected to be used by Philphos, and 30% was to be used for animal feed.

In late 1984, Philphos established a subsidiary called Philippine Pyrite Corp. with technical assistance provided by Vulcan. Philippine Pyrite began its commercial operation in April. The output of pyrite concentrate rose from 16,000 to 21,000 tons per month by yearend. The pyrite concentrate was for consumption by Philphos' sulfuric acid plant. Other domestic suppliers of pyrite concentrate included Atlas and Benguet Exploration, which produced pyrite from their tailings of copper, gold, and lead operations. The sulfuric acid requirements of Philphos was also met in part by the nearby copper smelter operated by PASAR. The ammonia requirements of about 165,000 to 180,000 tons per year were expected to be imported mainly from Indonesia.

MINERAL FUELS

Coal.—Domestic coal production reached 1.3 million tons. About 55% was produced from the country's largest coal mining area on Semirara Island by Semirara Coal Corp. Four bucket wheel excavators and a 15-kilometer conveyor, supplied by Voest-Alpine AG of Austria, reportedly were in full operation. The open pit Unong Mine on the island reportedly reached its 1-million-ton capacity. Two other major coal mining areas were in Cebu and Zamboanga del Sur.

According to the National Coal Authority, domestic demand for coal was estimated at 2.9 million tons, of which about 1.6 million tons was met by imports of high-grade (12,000 Btu) coal, principally from Australia, Canada, China, and the U.S.S.R. The increased consumption of coal by the cement, utility, and mining industries was the major factor for an 81% increase in domestic demand for coal of over 1.6 million tons in 1984.

In an effort to increase domestic coal production, Montenegrin Mining Corp. had reportedly secured a $1 million grant from the United States to conduct the feasibility studies for development of an open pit coal mine near Lianga on the east coast of Mindanao. Dames & Moore Inc. of the United States was to undertake the studies on mine design for a 300,000-ton-per-year coal mine and its transport system.[14]

Petroleum.—The Philippine crude petroleum output dropped again to an estimated 2.9 million barrels from 3.9 million barrels in 1984. According to industry sources, the combined output of the three producing oilfields—Nido, Matinloc, and Cadlao—offshore Palawan averaged only about 7,918 barrels per day. To increase output of crude oil from the Nido Oilfield, cyclical production methods were carried out by Philippine Cities Service Inc. However, the increased yields reportedly were disappointing. The Nido Oilfield was expected to be depleted by 1986.

In January, Marathon Oil Co. of the United States, which acquired 30% interest in the Galoc Oilfield from Husky Oil Co. of Canada in October 1984, withdrew its partnership from the six company consortium for development of the Galoc Oilfield. As a result, the development work on the Galoc offshore Palawan was postponed.

In September, an exploration agreement was signed between the Philippines National Oil Co. and a consortium of Oriental Petroleum and Minerals Corp. of the Philippines and Hanbi Corp. of the Republic of Korea to conduct exploratory drilling on offshore Central Luzon. The consortium was expected to spend $5 million.[15]

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[1]Economist, Division of International Minerals.
[2]Chamber of Mines of the Philippines. CMP Newsletter. V. 10, No. 3, Mar. 1985, p. 1; v. 10, No. 7, July 1985, p. 1; v. 10, No. 9, Sept. 1985, p. 1.
[3]Where necessary, values have been converted from the Philippine peso (P) to U.S. dollars at the rate of P16.7 =US$1.00 in 1984, and P18.5=US$1.00 in 1985.
[4]Business Day (Manila). Jan. 28, 1986, p. 2.
[5]Chamber of Mines of the Philippines. CMP Newsletter. V. 10, No. 8, Aug. 1985, p. 3.
[6]———. CMP Newsletter. V. 10, No. 9, Sept. 1985, p. 1.
[7]Japan Metal Journal (Tokyo). V. 15, No. 9, Sept. 1985, p. 3.
[8]American Metal Market. V. 93, No. 204, Oct. 22, 1985, p. 2.
Metal Bulletin (London). No. 7025, Oct. 4, 1985, p. 8.
Mining Journal (London). Sept. 13, 1985, p. 220; Oct. 25, 1985, p. 329.
[9]Chamber of Mines of the Philippines. CMP Newsletter. V. 10, No. 3, Mar. 1985, p. 3.
[10]Metal Bulletin (London). No. 6949, Dec. 28, 1984, p. 11.
Engineering and Mining Journal. V. 186, No. 4, Apr. 1985, p. 86.
[11]Chamber of Mines of the Philippines. CMP Newsletter. V. 10, No. 10, Oct. 1985, p. 1; v. 10, No. 12, Dec. 1985, p. 1.
[12]American Metal Market. V. 93, No. 76, Apr. 19, 1985, p. 2; v. 93, No. 189, Oct. 1, 1985, p. 16; v. 93, No. 202, Oct. 18, 1985, p. 5.
[13]Business Day (Manila). July 1, 1985, p. 2.
[14]Mining Journal (London). May 17, 1985, p. 353.
[15]Petroleum News (Hong Kong). Jan. 1986, p. 62.

The Mineral Industry of Poland

By John R. Craynon[1]

Poland retained its status as a major producer of many mineral commodities during 1985. The country produced about 10% of the world's sulfur to rank fourth in total production. In addition, Poland contributed nearly 5% of world copper production, over 5% of the world's silver production, about 3% of the zinc and cadmium production, and 2% of the total lead and salt production. Poland's silver production accounted for over 50% of the European total. Poland was also a major world producer of bituminous coal and lignite.

The economy continued its climb out of a depression, although production and income levels in constant prices remained below those of 1979. Industry, which was Government-owned, increased marketed production by 3.8% compared with that of 1984. However, marketed production of the extractive industry decreased slightly. The production sold by sulfur and copper mines decreased, and there were slight decreases in sales of bituminous coal. Sales of lignite, raw chemicals, nonferrous ores except copper, mineral wastes, building stone, and petroleum increased. The iron and steel industry registered a decline in its work force of 3.4%, the largest of any industry. Employment also decreased in the building materials and chemicals industries. Work force increases were reported in the coal, energy, and nonferrous metals sectors.[2]

The discovery of petroleum in the Baltic Sea 80 kilometers off the Port of Leba, the opening of a rail heat-treatment plant at the Katowice steelworks, and the completion of a natural gas pipeline from the U.S.S.R. were the major mineral-related developments in 1985.

Government Policies and Programs.—The central economic plan for the year was reportedly fulfilled in most respects despite a slow first quarter caused by an unusually severe winter. However, production of cement, fertilizers, steel, and sulfur fell short

Table 1.—Poland: Planned and reported mineral and energy production

(Metric tons)

Commodity	Reported production 1979	5-year plan 1981-85	3-year plan 1983-85	Reported production 1985
NONFUELS				
Cement	19,176,000	21,000,000	17,500,000	15,000,000
Copper	335,800	500,000	385,000	387,000
Lead	84,200	100,000	81,000	87,300
Steel, rolled products	13,577,000	17,000,000	12,100,000	11,900,000
Sulfur, native	5,195,000	NA	5,000,000	4,876,000
Zinc	209,000	200,000	179,000	180,000
FUELS				
Coal:				
Bituminous	193,121,000	235,000,000	191,500,000	191,600,000
Lignite and brown	36,866,000	90,000,000	53,000,000	57,800,000

NA Not available.

of the planned targets. The year marked the end of the 3-year plan for 1983-85, which was devised after labor unrest and economic difficulties brought on by Poland's enormous foreign debt service rendered the 1981-85 5-year plan goals impossible to achieve. The amended plan called for growth of only 10% to 12% in national income over the 3-year period, compared with a 14% to 18% increase projected in the 5-year plan.

PRODUCTION

The output of most major mineral commodities remained below the level of 1979 production. The output of copper, lead, and lignite were notable exceptions. The major area of copper production remained in the Lubin-Glogow Basin of Lower Silesia. Four large mines were active, including one which was still being developed. Sulfur mining took place in the Tarnobrzeg area. Lead-zinc ores were mined near Katowice. The majority of bituminous coal mining took place in the Upper Silesian Basin. The volume of coal production was achieved in part by the continuation of mandatory Saturday work.

Table 2.—Poland: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984[p]	1985[e]
METALS					
Aluminum metal, primary	66,000	42,700	44,400	45,900	[3]47,000
Cadmium metal, primary	580	[r]570	[r] [e]570	[r] [e]570	600
Copper:					
Mine output, metal content, recoverable	[r]294,600	[r]376,000	402,300	431,000	431,000
Metal:					
Smelter, including secondary[e]	[3]330,770	351,000	362,000	375,000	390,000
Refined, including secondary	327,210	348,000	360,000	372,300	[3]387,000
Gold:[e]					
Mine output, metal content, recoverable thousand troy ounces	750	970	1,040	1,110	1,110
Metal, smelter[4] troy ounces	5,800	5,800	5,800	5,800	5,800
Iron and steel:					
Iron ore and concentrate, gross weight thousand tons	105	49	10	11	[3]11
Pig iron do.	9,350	8,523	9,716	9,981	[3]9,807
Ferroalloys:					
Blast furnace do.	[r]110	[r]91	88	94	83
Electric furnace do.	[r]147	[r]128	175	174	177
Steel:					
Crude do.	15,719	14,795	16,236	16,533	[3]16,126
Semimanufactures:					
Rolled excluding pipe do.	11,064	10,477	11,731	12,195	[3]11,845
Pipe do.	1,043	940	995	1,010	1,100
Lead:					
Mine output, metal content, recoverable	[r]44,200	[r]45,300	47,000	52,800	53,000
Metal, smelter	69,000	[r]89,800	81,000	83,400	[3]87,300
Nickel:[e]					
Mine output, metal content, recoverable	2,100	2,100	2,100	2,100	2,000
Metal, smelter	2,100	2,100	2,100	2,100	2,000
Silver, mine output, metal content, recoverable thousand troy ounces	20,576	21,123	21,798	23,920	[3]26,717
Zinc:					
Mine output, metal content	[r]201,500	183,500	189,000	190,700	187,000
Metal, refined, including secondary	167,100	165,400	170,300	176,000	[3]180,000
INDUSTRIAL MINERALS					
Barite	85,300	90,600	81,000	91,000	[3]91,000
Cement, hydraulic thousand tons	14,226	16,100	16,200	16,700	[3]15,000
Clays and clay products:					
Crude:					
Bentonite[e] do.	50	70	70	70	75
Fire clay do.	1,200	1,075	1,001	[e]1,000	1,000
Kaolin do.	43	46	49	[e]50	45
Products[e] do.	600	600	600	600	550
Feldspar[e] do.	82	80	80	80	80

See footnotes at end of table.

Table 2.—Poland: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984[p]	1985[e]
INDUSTRIAL MINERALS —Continued					
Gypsum and anhydrite, crude[5] thousand tons	1,311	1,300	[e]1,300	[e]1,300	1,350
Lime, hydrated and quicklime do.	4,179	4,061	4,121	4,251	4,100
Magnesite, crude	11,300	[r]17,000	16,100	21,000	[3]19,000
Nitrogen: N content of ammonia thousand tons	1,389	[r]1,380	1,425	1,494	[3]1,254
Salt:					
Rock do.	1,313	1,338	1,131	1,185	[3]1,198
Other do.	2,958	2,518	[e]2,500	3,526	[3]3,660
Sodium and potassium compounds, n.e.s.:					
Sodium carbonate (soda ash) do.	701	746	825	918	850
Caustic soda (96% NaOH) do.	417	378	408	395	400
Stone:					
Dolomite do.	3,070	2,804	2,996	3,227	[3]3,025
Limestone do.	50,000	NA	NA	NA	NA
Other do.	16,000	NA	NA	NA	NA
Sulfur:					
Native:					
Frasch[e] do.	4,295	4,428	4,460	4,500	[3]4,353
Other than Frasch[e] do.	478	492	500	[r]490	[3]523
Total do.	4,773	4,920	4,960	4,990	[3]4,876
Byproduct:[e]					
From metallurgy[6] do.	180	160	170	170	170
From petroleum do.	30	30	30	30	30
Total do.	210	190	200	200	200
From gypsum[e] do.	20	20	20	20	20
Total sulfur do.	[r]5,003	[r]5,130	5,180	5,210	5,096
MINERAL FUELS AND RELATED MATERIALS					
Coal:					
Bituminous do.	163,022	189,300	191,100	191,592	[3]191,642
Lignite and brown do.	35,600	37,600	42,500	50,400	[3]57,800
Total do.	198,622	226,900	233,600	241,992	[3]249,442
Coke:					
Coke oven do.	17,346	17,300	17,100	16,200	[3]16,000
Gashouse do.	573	600	[e]600	[e]600	620
Total do.	17,919	17,900	[e]17,700	[r] [e]16,800	16,620
Fuel briquets, all grades do.	1,511	1,575	[e]1,500	719	[3]1,017
Gas:					
Manufactured:					
Town gas million cubic feet	11,763	11,500	[e]11,500	[e]11,000	10,500
Coke oven gas[e] do.	[3]229,546	200,000	200,000	200,000	200,000
Natural, marketed do.	205,248	195,370	193,230	214,430	[3]225,024
Natural gas liquids:[e]					
Natural gasoline[e] thousand 42-gallon barrels	80	80	80	80	75
Propane and butane do.	53	53	53	53	50
Peat: Fuel and agricultural[e]	[3]201,645	200,000	200,000	200,000	200,000
Petroleum:					
Crude:					
As reported thousand tons	315	[r]241	[e]210	189	[3]194
Converted thousand 42-gallon barrels	2,337	1,780	1,558	1,401	1,439
Refinery products[7] do.	101,078	99,288	95,501	95,529	[3]98,469

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through July 30, 1986.
[2]In addition to the commodities listed, antimony, cobalt, germanium, a variety of crude nonmetallic construction materials, and carbon black are also produced, but available information is inadequate to make reliable estimates of output levels. Poland may also produce alumina in small quantities, but details of such an operation, if it exists, are not available.
[3]Reported figure.
[4]Based on official Polish estimates.
[5]Includes building gypsum, as well as an estimate for gypsum used in production of cement.
[6]Figures for metallurgy byproduct sulfur have been revised for the years 1977 to 1984. See "Sulfur" section of "Commodity Review" for years not covered in this table.
[7]Includes virtually all major products; excludes some minor products as well as refinery fuel and losses.

TRADE

Trade continued to be an important part of the economy of Poland. In terms of fixed prices, exports rose by 1.7% and imports by 6.8% compared with those of 1984. Exports of many minerals and mineral products declined. Total exports of all industrial goods to market economy countries fell by 3.8%. The trade surplus with these nations was reportedly $1.1 billion, far less than the planned $1.6 billion and the $1.5 billion recorded in 1984.

Trade in mineral commodities is a significant portion of the overall trade balance. Poland's exports of coal, copper, silver, and sulfur played an important role in the balance of trade with market economy countries. Exports of coal, sulfur, and perhaps gold to other Council for Mutual Economic Assistance countries helped reduce Poland's trade deficit with these nations.

Poland remained dependent upon the U.S.S.R. for its import requirements of chromite, iron ore, magnesite, manganese, natural gas, and petroleum. Much of the trade between Poland and the U.S.S.R. involved minerals and mineral products.

Table 3.—Poland: Apparent exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984^p	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS				
Aluminum:				
Ore and concentrate	--	115	--	All to Italy.
Oxides and hydroxides	805	82	--	Thailand 35; Pakistan 21; United Kingdom 20.
Ash and residue containing aluminum	1,655	1,226	--	All to West Germany.
Metal including alloys:				
Scrap	3,188	1,357	--	West Germany 1,104; Canada 155; Sweden 98.
Unwrought[2]	2,812	3,166	--	Czechoslovakia 2,563; Italy 603.
Semimanufactures	535	874	--	West Germany 662; Austria 104; Pakistan 74.
Chromium: Oxides and hydroxides[2]	1,422	1,422	--	Sweden 540; Switzerland 340; Finland 175.
Copper:				
Ore and concentrate	96,431	150,757	--	West Germany 137,600; Canada 12,543.
Matte and speiss including cement copper	5,366	NA		
Sulfate	986	2,246	--	Netherlands 1,056; West Germany 905; Austria 165.
Metal including alloys:				
Scrap	531	[2]9,577	--	West Germany 5,957; Japan 1,381.
Unwrought[2]	183,203	179,970	351	West Germany 77,964; United Kingdom 55,894; Belgium-Luxembourg 16,891.
Semimanufactures[2]	54,085	59,035	1,171	U.S.S.R. 14,271; Czechoslovakia 14,049; Yugoslavia 7,580.
Iron and steel: Metal:				
Scrap[2]	146,138	176,150	--	West Germany 122,638; Austria 15,648; Yugoslavia 15,502.
Pig iron, cast iron, related materials	13	NA		
Ferroalloys:				
Ferrochromium	452	698	--	Belgium-Luxembourg 576; West Germany 122.
Ferrosilicon	1,536	5,169	725	West Germany 1,810; Austria 991; Japan 908.
Unspecified	239	131	--	France 72; Belgium-Luxembourg 59.
Steel, primary forms	161,000	160,000	--	Malaysia 82,115; Yugoslavia 49,443; Belgium-Luxembourg 25,520.
Semimanufactures:				
Bars, rods, angles, shapes, sections --- thousand tons	1,385	1,383	45	West Germany 139; Hong Kong 39; undetermined 1,059.
Universals, plates, sheets do	450	409	47	U.S.S.R. 35; West Germany 32.
Hoop and strip do	156	136	(3)	Yugoslavia 46; Sweden 21; United Kingdom 7.
Rails and accessories do	111	132	--	Malaysia 8; West Germany 3; undetermined 110.
Wire do	34	37	(3)	West Germany 2; Yugoslavia 2; undetermined 29.

See footnotes at end of table.

Table 3.—Poland: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued				
Iron and steel: Metal —Continued				
Semimanufactures —Continued				
Tubes, pipes, fittings thousand tons	77	83	3	East Germany 15; West Germany 10; France 4.
Castings and forgings, rough do	11	4	--	Sweden 2; United Kingdom 2.
Lead: Ash and residue containing lead	540	NA		
Manganese: Ore and concentrate, metallurgical-grade	--	20,685	--	All to Japan.
Nickel: Metal including alloys, unwrought	65	NA		
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$58	NA		
Silver:				
Ore and concentrate[4] do	$41	NA		
Waste and sweepings[4] do	$128	$361	--	West Germany $181; Switzerland $176.
Metal including alloys, unwrought and partly wrought[2] thousand troy ounces	13,021	15,368	3,537	United Kingdom 6,334; West Germany 2,733.
Tin:				
Ore and concentrate[2]	--	16,360	--	Bulgaria 14,446; United Kingdom 1,913.
Ash and residue containing tin	36	NA		
Titanium: Oxides	--	103	52	Yugoslavia 46; Malaysia 5.
Zinc:				
Ore and concentrate	--	600	--	All to Yugoslavia.
Oxides	7	806	--	West Germany 800; Pakistan 6.
Metal including alloys:				
Scrap	100	NA		
Unwrought[2]	27,774	26,838	103	United Kingdom 14,336; Hungary 8,155; West Germany 1,164.
Semimanufactures[2]	4,607	3,671	32	Czechoslovakia 1,226; U.S.S.R. 1,189; West Germany 662.
Other:				
Oxides and hydroxides	--	3	--	All to Jamaica.
Ashes and residues	3,242	7,132	19	Austria 6,791; United Kingdom 316.
Base metals including alloys, all forms	1,188	1,123	--	All to Czechoslovakia.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	72	254	--	Yugoslavia 170; West Germany 74.
Artificial:				
Corundum	3,482	5,957	--	West Germany 3,620; Yugoslavia 1,289; Italy 405.
Silicon carbide	1,123	1,011	--	France 686; West Germany 195; Austria 74.
Grinding and polishing wheels and stones	281	148	NA	Yugoslavia 69; Thailand 20; Turkey 20.
Asbestos, crude	60	NA		
Cement[2]	615,851	761,878	--	Sweden 285,992; West Germany 162,149.
Clays, crude:				
Chamotte earth[2]	8,078	13,384	--	Yugoslavia 10,725; Hungary 1,194
Fire clay[2]	15,641	NA		
Unspecified	--	20,884	76	Hungary 19,788; Austria 997.
Diamond: Industrial stones value, thousands	$358	$165	--	All to Belgium-Luxembourg.
Diatomite and other infusorial earth	22	NA		
Fertilizer materials:				
Crude, n.e.s	--	20	--	All to West Germany.
Manufactured:				
Ammonia[2]	--	15,148	--	Switzerland 14,420; Hungary 728.
Nitrogenous[2]	100,942	339,959	--	West Germany 98,000; Switzerland 49,000; France 46,000.
Phosphatic	2,182	5,501	--	West Germany 5,471; Hungary 30.
Potassic	--	824	--	All to Yugoslavia.
Unspecified and mixed	4,245	21,925	--	Denmark 9,980; West Germany 9,236; Yugoslavia 2,004.
Gypsum and plaster[2]	38,472	66,163	--	Finland 32,493; Hungary 31,120.
Lime[2]	16,192	38,908	--	West Germany 38,907.

See footnotes at end of table.

Table 3.—Poland: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Destinations, 1984: United States	Destinations, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Magnesium compounds	--	1,299	--	West Germany 1,200; Belgium-Luxembourg 60.
Nitrates, crude	36	NA		
Precious and semiprecious stones other than diamond:				
Natural ----- value, thousands	$2	$3	--	All to Sweden.
Synthetic ----- do	$68	$198	--	All to Japan.
Salt and brine[2]	376,675	370,418	--	Finland 163,525; Sweden 133,417; United Kingdom 41,016.
Sodium compounds, n.e.s.:				
Carbonate, manufactured[2]	167,614	252,333	200	China 86,276; U.S.S.R. 63,708; Czechoslovakia 42,772.
Sulfate, manufactured	--	5	--	All to Trinidad and Tobago.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked[2]	13,253	14,956	--	Netherlands 5,610; West Germany 5,437; Belgium-Luxembourg 1,984.
Worked	13,769	8,391	--	West Germany 4,992; Belgium-Luxembourg 2,256; Denmark 683.
Dolomite, chiefly refractory-grade[2]	16,333	5,345	--	West Germany 5,044; Czechoslovakia 273.
Gravel and crushed rock	[2]254,758	162,491	--	All to West Germany.
Limestone other than dimension	9,237	9,440	--	Do.
Sand other than metal-bearing	99,046	51,316	--	Do.
Sulfur:				
Elemental:				
Crude including native and byproduct[2] --- thousand tons	4,034	4,078	--	U.S.S.R. 872; Czechoslovakia 473; Brazil 373.
Colloidal, precipitated, sublimed	6,808	7,894	--	Sweden 7,569; Malaysia 237; Pakistan 73.
Sulfuric acid	[2]105,915	23,828	--	Netherlands 19,627; Belgium-Luxembourg 4,201.
Other:				
Crude	3,947	5,439	--	West Germany 4,872; Austria 557.
Slag and dross, not metal-bearing	386	31,771	--	West Germany 31,705.
MINERAL FUELS AND RELATED MATERIALS				
Carbon black	2	3	--	All to Italy.
Coal:				
Anthracite and bituminous[2] thousand tons	35,148	42,918	99	U.S.S.R. 12,834; Denmark 3,310; Italy 2,573.
Briquets of anthracite and bituminous coal ----- do	16	54	--	Hungary 33; United Kingdom 12; France 9.
Lignite including briquets[2] -- do	200	--		
Coke and semicoke[2] ----- do	1,630	1,794	--	U.S.S.R. 787; Austria 220; Hungary 159.
Peat including briquets and litter	13,471	10,002	--	Austria 6,188; Italy 1,551; West Germany 1,132.
Petroleum:				
Crude_ thousand 42-gallon barrels	1,386	760	--	All to United Kingdom.
Refinery products:				
Liquefied petroleum gas do	31	4	--	West Germany 2; Austria 1.
Gasoline ----- do	105	58	--	West Germany 57; Austria 1.
Mineral jelly and wax -- do	27	28	--	Austria 20; Netherlands 7.
Kerosene and jet fuel --- do	11	17	--	Hungary 16.
Distillate fuel oil ----- do	1,402	1,503	--	West Germany 656; Netherlands 623; Denmark 99.
Lubricants ----- do	146	372	--	Austria 133; Sweden 68; West Germany 48.
Residual fuel oil ----- do	597	538	--	Austria 187; Sweden 168; West Germany 103.
Bitumen and other residues do	10	8	--	All to West Germany.
Petroleum coke ----- do	27	44	--	United Kingdom 43.
Unspecified[2] ----- do	8,175	706	--	NA.

[p]Preliminary. NA Not available.

[1]Table prepared by Jozef Plachy. Owing to a lack of official trade data published by Poland, this table should not be taken as a complete presentation of this country's mineral trade. Unless otherwise specified, these data have been compiled from United Nations information and data published by the partner trade countries.

[2]Official Trade Statistics of Poland.

[3]Less than 1/2 unit.

[4]May include other precious metals.

Table 4.—Poland: Apparent imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Sources, 1984	
			United States	Other (principal)
METALS				
Aluminum:[2]				
Ore and concentrate	34,400	31,011	--	Hungary 20,000; Australia 5,934; Belgium-Luxembourg 4,976.
Oxides and hydroxides	210,434	226,221	--	Hungary 123,136; West Germany 103,085.
Metal including alloys:				
Unwrought	83,465	91,484	--	U.S.S.R. 40,465; Romania 23,097; West Germany 13,281.
Semimanufactures	18,030	8,461	4	U.S.S.R. 2,845; Austria 2,224; Czechoslovakia 1,980.
Cadmium: Metal including alloys, all forms	10	NA		
Chromium:				
Ore and concentrate[2]	169,249	150,993	--	U.S.S.R. 129,313; Albania 10,028; Turkey 8,150.
Oxides and hydroxides	--	461	--	All from United Kingdom.
Cobalt:				
Ore and concentrate	24	6	--	Do.
Oxides and hydroxides	19	6	--	All from West Germany.
Columbium and tantalum: Metal including alloys, all forms, columbium (niobium)	([3])	21	--	Do.
Copper:				
Ore and concentrate	--	1	--	All from United Kingdom.
Oxides and hydroxides	60	40	--	All from West Germany.
Metal including alloys:				
Scrap	--	41	--	All from Sweden.
Unwrought	[4]1,000	[2]17,138	--	United Kingdom 11,058; U.S.S.R. 3,089; West Germany 2,750.
Semimanufactures[2]	968	944	--	United Kingdom 292; West Germany 248; U.S.S.R. 137.
Gold: Metal including alloys, unwrought and partly wrought troy ounces	320	2,216	--	West Germany 2,156; Switzerland 60.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite[2] thousand tons	13,787	17,110	--	U.S.S.R. 13,799; Brazil 2,446; Sweden 764.
Metal:				
Scrap do.	4	7	--	U.S.S.R. 4; Czechoslovakia 2.
Pig iron, cast iron, related materials do.	1,133	1,188	--	Mainly from U.S.S.R.
Ferroalloys:				
Ferrochromium	--	100	--	All from West Germany.
Ferromanganese	9,000	29,000	--	NA.
Ferromolybdenum	198	50	--	Netherlands 30; Sweden 20.
Silicon metal	34	625	--	West Germany 325; Norway 300.
Unspecified	31,802	23,225	--	NA.
Steel, primary forms thousand tons	166	19	--	Yugoslavia 17.
Semimanufactures:				
Bars, rods, angles, shapes, sections do.	317	363	--	Czechoslovakia 147; Hungary 20; undetermined 171.
Universals, plates, sheets do.	506	619	--	Czechoslovakia 120; West Germany 56; undetermined 278.
Hoop and strip do.	14	43	([3])	West Germany 4; Yugoslavia 3; undetermined 33.
Rails and accessories do.	9	8	NA	NA.
Wire do.	44	59	([3])	West Germany 4; Italy 2; undetermined 47.
Tubes, pipes, fittings do.	188	193	--	Romania 56; Czechoslovakia 25; East Germany 14.
Castings and forgings, rough do.	12	13	--	NA.
Lead:				
Ore and concentrate	643	614	--	West Germany 572.
Oxides	435	413	--	All from Netherlands.
Metal including alloys:				
Unwrought[2]	1,621	6,133	--	United Kingdom 4,195; West Germany 1,444; North Korea 494.
Semimanufactures	--	6	--	All from West Germany.
Magnesium: Metal including alloys, unwrought[2]	1,513	1,111	--	Belgium-Luxembourg 814; United Kingdom 277.
Manganese:				
Ore and concentrate, metallurgical-grade[2]	574,194	648,163	--	U.S.S.R. 539,012; France 89,156; Brazil 19,995.
Oxides	180	NA		
Metal including alloys, all forms	610	35	--	All from Netherlands.
Mercury 76-pound flasks	145	522	--	Do.

See footnotes at end of table.

Table 4.—Poland: Apparent imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Molybdenum: Metal including alloys, all forms	30	NA		
Nickel:				
Matte and speiss, metal content	294	300	--	All from Cuba.
Metal including alloys:				
Unwrought	23	21	--	United Kingdom 13; West Germany 8.
Semimanufactures	50	67	--	West Germany 50; Sweden 6; Italy 5.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$1,904	$3,229	--	West Germany $1,149; United Kingdom $1,007; Sweden $836.
Silver: Metal including alloys, unwrought and partly wrought do.	$903	$301	--	France $263; United Kingdom $26.
Tin:				
Oxides	6	NA		
Metal including alloys:				
Unwrought[2]	4,352	3,634	--	United Kingdom 3,593; Vietnam 40.
Semimanufactures	1	18	--	United Kingdom 17.
Titanium:				
Ore and concentrate[2]	--	34,666	--	All from Norway.
Oxides	745	1,378	--	United Kingdom 1,027; West Germany 321; France 15.
Metal including alloys, all forms	1	2	--	All from West Germany.
Tungsten:				
Ore and concentrate	30	--		
Metal including alloys, all forms	5	4	3	Netherlands 1.
Zinc:				
Oxides	45	NA		
Metal including alloys:				
Unwrought[2]	5,787	4,615	--	U.S.S.R. 3,420; North Korea 1,189.
Semimanufactures	--	24	--	Yugoslavia 20; France 4.
Zirconium: Ore and concentrate	330	4,029	--	West Germany 3,156; Netherlands 873.
Other:				
Ores and concentrates	24,515	674	--	Australia 653; Belgium-Luxembourg 20.
Oxides and hydroxides	243	1,481	--	Sweden 1,375; United Kingdom 82.
Ashes and residues	--	20	--	All from Austria.
Base metals including alloys, all forms[2]	2,497	13,455	--	U.S.S.R. 5,525; Romania 4,879; Sweden 1,545.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	757	350	--	Italy 349.
Artificial: Corundum	4,485	2,725	--	Yugoslavia 1,112; Hungary 869; Italy 340.
Dust and powder of precious and semiprecious stones including diamond value, thousands	$105	$541	$6	Switzerland $474; United Kingdom $61.
Grinding and polishing wheels and stones	1,436	1,453	--	Austria 630; Yugoslavia 486; West Germany 185.
Asbestos, crude[2]	71,260	69,361	--	U.S.S.R. 61,122; Canada 3,456; Italy 2,256.
Barite and witherite	[2]22,814	NA		
Boron materials:				
Crude natural borates	23,282	NA		
Oxides and acids	1,042	250	--	Italy 200; France 50.
Cement[2]	17,977	15,626	--	U.S.S.R. 15,623.
Chalk	25	1	--	All from United Kingdom.
Clays, crude:				
Bentonite	5,207	4,850	--	All from Hungary.
Chamotte earth[2]	13,120	256	--	West Germany 180; United Kingdom 59.
Fire clay	5,017	--		
Kaolin[2]	137,918	123,782	249	Czechoslovakia 78,731; U.S.S.R. 25,575; East Germany 9,984.
Diamond:				
Gem, not set or strung value, thousands	$19	$57	--	Belgium-Luxembourg $43; United Kingdom $14.
Industrial stones do.	$4,047	$2,297	--	Belgium-Luxembourg $1,638; Switzerland $477; West Germany $91.
Diatomite and other infusorial earth	1,331	254	48	Denmark 140; France 65.
Feldspar, fluorspar, related materials	18,126	15,264	--	Norway 7,899; France 7,340.
Fertilizer materials: Manufactured:[2]				
Ammonia thousand tons	88	72	--	All from U.S.S.R.
Nitrogenous do.	166	26	--	All from Romania.
Potassic do.	1,685	2,440	--	U.S.S.R. 1,772; East Germany 622.
Graphite, natural[2]	6,688	7,445	--	Austria 5,071; Czechoslovakia 1,500; Norway 237.
Gypsum and plaster	4,973	5,457	103	West Germany 5,334; Netherlands 15.

See footnotes at end of table.

Table 4.—Poland: Apparent imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Iodine	--	27	--	All from Japan.
Kyanite and related materials	--	17	--	Do.
Lime	--	28,506	--	Romania 28,484.
Magnesium compounds[2]	243,021	222,513	--	North Korea 69,088; Czechoslovakia 64,232; Brazil 56,473.
Mica:				
Crude including splittings and waste[2]	779	1,750	--	India 1,650; France 100.
Worked including agglomerated splittings	21	25	--	Austria 12; Switzerland 7; United Kingdom 5.
Phosphates, crude[2] thousand tons	3,176	2,965	857	Morocco 1,061; U.S.S.R. 627.
Phosphorus, elemental	13,319	12,072	--	All from U.S.S.R.
Pigments, mineral: Iron oxides and hydroxides, processed	1,057	705	--	West Germany 696; Netherlands 9.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$97	$55	$54	Switzerland $1.
Synthetic do	$32	$19	--	Austria $10; Switzerland $5.
Salt and brine	6	--		
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	2,245	4,519	--	Albania 2,281; Hungary 1,552; Bulgaria 686.
Worked	105	136	--	Italy 121; Austria 9.
Dolomite, chiefly refractory-grade[2]	11,723	14,062	--	Hungary 10,139; United Kingdom 3,923.
Gravel and crushed rock[2]	13,465	9,944	--	Norway 7,163; Finland 2,295; Czechoslovakia 460.
Limestone other than dimension	71	100	--	All from West Germany.
Quartz and quartzite	2,827	3,028	--	West Germany 2,675; Sweden 353.
Sand other than metal-bearing	50	54	--	Italy 50; United Kingdom 4.
Sulfur:				
Elemental:				
Crude including native and byproduct	81	12	--	All from West Germany.
Colloidal, precipitated, sublimed	--	5	--	All from France.
Sulfuric acid	--	6	--	All from Netherlands.
Talc, steatite, soapstone, pyrophyllite[2]	16,662	25,646	--	Austria 8,587; North Korea 7,284; Czechoslovakia 7,080.
Other: Crude	12,827	10,247	--	Hungary 10,214; West Germany 23.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	70	52	--	All from West Germany.
Carbon black[2]	19,699	31,248	--	Romania 10,286; West Germany 10,158; Sweden 5,018.
Coal:[2]				
Anthracite thousand tons	21	--		
Bituminous do	1,042	1,031	--	U.S.S.R. 735.
Gas, natural: Gaseous[2] million cubic feet	212,134	212,418	--	All from U.S.S.R.
Peat including briquets and litter	53	77	--	All from Sweden.
Petroleum:[2]				
Crude thousand 42-gallon barrels	103,711	100,077	--	U.S.S.R. 95,175; Iran 3,014; Algeria 904.
Refinery products do	25,685	24,841	(3)	U.S.S.R. 16,536; East Germany 1,047; Romania 505.

[p]Preliminary. NA Not available.
[1]Table prepared by Jozef Plachy. Owing to a lack of official trade data published by Poland, this table should not be taken as a complete presentation of this country's mineral trade. Unless otherwise specified, these data have been compiled from United Nations information and data published by the partner trade countries.
[2]Official Trade Statistics of Poland.
[3]Less than 1/2 unit.
[4]World Metal Statistics, World Bureau of Metal Statistics, London, United Kingdom.

COMMODITY REVIEW

METALS

Copper.—Extensive reviews of Poland's copper mining and processing industry have been recently published.[3] These reports give significant detail regarding the methods and technology being used.

Poland's copper ore production came from the area between Legnica and Glogow in southwestern Poland. This deposit, with four large underground mines, Lubin, Polkowice, Rudna, and Sieroszowice, has been mined for 25 years with an increase in capacity each year. Production growth has been based on the development of these adjacent mines using highly mechanized room-and-pillar mining at depths of 600 to 1,100 meters. The mines were being worked in gently dipping sedimentary formations in which economic mineralization covers an area of 15 by 35 kilometers and ore extends to depths greater than 1,500 meters. Mining was being conducted at depths of less than 1,100 meters in 1985.

Concentrates from the mines were being shipped to the metallurgical center at Glogow to be processed in one of two smelting and refining complexes. The Glogow I smelter, which began operation in 1971, employed twin shaft furnaces to produce 60% to 65% copper matte. This matte was converted to copper blister in five Hoboken siphon converters. Concentrates from all the mines were blended to give a feed containing an average of 22% copper for the shaft furnaces. The facility produced 190,000 tons of blister copper and 150,000 tons of electrolytic copper in 1985.

The Glogow II plant came on-stream in 1978 utilizing a modified Outokumpu flash smelting process. The smelter's primary feed was Rudna Mine concentrate, which contained an average of 28% copper. About 70% of this copper was smelted directly to blister in the flash furnace. Output was 103,000 tons of blister copper and 130,000 tons of cathode during 1985.

Each of these smelters used its own electrolytic refinery with a capacity of 175,000 tons per year. The technology employed in the refineries differs owing to the 7 years between the startup of the two installations.

Gold.—Although official Polish sources have not reported the output of gold from mines or smelters, substantial evidence exists indicating gold occurs in important quantities as a constituent of both copper and lead-zinc ores. The content of these ores is such that gold could be economically recovered using readily available technology. In addition, several occurrences of disseminated gold are known to exist near the Czechoslovak border. No sales of Polish gold have been reported in market economy countries, however. The total output of Polish gold in 1985 was reported elsewhere as being as little as 6,500 troy ounces.[4] This small amount is unlikely given the gold content of copper concentrate previously reported in the Polish press. The estimates listed in table 2 reflect the estimated recoverable gold content of copper and lead-zinc concentrates as well as a small allowance for the mining or recovery of other gold-bearing materials.

Iron and Steel.—Poland's ferrous metals industry was almost entirely dependent on iron ore imports in 1985. Domestic iron ore production has come to a near standstill in the past 3 years owing to the low quality of reserves. These reserves, situated in the Czestochowa, Starachowice, and Leczyca regions, amounted to nearly 700 million tons. Details regarding another deposit discovered several years ago in the Surwalki region were released in 1985. The reserves were estimated to be nearly 900 million tons containing 27% iron and significant quantities of copper, nickel, titanium, and vanadium. The 2,000-meter depth of the deposit was considered a major obstacle to production, forecast in 1985 to begin in the 1990's.

Equipment tests were completed at yearend at the new rail heat-treatment plant at the Katowice steelworks in Ruda Slaska. Production of rails began on November 30. As a result of the difficulties in the Polish economy, construction had been halted in 1980. Construction was restarted in 1984 with aid and financing from the U.S.S.R. It was planned that the facility will process 250,000 tons of rails per year.

Construction continued in 1985 on new coking batteries at the Katowice works. The work on these batteries was also resumed in the spring of 1984 with Soviet assistance. The first two of the four batteries were scheduled to come on-line in the fourth quarter of 1986, with the other two planned for production in late 1987. The four production lines, based on the Soviet "dry-extinguishing" technology, will reportedly have a capacity of 1.5 million tons per year.

Work reportedly resumed on the construction of a third 3,200-cubic-meter blast furnace, also at the Katowice facility. Commissioning was planned for late 1986.

During 1985, 28 iron and steel enterprises were operating in Poland. These operations employed about 146,000 persons and used 69 open-hearth furnaces, 57 arc furnaces, 19 blast furnaces, 13 induction furnaces, and 5 oxygen-converter furnaces during the year.

INDUSTRIAL MINERALS

Construction Materials.—The output of the Bielinek aggregate quarry, one of the largest in Poland, continued to dwindle in 1985. The quarry, about 160 kilometers northeast of Warsaw, had supplied 10,000 tons per day of aggregate to the construction industry until recently. Production in 1986 was expected to decline to 3,000 to 4,000 tons daily. Efforts were being made to develop new sources of this important raw material. Much investigation centered on extraction from the Slupsk sandbank on the Baltic seabed near Ustka, 100 kilometers northwest of Gdansk.

Sulfur.—Construction began in late October on a new opencast sulfur mine near Osiek in Tarnobrzeg Voivodship. The mine, which will be a branch of the Siarkopol Mine at Grzybow, will reportedly produce over 1.3 million tons of sulfur annually. The hot water to melt the sulfur will come from the nearby Polaniec powerplant. Reportedly, the mine will go into production in late 1988 and will employ about 1,500 people. The new mine is in the same area as all the other major sulfur mines. Mining has been conducted in the region since 1980.

Sulfur was also generated in Poland as a byproduct of metallurgy. The Glogow I and II copper smelters were the major sources of byproduct sulfur recovered as sulfuric acid. Based on information regarding the output and capacities of these facilities, the estimates for metallurgical byproduct sulfur production previously published in the "Minerals Yearbook" for the years 1977-84 have been revised as follows, in thousand tons:

1977	235
1978	225
1979	210
1980	205

Figures for 1981-85 are in table 2.

MINERAL FUELS

Coal.—Coal mining remained extremely important in the economy of Poland. Poland remained the third leading exporter of coal in the world, and after the declines of 1980-82, continued to regain its share of the world and European markets. Plans were made to slow the growth in domestic use of energy, especially coal, so that coal exports can remain at the current level.

Accidents at Polish hard coal mines claimed over 30 lives in 1985. A methane explosion at the Walbrzych Colliery in December accounted for 18 of those fatalities.

Natural Gas.—Poland's production of natural gas was sufficient to supply 50% of domestic demand in 1985. The remainder of the requirements were supplied by the U.S.S.R. The supply of Soviet gas was enhanced at yearend by the completion of the 269-kilometer pipeline from Kobryn to Warsaw. Reportedly, 70 billion cubic feet of natural gas will be supplied via this pipeline in 1986. The 700-millimeter-diameter line, which opened on December 13, reportedly has a capacity of 175 billion cubic feet per day.

Petroleum.—The Petrobaltic joint enterprise of the German Democratic Republic, Poland, and the U.S.S.R. discovered petroleum in the Baltic Sea approximately 80 kilometers from the Polish Port of Leba. The oil was reportedly of high quality and relatively sulfur-free. Recoverable reserves were estimated at 52 million barrels. Polish official sources estimated the total recoverable reserves in Poland as 750 million barrels. This represents seven times the Polish annual imports of 103 million barrels, 93 million barrels of which came from the U.S.S.R.

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[1]Physical scientist, Division of International Minerals.

[2]Rzeczpospolita (Warsaw). Feb. 4, 1986.

[3]Kennedy, A. Poland's Copper Industry. Min. Mag. (London), Aug. 1985, pp. 105-111.

White, L. Polish Copper. Eng. and Min. J., v. 187, No. 2, Feb. 1986, pp. 26-30.

White, L. Poland's Copper Metallurgical Center at Glogow. Eng. and Min. J., v. 187, No. 4, Apr. 1986, pp. 38-41.

[4]Mining Magazine (London). Poland. Mining Annual Review, June 1986, p. 466.

The Mineral Industry of Portugal

By Roman V. Sondermayer[1]

Modest by world standards, the mineral industry of Portugal had an uneventful year during 1985. Except for tungsten and ferroalloy production, production of all minerals and related commodities was of domestic significance only. Mineral industry employment, including processing, ranged between 40,000 and 50,000 persons. Major events included efforts of the Government to develop complex sulfide ores in southern Portugal; modernization of two steel plants; change of ownership of Sociedade Mineira de Neves-Corvo S.A.R.L. (Somincor); closure of Borralha tungsten mine; and preparations for admission of Portugal into the European Economic Community effective January 1, 1986.

PRODUCTION

Both private and Government-owned companies operated the mineral industry of the country, but most of the large and important companies were Government-owned or controlled. Private ownership was predominant in the small companies, which mostly produced industrial minerals. Cimentos de Portugal E.P. remained the largest producer of cement. Empresa Carbonifera do Douro S.A.R.L. produced coal. Somincor was developing a copper mine. Sociedade Anglo-Portuguesa de Diatomita Lda. produced diatomite. Piritas Alentejanas S.A.R.L. was the largest producer of pyrite. Siderurgia Nacional S.A.R.L. produced iron and steel. Beralt Tin & Wolfram Ltd. was the largest tungsten producer. Quimica de Portugal E.P. (Quimigal) produced zinc and planned to construct a copper smelter. Mining activities for tungsten were seriously affected by falling tungsten prices.

Table 1.—Portugal: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984[p]	1985[e]
METALS					
Arsenic, white[e]	257	200	180	180	170
Beryl concentrate, gross weight	[r]18	12	3	10	10
Columbite and tantalite concentrates, gross weight	12	6	[e]3	3	--
Copper:					
Ore and concentrate:[e]					
Gross weight	2,437	2,002	[2]1,735	1,654	1,180
Metal content	[r]555	[2]411	[3]375	[3]357	[3]255
Metal:					
Smelter, primary and secondary[e]	3,200	1,500	6,000	[r]3,500	5,000
Refined, primary and secondary	4,800	4,600	[e]4,600	[e]4,600	4,500
Gold, mine output, metal content troy ounces	10,931	6,783	9,603	[e]9,100	9,000
Iron and steel:					
Iron ore and concentrate:					
Gross weight:					
Hematite and magnetite	46	--	--	--	--
Manganiferous	37,050	27,100	35,500	[e]36,000	26,000
Total	[r]37,096	27,100	35,500	[e]36,000	26,000
Iron content:					
Hematite and magnetite	10	--	--	--	--
Manganiferous	13,000	9,214	[e]11,000	[e]13,000	12,000
Total	[r]13,010	9,214	[e]11,000	[e]13,000	12,000
Metal:					
Pig iron thousand tons	410	215	355	373	414
Ferroalloys:					
Ferromanganese[e]	65,000	27,100	33,800	30,000	29,000
Silicomanganese[e]	18,000	16,000	16,000	15,000	14,000
Ferrosilicon[e]	24,000	21,000	22,000	20,000	19,000
Silicon metal[e]	32,000	32,000	32,000	30,000	20,000
Ferrotungsten	[e]200	212	177	[e]200	200
Total[e]	139,200	96,312	103,977	[e]95,200	82,200
Steel, crude thousand tons	551	504	666	687	663
Lead: Refined, secondary	5,300	4,000	6,000	6,000	6,000
Silver, mine output, metal content troy ounces	38,580	23,532	32,400	28,722	30,000
Tin:					
Mine output, metal content	506	410	347	[e]350	360
Metal, primary and secondary	900	400	200	[e]180	200
Titanium concentrates:					
Gross weight	[r]400	[r]585	270	164	144
Content of TiO_2	200	292	135	[4]82	[4]72
Tungsten, mine output, metal content	1,395	1,358	1,183	1,493	1,500
Uranium concentrate: U content	120	130	[e]120	[e]110	110
Zinc: Smelter, primary	4,600	4,200	3,800	6,400	6,000
INDUSTRIAL MINERALS					
Barite	1,350	1,300	944	[e]350	300
Cement, hydraulic thousand tons	5,697	5,800	6,062	5,539	6,000
Clays:					
Kaolin	52,846	50,716	57,275	87,225	92,192
Refractory	259,852	[e]250,000	223,082	[r] [e]230,000	240,000
Diatomite	2,690	1,770	1,870	[r] [e]1,600	1,600
Feldspar	44,007	41,327	33,509	[e]40,000	35,000
Gypsum and anhydrite	243,537	237,364	249,032	[e]240,000	250,000
Lime, hydrated and quicklime thousand tons	260	[e]250	[e]230	[e]200	210
Lithium minerals: Lepidolite	[e]900	905	545	600	650
Nitrogen: N content of ammonia thousand tons	133	[e]132	[e]135	[e]140	140
Pyrites and pyrrhotite (including cuprous), gross weight do	287	[e]290	281	334	350
Salt:					
Rock do	408	406	423	455	463
Marine do	120	[e]100	[e]110	[e]110	115
Total do	528	[e]506	[e]533	[e]565	[e]578
Sand do	5,430	4,376	4,249	NA	NA
Sodium compounds, n.e.s.:					
Sodium carbonate[e]	170,000	170,000	160,000	150,000	150,000
Sodium sulfate	57,759	[e]57,000	[e]56,000	[e]50,000	50,000

See footnotes at end of table.

Table 1.—Portugal: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984[p]	1985[e]
INDUSTRIAL MINERALS —Continued					
Stone:					
Basalt thousand tons	124	171	148	NA	NA
Calcareous:					
Dolomite do	98	108	108	NA	NA
Limestone, marl, calcite do	12,598	13,447	8,067	NA	NA
Marble do	383	403	414	NA	NA
Diorite do	53	265	265	NA	NA
Gabbro do	73	139	139	NA	NA
Granite do	5,966	5,585	5,215	NA	NA
Graywacke do	12	13	13	NA	NA
Ophite do	35	72	56	NA	NA
Quartz do	116	120	129	NA	NA
Quartzite do	587	611	435	NA	NA
Schist do	131	208	210	NA	NA
Slate do	NA	42	35	NA	NA
Syenite do	4	4	6	NA	NA
Sulfur:					
Content of pyrites do	[e]135	116	124	140	145
Byproduct, all sources do	2	2	5	4	5
Total do	137	118	129	144	150
Talc	[r]3,572	4,940	5,459	6,822	[2]3,607
MINERAL FUELS AND RELATED MATERIALS					
Coal, anthracite thousand tons	184	179	185	195	237
Coke, metallurgical do	173	159	[e]160	[e]170	170
Gas, manufactured million cubic feet	4,780	4,907	5,135	NA	NA
Petroleum refinery products:					
Gasoline thousand 42-gallon barrels	9,656	7,965	7,360	6,794	6,800
Jet fuel do	4,424	3,408	3,688	4,416	4,400
Kerosene do	534	395	271	240	250
Distillate fuel oil do	15,285	13,800	16,113	13,875	13,900
Residual fuel oil do	22,910	23,596	22,837	20,579	20,600
Liquefied petroleum gas do	3,132	2,830	3,016	2,496	2,500
Unspecified do	[r]3,855	[r]6,795	6,161	6,447	6,400
Refinery fuel and losses do	759	410	413	3,983	3,900
Total do	60,555	59,199	59,859	58,830	58,750

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through June 9, 1986.
[2]Reported figure.
[3]Calculated from gross weight at 21.6% Cu.
[4]Calculated from gross weight at 50% TiO_2.

TRADE

The trade balance of Portugal in minerals was negative during 1984, the latest year for which complete data were available. The value of mineral imports, about $2.8 billion, accounted for about 36% of the country's total imports. The value of crude petroleum and petroleum refinery products topped the list of imported mineral commodities, with 96% of the total, and 28% of total imports. Exports of minerals, valued at about $468 million, were approximately 9% of the country's total exports. Petroleum refinery products accounted for about 3% of the country's total exports and close to 38% of total minerals exports. Iron and steel products followed with 2.2% of the country's exports and 24% of the country's exports of minerals. Exports of cement and stone were below 1% of total exports; nevertheless, their share in the value of exports of minerals was approximately 8% each.

Table 2.—Portugal: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS				
Aluminum: Metal including alloys:				
Scrap	6,920	5,158	--	Spain 2,313; Netherlands 2,091; West Germany 482.
Unwrought	338	775	--	Spain 550; France 100; Angola 60.
Semimanufactures	5,692	1,219	505	Syria 500; Belgium-Luxembourg 196.
Beryllium: Metal including alloys, all forms	--	30	30	
Columbium and tantalum: Ore and concentrate	8	10	--	All to Netherlands.
Copper:				
Ore and concentrate	2,990	1,352	--	All to Sweden.
Matte and speiss including cement copper	399	252	--	All to Spain.
Sulfate	(2)	425	--	France 300; Egypt 100; Netherlands 25.
Metal including alloys:				
Scrap	1,001	855	--	Sweden 725; Netherlands 90; Turkey 40.
Unwrought	1,171	3,927	--	Belgium-Luxembourg 3,665; Spain 253.
Semimanufactures	1,744	1,788	503	Spain 286; Switzerland 203.
Iron and steel:				
Iron ore and concentrate: Pyrite, roasted	--	2,000	--	All to West Germany.
Metal:				
Scrap	9,710	9,526	19	Spain 5,347; Netherlands 3,756; West Germany 95.
Pig iron, cast iron, related materials	1,229	257	--	Morocco 200; Netherlands 29; Spain 24.
Ferroalloys:				
Ferromanganese	9,793	46,073	20,550	France 11,850; Italy 5,990.
Ferrosilicochromium	90	--		
Ferrosilicomanganese	59,820	38,512	3,250	West Germany 19,200; Greece 5,900; United Kingdom 3,750.
Ferrosilicon	18,950	6,177	--	West Germany 4,657; Japan 750; United Kingdom 360.
Unspecified	r1,228	193	90	Netherlands 48; Japan 40.
Steel, primary forms	11,399	3,815	--	Belgium-Luxembourg 2,286; Italy 998; West Germany 519.
Semimanufactures:				
Bars, rods, angles, shapes, sections	91,312	127,976	11,940	West Germany 45,912; Belgium-Luxembourg 31,000; United Kingdom 21,260.
Universals, plates, sheets	54,739	85,853	34,967	Romania 11,079; Italy 10,149.
Hoop and strip	823	147	--	Angola 78; West Germany 42; United Kingdom 16.
Rails and accessories	82	30	--	Guinea-Bissau 22; Zaire 5.
Wire	852	3,117	--	Algeria 1,470; Libya 750; Angola 347.
Tubes, pipes, fittings	5,976	6,330	8	West Germany 1,383; Spain 983; France 918.
Castings and forgings, rough	3,642	8,656	1,020	United Kingdom 3,136; Sweden 1,450; Belgium-Luxembourg 697.
Lead:				
Ore and concentrate	1,049	1,048	--	All to Belgium-Luxembourg.
Metal including alloys:				
Unwrought	44	9	--	Mainly to United Kingdom.
Semimanufactures	5	29	--	Angola 15; Morocco 9; Spain 4.
Magnesium: Metal including alloys, scrap	--	8	--	All to Netherlands.
Manganese: Ore and concentrate, metallurgical-grade	4,625	--		
Nickel: Metal including alloys:				
Scrap	13	14	--	All to United Kingdom.
Semimanfactures	7	10	--	United Kingdom 8; Mozambique 1.
Platinum-group metals: Metals including alloys, unwrought and partly wrought troy ounces	1,144	6,150	--	United Kingdom 5,330; France 731; Switzerland 83.
Selenium, elemental	--	1	--	All to United Kingdom.
Silver:				
Waste and sweepings value, thousands	$10	$25	--	All to West Germany.
Metal including alloys, unwrought and partly wrought troy ounces	56,500	2,200	NA	Mozambique 643; Angola 514.
Tin: Metal including alloys:				
Scrap	43	14	--	All to United Kingdom.
Unwrought	--	3	--	All to Angola.
Semimanufactures	1	8	--	Angola 5; Central African Republic 2.
Titanium: Oxides	--	20	--	All to Cape Verde.
Tungsten:				
Ore and concentrate	1,669	2,486	1,015	Japan 636; United Kingdom 294.
Metal including alloys, all forms	3	5	--	All to West Germany.

See footnotes at end of table.

Table 2.—Portugal: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued				
Zinc:				
Oxides	1,449	1,200	--	Italy 711; Netherlands 200; France 112.
Metal including alloys:				
Scrap	--	100	--	All to Netherlands.
Semimanufactures	14	63	--	Guinea-Bissau 36; Mozambique 18; Angola 4.
Zirconium: Ore and concentrate	--	3	--	All to Angola.
Other:				
Ashes and residues	997	2,967	75	Belgium-Luxembourg 2,127; Netherlands 472; United Kingdom 152.
Base metals including alloys, all forms	57	160	--	West Germany 53; United Kingdom 44; France 38.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	1	2	--	Mainly to Guinea-Bissau.
Artificial: Corundum	24	60	--	All to Spain.
Grinding and polishing wheels and stones	91	80	9	Mozambique 38; Spain 19; Angola 9.
Boron materials: Crude natural borates	65	28	--	United Kingdom 18; Netherlands 10.
Cement	2,640	19,948	--	Cape Verde 10,107; Guinea-Bissau 5,641; Algeria 2,150.
Chalk	64	109	--	Cape Verde 58; São Tomé and Principe 50.
Clays, crude:				
Bentonite	--	21	--	Angola 20.
Kaolin	508	517	1	Spain 502.
Unspecified	83	27	1	Spain 20.
Diamond: Gem, not set or strung carats	65,539	60,489	787	Switzerland 5,934; Belgium-Luxembourg 361.
Diatomite and other infusorial earth	25	18	--	Venezuela 10; Guinea 8.
Feldspar, fluorspar, related materials	4,522	1,297	--	West Germany 1,240; United Kingdom 57.
Fertilizer materials: Manufactured:				
Ammonia	50	4,072	--	Spain 4,053; Angola 15.
Nitrogenous	88,520	78,626	--	West Germany 66,780; Italy 6,278; Netherlands 2,750.
Phosphatic	25,998	76,885	--	Nigeria 38,000; United Kingdom 18,061; Ireland 6,720.
Potassic	--	2	--	All to Angola.
Unspecified and mixed	67,518	35,362	--	Angola 11,039; Saudi Arabia 11,000; West Germany 8,280.
Graphite, natural	140	59	--	All to Spain.
Gypsum and plaster	142	41	--	Cape Verde 25; Angola 14.
Lime	61	210	--	Guinea-Bissau 107; Cape Verde 99.
Mica:				
Crude including splittings and waste	208	823	--	United Kingdom 781; Italy 42.
Worked including agglomerated splittings	186	58	--	United Kingdom 36; Italy 20.
Pigments, mineral: Iron oxides and hydroxides, processed	40	82	--	West Germany 56; Cape Verde 13; Mozambique 8.
Salt and brine	5,510	9,029	--	Nigeria 7,526; France 517; Guinea-Bissau 426.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	4,879	1,019	--	Spain 983; Morocco 30; Angola 3.
Sulfate, manufactured	100	2,100	--	Bulgaria 2,000; Lebanon 100.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	133,509	125,856	828	Italy 38,762; Spain 35,918; Japan 28,769.
Worked	223,612	241,765	7,524	West Germany 149,591; United Kingdom 12,928; Denmark 11,496.
Gravel and crushed rock	4,943	1,128	--	Spain 500; Singapore 41; West Germany 23.
Limestone other than dimension	93	205	--	São Tomé and Principe 173; Cape Verde 32.
Quartz and quartzite	560	29,839	--	Norway 26,878; France 2,280; United Kingdom 540.
Sand other than metal-bearing	17,741	17,289	--	Gibraltar 12,160; Morocco 2,905; Greece 2,200.
Sulfur:				
Elemental: Crude including native and byproduct	47	10	--	All to Angola.
Sulfuric acid	15,089	21,820	--	Morocco 11,472; Spain 5,631; Belgium-Luxembourg 4,197.

See footnotes at end of table.

Table 2.—Portugal: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Talc, steatite, soapstone, pyrophyllite	32	8	--	All to Angola.
Other:				
Crude	430	279	--	Spain 198; West Germany 42; Guinea-Bissau 17.
Slag and dross, not metal-bearing	900	22	--	NA.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	664	7	--	Angola 3.
Carbon black	1	379	--	United Kingdom 122; West Germany 120; Spain 57.
Coal: Anthracite and bituminous	13	10	--	All to Angola.
Coke and semicoke	--	72	16	Angola 50; Zaire 6.
Petroleum refinery products:				
Liquefied petroleum gas thousand 42-gallon barrels	1	29	24	Cape Verde 4; Gibraltar 1.
Gasoline do	1,688	1,067	53	United Kingdom 285; Iceland 219; Netherlands 188.
Mineral jelly and wax do	14	8	--	All to Netherlands.
Kerosene and jet fuel do	2,072	2,155	217	Angola 168; Egypt 156.
Distillate fuel oil do	1,350	758	--	Iceland 320; Nigeria 82.
Lubricants do	160	157	--	Belgium-Luxembourg 51; Greece 30; Spain 19.
Residual fuel oil do	2,296	1,435	--	United Kingdom 508; France 344.

[r]Revised NA Not available.
[1]Prepared by Jozef Plachy.
[2]Less than 1/2 unit.

Table 3.—Portugal: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS				
Aluminum:				
Ore and concentrate	3,410	1,400	--	West Germany 840; Spain 555.
Oxides and hydroxides	6,506	6,371	22	United Kingdom 3,024; France 1,967; West Germany 1,210.
Metal including alloys:				
Scrap	35	45	--	Italy 16; West Germany 6; Spain 5.
Unwrought	42,975	26,110	--	Spain 10,378; Norway 6,104; Netherlands 4,463.
Semimanufactures	14,259	12,002	25	Spain 2,328; Belgium-Luxembourg 2,084; West Germany 1,895.
Antimony: Metal including alloys, all forms	53	32	--	Belgium-Luxembourg 17; China 15.
Cadmium: Metal including alloys, all forms	2	2	--	NA.
Chromium:				
Ore and concentrate	753	859	NA	Republic of South Africa 407; Netherlands 248; Italy 116.
Oxides and hydroxides	152	122	1	West Germany 63; Italy 36; U.S.S.R. 10.
Metal including alloys, all forms	14	6	([2])	NA.
Cobalt:				
Oxides and hydroxides	7	6	--	Republic of South Africa 3; Belgium-Luxembourg 2; Canada 1.
Metal including alloys, all forms	8	9	--	Belgium-Luxembourg 3; West Germany 3; France 1.
Columbium and tantalum: Metal including alloys, all forms, tantalum	1	4	([2])	France 2; Japan 1.
Copper:				
Ore and concentrate	1,030	4,365	--	All from Canada.
Matte and speiss including cement copper	20	([2])	([2])	
Metal including alloys:				
Scrap	188	79	--	Cape Verde 21; Netherlands 20.
Unwrought	13,947	15,071	601	Chile 6,849; Peru 3,759; Zaire 1,000.
Semimanufactures	12,753	10,577	20	Italy 1,983; France 1,957; Spain 1,925.

See footnotes at end of table.

Table 3.—Portugal: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Gold: Metal including alloys, unwrought and partly wrought troy ounces	3,378	6,040	--	Switzerland 5,073; West Germany 961.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite	470,413	374,718	--	Canada 132,403; Mauritania 121,980; Venezuela 120,137.
Metal:				
Scrap	108,294	120,120	--	United Kingdom 104,616; U.S.S.R. 10,305; Netherlands 2,233.
Pig iron, cast iron, related materials	55,179	47,773	(2)	Spain 40,385; Republic of South Africa 2,582; West Germany 1,489.
Ferroalloys:				
Ferrochromium	100	356	NA	Spain 172; Bulgaria 100; West Germany 26.
Ferromanganese	104	93	--	West Germany 46; Norway 22; France 20.
Ferromolybdenum	9	6	--	United Kingdom 3; West Germany 2.
Ferrosilicochromium	2	2	--	NA.
Ferrosilicomanganese	10	8	--	France 6; Spain 2.
Ferrosilicon	205	643	--	United Kingdom 371; Republic of South Africa 150; Brazil 50.
Unspecified	r144	123	NA	West Germany 44; United Kingdom 43; Norway 16.
Steel, primary forms	229,313	246,033	(2)	West Germany 92,410; Belgium-Luxembourg 49,659; France 33,593.
Semimanufactures:				
Bars, rods, angles, shapes, sections	115,078	105,095	32	Spain 39,289; France 16,813; West Germany 15,607.
Universals, plates, sheets	232,268	206,837	105	West Germany 64,006; Belgium-Luxembourg 28,262; East Germany 26,862.
Hoop and strip	32,610	29,568	23	West Germany 12,501; Belgium-Luxembourg 10,986; France 3,781.
Rails and accessories	4,107	15,112	--	France 13,170; Netherlands 1,095; West Germany 720.
Wire	21,774	21,923	1	Spain 10,076; Belgium-Luxembourg 3,334; United Kingdom 3,084.
Tubes, pipes, fittings	18,047	18,140	186	West Germany 7,118; France 3,422; Spain 1,835.
Castings and forgings, rough	502	150	--	Spain 76; West Germany 57.
Lead:				
Ore and concentrate	--	(2)	NA	NA.
Oxides	38	597	--	West Germany 544; Spain 46; United Kingdom 7.
Metal including alloys:				
Scrap	5	3	NA	NA.
Unwrought	21,321	21,176	--	Peru 8,926; Morocco 5,299; Spain 2,387.
Semimanufactures	5	50	1	United Kingdom 36; France 9; Spain 2.
Magnesium: Metal including alloys:				
Unwrought	11	(2)	--	NA.
Semimanufactures	2	5	1	NA.
Manganese:				
Ore and concentrate, metallurgical-grade	68,587	52,054	--	Republic of South Africa 17,232; Gabon 16,631; Ghana 16,607.
Oxides	1,595	1,256	(2)	Netherlands 507; Belgium-Luxembourg 506; Ireland 100.
Metal including alloys, all forms	3	2	NA	NA.
Mercury 76-pound flasks	232	435	--	Spain 255; Algeria 179.
Molybdenum: Metal including alloys, all forms	2	2	(2)	West Germany 1.
Nickel:				
Matte and speiss	30	4	--	Norway 2.
Metal including alloys:				
Scrap	16	7	--	NA.
Unwrought	275	223	--	Canada 79; Zimbabwe 57; Finland 46.
Semimanufactures	617	377	1	West Germany 124; Finland 110; France 46.
Platinum-group metals: Metals including alloys, unwrought and partly wrought troy ounces	5,101	7,977	--	United Kingdom 6,190; France 1,191; West Germany 368.
Selenium, elemental	2	4	--	United Kingdom 2; Sweden 1.

See footnotes at end of table.

Table 3.—Portugal: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Silver:				
Waste and sweepings value, thousands	$1	--		
Metal including alloys, unwrought and partly wrought thousands troy ounces	1,108	893	--	West Germany 810; France 47; United Kingdom 16.
Tin:				
Ore and concentrate	81	80	--	All from Burma.
Metal including alloys:				
Scrap	--	40	--	All from Spain.
Unwrought	408	396	--	Malaysia 280; Spain 60; Netherlands 31.
Semimanufactures	55	87	(²)	United Kingdom 60; West Germany 25.
Titanium:				
Ore and concentrate	371	425	--	Republic of South Africa 380; Australia 35.
Oxides	8,485	10,181	951	Finland 1,987; Spain 1,920; United Kingdom 1,656.
Metal including alloys, all forms	50	14	1	Belgium-Luxembourg 6; Sweden 4; Japan 1.
Tungsten: Metal including alloys, all forms	6	6	(²)	West Germany 6.
Zinc:				
Oxides	64	99	15	West Germany 55; United Kingdom 18.
Metal including alloys:				
Scrap	397	1,030	258	Republic of South Africa 124; United Kingdom 112; Saudi Arabia 111.
Unwrought	10,682	9,385	--	Canada 4,893; Belgium-Luxembourg 2,219; Netherlands 1,182.
Semimanufactures	1,713	1,424	--	West Germany 568; Belgium-Luxembourg 361; United Kingdom 250.
Zirconium: Ore and concentrate	1,554	1,623	NA	Spain 1,380; United Kingdom 133; Italy 47.
Other:				
Ores and concentrates	22,111	26,919	--	Brazil 13,794; Mexico 13,125.
Oxides and hydroxides	1,248	1,027	6	United Kingdom 554; Norway 211; West Germany 130.
Ashes and residues	754	285	--	Belgium-Luxembourg 113; Spain 72; United Kingdom 51.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	655	544	22	Italy 228; Spain 112; Greece 40.
Artificial:				
Corundum	1,396	1,179	1	West Germany 812; Austria 93; France 93.
Silicon carbide	738	674	--	West Germany 511; France 69; Norway 67.
Dust and powder of precious and semiprecious stones including diamond kilograms	195	274	4	West Germany 87.
Grinding and polishing wheels and stones	398	544	1	Italy 232; Spain 93; West Germany 64.
Asbestos, crude	14,047	8,126	29	Canada 3,492; Zimbabwe 1,899; Greece 881.
Barite and witherite	1,335	564	--	West Germany 248; Spain 169; France 113.
Boron materials:				
Crude natural borates	11,361	10,559	1,800	Turkey 8,000; Netherlands 607.
Oxides and acids	929	665	--	France 471; Italy 150; Spain 34.
Bromine	(²)	(²)	--	NA.
Cement	299,560	10,154	2	Spain 9,593; France 515.
Chalk	10,565	10,964	--	France 6,219; Spain 2,352; United Kingdom 1,505.
Clays, crude	37,763	31,600	654	Spain 18,907; United Kingdom 6,425; France 3,354.
Cryolite and chiolite	60	66	--	Denmark 65.
Diamond:				
Gem, not set or strung carats	466,880	28,201	--	Netherlands 11,697; Belgium-Luxembourg 1,480; Switzerland 503.
Industrial stones do	63,954	115,043	--	NA.
Diatomite and other infusorial earth	3,762	4,000	481	Spain 2,319; France 826.

See footnotes at end of table.

Table 3.—Portugal: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Feldspar, fluorspar, related materials	2,544	2,137	NA	France 1,602; United Kingdom 274; West Germany 51.
Fertilizer materials: Manufactured:				
Ammonia	57,861	44,475	11,098	Libya 11,283; Poland 7,977; Trinidad and Tobago 7,716.
Nitrogenous	16,827	51,659	--	United Kingdom 18,215; Netherlands 10,409; West Germany 7,544.
Phosphatic	720	1,080	--	All from France.
Potassic	74,686	59,711	--	Israel 27,226; Spain 24,030; East Germany 8,443.
Unspecified and mixed	14,216	16,222	9,960	Tunisia 5,206; West Germany 581.
Graphite, natural	146	95	17	Norway 48; West Germany 7.
Gypsum and plaster	34,050	37,423	NA	Spain 28,220; Morocco 7,880; West Germany 860.
Iodine	20	11	--	Japan 10.
Lime	1,055	784	--	Spain 720.
Magnesium compounds:				
Magnesite, crude	382	93	NA	Netherlands 36; Austria 22; West Germany 18.
Oxides and hydroxides	4,529	3,523	--	United Kingdom 2,459; Spain 379; Netherlands 236.
Mica:				
Crude including splittings and waste	320	283	--	United Kingdom 144; Norway 76; France 54.
Worked including agglomerated splittings	12	14	(3)	Switzerland 4; Belgium-Luxembourg 3; France 3.
Nitrates, crude	1,018	1,036	--	Chile 1,000; West Germany 36.
Phosphates, crude	301,863	364,752	21,835	Morocco 339,917; Togo 3,000.
Phosphorus, elemental	16	20	--	United Kingdom 12; West Germany 8.
Pigments, mineral: Iron oxides and hydroxides, processed	1,144	1,873	--	West Germany 1,006; Spain 612; United Kingdom 123.
Potassium salts, crude	3,300	--		
Precious and semiprecious stones other than diamond:				
Natural ——— value, thousands	r$3,014	$6,779	--	France $91; West Germany $7.
Synthetic ——— do	r$112	$39	--	West Germany $8.
Pyrite, unroasted	3	204	--	Spain 201.
Salt and brine	20,817	205	--	Netherlands 120; West Germany 70; United Kingdom 11.
Sodium compounds, n.e.s.: Carbonate, manufactured	3	3	--	United Kingdom 2.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	283	297	58	France 192; Greece 46.
Worked	242	309	--	Spain 251; Italy 27; Belgium-Luxembourg 22.
Dolomite, chiefly refractory-grade	7,249	4,872	NA	Norway 1,496; United Kingdom 1,094; Spain 896.
Gravel and crushed rock	325	732	7	France 622; Sweden 88.
Limestone other than dimension	3,500	4,500	--	All from France.
Quartz and quartzite	238	128	NA	Finland 57; France 16.
Sand other than metal-bearing	5,324	1,665	--	Belgium-Luxembourg 1,538; Spain 77; West Germany 26.
Sulfur:				
Elemental:				
Crude including native and byproduct	28,693	16,953	--	France 16,781; Spain 112.
Colloidal, precipitated, sublimed	2	11	--	All from West Germany.
Sulfuric acid	1,521	93	--	Netherlands 53; Belgium-Luxembourg 20; West Germany 18.
Talc, steatite, soapstone, pyrophyllite	4,773	5,808	218	France 3,129; Belgium-Luxembourg 1,018; Norway 361.
Other:				
Crude	426	1,154	(3)	Spain 727; Finland 104; Italy 82.
Slag and dross, not metal-bearing	160,733	--		

See footnotes at end of table.

Table 3.—Portugal: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	901	745	18	Spain 572; France 148.
Carbon black	11,509	7,401	3	Spain 4,002; France 2,276; West Germany 435.
Coal: Anthracite and bituminous	425,823	478,674	224,731	Poland 75,549; Republic of South Africa 52,564.
Coke and semicoke	55,205	44,547	(2)	United Kingdom 11,278; Netherlands 11,111; France 6,637.
Peat including briquets and litter	1,937	2,498	--	West Germany 1,137; United Kingdom 464; Sweden 380.
Petroleum:				
Crude __ thousand 42-gallon barrels	53,063	55,086	--	Saudi Arabia 13,881; Iran 6,870; Nigeria 6,212.
Refinery products:				
Liquefied petroleum gas __ do	3,603	3,272	155	United Kingdom 1,770; Netherlands 595; France 435.
Gasoline __ do	3,708	4,242	(2)	Saudi Arabia 1,066; Spain 734; Kuwait 547.
Mineral jelly and wax __ do	10	41	(2)	Spain 25; France 9; West Germany 4.
Kerosene and jet fuel __ do	101	58	(2)	Netherlands 10; France 4.
Distillate fuel oil __ do	646	969	--	Spain 442; France 142; East Germany 129.
Lubricants __ do	221	228	3	Italy 68; France 42; West Germany 21.
Residual fuel oil __ do	8,136	10,183	85	Spain 3,901; France 2,974; Netherlands 1,456.
Bitumen and other residues __ do	177	326	--	Spain 316; Belgium-Luxembourg 3; Netherlands 3.
Bituminous mixtures __ do	112	67	(2)	Spain 49; Netherlands 6; United Kingdom 5.
Petroleum coke __ do	112	99	99	West Germany (2); Spain (2).

[r]Revised. NA Not available.
[1]Table prepared by David Ellis.
[2]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Copper.—The Neves-Corvo Mine, under development near Castro Verde in southern Portugal, changed ownership during 1985. With permission from the Government of Portugal, Rio Tinto Zinc Corp. Ltd. purchased the 49% interest held by two French companies, Compagnie Penarroya S.A. and Compagnie Française des Mines. After the transaction, Somincor, the operating company at Neves-Corvo, was under the control of two owners, the Government of Portugal, with 51% of the total, and Rio Tinto, with 49%. Development of the Neves-Corvo Mine continued under difficult conditions. Ground movement halted sinking of the main shaft and there was poor ventilation and very high influx of water. Consequently, production startup at a rate of 1 million tons per year of ore was rescheduled for 1989.

Quimigal continued to study the impact that construction of the proposed copper smelter and refinery at Sines would have on the economy of the region and of the country. The new smelter was planned to produce 100,000 tons of refined copper per year. In addition, facilities at Sines would annually recover 30 tons of silver, 150 kilograms of gold, and 400,000 tons of sulfuric acid. Rio Tinto's participation in the development of the Neves-Corvo copper mine raised the possibility of treating the concentrate at Rio Tinto's smelter and refinery at Huelva, Spain, about 170 kilometers east of Neves-Corvo. Nevertheless, at yearend, it appeared that the Government of Portugal was determined to go ahead with the Sines smelter.

Iron and Steel.—Siderurgia Nacional revised its previously announced ambitious development plans for the integrated iron and steel plant at Seixal. Under the restructuring plan, approved by the Government of Portugal in the late fall of 1985, the company will install a 400,000-ton-per-year, six-strand Scholemann-Simag continuous caster, a billet reheating furnace, and a modernized coiled product line. The six-strand continuous caster is expected to replace the 150-000-ton-per-year Danieli billet caster, in operation since 1970. Changes in the restructuring plans resulted, however, in surpluses of equipment. This equipment, some of which was not paid for, has been stored in Seixal for more than a year. Nine companies from Japan, headed by Kenematsu-Gosho, finally agreed to purchase some of the warehoused equipment for about $84 million and pay off the suppliers. The Government of Portugal will reimburse the Japanese companies in 13 years for payments beyond the value of the equipment. At yearend, the management of Siderurgia Nacional was examining the possibility of also selling two new 12-ton Linz-Donawitz converters and a blast furnace stored at Seixal.

Gold.—British Petroleum Ltd. (BP), Rio Tinto, and Newmont Mining Corp. continued to prospect for gold in the area of Portel-Montemor. In addition, Newmont started to search for gold in the area of "3 Mines" near Jalles.

Pyrite.—Development of a new ramp at the Aljustrel Mine situated in southern Portugal was hampered by ground control and water problems. Final decision on the future of the Aljustrel operation awaits results of a feasibility study in progress at yearend.

Tin.—The Belgian company Geomina S.A. completed a preliminary study on a low-grade tin deposit at Arangela near Fundao, which reportedly has large reserves. A Portuguese company, Miriamque, reportedly started production of small quantities of tin concentrates at Massueime. The only tin smelter in Portugal was a small plant at Mangualde operated by the Nouva Empresa Estanifera de Mangualde. Estimates set the smelter production between 400 and 500 tons of tin per year. Disruption of the world tin market, caused by the problems between the International Tin Council and the London Metal Exchange, seriously affected small producers in Portugal. Some producers will have to close operations owing to the resulting low prices.

Tungsten.—Borralha tungsten mine, the second largest tungsten producer in the country, and three small mines closed down. Low tungsten prices on the world market were the principal reason for closures. Diamond drilling started on a tungsten deposit at Gois. The Government's General Direction of Geology and Mines financed and conducted the operation. Rio Tinto continued its exploration of a scheelite deposit near Tubuacao.

INDUSTRIAL MINERALS

At the Alhandra cement plant, work on modernization continued. The existing kiln was converted from the wet to the dry process. When a five-stage preheater is completed, cement production should reach 2,500 tons per day or about 800 tons per day higher than at present.

MINERAL FUELS

Portugal remained almost totally dependent on imported energy sources. Coal, hydropower, and uranium were produced in the country, but quantities were modest by world standards.

The main shaft at the only coal mine in the country was deepened and mining of the deeper coalbeds started in the spring of 1985. In addition, possibilities for starting a new open pit mine with a capacity of 100,000 tons per year were studied.

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[1]Physical scientist, Division of International Minerals.

The Mineral Industry of Romania

By Walter Steblez[1]

Romania's centrally planned mineral industry maintained the production of both nonferrous and iron ores but in quantities that were insufficient to meet the needs of industry. Domestic output of iron ore was about 12% of consumption, and those of copper, lead, and zinc was approximately 60%, 75%, and 70%, respectively. Production of industrial minerals was sufficient to meet the needs of both industry and the export market. Romania had to import greater quantities of crude oil to feed its large refinery capacity because of a decreasing output of petroleum.

The country's economic development in 1985 was disrupted by harsh weather conditions—summer drought and a cold winter—which resulted in electric power shortages. Most planned targets were not achieved. Compared with those of 1984, industrial production grew by 4.9% as opposed to the planned 7.5%, and productivity in industry grew by 5.0% instead of the planned 14.7%. The mineral industry's investment projects during the year included the startup of the No. 2 cold strip mill at the Galati steel complex and the first coking battery of the Calarasi iron and steel works. Mine development continued throughout the year at the Rosia Poieni copper mining and beneficiation complex and at the Calimani sulfur deposit at Suceava.

Government Policies and Programs.—Romania's seventh 5-year plan came to a close at yearend. Owing to overly ambitious centrally planned targets, few goals were achieved over this period on either an annual or a 5-year basis. Indicative of this are the actual 1985 results compared with the planned targets set at yearend 1980:[2] Coal—planned, 85.6 million tons, actual, 43.6 million; petroleum—planned, 12.5 million tons, actual, 10.7 million; natural gas—planned, 1.09 trillion cubic feet, actual, 0.99 trillion; steel—planned, 18.2 million tons, actual, 13.8 million; electric energy—planned, 82.5 billion kilowatts, actual, 71.8 billion; cement—planned, 15.6 million tons, actual, 12.2 million.

Most indicators, cited above, showed that 1985 production was actually below that of 1980. The production of crude steel was at about the same level as in 1980. Only coal showed a significant increase over the 1980 production level, although its calorific value had reportedly declined over the 5-year period. For the 1981-85 period, the average annual increases for the mining, metallurgical, and tool industries were 2.6%, 2.1%, and 5.6%, respectively. Growth of the mining and metallurgical sectors was below planned norms. The contradictions between legislated centrally planned norms and actual results stemmed from policies aimed at accelerating the growth of heavy industry, requiring heavy borrowing and infusions of foreign technology, coupled with initial difficulties of servicing debts owed to foreign lenders, owing to low efficiency, systemic bottlenecks, and low marketability of most of Romania's industrial products. To maintain solvency, the Romanian Government instituted a policy of reducing hard currency imports while increasing exports at all costs. The main impact of these policies on the mineral industry was an increased effort to maximize self-sufficiency of domestic raw material production. Massive capital outlays were expended for the development of low-grade deposits of nonferrous metals, sulfur, coal, and offshore petroleum and gas deposits. Several of these deposits were determined to be uneconomic or marginally economic only after considerable capital expenditure during the 1981-85 period.[3] Also, shortages of consumer goods and the deterioration of working conditions at mines and other enterprises resulted in a marked decline in production efficiency, resulting in the militarization of the management of several sectors within the mining, power generation, and transport industries.[4] Moreover, to provide necessary raw materials for the country's fabricating industries, the Romanian Government, whenever possible, sought barter arrangements that offered technical assistance to developing countries in exchange for mineral ores and fuels.

The Romanian Government's plan for 1986-90 again set ambitious tasks, stipulating a 7.5% to 8.3% average annual increase in industrial production and 5-year increases in the production of steel and coal to be 45% and 150%, respectively, compared with 1985 output levels. The annual plan for 1986 indicated a 9% increase in industrial output compared with the 1985 level; the output of coal, cement, steel, natural gas, petroleum, and electricity was to rise 46%, 35%, 19%, 14%, 13% and 8%, respectively.

PRODUCTION

Production shortfalls in Romania's mineral industry in 1985 were attributed to inefficient delivery of spare parts and equipment to the mining sector and inadequate management. In the first quarter, only 69% of the required equipment and assemblies, including excavators, dumpsters, and large-capacity conveyors, were delivered to the lignite mines and quarries. In many instances key spare parts and subassemblies were not delivered at all, causing large stockpiles of unusable equipment to grow at mine sites and loading areas.[5] Failure to complete planned excavations at mining, metallurgical, and coking plant construction sites during the year resulted in startup delays and production shortfalls. In part, this was attributed to shortages of qualified construction and equipment assembly and installation workers.[6] The policy of increasing domestic production of minerals and fuels at all costs required development of new and existing mine facilities, resulting in increased gross mine output but with decreasing ore quality or calorific values; this in turn required larger outlays of capital for beneficiation. The labor conditions at many mining sites had worsened during the 1981-85 period and led to an exodus of skilled employees to other industries. In 1985, militarization of various mining sectors and decrees limiting worker mobility were instituted to limit the outflow of key personnel.

Table 1.—Romania: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984[p]	1985[e]
METALS					
Aluminum:					
Bauxite, gross weight[e]	[3]712,000	680,000	650,000	620,000	600,000
Alumina, calcined, gross weight	540,000	514,000	512,000	552,000	480,000
Ingot including alloys:					
Primary	242,000	208,000	223,000	244,000	220,000
Secondary	18,000	[r]20,000	21,000	20,000	21,000
Total	260,000	[r]228,000	244,000	264,000	241,000
Bismuth, mine output, metal content[e]	80	80	80	80	80
Cadmium, smelter[e]	85	80	80	75	75
Copper:[e]					
Mine output, metal content	27,000	26,000	27,000	25,000	26,000
Smelter:					
Primary	39,450	35,000	34,000	32,000	[3]32,963
Secondary	4,000	4,000	6,000	6,000	7,000
Total	43,450	39,000	40,000	38,000	39,963
Refined, primary and secondary[e]	60,000	50,000	47,000	45,000	46,000
Gold, mine output, metal content[e] troy ounces	65,000	65,000	65,000	65,000	65,000

See footnotes at end of table.

Table 1.—Romania: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984[p]	1985[e]
METALS —Continued					
Iron and steel:					
Iron ore:					
Gross weight thousand tons	2,304	2,146	1,987	1,916	2,100
Metal content (26% Fe) do.	600	560	517	498	546
Metal:					
Pig iron do.	8,857	8,637	8,190	9,557	8,100
Steel, crude do.	13,025	13,055	12,593	14,437	13,800
Ferroalloys:[e]					
Ferrochromium	36,000	39,000	42,000	45,000	44,000
Ferrosilicon	42,000	45,000	48,000	52,000	50,000
Ferromanganese	70,000	75,000	80,000	87,000	80,000
Silicomanganese	33,000	35,000	38,000	41,000	39,000
Silicon metal	3,300	3,600	3,800	4,100	3,800
Semimanufactures:					
Castings and forgings, finished[e] thousand tons	1,200	1,200	[e]1,100	1,200	1,200
Pipes and tubes do.	1,464	1,422	1,411	1,507	1,500
Rolled products do.	[r]9,549	9,346	9,179	10,329	10,500
Lead:					
Mine output, metal content[e]	25,000	27,000	30,000	30,000	30,000
Metal, smelter:					
Primary[e]	[3]40,665	40,500	40,000	[r]37,000	39,000
Secondary	[e]5,000	5,175	9,298	8,917	[3]9,969
Total	45,665	45,675	49,298	45,917	48,969
Manganese:[4]					
Ore:					
Gross weight thousand tons	228	220	312	264	250
Concentrate:					
Gross weight do.	57	55	78	66	64
Metal content do.	17	17	23	20	19
Silver, mine output, metal content[e] thousand troy ounces	850	850	820	810	810
Zinc:[e]					
Mine output, metal content	50,000	45,000	45,000	44,000	43,000
Metal, smelter, primary and secondary	[e]45,217	39,800	42,000	41,000	40,000
INDUSTRIAL MINERALS					
Barite[e]	79,000	78,000	78,000	75,000	75,000
Cement, hydraulic thousand tons	14,746	14,995	13,968	14,016	12,200
Clays:[e]					
Bentonite	176,000	175,000	177,000	180,000	180,000
Kaolin	410,000	410,000	410,000	410,000	410,000
Diatomite[e]	290,000	290,000	290,000	300,000	290,000
Feldspar[e]	84,000	84,000	85,000	85,000	86,000
Fluorspar[e]	20,000	20,000	20,000	20,000	20,000
Graphite[e]	12,500	12,500	12,500	12,500	12,000
Gypsum[e]	1,630	1,630	1,630	1,650	1,620
Lime thousand tons	3,742	3,792	3,623	3,848	3,600
Nitrogen: N content of ammonia do.	2,381	[r]2,587	2,727	2,861	2,700
Pyrites, gross weight[e] do.	930	930	930	930	930
Salt:					
Rock do.	2,013	1,902	1,838	1,874	1,800
Other do.	3,020	2,854	2,758	3,000	2,800
Total do.	5,033	4,756	4,596	4,874	4,600
Sand[e] do.	2,800	2,900	2,500	2,500	2,500
Sodium compounds, n.e.s.:					
Caustic soda do.	[r]767	760	745	805	800
Sodium carbonate, manufactured, 100% Na_2CO_3 basis do.	926	870	788	912	900
Sulfur:[e]					
S content of pyrites do.	300	200	200	200	200
Byproduct, all sources do.	150	150	150	150	150
Total do.	450	350	350	350	350
Sulfuric acid do.	[r]1,814	[r]1,900	1,941	1,915	1,900
Talc[e]	65,000	65,000	66,000	65,000	65,000
MINERAL FUELS AND RELATED MATERIALS					
Carbon black	104,358	102,000	101,166	106,900	107,000

See footnotes at end of table.

Table 1.—Romania: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984[p]	1985[e]
MINERAL FUELS AND RELATED MATERIALS —Continued					
Coal:					
Run-of-mine:					
Anthracite and bituminous thousand tons	9,826	9,658	10,629	10,653	11,000
Brown do	724	714	773	827	800
Lignite do	29,014	31,061	37,357	36,319	36,000
Total do	39,564	41,433	48,759	47,799	47,800
Washed (produced from above):					
Anthracite and bituminous:					
For coke and semicoke production do	2,391	2,244	2,618	2,903	2,900
For other uses do	5,895	4,944	5,175	5,555	5,000
Brown do	686	674	731	782	700
Lignite do	27,955	29,996	35,998	35,040	35,000
Total do	36,927	37,858	44,522	44,280	43,600
Coke:					
Metallurgical do	2,933	3,513	4,268	4,849	4,800
Other[e] do	450	450	450	450	450
Total do	3,383	3,963	4,718	5,299	5,250
Fuel briquets (from brown coal)[e] do	730	730	750	750	750
Gas, natural:					
Gross:					
Associated million cubic feet	274,042	310,663	366,813	387,437	380,000
Nonassociated do	1,033,379	1,010,706	978,888	991,743	990,000
Total do	1,307,421	1,321,369	1,345,701	1,379,180	1,370,000
Marketed[e] do	1,200,000	[3]1,010,706	1,100,000	[r]1,127,000	1,110,000
Petroleum:					
Crude:					
As reported thousand tons	11,644	11,742	11,593	11,453	10,700
Converted thousand 42-gallon barrels	88,028	88,769	87,643	86,585	80,892
Refinery products:[5]					
Liquefied petroleum gas do	2,807	[e]2,800	[e]2,900	[e]2,900	3,000
Gasoline do	42,381	[e]42,500	43,367	45,228	45,000
Jet fuel and kerosene do	7,200	[e]7,300	[e]7,300	[e]7,300	7,000
Distillate fuel oil do	50,265	[e]49,000	48,042	50,795	50,000
Residual fuel oil do	56,244	[e]55,000	53,167	54,079	54,000
Asphalt[e] do	4,000	3,500	3,000	3,000	3,000
Lubricants do	4,207	[e]4,000	3,927	[e]3,950	4,000
Total do	167,104	[e]164,100	161,703	167,252	166,000

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Includes data available through Sept. 30, 1986.
[2]In addition to the commodities listed, antimony, asbestos, and a variety of crude construction materials are produced, but output is not reported quantitatively, and available information is inadequate to make reliable estimates of output levels.
[3]Reported figure.
[4]Estimated series were based on published data on concentrate production.
[5]Romanian sources do not indicate whether refinery fuel is reported as a part of the listed product yields. Moreover, additional minor products may be produced but are not listed in official sources.

TRADE

The U.S.S.R. remained Romania's chief trading partner, accounting for over 17% of the country's total export. Trade with the rest of the member countries of the Council for Mutual Economic Assistance (CEMA) amounted to over 16%. The Soviet Union was Romania's chief supplier of mineral fuels and other mineral raw materials. Approximately 60% of Romania's imports of iron ore and pig iron, 80% of coke imports, and 40% of the imports of ferroalloys came from the Soviet Union. In exchange, Romania exported industrial machinery and vehicles and participated in the development of mineral projects, particularly iron and nonferrous metal mining and smelting, in the U.S.S.R. Romania also continued to promote barter-based commercial arrangements outside CEMA. Agreements were negotiated during the year with Australia, Ghana, India, and Venezuela for products such as iron pellets, iron ore, and manganese, in exchange for deliveries of Romanian equipment and technical assistance.

Table 2.—Romania: Apparent exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS				
Aluminum:				
Ore and concentrate	22,781	NA		
Oxides and hydroxides	--	20	--	All to France.
Metal including alloys:				
Scrap	--	280	--	All to Italy.
Unwrought	[2]121,600	[2]122,400	701	Poland 23,097; France 18,062; Italy 10,581.
Semimanufactures	12,683	18,837	9,340	Japan 5,532; France 1,618.
Chromium: Oxides and hydroxides	251	323	270	West Germany 40; Japan 10.
Copper: Metal including alloys:				
Scrap	--	5,179	--	Poland 4,879; France 300.
Unwrought	4,279	1,733	--	All to West Germany.
Semimanufactures	125	52	3	Pakistan 47; Algeria 2.
Gold: Metal including alloys, unwrought and partly wrought troy ounces	611	225	--	All to West Germany.
Iron and steel: Metal:				
Scrap	254	790	--	Yugoslavia 664; Spain 71; Italy 55.
Pig iron, cast iron, related materials	1,102	352	--	West Germany 252; Sweden 100.
Ferroalloys:				
Ferrosilicomanganese	--	8,671	8,250	West Germany 421.
Ferrosilicon	126	187	--	All to Japan.
Unspecified	2,175	5,367	--	Turkey 4,867; Hungary 500.
Steel, primary forms	165,000	75,000	1,704	Japan 28,792; Yugoslavia 22,341; Italy 17,514.
Semimanufactures:				
Bars, rods, angles, shapes, sections thousand tons	781	1,077	2	West Germany 54; Yugoslavia 29; unspecified 941.
Universals, plates, sheets do	776	1,173	172	Japan 308; West Germany 78.
Hoop and strip do	(3)	1	--	Mainly to Yugoslavia.
Rails and accessories do	(3)	(3)	--	Mainly to Algeria.
Wire do	103	106	(3)	West Germany 12; Malaysia 5; unspecified 85.
Tubes, pipes, fittings do	[2]374	[2]356	54	Poland 56; West Germany 22.
Castings and forgings, rough do	4	3	(3)	West Germany 2.
Lead: Metal including alloys, semimanufactures	--	8	--	All to Algeria.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$59	NA		
Silver:				
Waste and sweepings do	$32	NA		
Metal including alloys, unwrought and partly wrought do	$2,340	$253	--	All to Yugoslavia.
Tin: Metal including alloys, scrap	20	NA	--	
Zinc: Metal including alloys, unwrought	--	701	--	West Germany 451; Thailand 250.
Other: Base metals including alloys, all forms[2]	19,037	11,303	--	NA.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Dust and powder of precious and semiprecious stones including diamond value, thousands	$1,125	$605	$52	Belgium-Luxembourg $551.
Grinding and polishing wheels and stones	1	5	--	Algeria 3; West Germany 2.

See footnotes at end of table.

Table 2.—Romania: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Destinations, 1984: United States	Destinations, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Asbestos, crude	--	646	--	West Germany 599; Italy 47.
Barite and witherite	202	725	--	All to France.
Boron: Oxides and acids	107	561	--	Yugoslavia 459; Japan 101.
Cement thousand tons	[2]2,490	[2]2,764	--	Algeria 299; Saudi Arabia 89; unspecified 2,279.
Clays, crude	--	2	--	All to Italy.
Diamond:				
Gem, not set or strung value, thousands	--	$37	--	All to Belgium-Luxembourg.
Industrial stones do	$107	$422	--	Do.
Diatomite and other infusorial earth	20	NA		
Fertilizer materials: Manufactured:				
Crude, n.e.s	--	3,024	--	All to Saudi Arabia.
Manufactured:				
Ammonia thousand tons	11	16	--	Greece 8; Yugoslavia 8.
Nitrogenous do	[2]1,353	[2]1,512	618	Turkey 340; France 103.
Phosphatic do	21	40	--	Hungary 25; Yugoslavia 12; Saudi Arabia 2.
Potassic do	20	6	--	All to Saudi Arabia.
Unspecified and mixed do	[2]2,011	[2]2,833	--	Thailand 124; Denmark 55; unspecified 2,518.
Graphite, natural	--	12	--	All to Yugoslavia.
Gypsum and plaster	15,100	16,872	--	All to Hungary.
Lime	3	24,484	--	All to Poland.
Nitrates, crude	16	NA		
Pigments, mineral: Iron oxides and hydroxides, processed	30	NA		
Precious and semiprecious stones other than diamond: Synthetic value, thousands	$58	$65	$4	Belgium-Luxembourg $61.
Salt and brine	565,593	588,314	1	Hungary 416,861; Yugoslavia 171,452.
Sodium compounds, n.e.s.: Carbonate, manufactured	[2]377,700	[2]473,600	--	Hungary 57,073; Yugoslavia 49,355; Thailand 31,051.
Stone, sand and gravel: Dimension stone:				
Crude and partly worked	752	3,312	266	Hungary 2,988; Japan 40.
Worked	9,248	9,949	NA	West Germany 8,860; Austria 857.
Other: Crude	--	162	--	West Germany 133; France 23.
MINERAL FUELS AND RELATED MATERIALS				
Carbon black	[2]24,900	[2]24,800	--	Poland 10,286; Czechoslovakia 2,389.
Coal:				
Anthracite and bituminous	2,900	11,878	--	All to Italy.
Briquets of anthracite and bituminous coal	--	46,410	46,410	
Coke and semicoke	88	34	--	All to Italy.
Gas, natural: Gaseous million cubic feet	[2]7,063	[2]706	--	All to Hungary.
Peat including briquets and litter	637	171	--	All to Austria.
Petroleum refinery products:				
Liquefied petroleum gas 42-gallon barrels	50	NA		
Gasoline do	[2]28,674	[2]31,151	11,704	France 1,598; Spain 916.
Mineral jelly and wax do	[2]28	[2]20	--	Pakistan 13; Italy 3; Thailand 2.
Kerosene and jet fuel do	615	102	--	West Germany 76; Hungary 20.
Distillate fuel oil do	[2]17,106	[2]20,257	420	Italy 16,050; Singapore 877; France 548.
Lubricants do	[2]1,487	[2]1,044	NA	Austria 295; United Kingdom 18.
Residual fuel oil do	[2]20,396	[2]24,437	373	Italy 9,473; United Kingdom 7,173; Austria 636.
Bitumen and other residues do	7	13	--	Austria 12.
Petroleum coke do	[2]636	[2]1,048	--	Italy 128; West Germany 38; unspecified 867.

[p]Preliminary. NA Not available.
[1]Table prepared by Jozef Plachy. Owing to a lack of official trade data published by Romania, this table should not be taken as a complete presentation of this country's mineral trade. Unless otherwise specified, these data have been compiled from United Nations information and data published by the partner trade countries.
[2]Official Trade Statistics of Romania.
[3]Less than 1/2 unit.

Table 3.—Romania: Apparent imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS				
Aluminum:				
Ore and concentrate	534,609	704,760	--	Greece 503,649; Yugoslavia 201,109.
Oxides and hydroxides	14,445	20,536	--	Yugoslavia 12,713; Netherlands 4,877; Hungary 2,025.
Metal including alloys:				
Unwrought	2,205	900	--	All from Hungary.
Semimanufactures	745	2,317	--	Hungary 1,731; France 234; West Germany 153.
Cadmium: Metal including alloys, all forms	32	30	--	All from Japan.
Chromium:				
Ore and concentrate	62,414	292	--	All from West Germany.
Oxides and hydroxides	1	2	--	France 1; United Kingdom 1.
Cobalt:				
Oxides and hydroxides	9	6	--	All from Netherlands.
Metal including alloys, all forms	28	12	--	Belgium-Luxembourg 10; West Germany 2.
Copper:				
Ore and concentrate	[2]750	NA		
Oxides and hydroxides	25	20	--	All from West Germany.
Metal including alloys:				
Unwrought	23,748	17,489	--	Poland 11,568; Chile 5,900.
Semimanufactures	7,942	7,280	--	Poland 5,748; West Germany 635; France 346.
Gold: Metal including alloys, unwrought and partly wrought ___ troy ounces	96	258	--	West Germany 256; Japan 2.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite __ thousand tons	[3]14,477	[3]14,963	--	U.S.S.R. 7,671; Algeria 100; unspecified 7,192.
Metal:				
Scrap	30	NA		
Pig iron, cast iron, related materials[3]	212,800	169,800	--	NA.
Ferroalloys:				
Ferrochromium	1,200	259	--	All from West Germany.
Ferromanganese	54,000	58,000	--	NA.
Ferronickel	73	81	--	All from West Germany.
Ferrosilicon	21,405	20,120	--	All from U.S.S.R.
Silicon metal	--	398	--	All from Spain.
Unspecified[3]	72,022	75,142	--	NA.
Steel, primary forms	445,000	218,000	--	NA.
Semimanufactures:				
Bars, rods, angles, shapes, sections _ thousand tons	190	197	--	Hungary 20; Czechoslovakia 3; unspecified 168.
Universals, plates, sheets do	156	131	([4])	Hungary 19; Portugal 11; Italy 9.
Hoop and strip do	11	7	--	West Germany 6.
Rails and accesories do	108	95	--	Yugoslavia 10; unspecified 85.
Wire do	7	9	--	Yugoslavia 1; unspecified 6.
Tubes, pipes, fittings do	[4]48	[3]27	--	Japan 3; Czechoslovakia 2; West Germany 2.
Castings and forgings, rough do	1	([4])	--	Mainly from Italy.
Lead:				
Ore and concentrate	3,400	9,694	--	Spain 5,262; Yugoslavia 4,068.
Oxides	550	1,003	--	Italy 1,000; West Germany 3.
Metal including alloys:				
Unwrought	[2]1,200	4,594	--	Spain 3,000; Yugoslavia 1,122; Belgium-Luxembourg 172.
Semimanufactures	--	41	--	All from West Germany.
Magnesium: Metal including alloys:				
Unwrought	--	36	--	All from United Kingdom.
Semimanufactures	--	28	--	All from West Germany.
Manganese:				
Ore and concentrate, metallurgical-grade	220,000	165,000	--	NA.
Metal including alloys, all forms	3	NA		
Mercury ___ 76-pound flasks	4,148	4,061	--	All from Algeria.

See footnotes at end of table.

Table 3.—Romania: Apparent imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Molybdenum: Metal including alloys, semimanufactures	(4)	1	--	All from France.
Nickel:				
Matte and speiss	955	1,048	--	All from Cuba.
Oxides and hydroxides	23	NA		
Metal including alloys:				
Unwrought	700	18	--	United Kingdom 17.
Semimanufactures	203	211	2	West Germany 131; Italy 56; France 13.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$698	$1,748	--	West Germany $1,077; United Kingdom $523.
Silver: Metal including alloys, unwrought and partly wrought do	$25	$26	--	Switzerland $24; Austria $2.
Tin: Oxides	--	2	--	All from Italy.
Titanium:				
Ore and concentrate	2,659	4,500	--	All from Netherlands.
Oxides	2,311	2,840	--	Yugoslavia 1,595; West Germany 530; Spain 400.
Metal including alloys, all forms	--	2	--	All from West Germany.
Tungsten:				
Oxides and hydroxides	10	NA		
Metal including alloys, all forms	15	60	--	Do.
Zinc:				
Ore and concentrate	2,500	15,538	--	Spain 15,059; Yugoslavia 479.
Oxides	3,135	4,933	--	France 3,621; Yugoslavia 1,056; Netherlands 256.
Blue powder	240	527	--	All from West Germany.
Metal including alloys:				
Unwrought	[2]1,000	NA		
Semimanufactures	1,050	174	--	Belgium-Luxembourg 150; Netherlands 20; Yugoslavia 3.
Zirconium: Ore and concentrate	53	220	--	All from West Germany.
Other:				
Ores and concentrates	95,555	32,440	--	Greece 32,306; Italy 130.
Oxides and hydroxides	199	98	--	Belgium-Luxembourg 56; United Kingdom 30; Netherlands 12.
Base metals including alloys, all forms	26	82	--	United Kingdom 75; Sweden 6.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	93	NA		
Artificial: Corundum	6,414	6,852	--	Yugoslavia 4,436; Hungary 2,182; West Germany 225.
Dust and powder of precious and semiprecious stones including diamond value, thousands	$763	$612	$604	United Kingdom $5; Belgium-Luxembourg $3.
Grinding and polishing wheels and stones	935	782	--	West Germany 315; Italy 142; Netherlands 108.
Asbestos, crude	1,412	332	--	Canada 330; Switzerland 2.
Barite and witherite	1,000	2,000	--	All from Turkey.
Boron materials:				
Crude natural borates	24,397	NA		
Oxides and acids	1,057	1,401	--	Turkey 1,000; Yugoslavia 400.
Cement	49	175	--	Italy 99; Yugoslavia 66.
Clays, crude:				
Kaolin	6,375	800	--	All from Spain.
Unspecified	50,040	54,991	--	Turkey 54,174; West Germany 803.
Diamond:				
Gem, not set or strung value, thousands	$118	$2	--	All from United Kingdom.
Industrial stones do	$5,442	$4,936	--	United Kingdom $2,768; Belgium-Luxembourg $2,168.
Diatomite and other infusorial earth	992	782	--	France 609; Iceland 88; Austria 64.
Fertilizer materials: Manufactured:				
Nitrogenous	461	5	--	All from West Germany.
Potassic	[3]811,538	[3]872,596	7	U.S.S.R. 296,000; West Germany 183,000.
Unspecified and mixed	401	7	--	West Germany 6.
Fluorspar	--	4,844	--	All from Italy.
Graphite, natural	129	89	--	Austria 45; West Germany 44.
Iodine	18	24	--	Japan 17; Belgium-Luxembourg 7.

See footnotes at end of table.

Table 3.—Romania: Apparent imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Lime	--	9	--	All from Yugoslavia.
Magnesium compounds	29,696	78,353	--	Czechoslovakia 39,000; Turkey 31,971; Greece 6,000.
Mica: Worked including agglomerated splittings	17	32	--	Austria 27; France 5.
Phosphates, crude thousand tons	[3]2,510	[3]2,370	433	Morocco 459; Tunisia 192.
Phosphorus, elemental	190	1,088	--	All from U.S.S.R.
Pigments, mineral: Iron oxides and hydroxides, processed	412	240	--	West Germany 121; Japan 119.
Precious and semiprecious stones other than diamond: Natural value, thousands	$11	NA		
Pyrite, unroasted	--	48,867	--	All from Yugoslavia.
Salt and brine	--	28	--	All from West Germany.
Stone, sand and gravel:				
Dimension stone: Worked	34	207	--	Belgium-Luxembourg 145; Italy 48; Yugoslavia 8.
Gravel and crushed rock	--	185	--	Yugoslavia 123; United Kingdom 62.
Quartz and quartzite	200	131	--	Italy 85; United Kingdom 46.
Sand and gravel	400	NA		
Sulfur:				
Elemental:				
Crude including native and byproduct	290,167	205,375	21,000	Poland 116,000; Canada 60,800.
Colloidal, precipitated, sublimed	100	123	--	Spain 115; France 8.
Dioxide	--	461	--	All from West Germany.
Sulfuric acid	16	24	--	Do.
Talc, steatite, soapstone, pyrophyllite	--	290	--	Do.
Other:				
Crude	3,841	4,133	--	Italy 2,880; Greece 750; Yugoslavia 279.
Slag and dross, not metal-bearing	67	NA		
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	25	16	--	All to Italy.
Carbon black	25	44	--	West Germany 36; Netherlands 7.
Coal: Anthracite and bituminous thousand tons	[3]5,313	[3]7,043	604	Poland 2,109; Australia 1,140; unspecified 3,046.
Coke and semicoke do.	[3]1,715	[3]1,784	--	Japan 445; Italy 141; Czechoslovakia 85.
Petroleum and refinery products:				
Crude thousand 42-gallon barrels	90,484	98,798	--	NA.
Refinery products:				
Liquefied petroleum gas do.	--	12	--	All from United Kingdom.
Gasoline do.	3,621	162,563	--	Yugoslavia 162,214; Italy 213.
Mineral jelly and wax do.	126	4,085	--	Hungary 3,998; West Germany 71.
Kerosene and jet fuel do.	4,689	2,372	--	Greece 2,093; Yugoslavia 209.
Distillate fuel oil do.	--	754	--	Algeria 448; West Germany 291.
Lubricants do.	40,110	41,888	980	West Germany 30,919; Austria 5,082; Italy 1,659.
Residual fuel oil do.	1,798	3,783	--	Spain 3,263; Argentina 493.
Bitumen and other residues do.	164	--		
Bituminous mixtures do.	18	36	--	All from France.
Petroleum coke do.	3,375	30,547	--	Netherlands 28,897; Japan 1,650.

[p]Preliminary. NA Not available.

[1]Table prepared by Jozef Plachy. Owing to a lack of official trade data published by Romania, this table should not be taken as a complete presentation of this country's mineral trade. Unless otherwise specified, these data have been compiled from United Nations information and data published by the partner trade countries.

[2]World Metal Statistics, World Bureau of Metal Statistics, London, United Kingdom.

[3]Official Trade Statistics of Romania.

[4]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Copper.—Development of the Rosia Poieni copper mining and beneficiation complex in the Apuseni Mountains continued during the year. The construction area covered over 200 square kilometers and was reputed to be the largest complex in the region with a total of 70 kilometers of roads constructed at high altitudes. Apart from the central crushing unit and concentrator already in place, three more concentrators were under construction. The copper deposits were low grade, and the operation was expected to produce on an average of only about 1 ton of concentrate with a metal content of about 20% from 100 tons of ore.

Ferroalloys.—Work continued on the expansion of facilities for the production of ferrotitanium, low-carbon ferrochromium, and silicon metal at the Tulcea metallurgical complex, located near the Danube-Black Sea Delta. The complex, with a capacity of over 280,000 tons, produced about two-thirds of the country's requirement of ferroalloys.

Iron and Steel.—The main investments in the steel industry included the startup of a new mill for the production of 20-inch-diameter pipe at the Roman tube enterprise. Expansion under way at the Calarasi steel plant included three new 150-ton-per-day oxygen convertors, a coke oven battery, and rolling mills.

In the early part of the year, the Bucharest Metallurgical Research Institute announced the development of a process for recovery of 150,000 to 200,000 tons of iron, 30,000 tons of manganese, and about 150,000 tons of calcium and magnesium oxide from 1 million tons of steel slag. The equipment was tested successfully at the Hunedoara iron and steel complex and was to be put into operation throughout the country's steel industry. Romania's steel industry produced about 2 million tons of slag annually.

A number of commercial agreements on iron ore import were reached during the year. Romania had proposed a barter deal with Australia in 1984 for exchange of Romanian mining equipment for ore from the developing Marandoo iron ore deposit in the Pilbara region of Western Australia. After further negotiations, both sides agreed in late 1985 to terms that would provide Romania with 53 million tons of ore over a 15-year period beginning in 1988 or 1989. In exchange, Romania would provide 60% of the required equipment, worth about $315 million, for the Marandoo Mine. To expedite deliveries of iron ore to Romania and other areas in Eastern Europe, Hancock Pty. Ltd., the Australian principal in the agreement, was to finance the installation of two ship unloaders at the Port of Constanta in Romania. These units were to be constructed by Voest-Alpine AG for about $30 million; completion was scheduled for March 1987. At yearend, Romania signed a contract with C.V.G. Ferrominera Orinoco C.A., a subsidiary of the state-owned Corporación Venezolana de Guayana, for the purchase of 2.5 million tons of iron ore over the subsequent 4 years. Also at yearend, an arrangement was concluded between Romania and the U.S. Government that would limit Romania's export of certain steels to the U.S. market in compliance with the U.S. Government's steel importation provisions.

Lead and Zinc.—Low-grade lead-zinc ores were mined at Baia Mare in the northwest area of the country. After concentration, the ore was smelted at Copsa Mica in central Romania at the Uxina Chimica Metalurgia Imperial Smelter.

Manganese.—Romania's foreign trade organization Geomin Co. and the Government of Ghana agreed to conduct exploration and development of Ghanaian manganese deposits in the Essikema-Western region. A pilot concentrator for low-grade manganese from the Nsuta-Wassaw area would be built as well.

INDUSTRIAL MINERALS

Romania continued to produce barite, bentonite, diatomite, feldspar, graphite, kaolin, limestone, and other industrial minerals, largely for domestic needs. In 1985, Romania mined 16.2 million tons of industrial minerals compared with 10.3 million in 1984.

Development of the Calimani sulfur deposit at Suceava continued slowly and without much progress. After 15 years of development, including the reduction of the height of a 2,100-meter mountain by 500 meters, it was determined that the size of sulfur reserve in the deposit did not justify the investment. Nevertheless, in June volunteer workers excavated an additional 2 million cubic meters of rock overburden to finally uncover the sulfur.

MINERAL FUELS

Coal.—Romania possessed limited reserves of hard coal, about 50 million tons, and considerably larger reserves of brown coal and lignite, estimated to be about 750 million tons. The production of brown coal and lignite had been expanded in recent years to feed thermal power stations to reduce the consumption of petroleum and natural gas. The country's consumption of coal was about 15% of total primary energy consumption. In 1985, a coking coal mine was reportedly under construction at Valea de Bramighere in the Jiu Valley. The first section of the mine was to be completed by yearend and was to supply coal to the 4.2-million-ton-per-year concentrator at Uricani.

Petroleum and Natural Gas.—Romania's petroleum and natural gas reserves were estimated to be 1.5 billion barrels and 8 to 12 trillion cubic feet, respectively. Petroleum's share of primary energy consumption was about 14%, and that of gas was approximately 28%. With declining onshore production, Romania continued offshore exploration during the year, employing three platforms in the Black Sea area in an attempt to maintain maximum self-sufficiency. The drilling was to delineate deposits previously discovered as well as to explore for new deposits. To feed the country's 13 refineries, with a capacity of 617,000 barrels per day, Romania continued to import substantial amounts of additional petroleum from the Soviet Union and the Middle East.

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[1]Foreign mineral specialist, Division of International Minerals.

[2]Scinteia (Bucharest). July 2, 1981, pp. 3-4; Feb. 7, 1986, pp. 1-3.

[3]RL/RFE Research. Sept. 11, 1985, pp. 21-23.

[4]———. Nov. 14, 1985, pp. 7-11.

[5]Scinteia (Bucharest). Apr. 25, 1985, pp. 1, 3.

[6]Revista Economica (Bucharest). No. 30, July 26, 1985, pp. 13-14.

The Mineral Industry of Saudi Arabia

By Michael D. Fenton[1]

Saudi Arabia had the largest crude oil reserves in the world, 166.3 billion barrels of recoverable oil, over one-fourth of the world's known oil reserves and about one-third of the known reserves in the market economy countries. Saudi Arabia was second to Iran in natural gas reserves with 122.7 trillion cubic feet of recoverable gas. By the beginning of 1985, the Arabian-American Oil Co. (Aramco) had discovered a total of 52 commercial oilfields, including the Ghawar Field, which is the world's largest onshore field, and the Safaniya Field, the largest offshore field.

The petroleum industry continued to dominate the economy and the Government continued to act as swing producer in the Organization of Petroleum Exporting Countries (OPEC). Declining world demand for oil and the breaking of production quotas by OPEC members caused a gradual decline in Saudi Arabian production from nearly 10 million barrels per day in 1980 to 2.2 million barrels per day in mid-1985. In midyear, the Government dramatically increased production that reached 4.5 million barrels per day in December, which caused an equally dramatic overabundance of oil in the world market and a sudden, prolonged decline in the price of oil. The decision to significantly raise production affected both the oil market and the economies of several countries, including Saudi Arabia and the United States. The Saudi Government began to make its oil more attractive by selling it in a series of netback and discount deals at below official prices that were based on refined product prices less the costs to the buyer of transportation and refining. Nevertheless, oil export earnings fell to an estimated $26 billion, while income from overseas investments and other exports also declined. The current account deficit rose to an estimated $17.5 to $24 billion, and the drawdown of overseas financial reserves exceeded $20 billion (from liquid asset reserves of $50 billion). Consequently, the Government was forced to decrease significantly domestic expenditures, and the level of all imports decreased by over 30% in the first 9 months of 1985. The gross domestic product for fiscal year 1985[2] was $89 billion, down nearly 18% from that of the previous fiscal year.

Apparently, the Government wanted to maintain its share of the market, to regain lost revenue, and to ensure oil's long-term dominance in the world energy market. Since 1979, the world demand for oil had fallen by 8 million barrels per day, while consumption of coal and nuclear energy had risen by the equivalent of about 3 million barrels per day.

During 1985, Saudi Arabian Basic Industries Corp. (SABIC) finished the last 5 of 12 projects in its first-generation program of petrochemical industry development for a total cost of $10.6 billion. These projects were Saudi Petrochemical Co. (Sadaf), Saudi Yanbu Petrochemical Co. (Yanpet), Al Jubail Petrochemical Co. (Kemya), Arabian Petrochemical Co. (Petrokemya), and Eastern Petrochemical Co. (Sharq). SABIC reported a total net income of $22.3 million in the first 9 months of 1985, up 137% from $9.4 million in all of 1984. Net profit was $40.2 million for the year, over four times the 1984 figure of $9.4 million. The increase was mainly a result of the start of production of the new plants.

The ambitious program of expansion of the petrochemical industry was aimed at producing nearly 5% of world demand. Close to 4% of the world's current capacity was accounted for by Saudi output in 1985. Second-generation industries costing $4.5 billion, to be started in 1985-89, would expand the established industrial base of the economy through vertical integration with increased private sector participation.

Additional efforts at diversification in the minerals economy were in the development of the Mahd adh Dhahab gold mine and the Wadi Sawawin iron mine. Even with such large investments in petrochemicals, gold, iron, steel, cement, and other building materials, Saudi Arabia remained as dependent on oil as ever. Most of its investments have yielded low returns and some projects have had cost overruns. The fourth 5-year plan (1985-89) called for raising nonoil economic activity, maximizing the value-added oil sector by increasing refined products and petrochemical capacity, and reducing the Government's role in large development projects, including the privatization of some refining and petrochemical operations.

PRODUCTION AND TRADE

Crude oil production declined from 10 million barrels per day in fiscal year 1980, to nearly 2 million barrels per day in August 1985 as Saudi Arabia attempted to offset excessive production beyond OPEC quotas by other OPEC member countries. At that time, Aramco increased production to about 4.2 million barrels per day during the fourth quarter. Of 3.4 million barrels per day of oil produced in 1985, an average of 2.6 million barrels per day during the year, and as little as 1.6 million barrels per day during the summer, was exported. The average rate of export was about 2.5 million barrels per day. As many as 9 million barrels per day was exported 4 years earlier. The decline in exports was matched by a 31% decline in all imports during the first half of 1985. Exports to the United States averaged 167,000 barrels per day in 1985. Oil revenue reductions at Aramco brought about a $1 billion operating deficit on a $3.5 billion budget, and staff reductions continued toward a goal of 40,000 from about 55,800.

By yearend, domestic refineries were operating at Ras Tanura, with 563,000 barrels per day of design capacity; Jeddah, 105,000 barrels per day; Riyadh, 120,000 barrels per day; and Yanbu, 170,000 barrels per day. Two new export refineries were at Yanbu, 250,000 barrels per day, and at Al Jubail, 250,000 barrels per day. Two topping plants in the Divided Zone produced 50,000 barrels per day of naphtha and fuel oils at Mina Saud and 30,000 barrels per day at Mina Khafji. Output in 1985 increased significantly above the 1984 production of 878,000 barrels per day as a result of increased export sales. Capacity may reach 1.9 million barrels per day when the export refinery at Rabigh, with a design capacity of 325,000 barrels per day, is finished in 1989. Saudi Arabia would then be able to export 0.5 to 0.7 million barrels per day of oil as refined products.

With all of its first-generation projects in production in 1985, SABIC affiliate plants had annual combined capacities of 1.6 million tons of ethylene, 1.3 million tons of methanol, 830,000 tons of urea, 700,000 tons of linear low-density polyethylene (LLDPE) and high-density polyethylene (HDPE), 520,000 tons of ethylene glycol, and 454,000 tons of ethylene dichloride. Products also included 438,000 tons of oxygen, 377,000 tons of caustic soda, 295,000 tons of styrene monomer, 281,000 tons of crude industrial ethanol, 146,000 tons of nitrogen, 100,000 tons of sulfuric acid, and 20,000 tons of melamine.

SABIC's 12 petrochemical plants produced 6.3 million tons of products in 1985, an increase over the 2.7 million tons produced in 1984. During the first half of 1985, the Saudi Arabian Fertilizer Co. (SAFCO) produced 164,296 tons of urea fertilizer and 38,875 tons of sulfuric acid. The company sold 111,625 tons of fertilizers domestically and realized a net profit of $19.2 million. SABIC sold 94% of the urea and sulfuric acid produced. Ninety-two percent of industrial ethanol was sold, and sales of other products were above 71% of production. Even though its products were inexpensive relative to those of its competitors, the Petromin Oil Lubricants Co. had its profits decreased by one-third to $8.5 million for a production of 1.3 million barrels of lube oils in Jeddah and Riyadh. The cause of the decline was a result of the declining local economy. SABIC's two steel product companies sold essentially all of their approximately 1-million-ton production of steel rods and bars, whereas methanol sales exceeded production, reaching 1.29 million tons.

The traditional Government policy of adherence to official OPEC prices for crude oil resulted in a loss in Saudi Arabia's share of the market while other OPEC members were increasing their production and ignoring official prices. To be competitive in the petrochemical market, the Government set prices of products from its new export refineries that were market-oriented. For petrochemical products from Yanbu, prices were based on a 15-day rolling average of Platt's Oil Marketing Bulletin prices for Northwest Europe, and the rolling average of prices for Northwest Europe and Singapore was used for products from Al Jubail. The plan was based on the success of the netback pricing system for crude oil.

Saudi Arabia's efforts at building a modern industrial environment within a decade were hindered by a shortage of personnel, but skilled and unskilled foreign labor was imported and paid for with profits of the crude oil industry while Saudis were trained. Products of this downstream industry were expected to be competitive in the world market because of the availability of low-cost associated-gas feedstock and its proximity to Asian markets. Saudi Arabia expected future exports of its petrochemical and refined products to the United States to reach 20%.

Table 1.—Saudi Arabia: Production of mineral commodities[1]

Commodity	1981	1982	1983	1984[p]	1985[e]
METALS					
Iron and steel: Metal: Steel, crude thousand metric tons	72	70	400	842	1,106
INDUSTRIAL MINERALS					
Cement, hydraulic do	4,735	7,153	8,126	9,000	9,000
Gypsum do	350	363	500	300	300
Lime[e] do	175	170	[2]9	[2]12	12
Nitrogen: N content of ammonia do	170	207	191	208	219
Sulfur: Byproduct, all sources do	600	900	793	833	1,068
MINERAL FUELS AND RELATED MATERIALS[2]					
Gas, natural:					
Gross million cubic feet	[r]1,849,900	1,200,000	950,000	1,025,900	252,000
Marketed[e] do	[r]785,600	[r]316,067	[r]154,700	[r]252,500	63,000
Natural gas liquids: All forms thousand 42-gallon barrels	163,582	159,769	[e]125,000	130,000	146,000
Petroleum:					
Crude do	3,579,920	2,309,428	1,657,100	1,645,400	1,231,000
Refinery products:					
Gasoline do	[r]32,300	[r]36,700	[r] [e]36,700	[r] [e]37,000	43,000
Jet fuel do	13,500	16,700	[e]17,000	[r] [e]17,000	19,000
Kerosene do	[r]12,200	[r]11,800	[r] [e]12,100	[r] [e]12,000	13,000
Distillate fuel oil do	[r]54,200	[r]67,000	[r] [e]68,700	[r] [e]68,700	77,000
Residual fuel oil do	[r]85,500	93,748	[r] [e]92,600	[r] [e]92,600	104,000
Liquefied petroleum gas do	[r]39,283	[r]34,752	[r] [e]31,000	[r] [e]31,000	35,000
Naphtha do	[e]47,000	[r]24,000	[e]32,000	[r] [e]35,900	40,000
Asphalt do	[e]8,300	[r]14,100	[r] [e]12,800	[r] [e]12,800	14,000
Unspecified do	[e]1,700	2,000	[r] [e]2,000	3,500	4,000
Refinery fuel and losses[e] do	10,500	10,000	9,000	10,000	11,000
Total do	[r]304,483	[r]310,800	313,900	320,500	360,000

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through Sept. 11, 1986.
[2]Includes Saudi one-half share of production in the Kuwait-Saudi Arabia Partitioned Zone.

Table 2.—Saudi Arabia: Exports of selected mineral commodities[1]

Commodity	1983	1984
Petroleum:		
Crude thousand 42-gallon barrels	[2]1,658,925	1,390,800
Refinery products:		
Liquefied petroleum gas do	117,530	101,016
Gasoline, motor do	37,230	--
Kerosene and jet fuel do	12,045	20,862
Distillate fuel oil do	70,810	19,032
Lubricants do	1,825	--
Residual fuel oil do	93,075	37,332

[1]Table prepared by Virginia A. Woodson. Destinations for petroleum are unavailable as well as for other commodities.
[2]Includes partly refined.

Table 3.—Saudi Arabia: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS				
Alkali and alkaline-earth metals	2,770	--		
Aluminum:				
Ore and concentrate	142,686	163,647	--	Australia 97,445; India 41,564.
Oxides and hydroxides	393	2,146	511	Netherlands 777; West Germany 558.
Ash and residue containing aluminum	436	22,623	NA	Thailand 22,252.
Metal including alloys:				
Scrap and unwrought	14,629	13,979	NA	Bahrain 7,942; Spain 4,949.
Semimanufactures	60,642	53,795	3,744	Greece 15,315; Brazil 6,582; Belgium-Luxembourg 4,186.
Arsenic: Metal including alloys, all forms	129	270	100	West Germany 50; Netherlands 40.
Chromium: Oxides and hydroxides	--	40	NA	United Kingdom 14; unspecified 26.
Cobalt:				
Oxides and hydroxides	154	62	NA	West Germany 18; unspecified 44.
Metal including alloys, all forms	196	166	22	Italy 83; Spain 36.
Copper:				
Sulfate	3,947	6,060	NA	Spain 5,082; West Germany 540.
Metal including alloys:				
Scrap	77	535	NA	NA.
Unwrought	58	--		
Semimanufactures	28,678	27,760	2,611	Canada 3,128; Japan 2,546; Taiwan 2,190.
Gold: Metal including alloys, unwrought and partly wrought troy ounces	738,180	600,254	NA	Switzerland 510,682; West Germany 81,984.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite	294,656	1,044,173	NA	Brazil 793,015; Sweden 148,710.
Metal:				
Pig iron, cast iron, related materials	377,853	384,667	38	Brazil 273,401; Sweden 77,276; Bahrain 20,000.
Ferroalloys	140	192	62	West Germany 53; Italy 9.
Steel, primary forms	214,296	204,882	31	Japan 91,189; West Germany 72,186; France 15,099.
Semimanufactures:				
Bars, rods, angles, shapes, sections thousand tons	2,972	2,062	2	Republic of Korea 697; Japan 533; Spain 207.
Universals, plates, sheets do.	559	516	3	Japan 325; West Germany 82; France 23.
Hoop and strip do.	10	7	([2])	Japan 2; West Germany 1; United Kingdom 1.
Rails and accessories do.	23	4	([2])	Japan 2; West Germany 1.
Wire do.	90	54	1	Japan 15; China 7; Republic of Korea 7.
Tubes, pipes, fittings do.	1,028	640	32	Japan 227; Italy 84; West Germany 69.
Castings and forgings, rough do.	93	80	9	India 14; United Kingdom 11; West Germany 6.
Lead:				
Ore and concentrate	158	--		
Oxides	214	396	NA	Australia 210; West Germany 95.
Metal including alloys:				
Scrap and unwrought	1,575	1,323	NA	United Kingdom 737; Jordan 163.
Semimanufactures	9,719	2,585	NA	West Germany 1,252; United Kingdom 392; Jordan 276.
Magnesium: Metal including alloys, scrap and unwrought	--	435	23	Qatar 400.
Manganese:				
Ore and concentrate, metallurgical-grade	7,424	22,649	--	France 10,716; Norway 9,885.
Oxides	159	--		
Mercury 76-pound flasks	638	--		
Molybdenum: Ore and concentrate[3]	1,001	1,629	121	United Kingdom 1,046; France 190.
Nickel: Metal including alloys, semimanufactures	360	174	9	Italy 62; West Germany 31; Spain 21.
Rare-earth metals including alloys, all forms	--	2,594	75	Cyprus 900; Czechoslovakia 780.
Silver: Metal including alloys, unwrought and partly wrought[4] troy ounces	24,370	88,286	NA	Switzerland 67,516; France 16,075.
Tin: Metal including alloys:				
Scrap and unwrought	34	140	--	Singapore 126; United Kingdom 5.
Semimanufactures	3,263	8,437	73	Japan 8,123; West Germany 154.

See footnotes at end of table.

Table 3.—Saudi Arabia: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Titanium: Oxides	4,277	6,637	3,313	United Kingdom 1,011; Belgium-Luxembourg 865.
Zinc:				
Ore and concentrate	514	217	--	Czechoslovakia 105; West Germany 105.
Oxides	898	952	38	West Germany 338; United Kingdom 206.
Metal including alloys:				
Scrap and unwrought	1,153	1,545	NA	West Germany 797; Czechoslovakia 343; Japan 299.
Semimanufactures	15,646	10,831	28	Japan 3,370; Belgium-Luxembourg 3,143; West Germany 1,045.
Other:				
Ores and concentrates	207	128	NA	United Kingdom 50; unspecified 78.
Oxides and hydroxides	215	652	53	West Germany 505; Norway 37.
Ashes and residues	436	542	NA	Netherlands 342; United Kingdom 91.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	306	427	40	Netherlands 335.
Grinding and polishing wheels and stones	3,208	3,607	39	Italy 2,002; Japan 374; West Germany 318.
Asbestos, crude	8,801	6,660	368	United Kingdom 1,523; Greece 1,500; Canada 1,200.
Barite and witherite	73,459	4,124	NA	Netherlands 3,266; United Kingdom 476.
Boron materials:				
Crude natural borates	387	--		
Elemental	339	1,255	727	Japan 184; West Germany 124.
Oxides and acids	--	267	--	West Germany 261.
Bromine	2,729	2,294	40	United Arab Emirates 1,948; France 195.
Cement thousand tons	15,543	12,119	1	Japan 4,032; Spain 3,556; Greece 1,958.
Chalk	3,995	2,611	12	Belgium-Luxembourg 1,069; France 892.
Clays, crude: Fire clay	23,189	26,005	638	Bulgaria 12,079; India 4,848; Brazil 2,835.
Diamond:				
Gem, not set or strung value, thousands	$2,001	$1,086	NA	Belgium-Luxembourg $378; India $274; Italy $194.
Industrial stones do	$471	$253	NA	India $178; West Germany $56.
Diatomite and other infusorial earth	10,518	6,871	5,672	Netherlands 764; Spain 203.
Feldspar, fluorspar, related materials	1,136	1,663	NA	Italy 1,000; France 529.
Fertilizer materials:				
Crude, n.e.s	89,594	107,545	2,292	West Germany 45,641; Belgium-Luxembourg 19,999; France 15,731.
Manufactured:				
Ammonia	588	1,416	95	United Kingdom 499; U.S.S.R. 403; Netherlands 184.
Nitrogenous	73,497	97,501	8,341	Netherlands 21,957; Sweden 18,206; West Germany 11,289.
Phosphatic	97,254	191,775	7,789	Iraq 119,232; Italy 10,150; Netherlands 8,093.
Potassic	29,119	81,097	4,309	Italy 30,753; Belgium-Luxembourg 11,599; Portugal 5,000.
Unspecified and mixed	21,793	31,846	3,843	Romania 8,510; Netherlands 8,213.
Gypsum and plaster	96,788	111,172	1,898	Yemen (Sanaa) 47,404; France 25,106; West Germany 23,788.
Kyanite and related materials:				
Andalusite	3,937	4,570	286	West Germany 2,140; U.S.S.R. 1,115; United Kingdom 815.
Lime	9,937	15,714	418	United Arab Emirates 7,475; Lebanon 2,653; Italy 1,907.
Magnesium compounds:				
Magnesite, crude	869	--		
Oxides and hydroxides	--	376	NA	West Germany 163; Netherlands 33; unspecified 178.
Mica:				
Crude including splittings and waste	1,032	670	--	India 560; Italy 92.
Worked including agglomerated splittings	109	412	NA	Italy 392; unspecified 19.

See footnotes at end of table.

Table 3.—Saudi Arabia: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Nitrates, crude	7,666	292	NA	West Germany 118; unspecified 123.
Phosphates, crude	345	--		
Pigments, mineral:				
Natural, crude	5,667	NA		
Iron oxides and hydroxides, processed	15,949	20,502	NA	Qatar 19,189; West Germany 496.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$766	$602	NA	India $284; Netherlands $71; West Germany $57.
Synthetic do	$1,109	$869	NA	West Germany $291; Iran $215; India $210.
Salt and brine	20,665	16,880	12,187	Netherlands 2,083; United Kingdom 563.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	60,226	66,521	367	Belgium-Luxembourg 15,534; Sweden 5,932; United Kingdom 5,882.
Sulfate, manufactured	10,164	18,975	4,376	West Germany 8,484; United Kingdom 3,316.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	64,578	59,486	309	Italy 48,106; Sweden 2,414; Spain 2,020.
Worked	614,408	609,671	2,292	Italy 433,229; Greece 56,214; Spain 42,464.
Dolomite, chiefly refractory-grade	1,917	2,183	NA	France 1,311; Netherlands 367; West Germany 252.
Gravel and crushed rock	284,497	134,527	1,199	Italy 78,252; United Arab Emirates 39,000.
Limestone other than dimension	798	--		
Quartz and quartzite	891	1,454	NA	West Germany 824; Italy 474.
Sand other than metal-bearing	7,846	8,068	430	Netherlands 4,960; United Kingdom 1,197.
Sulfur:				
Elemental:				
Crude including native and byproduct	287	170	NA	Kuwait 137; unspecified 33.
Colloidal, precipitated, sublimed	591	425	NA	France 285; Kuwait 42; unspecified 80.
Dioxide	--	308	--	United Arab Emirates 120; Japan 116; Netherlands 60.
Sulfuric acid	1,191	1,285	41	West Germany 644; Belgium-Luxembourg 299.
Talc, steatite, soapstone, pyrophyllite	1,876	5,379	NA	Finland 3,103; Austria 1,018.
Other: Crude	--	7,983	425	West Germany 2,310; United Kingdom 1,571; Belgium-Luxembourg 1,569.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	2,764	1,217	328	France 277; Norway 171; Netherlands 129.
Carbon black	178	148	25	United Kingdom 34; West Germany 25; Belgium-Luxembourg 17.
Coal: All grades including briquets	4,457	6,220	801	West Germany 3,325; Thailand 682.
Coke and semicoke	941	224	31	NA.
Peat including briquets and litter	669	1,185	NA	U.S.S.R. 750; Finland 338.
Petroleum:				
Crude 42-gallon barrels	1,627	1,706	288	Netherlands 742; unspecified 676.
Refinery products:				
Liquefied petroleum gas do	1,322	2,320	766	United Kingdom 673; Italy 209.
Mineral jelly and wax do	894	2,967	110	United Kingdom 1,676; Ireland 299.
Kerosene and jet fuel do	10,540	8,145	217	West Germany 3,650; Netherlands 3,170.
Lubricants do	1,099,119	1,165,752	187,012	Netherlands 322,049; United Kingdom 269,990; Singapore 200,074.
Nonlubricating oils do	80,150	150,269	12,628	United Arab Emirates 26,859; United Kingdom 21,483; Singapore 20,111.
Residual fuel oil do	--	1,179	506	United Kingdom 619.
Bitumen and other residues do	6,266	2,933	152	United Kingdom 1,645; Japan 315.
Bituminous mixtures do	45,274	28,585	1,696	United Kingdom 18,340; Netherlands 1,400.

NA Not available.
[1]Table prepared by Virginia A. Woodson.
[2]Less than 1/2 unit.
[3]May contain vanadium and tantalum ores.
[4]May include platinum-group metals.

COMMODITY REVIEW

METALS

Aluminum.—Since the three Arab smelters in Bahrain, Dubai, and Egypt found themselves in strong competition with other world producers having both low energy costs and inexpensive sources of alumina in a market of oversupply of high-quality products and falling prices, Saudi Arabia continued to finance the expansion of Aluminium Bahrain Ltd.'s (Alba) smelter rather than begin to build its own facility. Alba started a retrofit program to upgrade potlines by adding computerized control systems. Ardal og Sunndal Verk A/S of Norway was the contractor for this project.

Interest continued in developing the Zabirah bauxite deposit as a substitute source of alumina for Persian Gulf smelters that were buying from U.S. multinational-company suppliers. Low-kaolin bauxite from Zabirah may be satisfactorily converted to alumina by the Bayer process. The required caustic soda would be available at low cost as a petrochemical byproduct. The deposit had inferred reserves of 94 million tons of low-silica bauxite with an available alumina content of 50%.

Copper.—The evaluation of the Al Masane copper prospect continued in southern Saudi Arabia. Arabian Shield Development Co. and National Mining Corp. increased reserves of zinc, copper, gold, and silver to at least 15 years by drilling and underground sampling.

Gold.—Gold Fields Mahd adh Dhahab Ltd., a subsidiary of Gold Fields Group, the United Kingdom, was evaluating bids for the General Petroleum and Mineral Organization (Petromin), the state energy and minerals agency, for the design, engineering, procurement, and construction of an ore treatment plant at the Mahd adh Dhahab gold mine, 170 miles northeast of Jeddah. Four contracts for the mining complex had been awarded previously that were valued at $20 million. Reserves were 1.08 million tons of ore grading 0.92 troy ounce of gold per ton. Daily production was expected to be 500 troy ounces of gold from 900 tons of ore. The total investment would be $38 million, low by world standards.

Iron and Steel.—The Rolling Mill Co., part of Saudi Iron and Steel Co. (Hadeed), reported a production increase of 6% in 1985 to 138,000 tons. Production was expected to increase to 160,000 tons in 1986, and sales were projected to increase to 210,000 tons.

The National Industrialization Co. planned to build a $50 million steel wire drawing plant at Jubail. Up to 90% of the feedstock would come from the Hadeed plant.

British Steel Corp. Overseas Ltd. continued to evaluate the economic potential of the Wadi Sawawin iron deposit in northwestern Saudi Arabia. Reserves were estimated at 330 million tons of 22% iron. After 5 years of test mining of Wadi Sawawin and studies at the nearby Al Muhwaylih 5-ton-per-hour pilot plant on the Red Sea coast, the selective fine-grinding, flocculation-reverse, anionic flotation process developed specifically for the low-grade ore by the U.S. Bureau of Mines was found to be technically feasible. Hadeed then became interested in performing tests in its direct-reduction shaft furnace using small sample charges of the enriched 65% iron pellets. Hadeed's newly commissioned 800,000-ton-per-year steel plant at Al Jubail on the gulf coast may use Wadi Sawawin pellets eventually rather than Swedish and Brazilian pellets and Brazilian lump iron ore. However, since the upgrading process would be energy intensive and the transport cost to Jubail would be high, Government support of the industry would probably be necessary.

Tin.—The Deputy Ministry for Mineral Resources reported the discovery of tin deposits at Jabal Al Silsilah, about 60 miles west of Buraidah, one of which contains 1 million tons of 0.18% tin. Although this deposit and associated smaller deposits were not of economic quality, they were thought to be an indication of the high potential of the region as a source of tin and associated tungsten.

Titanium.—IDI Ltd., a Saudi private-sector industrial group, was planning to build a 50,000-ton-per-year titanium dioxide (TiO_2) plant at Al Jubail. The $130 million plant would probably use chloride technology on imported rutile from Australia. Markets for the TiO_2, a white pigment used in paints, paper, plactics, and rubber, would be in north Africa, the Middle East, and Pakistan.

INDUSTRIAL MINERALS

Cement.—Saudi Arabia was unable to satisfy domestic needs for cement from its own production of eight plants. The demand for cement declined as many construction projects in the planning stages were canceled and the pace of construction decreased as a result of decreasing oil revenues. Current annual consumption was about 23 million tons. Cement was also exported to Iraq and Qatar. Saudi Cement Corp. built the first cement plant in 1961 in Hofuf, eastern Saudi Arabia, and awarded a contract in 1985 to Mitsubishi Mining and Cement Co. Ltd. of Japan for the supply and installation of a 500-ton-per-hour mobile crusher and a 7-mile-long conveyor belt at its Jeddah limestone quarry to be completed by August 1987.

Yamama Saudi Cement Co. Ltd. continued to build its sixth line at its Riyadh plant where daily capacity would be increased from 3,100 tons to 8,700 tons. New equipment was to consist of a preheater kiln with a precalciner rated at 3,000 tons per hour, a 280-ton-per-hour roller mill for raw material grinding, and a cement mill rated at 180 tons per hour. The total capacity of the powerplant was to be raised to 65 megawatts by the installation of three diesel engines. Commissioning was scheduled for 1986.

The Saudi-Kuwait Cement Manufacturing Co. (SKCMC) started its 7,000-ton-per-day plant at El Khursaniyah, 40 miles northwest of Jubail, which had two identical production lines with 3,500-ton-per-day preheater kilns and precalciners with bypass, a 360-ton-per-hour raw mill, and a 135-ton-per-hour cement mill. Fuel for the cement plant was supplied by a 40-mile-long natural gas pipeline from the Aramco gas and oil separation plant in Jubail. SKCMC was reported to be making a profit in the second quarter of 1985. In July, the company signed a contract to supply Kuwait Cement Co. with 1 million tons per year of clinker starting in 1987.

Construction continued on The Qassim Cement Co. plant in Buraydah. The $110 million, 2,200-ton-per-day extension project, consisting of a mobile large-scale crusher with a single-cycle hammer for the quarry and a precalciner with bypass system, was scheduled for completion in early 1987.

Fertilizer Materials.—Saudi Arabia had been a source of urea for world markets since 1969, and total urea production reached 863,000 tons by 1984. Urea production by SAFCO in Damman, an affiliate of SABIC, was a record high 353,361 tons in 1985. Ammonia output reached 215,088 tons, and sulfuric acid production was 83,749 tons. SAFCO announced 1985 pretax profits of $45.6 million, up by 3.7% from that of 1984. With the commissioning of the new ammonia plant by SABIC-SAFCO in Al Jubail, Saudi Arabia would join Abu Dhabi, Kuwait, and Qatar as both producers and exporters of ammonia for fertilizer and industrial uses.

Design of a 500,000-ton-per-year ammonia plant at Jubail was continuing by Toyo Engineering Corp. of Japan for the joint venture company National Chemical Fertilizer Co., owned by SABIC and SAFCO. The production plant, storage complex at the port, and linking pipeline, all costing about $100 million, were expected to be commissioned in 1988 when the total Saudi ammonia capacity would be nearly doubled to 842,000 tons per year of nitrogen. The liquid ammonia was expected to supply the domestic and export markets for fertilizer and industrial uses. SAFCO operated an ammonia-urea plant at Damman, having a capacity of 200,000 tons per year, and the SABIC-Taiwan Fertilizer Co. Ltd. owners of Jubail Fertilizer Co. had an ammonia-urea plant at Al Jubail with a capacity of 330,000 tons per year.

The Directorate General of Mineral Resources announced a major discovery and the progressing economic evaluation of a phosphate deposit in the Al Jalamid area southeast of Turayf in northern Saudi Arabia. The deposit is within a 15-square-mile area and below 43 feet of overburden. Two reserve estimates were reported at 310 million tons of 23% phosphorus pentoxide and 1 billion tons having a grade of 17% to 19%. This relatively low-grade rock would require upgrading to the selling grade of 34% to 36%. The ultimate goal was a phosphoric acid and fertilizer industry using locally available sulfuric acid. The required potash was being sought along the Red Sea coast and around the Farasan Islands.

Sulfur.—The Middle East was a major supplier of sulfur, and Saudi Arabia was the most important producer with three major export-oriented plants. Saudi Arabian sulfur production was up by about 240,000 tons in 1985, although exports declined nearly 600,000 tons to slightly over 900,000 tons. Sulfur was derived primarily from associated sour natural gas; oil and nonassociated gas were also important sources.

The major source of refined sulfur is the 20,000-ton-per-year plant at Damman that is owned by the National Establishment for Agricultural and Industrial Sulfur (NEAIS). Feedstock is from the Aramco gas purification plants near Al Jubail. To satisfy the export and local demand for the exceptionally pure sulfur, a 3-month stockpile was kept routinely, and doubling capacity by adding a second work shift was considered. NEAIS sulfur was used in fungicides, pesticides, and irrigation-water treatment products.

MINERAL FUELS

Coal.—A long-term coal exploration program began in 1982, and seams of subbituminous coal up to 2 feet thick were in the Qassim region. Evaluation continued to determine the extent of the deposit and its potential as a moisture retainer in the agriculture industry.

Natural Gas.—As swing producer of crude oil within OPEC, Saudi Arabia decreased production prior to mid-1985 of crude oil and associated gas causing electric power cuts and shortfalls in the planned production of liquefied petroleum gas (LPG). In an effort to conserve gas, Saudi Arabia agreed in principle with member states of the Gulf Cooperation Council to build a gas grid linking these states, but a consensus on prices was needed between potential suppliers, Qatar and the United Arab Emirates, and potential buyers, Saudi Arabia and Kuwait.

Saudi Arabia was working on the second phase of the $14 million Master Gas Gathering System that would bring the system to full capacity from 3.4 trillion cubic feet per day to 5 trillion cubic feet per day. The system was designed to gather and desulfurize associated gas at 26 separators at Ghawar, Harmaliyah, and Berri Oilfields and to pipe natural gas liquids to fractionation plants at Ras Tanura, Ju'aymah, and Yanbu for the production of ethane gas, LPG, and natural gasoline.

Aramco was progressing toward completion in mid-1985 of a 1-billion-cubic-foot-per-day nonassociated gas system that was to prevent future gas shortages. The 27-well development was to tap the deep Permian Khuff formation beneath the Ghawar Oilfield. About 750 million cubic feet of gas was estimated to be available. Aramco was also training workers in gas gathering and processing.

Aramco was upgrading the flaring system at the Abqaiq gas-oil separation plant, which was to increase the gas handling capacity to 700 million cubic feet per day by early 1986. The rate of gas burned was to decrease from 400,000 cubic feet per day to 50,000 cubic feet per day.

Saudi Arabia charted three ultralarge and very large crude oil tankers for additional storage capacity of 5 million to 6 million barrels of Arabian Light crude oil at Ras Tanura. The total floating stockpile storage capacity was about 50 to 60 million barrels. Additional production of gas-rich Arabian Light became necessary because relatively low oil production levels had brought about serious gas shortages and the need to draw on strategic reserves of gas stored underground.

Petroleum.—*Transportation.*— Aramco was in the process of partially looping its Abqaiq-Yanbu Pipline (Petroline) 760 miles from Abqaiq-Ghawar Oilfields in the Eastern Province to Yanbu and the Red Sea coast. The new pipeline, parallel to the existing line and using the same pumping stations, would increase the total capacity from 1.85 million barrels per day to about 2.8 million barrels per day. Orders for 315,000 tons of 56-inch pipe were placed with four Japanese steel manufacturers; 140,000 tons would be supplied by a Saudi company, the National Pipe Co., and the remaining pipe would come from Italy. Mannesmann Anlagenbau AG of the Federal Republic of Germany and Consolidated Contractors International Co. Ltd., a Lebanese company in Greece, was constructing the eastern 375 miles for $80 to $90 million. The western 385 miles were being built by the Italian-Saudi joint venture Saudi Arabian Saipem for about $90 million. About 1 million barrels per day was pumped through the existing pipeline.

The first Basrah Light crude oil was delivered at the end of September to Yanbu through the new 500,000-barrel-per-day Iraqi-Saudi pipeline. The Iraqi line from the Rumaila Oilfield joined, at PS-3 pump station, Petroline between the Ghawar Oilfield and Yanbu. The capacity of the new 400-mile, 48-inch line was expected to increase to 1.6 million barrels per day in 1987 when the Petroline looping project was to be completed. Saipem S.p.A., Snamprogetti S.p.A., and Siderexport S.p.A. of Italy, and Spie Capag of France completed the construction.

A route for a new independent pipeline from the southern Iraqi oilfields and a site for the terminal on the Red Sea coast about 30 miles south of Yanbu were approved by the Government. Four Japanese steel companies were awarded a contract by Iraq's State Corp. for Oil Projects to supply 90,000 tons of steel pipe.

Refining.—The new domestic and export refinery at Rabigh on the Red Sea was scheduled to be operating by 1989. This refinery, owned equally by Petromin of Saudi Arabia and Petrola S.A. of Greece, was expected to have a capacity of 325,000 barrels per day, including 57,500 barrels per day of naphtha, 30,000 barrels per day of kerosene, 74,000 barrels per day of gas-diesel oil, and 156,200 barrels per day of fuel oil. Storage capacity comprised 33 tanks for 170 million barrels of products, and 21 tanks for 22 million barrels of crude oil, which was 60 days of feedstock. The associated oil terminal was to have five berths, an industrial area, a power-desalination plant providing 80 megawatts and 282,000 cubic feet of water, a housing complex, and an airport.

After announcing a cancellation of construction of the new 160,000-barrel-per-day refinery at Qassim, 22 miles north of Buraydah, Qassim Province, and the cancellation of a planned refinery at Al Shuqaiq in the southwestern part of the country, the Government announced that only the Qassim project would be completed during the 5-year plan beginning in March 1985, and only if economic conditions improved and domestic demand increased. Bechtel Petroleum Inc. of the United States announced that engineering work was 75% complete and construction was 15% complete in the Qassim project.

The Ras Tanura domestic refinery was being modernized by the addition of a new two-stage crude distillation unit, which had a design capacity of 250,000 barrels per day of light and heavy naphthas, kerosene, diesel fuels, vacuum gas oil, and vacuum residuum from light and heavy Arabian crude oils, and a sulfur recovery unit. Completion of this project was scheduled for the end of 1986. At the Riyadh refinery, the production capacity of the unit that removed salt from oil had been increased. As a result, this refinery's first-phase refining capacity had risen from 15,000 to 20,000 barrels per day.

Chiyoda-Petrostar Ltd. of Japan was given a letter of intent from Petromin Lubricating Oil Refining Co. (Luberef) for the construction of a 1.5-million-barrel-per-day lube oil plant, Luberef 2, at Yanbu by 1988. However, the project was delayed until 1986 as a result of inadequate financing. Luberef, 70% owned by Petromin and 20% by Mobil Oil Corp. of the United States, was operating a lube refinery at Jeddah with a capacity of 1.6 million barrels per day. The Jamjoom-French Lubricants Co., a joint venture between Ahmad Jamjoom of Saudi Arabia and Cofran Lubricants of France, also planned to build a 48,000-barrel-per-year lube oil blending plant in Jeddah by 1986.

Petromin and Shell Oil Co. began operating their $1.4 million, 250,000-barrel-per-day export refinery at Jubail when the last 36,000-barrel-per-day hydrocracker, based on a Shell process, came on-stream. The refinery had two 120,000-barrel-per-day atmospheric distillation columns, a 69,000-barrel-per-day vacuum unit, a 30,500-barrel-per-day visbreaker, and a 15,000-barrel-per-day platformer. The first export cargo was 200,000 barrels of fuel oil, and an additional 400,000 barrels of fuel oil was scheduled for lifting. Later, two major Japanese trading houses, C. Itoh & Co. Ltd. and Mitsui & Co., began buying Petromin's share of available naphtha, kerosene, and gas oil products. Sales were on a month-to-month basis with prices being market-related rather than official. By June 1985, throughput was averaging 130,000 to 150,000 barrels per day using Arabian Light crude oil as feedstock. The refinery's design capacities were 5,000 barrels per day of LPG, 60,000 barrels per day of naphtha, 45,000 barrels per day of kerosene, 75,000 barrels per day of diesel, 65,000 barrels per day of fuel oil, 5,000 barrels per day of benzene, and 250 tons per day of sulfur.

Petrochemicals.—Production of LLDPE and ethylene glycol began in the third quarter of 1985 at the new plants in Jubail that were owned by Sharq, a joint venture between SABIC and a group of Japanese companies, including Mitsubishi. The $1.35 billion plants had an annual design capacity of 130,000 tons of LLDPE and 300,000 tons of ethylene glycol. The ethylene glycol plant uses the Shell oxygen process. Ethylene feedstock for production of LLDPE and ethylene glycol was supplied by the Arabian Petrochemical Co., a SABIC company.

The Sadaf joint venture between SABIC and Shell at Al Jubail commissioned its 300,000-ton-per-year, $2.5 billion styrene plant. Two 7,500-ton cargoes of styrene were shipped in July to the Far East. Commissioning also occurred for the chloralkali unit that would produce caustic soda for Australia and ethylene dichloride for the

SABIC-Lucky polyvinyl chloride plant in Al Jubail that was due on-stream in 1986. The Sadaf complex had an annual design capacity of 656,000 tons of ethylene, 454,000 tons of ethylene dichloride, 281,000 tons of crude industrial ethanol, 295,000 tons of styrene, and 377,000 tons of caustic soda. After some initial importing of benzene feedstock, the Petromin-owned local refinery in Al Jubail provided it. Japan, the Republic of Korea, and southeast Asia were to receive at least one-half of the production, and some was to be marketed in Western Europe and the United States through Shell. Some product was to feed a 100,000-ton-per-year polystyrene plant at Jubail. Over 100,000 tons per year would be sold to Japan through Mitsubishi and Mitsui.

In 1985, the Yanpet plant at Yanbu, a joint venture between SABIC and Mobil, exported 156,000 tons of ethylene glycol, 89,000 tons of LLDPE, and 155,000 tons of HDPE. Europe, including the United Kingdom, received 30% of the LLDPE. The plant had two LLDPE reactors, and a third was producing a high-density product. Annual capacities of the $2.5 billion plant were 450,000 tons of ethylene, 200,000 tons of LLDPE, and 90,000 tons of HDPE.

SABIC, through its subsidiary Petrokemya, started its 500,000-ton-per-year ethylene plant in Al Jubail that was built by Chiyoda Chemical Engineering and Construction Co. of Japan. Union Carbide Corp. of the United States gradually turned over the plant to 160 Saudis whom it had trained after assisting in managing the design, construction, and startup. The new plant would provide feedstock to Sharq and the National Plastic Co. (Ibn Hayyan) plant that was scheduled to begin operating in 1986, and 30,000 tons of ethylene was exported through the Al Jubail ethylene terminal. SABIC also signed licensing agreements with Cosden Technology of the United States and Société Chimique des Charbonnages for the use of process technology in the construction at Al Jubail of polystyrene units with combined capacities of 100,000 tons per year, to be added to the ethylene plant by 1988. Production annually was expected to be 50,000 tons of high-impact polystyrene, 30,000 tons of general-purpose-grade polystyrene, and 20,000 tons of expandable polystyrene. Builders were expected to be either Litwin S.A. of France or Chiyoda of Japan. Styrene monomer feedstock was to be drawn from the SABIC-Shell Sadaf styrene plant at Al Jubail.

Kemya signed a 7-year loan for $118.3 million for startup costs, initial working capital, and other business in connection with the 270,000-ton-per-year polyethylene plant at Al Jubail. Kemya was a 50-50 joint venture between SABIC and Exxon Chemical Arabia Inc.

The Saudi European Petrochemical Co. (SEPC) gave a construction management contract to Snamprogetti of Italy to construct by 1988, at Al Jubail, a $300 million butane dehydrogenation facility that would produce the gasoline additive methyl tertiary butyl ether (MTBE), butadiene, and butene-1. Feedstock would be 120,000 tons per year of methanol from SABIC joint ventures and 400,000 tons per year of butane from Petromin refineries. About 320,000 tons per year of isobutylene would be produced from isobutane; in turn, 500,000 tons per year of MTBE would be produced by reaction of isobutylene with methanol. Other products would be 124,000 tons of butadiene and 80,000 tons of butene-1. SABIC held a 70% interest in SEPC and expected to market almost one-half the output. Two other partners, Enichem S.p.A. of Italy and Neste Oy of Finland, would market the remainder.

The Jubail petrochemical complex began operating its aromatics unit designed and licensed by Universal Oil Products Co. (UOP) of the United States. UOP's continuous-catalyst regeneration platforming method of producing benzene, toluene, and xylene from more than 16,000 barrels per day of hydrocracked naphtha was used by Petromin-Shell, the operator.

Mobil and Saudi Arabian partners were planning a joint venture, Arabian Chemical Terminals, to build a chemical terminal at Yanbu to handle imports of solvents and chemicals. National Engineering Services and Marketing Co. and Costain Process Engineering and Construction Ltd. of the United Kingdom would build the terminal consisting of 12 liquid storage tanks of 12,500-ton capacity, and 3 pipelines to connect the tanks to berths for vessels of 5,000 to 35,000 deadweight tons.

Construction began in Jeddah on a $30 million polystyrene plant by the Arabian Chemical Co., a joint venture between Dow Chemical Co. of the United States and E. A. Juffali and Bros. of Saudi Arabia. Production of extruded polystyrene was to be used for insulation in the domestic construction market.

The National Shipping Co. of Saudi Arabia took delivery of its first petrochemical tanker, a 43,000-deadweight-ton vessel built in the Republic of Korea for $20 to $22 million. The ship was to be leased to the National Methanol Co. for 7 years. Sadaf was also planning on leasing another 41,500-deadweight-ton tanker under construction in the Republic of Korea.

The Ibn Hayyan plant in Jubail, which was due to start production in early 1986, was designed to produce 300,000 tons per year of vinyl chloride monomer and 200,000 tons per year of polyvinyl chloride.

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[1]Physical scientist, Division of International Minerals.
[2]Saudi Arabian fiscal year 1985: Mar. 22, 1985—Mar. 10, 1986.

The Mineral Industry of Sierra Leone

By Ben A. Kornhauser[1]

The mineral industry continued to be Sierra Leone's major source of foreign exchange, with rutile exports becoming an important contributor. Austromineral GmbH, a subsidiary of the Austrian state-owned firm of Voest-Alpine AG, ceased operating the Marampa iron ore mine because the operation was uneconomical. Smuggling of precious minerals remained a problem that the Government was still trying to suppress in order to improve income and foreign exchange earnings.

PRODUCTION AND TRADE

The bulk of Sierra Leone's foreign exchange continued to be generated by its mineral industry. During the first 9 months of the 1985 fiscal year, which started in July 1984, the trade deficit, based on estimated export and import figures, amounted to $23.1 million,[2] and the overall balance-of-payment deficit was $109 million. In that period, mineral exports of $64.6 million were as follows, in millions of dollars: bauxite, $18.7; diamonds, $19.7; gold, $4.7; iron ore, $0.7; and rutile, $20.7. Although some restructuring of the economy through International Monetary Fund (IMF) efforts occurred, including a currency devaluation, IMF funds were ultimately cut off late in the year.

Although the production and shipments of rutile concentrate by Sierra Rutile Ltd. (SRL) decreased compared with those of 1984, the value of the shipments was about $31.7 million, considerably greater than that of 1984, which permitted extensive overhauling and improvement of the plant.

The Precious Minerals Marketing Co. (PMMC) had difficulty in selling some of its diamonds. PMMC's dominance in the country's market was undercut by the issuance of diamond and gold export licenses to several traders. Also, the Government established the Government Gold and Diamond Office (GGDO) to handle the various phases of precious commodity transactions, and was expected to use the stores of these minerals as collateral for loans.

Table 1.—Sierra Leone: Production of mineral commodities[1]

Commodity[2]	1981	1982	1983	1984[p]	1985[e]
Aluminum: Bauxite, gross weight thousand metric tons	610	631	785	1,000	800
Diamond:					
Gem thousand carats	208	203	242	240	240
Industrial stones do	97	87	103	105	105
Total do	305	290	345	345	345
Gold troy ounces	3,435	8,729	[3]12,000	[3]18,223	18,000
Iron ore metric tons	--	66,000	420,000	355,000	300,000
Petroleum refinery products:					
Gasoline thousand 42-gallon barrels	343	228	213	238	NA
Jet fuel do	131	84	112	128	NA
Kerosene do	213	151	93	93	NA
Distillate fuel oil do	548	414	671	709	NA
Residual fuel oil do	383	295	400	433	NA
Liquefied petroleum gas do	9	9	9	9	NA
Other do	NA	1	1	1	NA
Refinery fuel and losses do	88	25	60	64	NA
Total do	1,715	1,207	1,559	1,675	NA
Salt[e] thousand metric tons	200	200	200	200	200
Titanium: Rutile ore and concentrate, 96% TiO_2 gross weight metric tons	50,795	47,709	71,800	91,300	[4]81,000

[e]Estimated. [p]Preliminary. NA Not available.
[1]Table includes data available through July 16, 1986.
[2]In addition to the commodities listed, a variety of crude construction materials (clays, sand and gravel, and stone) was produced, but output was not reported, and available general information was inadequate to make reliable estimates of output levels. Sierra Leone annually refined 4,000 to 10,000 metric tons of salt from imported crude marine salt, but this was not included in the body of the table because it would represent double counting of materials credited to the country where the salt was originally collected. This output would be in addition to that reported in this table.
[3]Based on export figures reported in the Mining Journal (London), v. 304, No. 7804, Mar. 15, 1985, p. 180.
[4]Reported figure.

Table 2.—Sierra Leone: Exports of mineral commodities[1]

Commodity	1983	Destinations, 1983: United States	Destinations, 1983: Other (principal)
Aluminum: Ore and concentrate metric tons	523,705	--	Netherlands 292,456; Switzerland 132,935; Venezuela 69,710.
Diamond:			
Gem, not set or strung value, thousands	$21,448	$704	United Kingdom $10,482; Belgium-Luxembourg $10,262.
Industrial stones do	$7,282	$1	Belgium-Luxembourg $5,504; United Kingdom $1,777.
Iron and steel:			
Iron ore and concentrate excluding roasted pyrite do	$71	--	Austria $70.
Metal, scrap do	$121	--	United Kingdom $70; West Germany $37.
Petroleum refinery products:			
Liquefied petroleum gas do	$9	--	Guinea $6; Liberia $3.
Gasoline, motor do	$6	--	All to Liberia.
Distillate fuel oil 42-gallon barrels	3,931	--	All for ship's stores.
Lubricants do	12,985	--	Do.
Residual fuel oil do	56,717	--	Switzerland 48,198; United Kingdom 4,382.
Other metals: Ores and concentrates metric tons	46,216	--	Netherlands 36,236; United Kingdom 9,980.

[1]Table prepared by Virginia A. Woodson. Comparable data for 1982 and 1984 were not available at the time of publication.

Table 3.—Sierra Leone: Imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	Sources, 1983: United States	Sources, 1983: Other (principal)
METALS			
Alkalai and alkaline-earth metals	137	--	Netherlands 68; West Germany 35; France 34.
Aluminum: Metal including alloys, semimanufactures value, thousands	$244	$10	France $128; Netherlands $65.
Copper: Metal including alloys:			
Scrap	1	--	All from Guinea.
Semimanufactures value, thousands	$9	--	United Kingdom $7; Netherlands $1.
Iron and steel: Metal:			
Scrap	1	NA	NA.
Pig iron, cast iron, related materials	225	--	West Germany 174; Spain 51.
Semimanufactures:			
Bars, rods, angles, shapes, sections	1,938	--	Belgium-Luxembourg 867; West Germany 397; East Germany 27.
Universals, plates, sheets value, thousands	$1,058	--	Japan $717; Belgium-Luxembourg $129.
Hoop and strip	1	--	All from West Germany.
Wire	420	--	East Germany 293; Poland 100.
Tubes, pipes, fittings	681	2	Italy 140; Belgium-Luxembourg 123; Thailand 72.
Castings and forgings, rough value, thousands	$44	--	United Kingdom $24; Belgium-Luxembourg $16.
Lead: Metal including alloys:			
Unwrought	6	--	United Kingdom 5.
Semimanufactures value, thousands	$2	--	All from United Kingdom.
Tin: Metal including alloys, semimanufactures do	$1	--	All from Sweden.
Titanium: Oxides	14	--	All from West Germany.
Other: Base metals including alloys, all forms value, thousands	$2	--	Mainly from Belgium-Luxembourg.
INDUSTRIAL MINERALS			
Boron materials: Oxides and acids	18	--	All from United Kingdom.
Cement	1,579	--	France 1,219; Netherlands 117; Poland 58.
Fertilizer materials: Manufactured:			
Ammonia	5	--	Denmark 3; West Germany 1.
Nitrogenous	672	--	Netherlands 449; Saudi Arabia 213.
Phosphatic	2,639	--	Netherlands 2,619.
Gypsum and plaster	228	--	All from France.
Lime	368	--	Netherlands 180; United Kingdom 48.
Pigments, mineral: Iron oxides and hydroxides, processed	3	--	All from West Germany.
Salt and brine	7,966	--	Senegal 7,000; West Germany 671.
Sodium compounds, n.e.s.: Carbonate, manufactured	65	--	Poland 25; West Germany 30.
Stone, sand and gravel:			
Dimension stone: Worked value, thousands	$1	--	All from Lebanon.
Sand other than metal-bearing	1	--	All from China.
Sulfur:			
Elemental: Crude including native and byproduct	52	--	All from Netherlands.
Sulfuric acid	2	--	All from United Kingdom.
Other: Crude	160	--	Netherlands 110; United Kingdom 50.
MINERAL FUELS AND RELATED MATERIALS			
Petroleum:			
Crude thousand 42-gallon barrels	1,615	--	All from Nigeria.
Refinery products:			
Liquefied petroleum gas value, thousands	$27	--	West Germany $14; Netherlands $6.
Gasoline, motor do	$62	--	All from Netherlands.
Mineral jelly and wax 42-gallon barrels	2,487	--	West Germany 1,480; China 519; Spain 283.
Kerosene and jet fuel do	23	16	Belgium-Luxembourg 7.
Lubricants do	21,091	--	Belgium-Luxembourg 13,993; United Kingdom 5,327.
Bituminous mixtures do	2,648	--	Netherlands 1,212; Belgium-Luxembourg 951.

NA Not available.

[1]Table prepared by Virginia A Woodson. Comparable data for 1982 and 1984 were not available at the time of publication.

COMMODITY REVIEW

METALS

Gold.—The Government-established GGDO, which was run by an eight-person board, ended PMMC's monoply. GGDO was created to buy gold and diamonds at competitive prices, and to sort, value, parcel, market, and export them. With new stringent measures to prevent smuggling, GGDO was expected to provide the Government with a strong credible basis for raising external loans by using its stock of gold and diamonds as collateral.

Iron Ore.—Austromineral notified the Government of its intention to cease operating the Marampa iron ore mine on June 30, 1985. Reactivation and operation of the Marampa Ore Mining Co. Ltd. had been based on an annual production of 1 million tons of salable iron ore. However, production had been considerably lower since operations resumed in 1983. Austromineral withdrew because of a combination of factors that included very low production, low market prices of iron ore, and high labor costs.

Titanium.—While production of rutile was down 11.3%, to 81,000 tons, from the 1984 output, shipments amounted to 93,000 tons, which were 18.9% below 1984 shipments. However, the value of 1985 shipments, at $31.7 million, was 27% larger than that of 1984. The better average market price of $342 per ton of rutile concentrate permitted a considerable investment in refurbishing the dredge and wet plant and in installing new equipment to expand the dry plant's capacity. The higher grade of rutile ore that was mined by SRL in 1985 afforded the opportunity to change to another ore body. The Government mining leases, held by SRL and owned by Nord Resources Corp. of Dayton, Ohio, should run until the year 2009, with a renewal option for another 15 years. After June 30, 1992, the Government could acquire 47% of SRL's shares at 47% of the book value.

MINERAL FUELS

Amoco Sierra Leone Exploration Co.'s first exploratory oil well on its offshore permit was dry. The concession covered 11,200 square miles.

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[1]Physical scientist, Division of International Minerals.
[2]Where necessary, values have been converted from Leones (Le) to U.S. dollars at the rate of Le1=US$0.17.

The Mineral Industry of the Republic of South Africa

By George A. Morgan[1]

In 1985, the Republic of South Africa was among the leading five world suppliers of nonfuel mineral products as well as beneficiated mineral materials such as ferroalloys. In 1983, the latest year for which comprehensive comparable worldwide data were available, the Republic of South Africa ranked second behind the U.S.S.R. and ahead of the United States in terms of value of selected nonfuel mineral production at nearly $13 billion.[2]

Mining and quarrying accounted for 15.7% of a gross domestic product (GDP) of $50 billion, compared with 5.3% for agriculture, 12.9% for Government, 22.3% for manufacturing, and 11.4% for services. Total mineral sales were up about 36% in terms of the South African rand, but declined about 11% in terms of U.S. dollars to $11.8 billion. Exports of mineral products were valued at $10.3 billion, of which almost $7 billion was accounted for by gold, and $3.3 billion by other minerals. The value of local sales to the domestic economy was $1.5 billion. Gold accounted for over 59% of all mineral earnings and 68% of total mineral export revenue. About 62% of total foreign exchange earnings were obtained from mineral sales. If beneficiated mineral-based products such as ferroalloys and iron and steel were included, the mining industry's share of GDP and foreign exchange earnings would be higher.

The revenue from mining was $194.5 million, including $173 million from mining leases and $19 million from diamond export duties. In 1984, total tax revenue from mining was over $400 million. Tax revenue from refined petroleum product sales was estimated at $900 million. Total mineral industry profits were $4.4 billion, up nearly 47% or $1.4 billion from that of 1984. Capital expenditures by the industry, excluding equipment purchases, were $1.2 billion, up $245 million from that of 1984.

Mining activity was primarily by six major mining corporations: Anglovaal Ltd. (AVL), Anglo American Corp. of South Africa Ltd. (AAC), Barlow Rand Ltd. (BRL), General Mining Union Corp. Ltd. (Gencor), Gold Fields of South Africa Ltd. (GFSA), and Johannesburg Consolidated Investment Co. Ltd. (JCI). A major new exploration company, Consolidated Resources Exploration Co. Ltd. (CRE), was registered. CRE's interests included primarily coal, gold, and uranium mining, but also chromite, diamond, platinum, and other minerals.

Total employment in the mining industry at yearend was 724,587 compared with 711,511 (revised) in 1984. Employment by sector was as follows: gold, 515,913; coal, 98,882; diamonds, 18,480; iron ore, 7,273; chromite, 6,949; asbestos, 6,883; tin, 3,310; manganese, 2,861; quarries, 15,106; and other minerals, 48,930. The foreign worker component of the mining labor force was about 40%, mainly from Botswana, Lesotho, Malawi, Mozambique, and Swaziland. Recruitment was by the Employment Bureau of Africa Ltd. (TEBA) through offices in the Republic of South Africa and the adjoining countries. Total salaries and wages earned in the mining industry were $2.2 billion, up almost $300 million from that of 1984. Compulsory deferred wages paid out in the foreign workers' own countries were $102 million, voluntary deferred pay was $39 million, and earnings sent to the home countries through TEBA's fiscal remittance system were $60.6 million. Additional sums including awards, compensation, pensions, and savings were in addition to the above remittances. In the manufacturing industry at yearend 1985, employment in the chemicals, petroleum, and coal products sector was 95,200; the industrial minerals sector, 77,600; and the basic metals sector, 109,000.

Government Policies and Programs.—The Council for Mineral Technology continued to place emphasis on research to improve mining productivity and to expand downstream processing, mainly for increasing the added value of exports and to reduce import dependence. The Government, which initially capitalized several major industries such as iron and steel, phosphate rock, and synthetic fuels from coal, continued its policy of sales of such companies to the public. However, the Government also approved development of the Mossel Bay natural gasfields through the efforts of the Central Energy Fund (CEF). CEF was a Government institution with responsibility for research, development, stockpiling, and production of liquid fuels. CEF formed a wholly owned subsidiary, Mossgas (Pty.) Ltd., which was responsible for offshore aspects of the project. Funding for CEF projects was partly from a fuel tax paid by motorists for use in creating alternatives to imported fuel.

A secretariat for unconventional trade, or countertrade, was created in the Department of Trade and Industry, with the purpose of investigating countertrade practices, such as promoting exports to weak foreign currency markets, to nontraditional partners, and to blocked markets. The Mineral Policy and Energy Policy Committees, each consisting of private and public sector representatives, were created to keep the Government informed of mineral industry developments.

Mineral developments within the National States were administered by the Department of Development Aid through the South African Development Trust Corp., under the terms of the Development Trust and Land Act of 1936.

PRODUCTION AND TRADE

The index of physical volume of all mining production including gold was 103.8 in 1985 compared with 104.1 (revised) in 1984 (1980=100). Output of about 60 different minerals was from over 890 mines and quarries, from companies that were members of the Chamber of Mines (CM). Of these mines, 77 produced gold, 97 produced coal, and 58 produced diamonds. An additional 140 mines and plants not affiliated with the CM were members of the Association of Controlled Mines Works. The country was divided into 10 mining districts with their respective mining commissioners responsible for reporting prospecting and mining activities to the Department of Mineral and Energy Affairs.

The National Union of Mineworkers, represented almost entirely by black mine workers, and several other unions continued to seek the right to represent workers of various mines throughout the country. Several strikes of major coal and gold mines occurred in 1985, but were of short duration and had minimal effect on production.

The South African Transport Services (SATS), with a labor force of about 233,000 people, provided for shipment of both domestically produced products and transshipment of material for neighboring countries. With over 4,700 steam, electric, and diesel locomotives and about 161,000 freight cars, leasing, repair, and maintenance services were also provided to other countries. Nearly all of Zimbabwe's mineral exports were shipped through the Republic of South Africa. A substantial share of Zaire's and Zambia's trade was via South African ports. Shipments to Maputo in Mozambique were mainly coal, and steel ingots and billets. Total rail transport by SATS in the year ending March 31, 1985, was over 170 million tons compared with 157 million tons in 1984. SATS road transport, excluding private road haulers, was 4.2 million tons. Cargo shipped from South African harbors was 73.8 million tons and cargo landed was 16.3 million tons, both increases from that of 1984. Over 40 million tons of coal and coke were shipped for export, and 25.6 million tons were shipped to local markets. Other mineral products and their derivatives railed were 48.1 million tons, including 19.4 million tons of iron ore, 4.9 million tons of cement, 2.9 million tons of manganese ore for export plus 1.3 million tons for local use, and 2.1 million tons of phosphate rock. Base metals and iron and steel shipped by rail were 9.6 million tons.

Table 1.—Republic of South Africa: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984[p]	1985[e]
METALS					
Aluminum metal	83,700	105,500	161,300	167,357	164,600
Antimony concentrate:					
Gross weight	16,599	15,314	10,670	12,924	12,600
Metal content	9,810	[r]9,135	6,302	7,440	7,390
Beryl concentrate (11% to 12% BeO)	122	58	21	1	5
Chromite, gross weight:					
More than 48% Cr_2O_3 thousand tons	36	33	25	53	65
44% to 48% Cr_2O_3 do	1,561	1,193	1,070	1,242	1,975
Less than 44% Cr_2O_3 do	1,273	939	1,137	1,711	1,658
Total[2] do	2,870	2,164	2,232	3,006	3,699
Columbium-tantalum concentrate kilograms	3,615	9,960	406	317	1
Copper:					
Mine output, metal content	199,424	188,709	204,984	198,179	205,052
Metal:					
Smelter	185,400	191,800	192,300	178,700	191,700
Refined	144,100	142,800	157,700	155,722	164,304
Gold, primary thousand troy ounces	21,121	21,355	21,847	21,861	21,524
Iron and steel:					
Ore and concentrate:					
Gross weight thousand tons	28,319	24,554	16,605	24,647	24,414
Iron content do	18,124	15,714	10,627	15,749	15,076
Metal:					
Pig iron do	7,365	6,762	5,213	5,455	6,574
Ferroalloys, blast furnace and electric-furnace:[e]					
Ferrochromium do	[r]750	[r]460	720	886	852
Ferromanganese do	450	440	143	196	331
Ferrosilicochrome do	20	20	18	27	5
Ferrosilicomanganese do	50	40	143	196	238
Ferrosilicon do	110	100	100	110	75
Ferrovanadium do	[r]1	[r]1	[r]1	[r]3	(3)
Silicon metal do	30	30	22	25	36
Total[2] do	[r]1,411	[r]1,091	[r]1,147	1,440	1,537
Steel, crude do	9,004	8,271	7,190	7,827	8,582
Semimanufactures:					
For immediate sale do	93	NA	NA	NA	NA
Hot-rolled products do	6,707	NA	NA	NA	NA
Iron castings do	2,092	NA	286	322	NA
Steel castings and forgings do	76	NA	112	111	NA
Total do	8,968	NA	NA	NA	NA
Lead:					
Mine output, metal content	98,901	90,288	87,533	94,764	98,424
Smelter, secondary	26,900	30,400	23,600	21,900	25,000
Manganese:					
Ore and concentrate, gross weight:					
Metallurgical:					
Over 48% Mn thousand tons	368	442	674	753	950
45% to 48% Mn do	1,226	1,423	268	448	213
40% to 45% Mn do	676	713	415	432	837
30% to 40% Mn do	2,429	[r]2,304	1,270	1,225	1,442
Total[2] do	4,699	[r]4,882	2,627	2,858	3,443
Chemical:					
Over 65% MnO_2 do	(3)	(3)	(3)	(3)	1
35% to 65% MnO_2 do	45	39	98	123	118
Less than 35% MnO_2 do	296	295	161	69	38
Total[2] do	341	334	259	192	158
Total manganese[2] do	5,040	[r]5,217	2,886	3,049	3,601
Metal	36,568	19,897	23,367	36,776	31,825
Nickel:					
Mine output, metal content[e]	[4]26,400	22,000	20,500	25,000	25,000
Metal, electrolytic	17,960	14,425	[e]17,000	20,500	20,000
Platinum-group metals, metal content of concentrate, matte, refinery products[e 5] thousand troy ounces	3,110	2,600	2,600	3,500	3,700

See footnotes at end of table.

Table 1.—Republic of South Africa: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984[p]	1985[e]
METALS —Continued					
Silver:					
Mine output, metal content thousand troy ounces	7,568	6,943	6,513	6,997	6,731
Primary do	3,050	3,080	[e]1,950	[e]2,000	2,000
Tin:					
Concentrate:					
Gross weight[e]	6,950	7,500	6,700	5,900	5,600
Metal content	2,811	3,035	2,668	2,301	2,153
Metal, primary[6]	2,602	2,884	2,685	1,592	1,463
Titanium:[e]					
Rutile concentrate	49,900	47,000	56,000	56,000	55,000
Slag	370,000	381,000	[r]417,300	[r]417,300	415,000
Uranium oxide (U_3O_8)	7,235	6,833	7,128	6,762	5,744
Vanadium:					
Vanadiferous slag, gross weight	59,459	57,395	35,825	45,911	57,340
V content:					
Of vanadiferous slag[e]	8,400	8,100	5,100	6,500	5,915
Of V_2O_5 and vanadate products[e]	4,217	3,613	3,733	6,017	8,100
Total	12,617	11,713	8,833	12,517	14,015
Zinc:					
Concentrate:					
Gross weight[e]	[4]174,377	183,000	200,000	200,000	190,000
Metal content	87,172	91,516	109,981	106,107	96,943
Metal, smelter	80,900	79,700	84,384	88,406	93,700
Zirconium concentrate (baddeleyite and zircon)	[e]100,000	[e]125,000	162,281	153,123	160,533
INDUSTRIAL MINERALS					
Asbestos:					
Amosite	56,834	43,457	40,656	33,237	37,856
Chrysotile	76,772	81,140	93,016	75,414	91,645
Crocidolite	102,337	87,263	87,439	58,738	34,073
Total	235,943	211,860	221,111	167,389	163,574
Barite	2,247	3,177	6,683	4,467	4,387
Cement, hydraulic thousand tons	8,095	8,010	7,897	8,188	7,034
Clays:					
Attapulgite	5,221	4,398	4,425	4,843	5,885
Bentonite	44,372	30,827	39,529	41,849	43,472
Fire clay	282,645	259,767	117,807	162,665	168,145
Flint clay	171,500	163,075	69,984	93,755	123,810
Fuller's earth	434	311	312	--	--
Kaolin	155,003	127,891	129,605	136,160	128,899
Montmorillonite	354	--	--	--	--
Corundum, natural	91	62	49	21	10
Diamond:					
Gem[e] thousand carats	3,429	3,342	4,554	4,516	4,543
Industrial[e] do	6,097	5,812	5,757	[r]5,627	5,660
Total do	9,526	9,154	10,311	10,143	10,203
Diatomite	615	596	1,088	258	214
Feldspar	57,052	47,854	45,114	39,018	33,012
Fluorspar:					
Acid-grade	451,614	293,821	232,750	289,294	310,211
Ceramic-grade	6,118	9,628	6,406	4,502	5,724
Metallurgical-grade	38,789	27,386	28,446	25,410	33,272
Total	496,521	330,835	267,602	319,206	349,207
Gem stones, semiprecious:					
Emerald crystals kilograms	502	[e]547	575	440	102
Tiger's-eye do	220,034	[e]112,000	120,000	111,500	178,821
Gypsum, crude	554,827	534,991	518,353	535,286	458,399
Kyanite-related materials:					
Andalusite	181,272	155,723	116,576	143,305	194,693
Sillimanite	15,504	10,060	815	1,311	1,337
Lime[6] thousand tons	2,251	2,150	1,892	2,110	2,014
Magnesite, crude	56,557	31,927	22,560	33,059	28,898
Mica:					
Sheet kilograms	--	NA	NA	--	81
Waste	2,395	1,762	2,672	4,478	2,072
Nitrogen: N content of ammonia thousand tons	552	571	575	580	580
Phosphate rock, gross weight do	[r]2,718	[r]3,161	2,887	2,496	2,433

See footnotes at end of table.

Table 1.—Republic of South Africa: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984[p]	1985[e]
INDUSTRIAL MINERALS —Continued					
Pigments, mineral, natural:					
Ochers	742	1,812	1,319	746	528
Oxides	555	324	369	245	224
Total	1,297	2,136	1,688	991	752
Pyrites, gross weight	1,475,000	[e]1,500,000	[e]1,500,000	464,878	500,000
Quartz, quartzite, glass sand (silica) thousand tons	1,387	1,260	1,184	1,471	1,518
Salt	539,801	586,210	744,295	615,531	722,482
Silcrete	9,243	5,582	1,839	1,153	47
Sodium sulfate	4,542	2,062	630	820	75
Stone, n.e.s.:					
Dimension:					
Granite:[6]					
Sawn slabs	23,535	12,595	11,000	13,345	11,708
Rough blocks	182,770	160,000	150,000	196,237	315,707
Marble	6,327	6,725	4,936	1,000	1,000
Slate	57,300	43,900	40,000	45,100	42,100
Crushed and broken:					
Limestone thousand tons	21,107	22,379	19,874	21,084	20,520
Shale do	600	482	454	533	527
Sulfur:					
S content of pyrites do	502	465	474	464	474
Byproduct:					
Of metallurgy[e] do	100	135	125	[4]91	85
Of petroleum[e] do	27	25	32	30	35
Total[e] do	629	625	631	585	594
Sulfuric acid, gross weight[7] do	3,677	3,195	3,201	NA	NA
Talc and related materials:					
Talc	9,464	9,743	7,617	10,561	10,220
Pyrophyllite (wonderstone)	5,662	4,070	3,575	3,851	4,227
Vermiculite	190,601	182,641	153,034	173,759	184,070
MINERAL FUELS AND RELATED MATERIALS					
Carbon black[e]	45,000	NA	NA	NA	NA
Coal:					
Anthracite thousand tons	4,017	3,526	2,227	3,228	4,910
Bituminous do	126,361	140,650	142,896	159,681	168,606
Total[2] do	130,379	144,176	145,123	162,909	173,516
Coke, all types do	5,685	NA	NA	NA	NA
Petroleum refinery products:					
Gasoline thousand 42-gallon barrels	33,215	35,770	38,325	NA	NA
Jet fuel do	2,920	3,285	3,285		
Kerosene do	3,650	3,650	3,650		
Distillate fuel oil do	35,405	37,230	40,880		
Residual fuel oil do	24,090	[r]27,470	21,900		
Lubricants do	2,555	2,555	2,555		
Other do	8,395	11,315	12,410		
Refinery fuel and losses do	5,475	6,205	6,205		
Total do	115,705	[r]127,480	129,210	NA	NA

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through Sept. 23, 1986.
[2]Data may not add to totals shown because of independent rounding.
[3]Less than 1/2 unit.
[4]Reported figure.
[5]Includes osmiridium from gold ores estimated at 2,500 troy ounces per year.
[6]Domestic sales plus exports.
[7]Sulfuric acid was produced from gases derived from local smelting operations and from burning imported elemental sulfur.

Table 2.—Republic of South Africa: Apparent exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides	66,861	8	1	United Kingdom 7.
Metal including alloys:				
Scrap	3,085	4,153	35	Japan 2,851; West Germany 607; United Kingdom 194.
Unwrought	89,251	63,321	19,662	Taiwan 19,443; West Germany 17,362.
Semimanufactures	2,020	2,182	1,274	Taiwan 608; United Kingdom 126.
Antimony:				
Ore and concentrate	3,767	1,406	975	Japan 431.
Oxides	3,461	6,770	6,770	
Metal including alloys, all forms	218	--		
Beryllium: Ore and concentrate	116	84	84	
Chromium:				
Ore and concentrate thousand tons	[2]803	[2]1,097	214	Japan 418; West Germany 112.
Oxides and hydroxides	911	829	829	
Unspecified	--	36,447	5	Sweden 36,442.
Cobalt:				
Oxides and hydroxides	--	3	--	All to Portugal.
Metal including alloys, all forms	31	66	18	West Germany 28; Taiwan 20.
Columbium and tantalum: Ore and concentrate	4	5	3	Japan 2.
Copper:				
Ore and concentrate	41,733	62,083	--	Japan 61,900.
Matte and speiss including cement copper	553	1,170	--	Greece 978; West Germany 122.
Ash and residue containing copper	167	331	--	All to West Germany.
Metal including alloys:				
Scrap	10,228	10,416	--	West Germany 4,457; United Kingdom 2,336; Belgium-Luxembourg 1,930.
Unwrought	175,394	163,027	4,032	West Germany 68,449; Belgium-Luxembourg 35,760; Japan 27,248.
Semimanufactures	2,987	5,031	2,172	Hong Kong 907; Taiwan 684.
Gold:				
Ore and concentrate value, thousands	--	$5	--	All to Canada.
Waste and sweepings do	$2,925	$314	$226	West Germany $88.
Metal including alloys, unwrought and partly wrought thousand troy ounces	[3]2,405	3,491	22	Italy 3,324.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite thousand tons	8,380	11,630	--	Japan 5,472; West Germany 3,188; United Kingdom 1,010.
Metal:				
Scrap	46,326	46,286	--	Japan 40,600; Taiwan 3,268.
Pig iron, cast iron, related materials	56,725	85,355	28,566	Japan 20,000; West Germany 15,718.
Ferroalloys:				
Ferrochromium	[2]741,824	728,567	225,626	Japan 253,283; West Germany 138,622.
Ferromanganese	[2]304,100	196,570	121,499	Italy 32,928; Turkey 15,300.
Ferrosilicomanganese		81,653	21,250	Japan 41,107; West Germany 9,629.
Ferronickel	20	42	10	West Germany 32.
Ferrosilicochromium	2,434	5,098	--	Japan 4,540; Sweden 558.
Ferrosilicon	[2]22,000	33,425	1,254	Japan 29,320; Indonesia 1,131.
Silicon metal	[2]27,000	8,079	1,810	West Germany 5,606; Italy 663.
Unspecified	211,970	88,347	--	Italy 54,133 United Kingdom 24,723; Belgium-Luxembourg 6,164.
Steel, primary forms	234,734	214,775	--	Turkey 94,746; Hong Kong 37,000; Taiwan 19,367.

See footnotes at end of table.

Table 2.—Republic of South Africa: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS—Continued				
Iron and steel—Continued				
Metal—Continued				
Semimanufactures:				
Bars, rods, angles, shapes, sections	400,547	307,801	130,509	Hong Kong 55,725; West Germany 44,061; United Kingdom 27,145.
Universals, plates, sheets	523,720	402,484	246,462	Taiwan 32,736; Hong Kong 25,130.
Hoop and strip	4,918	929	--	Taiwan 556; Sri Lanka 169.
Rails and accessories	10,141	34,555	--	Turkey 34,487.
Wire	14,707	23,735	12,510	Sri Lanka 5,533; Netherlands 1,822.
Tubes, pipes, fittings	52,441	89,787	46,443	Hong Kong 19,765; West Germany 9,852.
Castings and forgings, rough	30	277	3	Canada 246; Netherlands 14.
Lead:				
Ore and concentrate	110,565	59,206	--	Japan 35,935; West Germany 18,199.
Oxides	20	105	--	Canada 83; Italy 10.
Metal including alloys:				
Scrap	685	722	--	Taiwan 281; Denmark 214; United Kingdom 118.
Unwrought	13,259	3,274	([4])	Italy 2,758; Japan 351.
Semimanufactures	114	186	--	Sweden 109; Hong Kong 77.
Lithium: Ore and concentrate	--	56	56	
Magnesium: Metal including alloys:				
Scrap	80	292	--	United Kingdom 121; West Germany 92; Italy 36.
Unwrought	52	([5])	--	
Manganese:				
Ore and concentrate, metallurgical-grade thousand tons	[2]1,996	[2]3,038	--	Japan 1,207; West Germany 320; Norway 291.
Oxides	303	43,280	67	Taiwan 42,535; Turkey 208.
Metal including alloys, all forms	14,107	20,695	11,695	West Germany 3,342; Canada 2,757.
Mercury 76-pound flasks	--	29	--	All to West Germany.
Molybdenum: Ore and concentrate	--	32,860	32,821	West Germany 39.
Nickel:				
Matte and speiss	74,321	4,633	--	Norway 4,391; Belgium-Luxembourg 220.
Metal including alloys:				
Scrap	99	578	--	Canada 220; West Germany 135; United Kingdom 124.
Unwrought	15,287	13,143	3,596	West Germany 3,250; Sweden 1,712; Italy 1,355.
Semimanufactures	150	452	438	Italy 10.
Platinum-group metals:				
Waste and sweepings value, thousands	$1,726	$202	--	All to West Germany.
Ash containing platinum do.	--	$1,537	--	Do.
Metal including alloys, unwrought and partly wrought:				
Palladium troy ounces	415,671	774,600	584,661	Japan 177,427; West Germany 12,512.
Platinum do.	1,500,061	1,104,984	1,039,000	West Germany 65,984.
Rhodium do.	84,010	116,612	97,127	Japan 19,485.
Iridium, osmium, ruthenium do.	97,739	219,021	154,709	Japan 64,312.
Unspecified value, thousands	$81,614	$40,326	$950	Switzerland $22,763; West Germany $7,470.
Silver:				
Ore and concentrate[6] do.	$1,645	$185,296	--	United Kingdom $183,857; Canada $1,439.
Waste and sweepings do.	$664	$12,258	--	United Kingdom $11,167; Switzerland $834.
Metal including alloys, unwrought and partly wrought do.	$2,659	$21,902	--	United Kingdom $19,162; West Germany $2,568.
Tin:				
Ore and concentrate	212	3,329	--	Italy 2,621; United Kingdom 708.
Metal including alloys:				
Scrap	4,787	147	--	All to Sri Lanka.
Unwrought	1,333	791	10	United Kingdom 431; Italy 182.
Semimanufactures	1	3,390	3,377	Sri Lanka 13.

See footnotes at end of table.

Table 2.—Republic of South Africa: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued				
Titanium:				
Ore and concentrate	44,008	48,180	14,459	West Germany 12,718; Belgium-Luxembourg 12,383.
Oxides	--	85	--	Indonesia 51; United Kingdom 34.
Metal including alloys, semimanufactures	26	--		
Tungsten: Ore and concentrate	--	19	--	West Germany 18.
Uranium and thorium:				
Ore and concentrate value, thousands	--	$28,840	--	All to Canada.
Oxides and other compounds	3,685	2,628	2,628	
Metal including alloys, all forms, uranium	1,872	465	--	All to West Germany.
Vanadium:				
Oxides and hydroxides	2,090	1,300	711	Belgium-Luxembourg 589.
Pentoxides	--	3,250	3,250	
Ash and residue containing vanadium	2,156	12,197	--	All to Belgium-Luxembourg.
Zinc:				
Ore and concentrate	33,687	61,161	([7])	Japan 28,235; West Germany 21,571; Netherlands 11,178.
Oxides	41	32	--	All to Sri Lanka.
Ash and residue containing zinc	--	173	--	All to Netherlands.
Metal including alloys:				
Scrap	175	573	--	Taiwan 209; West Germany 134; Portugal 124.
Unwrought	2,231	1,010	992	West Germany 18.
Semimanufactures	44	51,412	51,395	United Kingdom 17.
Zirconium: Ore and concentrate	[2]132,765	[2]140,726	18,424	West Germany 34,456; Japan 25,345.
Other:				
Ores and concentrates	78,145	85,701	--	Sweden 39,756; Italy 19,542; Belgium-Luxembourg 12,710.
Oxides and hydroxides	50	615	--	Belgium-Luxembourg 589; United Kingdom 26.
Ashes and residues	125,865	80,577	105	Italy 42,060; United Kingdom 20,300; Austria 17,717.
Base metals including alloys, all forms	9,270	4,743	787	United Kingdom 2,179; Italy 759; Switzerland 319.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	18	--		
Dust and powder of precious and semiprecious stones including diamond value, thousands	$51	$747	--	West Germany $600; Turkey $72; Italy $65.
Asbestos, crude	[2]183,946	[2]163,107	13,911	Japan 49,975; Italy 11,275; Yugoslavia 6,785.
Barite and witherite	--	[2]833	NA	NA.
Clays, crude:				
Bentonite[2]	380	915	NA	NA.
Chamotte earth	6,014	6,483	--	West Germany 6,388; Austria 95.
Fire clay	4,353	--		
Kaolin[2]	[r]979	638	NA	NA.
Unspecified	57,711	68,898	--	United Kingdom 30,847; Italy 20,770; Japan 11,376.
Diamond:				
Gem, not set or strung value, thousands	$405,726	$448,850	$371,950	Belgium-Luxembourg $30,789; Hong Kong $23,412.
Industrial stones do	$52,594	$51,336	$45,901	West Germany $5,009.
Dust and powder thousand carats	14,056	2,036	2,034	Japan 2.
Feldspar, fluorspar, related materials:				
Feldspar[2]	459	620	NA	NA.
Fluorspar	[2]246,462	[2]343,432	179,190	NA.
Unspecified	168,900	159,704	--	Japan 103,070; West Germany 42,612.
Fertilizer materials:				
Crude, n.e.s	2,902	870	--	West Germany 795; Switzerland 36.
Manufactured:				
Nitrogenous	140	7,020	--	Sri Lanka 6,020; Argentina 1,000.
Phosphatic	11,389	11,093	--	West Germany 8,755; Denmark 1,334.
Unspecified and mixed	24	17,243	--	West Germany 13,417; Belgium-Luxembourg 2,571.

See footnotes at end of table.

Table 2.—Republic of South Africa: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Graphite, natural	380	11,439	1,089	Japan 792; United Kingdom 358.
Gypsum and plaster[2]	3,003	2,184	NA	NA.
Kyanite and related materials:				
Andalusite[2]	69,264	91,574	NA	NA.
Sillimanite[2]	2,560	1,340	NA	NA.
Unspecified	--	24,503	--	West Germany 20,395; Netherlands 3,966.
Magnesium compounds:				
Magnesite, crude	1,108	612	500	United Kingdom 108.
Oxides and hydroxides	--	367	--	Canada 343; Austria 24.
Mica: Crude including splittings and waste	[8]392	829	1	United Kingdom 543; West Germany 144.
Nitrates, crude	--	620	--	All to Sri Lanka.
Phosphates, crude	258,909	925,161	--	Turkey 435,960; West Germany 167,358; Denmark 110,029.
Phosphorus, elemental	712	739	198	Taiwan 541.
Pigments, mineral:				
Natural, crude[2]	200	155	NA	NA.
Iron oxides and hydroxides, processed	2	91	--	United Kingdom 90.
Precious and semiprecious stones other than diamond: Natural value, thousands	[r]$4,464	$6,992	$2,453	Taiwan $1,166; Switzerland $1,155.
Pyrite, unroasted	[2]103,662	--		
Quartz crystal, piezoelectric kilograms	--	125	--	All to West Germany.
Salt and brine	[2]103,262	[2]89,731	5,171	NA.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked thousand tons	244	234	NA	Italy 73; Japan 67; West Germany 33.
Worked do.	[8]1,597	428	NA	United Kingdom 259; Netherlands 123.
Limestone other than dimension[2]	61,381	--		
Quartz and quartzite	779	845	82	West Germany 247; Netherlands 229; United Kingdom 134.
Sulfur: Elemental, crude including native and byproduct	[2]11,338	--		
Talc, steatite, soapstone, pyrophyllite	94	20	--	All to Sweden.
Vermiculite	[2]113,154	[2]157,882	--	West Germany 10,188; Italy 9,103; Canada 3,185.
Other:				
Crude	69,070	48,113	--	United Kingdom 16,570; Italy 9,128; Switzerland 5,994.
Slag and dross, not metal-bearing	58,253	23	--	United Kingdom 18; Turkey 5.
MINERAL FUELS AND RELATED MATERIALS				
Carbon black	2	5,729	--	United Kingdom 5,726.
Coal:				
Anthracite and bituminous thousand tons	[2]30,131	[2]38,161	501	Japan 7,775; Italy 5,414; Belgium-Luxembourg 1,862.
Briquets of anthracite and bituminous coal	71,831	--		
Lignite including briquets	11,831	54,356	54,356	
Coke and semicoke	15,815	30	--	All to Sri Lanka.
Petroleum:				
Crude thousand 42-gallon barrels	5,429	NA	NA	NA.
Refinery products:				
Gasoline:				
Aviation do.	950	[8]246	246	
Motor do.	183	--		
Mineral jelly and wax do.	--	156	84	West Germany 43; Italy 13.
Kerosene and jet fuel do.	--	1,223	--	All to Japan.

See footnotes at end of table.

Table 2.—Republic of South Africa: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum —Continued				
Refinery products —Continued				
Distillate fuel oil thousand 42-gallon barrels	169	[8]36	36	
Lubricants do	2	1	([9])	Mainly to West Germany.
Residual fuel oil do	([9])	287	--	Italy 286.
Bituminous mixtures do	6	--		
Petroleum coke do	--	7	--	All to West Germany.

[r]Revised. NA Not available.

[1]Table prepared by Virginia A. Woodson. Because official South African trade statistics provide data only on the value of total exports of each commodity class (with no data on destinations) and not on quantity of material exported, this table has been compiled from a variety of sources including the data issued by the Republic of South Africa Department of Mines and Department of Mineral and Energy Affairs as well as official trade returns of trading partner countries. Data issued by the Government of the Republic of South Africa are footnoted; other figures are compiled from a variety of sources with specifics on destination obtained from the import statistics of the countries listed. Data presented are exports by the common customs area of Botswana, Lesotho, Republic of South Africa, and Swaziland.

[2]Data issued by the Government of the Republic of South Africa.

[3]Excludes imports of unreported quantity valued at $3,909,000 by France and $22,000 by Iceland.

[4]Unreported quantity valued at $275,000.

[5]Unreported quantity valued at $5,000 imported by New Zealand.

[6]May include platinum-group metals.

[7]Unreported quantity valued at $2,633,000.

[8]Incomplete total. Excludes imports reported in value only.

[9]Less than 1/2 unit.

Table 3.—Republic of South Africa: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS				
Aluminum:				
Ore and concentrate	17,196	20,038	NA	Australia 10,939; unspecified 9,062.
Oxides and hydroxides	357,892	313,863	641	Australia 298,580; Japan 4,014.
Metal including alloys:				
Scrap	6,070	657	17	United Kingdom 201; West Germany 124.
Unwrought	433	169	--	United Kingdom 118; Netherlands 13.
Semimanufactures	12,592	15,100	596	West Germany 5,630; Australia 3,460; United Kingdom 1,592.
Arsenic:				
Oxides and acids	90	NA		
Metal including alloys, all forms	9	22	--	Sweden 20.
Chromium: Oxides and hydroxides	774	245	17	United Kingdom 106; Spain 70.
Cobalt:				
Oxides and hydroxides	16	23	NA	Canada 3; unspecified 20.
Metal including alloys, all forms	91	81	7	West Germany 14; United Kingdom 9.
Columbium and tantalum: Metal including alloys, all forms, tantalum kilograms	1,300	2,600	2,600	
Copper: Metal including alloys, all forms	5,839	8,022	272	West Germany 2,935; United Kingdom 1,199; Japan 504.
Gold: Metal including alloys, unwrought and partly wrought[2] troy ounces	8,545	109,634	26	Switzerland 2,539; unspecified 105,197.

See footnotes at end of table.

Table 3.—Republic of South Africa: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Iron and steel: Metal:				
Scrap	7,274	55,548	NA	NA.
Pig iron, cast iron, related materials	3,782	4,221	71	Sweden 1,760; United Kingdom 1,544.
Ferroalloys:				
Ferrochromium	8,088	5,630	21	Sweden 50; unspecified 5,559.
Ferromanganese	55	24	--	West Germany 23.
Ferromolybdenum	120	407	43	Belgium-Luxembourg 141; United Kingdom 117.
Ferrosilicomanganese	7	3	NA	NA.
Ferrosilicon	932	511	--	Japan 200; France 152; Italy 102.
Silicon metal	133	9	--	United Kingdom 7.
Unspecified	1,069	2,122	5	France 963; United Kingdom 436; Italy 345.
Steel, primary forms	50,769	45,341	NA	West Germany 264; unspecified 44,993.
Semimanufactures:				
Bars, rods, angles, shapes, sections	48,592	48,508	270	United Kingdom 3,175; West Germany 2,482; Belgium-Luxembourg 742.
Universals, plates, sheets	30,685	63,330	333	Japan 36,579; West Germany 18,547.
Hoop and strip	10,903	5,370	94	West Germany 2,293; United Kingdom 925.
Rails and accessories	635	4,463	NA	United Kingdom 512; unspecified 3,865.
Wire	20,432	27,802	50	Belgium-Luxembourg 4,240; West Germany 3,935; France 3,122.
Tubes, pipes, fittings	61,895	89,022	8,185	Japan 33,391; West Germany 20,884; United Kingdom 4,992.
Castings and forgings, rough	735	1,225	19	West Germany 413; United Kingdom 53; Japan 61.
Unspecified	2,573	--		
Lead:				
Ore and concentrate	NA	7,277	--	All from Australia.
Oxides	67	73	--	Mexico 36; West Germany 18; Belgium-Luxembourg 17.
Metal including alloys:				
Scrap	216	791	NA	United Kingdom 84; unspecified 658.
Unwrought	5,438	9,912	139	Belgium-Luxembourg 2,846; United Kingdom 970.
Semimanufactures	90	65	2	United Kingdom 21; West Germany 7; unspecified 35.
Lithium:				
Ore and concentrate	1,228	1,146	NA	NA.
Oxides and hydroxides	102	110	78	NA.
Magnesium: Metal including alloys:				
Scrap	--	8	NA	NA.
Unwrought	536	627	571	Switzerland 35.
Semimanufactures	61	92	64	West Germany 14; Switzerland 8.
Manganese: Oxides	4,037	3,556	--	Belgium-Luxembourg 3,454; Netherlands 52.
Mercury 76-pound flasks	1,218	841	--	Italy 290; Netherlands 203; United Kingdom 145.
Molybdenum:				
Oxides and hydroxides	10	188	--	United Kingdom 150; West Germany 38.
Metal including alloys, all forms	26	23	--	Belgium-Luxembourg 17; West Germany 3.
Nickel:				
Ore and concentrate	--	22	NA	NA.
Matte and speiss	455	577	196	Canada 376.
Metal including alloys, all forms	710	444	5	United Kingdom 113; West Germany 103; Japan 31.
Platinum-group metals: Metals including alloys, unwrought and partly wrought:				
Platinum troy ounces	--	497	NA	France 51; unspecified 446.
Unspecified do.	46,669	94,026	35,119	United Kingdom 31,774; Belgium-Luxembourg 20,511.
Selenium, elemental	9	10	--	United Kingdom 8; Belgium-Luxembourg 2.
Silver:				
Ore and concentrate[3] value, thousands	$67,339	--		
Waste and sweepings[3] do.	$195	$1,883	NA	United Kingdom $835; unspecified $1,048.
Metal including alloys, unwrought and partly wrought troy ounces	776,402	817,592	2,032	West Germany 541,569; United Kingdom 177.

See footnotes at end of table.

Table 3.—Republic of South Africa: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Tin: Metal including alloys, all forms	48	83	NA	United Kingdom 26; West Germany 10.
Titanium:				
Ore and concentrate	3	19	16	NA.
Oxides	2,207	1,314	331	West Germany 573; Netherlands 202.
Tungsten:				
Ore and concentrate	507	363	NA	Canada 296; West Germany 17; Netherlands 17.
Metal including alloys, all forms	34	32	3	Sweden 10; Austria 8.
Vanadium: Ore and concentrate	--	295	295	
Zinc:				
Oxides	180	100	1	West Germany 54; Netherlands 29.
Blue powder	730	831	--	West Germany 674; Norway 19.
Metal including alloys:				
Scrap	242	416	NA	NA.
Unwrought	3,149	2,846	NA	West Germany 780; Belgium-Luxembourg; 268; unspecified 1,672.
Semimanufactures	190	30	NA	West Germany 9; unspecified 20.
Other:				
Ores of precious metals value, thousands	$67,538	$82,596	--	Norway $82,595.
Ores and concentrates	69	3	NA	NA.
Oxides and hydroxides	281	327	148	West Germany 40; Belgium-Luxembourg 25.
Ashes and residues	1,436	913	NA	United Kingdom 100; unspecified 813.
Base metals including alloys, all forms	1,579	471	220	United Kingdom 135.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	484	331	101	Japan 36; Greece 29; unspecified 144.
Artificial:				
Corundum	2,597	3,563	617	West Germany 1,163; United Kingdom 798; Japan 311.
Silicon carbide	1,766	2,676	--	Norway 2,115; Switzerland 206.
Dust and powder of precious and semiprecious stones excluding diamond value, thousands	$95	$46	$14	Japan $14; Belgium-Luxembourg $10.
Grinding and polishing wheels and stones	532	826	29	West Germany 265; Italy 232; France 50.
Asbestos, crude	12,781	20,913	17	Canada 1,009; unspecified 19,835.
Barite and witherite	2,384	3,495	NA	United Kingdom 465; France 159; unspecified 2,640.
Boron materials:				
Crude natural borates	3,952	4,242	818	Netherlands 1,484; Belgium-Luxembourg 584; Turkey 290.
Elemental value	$336	$1,218	NA	NA.
Oxides and acids	832	694	--	France 473; Argentina 71; Italy 71.
Bromine	31	18	--	All from Israel.
Cement	108,658	316,806	NA	Spain 70,613; Norway 32,500; France 16,062.
Chalk	5,753	9,196	--	France 6,719; United Kingdom 1,164.
Clays, crude	31,002	33,549	15,272	United Kingdom 17,657.
Cryolite and chiolite	115	178	--	Denmark 135; West Germany 26.
Diamond:				
Gem, not set or strung carats	98,500	226,000	3,000	Belgium-Luxembourg 152,500; United Kingdom 39,500.
Industrial stones do	1,547,000	278,500	--	Ireland 106,000; United Kingdom 24,500; West Germany 15,500.
Diatomite and other infusorial earth	5,849	5,333	4,801	France 172; West Germany 89.
Feldspar, fluorspar, related materials	33	29	NA	NA.
Fertilizer materials: Manufactured:				
Ammonia	21,278	21,113	15,748	Brazil 2,000.
Nitrogenous	40,016	20,612	6,634	Republic of Korea 3,991; West Germany 1,939.
Phosphatic	3,249	132	45	Israel 77.
Potassic	173,541	294,470	--	Israel 11,551; West Germany 64,020; Canada 44,260.
Unspecified and mixed	58,202	1,688	97	United Kingdom 548; Netherlands 255.
Graphite, natural	2,129	4,122	19	Republic of Korea 1,365; Brazil 1,067.
Gypsum and plaster	9,523	8,609	64	West Germany 5,543; United Kingdom 1,483.

See footnotes at end of table.

Table 3.—Republic of South Africa: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Lime	14,361	6,660	40	France 6,595.
Magnesium compounds:				
Magnesite	32,420	56,360	8	Italy 16,167; Greece 15,513; unspecified 18,340.
Oxides and hydroxides	26,793	23,602	51	Republic of Korea 11,988; United Kingdom 5,184; Greece 2,216.
Mica:				
Crude including splittings and waste	486	1,073	NA	Australia 409; unspecified 664.
Worked including agglomerated splittings	80	65	2	Switzerland 18; Austria 13; Belgium-Luxembourg 8.
Phosphates, crude	2	143,908	90,708	NA.
Phosphorus, elemental	73	24	--	Mainly from West Germany.
Pigments, mineral:				
Natural, crude	50	38	--	Austria 34.
Iron oxides and hydroxides, processed	10,897	13,384	9	West Germany 12,605.
Precious and semiprecious stones other than diamond:				
Natural _____ value, thousands	$1,382	$830	$90	Switzerland $314; Brazil $68.
Synthetic _____ do	$8,384	$8,474	$646	Ireland $6,563; Australia $587.
Pyrite, unroasted	108	69	28	West Germany 19; France 18.
Salt and brine	43,550	50,525	10,836	Australia 37,975; United Kingdom 847.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	214,041	297,959	115,382	United Kingdom 142,318; Spain 2,976.
Sulfate, natural and manufactured	40,567	18,650	5,263	West Germany 3,976; Spain 2,870; United Kingdom 1,350.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	2,301	5,331	--	Finland 2,649; Italy 1,779.
Worked	1,230	2,208	NA	Italy 1,447; Portugal 227; Taiwan 175.
Dolomite, chiefly refractory-grade	102	890	NA	NA.
Gravel and crushed rock	804	24,872	50	France 90; unspecified 24,686.
Limestone other than dimension	75	338	NA	Finland 94; Sweden 40; unspecified 167.
Quartz and quartzite	92	140	NA	United Kingdom 6; unspecified 134.
Sand other than metal-bearing	347	526	31	West Germany 203; Canada 122.
Sulfur:				
Elemental:				
Crude including native and byproduct	383,414	597,145	--	Canada 595,713.
Colloidal, precipitated, sublimed	111	223	125	West Germany 90.
Dioxide	19	1	NA	NA.
Sulfuric acid	54,470	62,088	NA	Japan 38,858; unspecified 23,215.
Talc, steatite, soapstone, pyrophyllite	2,555	3,198	175	Republic of Korea 847; Belgium-Luxembourg 784; Norway 456.
Other:				
Crude	7,535	8,575	19	Greece 7,426.
Slag and dross, not metal-bearing	3,166	9,254	67	Sweden 6,053; Taiwan 1,110; West Germany 1,037.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	254	435	354	United Kingdom 54.
Carbon black and gas carbon	3,927	3,757	1,154	Taiwan 714; Canada 683.
Coke and semicoke	7	5	NA	NA.
Peat including briquets and litter	651	877	--	Canada 402; Sweden 143; Ireland 120.
Petroleum refinery products:				
Liquefied petroleum gas 42-gallon barrels	974	824	209	Italy 267; Belgium-Luxembourg 128.
Mineral jelly and wax _____ do	520,388	473,475	87,396	West Germany 150,097; Japan 113,352.
Lubricants _____ do	12,572	NA		
Bitumen and other residues _____ do	721	376	91	Netherlands 182; West Germany 49.
Bituminous mixtures _____ do	3,079	1,939	448	United Kingdom 855.
Petroleum coke _____ do	488,802	384,742	323,285	Netherlands 32,560; United Kingdom 28,875.

NA Not available.

[1]Table prepared by Virginia A. Woodson. Data presented are imports by the common customs area of Botswana, Lesotho, Republic of South Africa, and Swaziland released by the Commissioner for Customs and Excise of the Republic of South Africa.

[2]May include platinum-plated gold.

[3]May include platinum-group metals.

Table 4.—Republic of South Africa: Value of domestic sales and exports of major mineral commodities

(Thousand U.S. dollars)

Commodity	Domestic sales 1983	Domestic sales 1984	Domestic sales 1985[p]	Exports 1983	Exports 1984	Exports 1985[p]
METALS						
Antimony	16,381	16,166	7,741	1,137	10,008	2,820
Chromite	44,315	43,221	41,199	35,544	43,871	67,208
Copper	122,374	118,774	98,788	194,265	140,112	149,938
Gold	(1)	(1)	(1)	9,153,026	8,047,942	6,979,107
Iron ore	119,788	91,953	69,814	158,860	168,132	145,708
Lead concentrate	--	--	--	22,424	22,102	22,200
Manganese	22,139	22,252	38,155	77,017	119,271	111,305
Nickel	11,061	16,854	37,789	36,848	33,702	37,789
Silver	3,119	561	647	60,696	45,808	33,973
Tin	9,435	9,552	16,571	21,778	16,769	11,568
Titanium	5,337	4,377	13,133	9,646	14,289	19,470
Uranium[e]	NA	NA	NA	250,000	200,000	200,000
Vanadium	3,548	3,235	[e]3,500	34,851	58,624	[e]60,000
Zinc	26,588	42,143	29,859	5,171	18,598	5,672
Zirconium	676	342	540	22,551	25,575	29,369
INDUSTRIAL MINERALS						
Asbestos	5,924	3,680	1,727	92,914	66,519	44,973
Cement[e]	300,000	380,000	350,000	35,000	40,000	35,000
Clays, flint	2,746	2,558	4,446	2,393	1,708	1,372
Clays, other	7,027	6,064	4,859	26	54	106
Diamond	(1)	(1)	(1)	483,328	361,180	353,076
Feldspar	3,116	2,763	1,888	54	61	--
Fluorspar	2,642	2,253	2,062	25,000	32,001	23,734
Granite	1,847	1,452	956	21,723	19,071	16,511
Gypsum	5,410	4,669	3,053	40	23	8
Kyanite-related materials:						
Andalusite	5,391	6,239	4,381	7,081	8,519	11,393
Sillimanite	289	112	27	430	178	139
Lime products	87,000	77,413	56,545	2,722	2,569	2,283
Limestone	55,336	52,212	34,345	107	87	78
Magnesite	1,765	1,247	1,002	31	--	--
Mica	319	322	213	406	338	303
Phosphate rock	55,581	52,338	37,714	11,196	17,335	16,532
Pyrite-sulfur	42,633	31,512	19,733	569	396	92
Salt	19,103	22,449	17,174	3,606	2,527	1,984
Silica, sand	16,670	16,494	10,897	116	189	13
Slate	2,155	1,853	1,038	2,133	2,553	2,345
Stone, other	1,502	1,817	1,036	277	237	193
Vermiculite	387	374	261	9,336	13,315	12,630
Wonderstone	238	741	521	333	47	--
Miscellaneous	253,323	227,491	91,978	557,654	685,942	690,986
MINERAL FUELS						
Coal:						
Anthracite	13,263	18,480	14,394	55,480	101,177	129,455
Bituminous	1,300,020	1,175,960	861,070	986,572	1,092,282	1,302,949
Total	2,568,448	2,459,923	1,879,056	12,382,341	11,413,111	10,522,282

[e]Estimated. [p]Preliminary. NA Not available.
[1]Value, if any, is included under exports.

Source: Republic of South Africa Department of Mineral and Energy Affairs, South Africa's Mineral Industry 1985; Minerals Bureau, Mineral Production and Sales Statistics, 1984 and 1985.

COMMODITY REVIEW

METALS

Aluminum.—Alcan Aluminium Ltd. of Montreal, Canada, reached agreement in principle to sell its 24% share of Hullet Metals (Pty.) Ltd. Hullet produced aluminum extrusions and was the sole maker of aluminum master alloys at Benoni, having closed its Richards Bay plant.

Alusaf (Pty.) Ltd. introduced new computer technology, which it expected to save $1.1 million of its annual maintenance costs of $16 million, as well as extend the plant's productive life. The company commissioned its fourth homogenizing furnace, its third billet saw, and a new billet stacker. Near full production capacity of 170,000 tons per year of aluminum metal from imported alumina was reached with about 60% of production exported.

Ferruginous bauxite mineralization in Natal graded 20% to 30% iron, 5% to 8%

silica, and averaged 27% available alumina. Several studies have also been made on shales, clays, and coal ash for the extraction of alumina.

Antimony.—Consolidated Murchison Ltd. was the sole producer of antimony from a mine in the Murchison Greenstone Belt in the eastern Transvaal. Mineralization was primarily stibnite with minor berthierite and gudmundite along a 50-kilometer-long strike line in siliceous carbonate rocks surrounded by talc chlorite schists in pinch and swell structures. The presence of antimony and arsenic oxides complicated recovery. Ore grades have dropped from between 6% and 12% antimony to an average of 2.9% antimony over a 40-year period. Final assessment of a surface exploration program begun in October 1984 outside the current mining area was near completion. Deepening of the Monarch East Shaft was under way to gain access to exploitable ore. Mining was by sublevel open stoping on a three-shift basis, with a monthly hoisting capacity of about 50,000 tons of ore and waste. The comminution plant had a capacity of about 2,000 tons per day of talcose rock, but considerably less for quartz-rich rock. Salable products included stibnite concentrate, crude antimony trioxide grading 97% Sb_2O_3, refined antimony trioxide grading 99.5% Sb_2O_3, and byproduct gold. Exports were through the Port of Durban.

Chromite.—Chromite reserves amounted to 2.4 billion tons, as reported by the Minerals Bureau of South Africa, and were in the mafic phase of the Bushveld Igneous Complex (BIC), a pear-shaped area extending about 480 kilometers across Transvaal into Botswana. Chromite was found in seams varying in thickness from several centimeters to about 2 meters in two main belts. In the western belt, the LG6 or Magazine Seam, varying from 0.76 meter to 1.27 meters in thickness, was the main ore seam and was generally mined simultaneously with the 0.3-meter-thick Leader Seam. Chromite produced from the UG2 Seam was stockpiled. The Steelpoort Seam at 1.06 meters to 1.8 meters in thickness was mined in the eastern belt.

As of January 1985, about 23 mines produced chromite. South African Manganese Amcor Ltd. (Samancor), the major producer, was 50% owned by Gencor. Samancor owned 51% of Cromore Ltd., which operated the Grasvally Mine near Potgietersrus, the Mooinooi and Waterkloof Mines near Rustenburg, and the Montrose, Tweenfontein, and Groothoek Mines near Steelpoort. Cromore acquired Union Carbide Corp.'s chromite operations in eastern Transvaal, including the Jagdlust Mine, currently on care and maintenance. Batlhako Mining Ltd., a wholly owned subsidiary, owned the Ruighoek Mine in Bophuthatswana.

BRL owned the Henry Gould and Winterveld Mines, the latter the largest chromite mine in the Republic of South Africa. The Millsell Mine was on care-and-maintenance status. Overall production capacity for chromite in the Republic of South Africa was about 3.5 million tons, with about two-thirds consumed by ferroalloy plants.

Cobalt.—All production was as a byproduct of platinum-group-metal (PGM) output. Western Platinum Ltd. (Wesplat) completed construction of a $7.9 million base metal refinery near Rustenburg. Matte, previously shipped overseas for refining, will be processed at the plant for conversion to nickel-cobalt sulfate. Wesplat produced 20 tons of cobalt cathode at 99% cobalt in 1985. Rustenburg Refineries (Pty.) Ltd. had the capacity to produce 2,500 tons per year of cobalt sulfate from a coverter matte for the equivalent of 525 tons of cobalt. Impala Platinum Holding (Pty.) Ltd. produced a 99.8%-pure cobalt powder at its refinery at Springs. Capacity was estimated to be 300 tons of cobalt equivalent.

Copper.—Nine companies produced copper as either a primary product or a byproduct. Palabora Mining Co. Ltd. (PMC), the largest producer, mined 100.2 million tons of ore and waste rock, and treated 27.1 million tons of ore yielding 311,245 tons of copper concentrate grading 36.5% copper. Copper anode production was 132,273 tons, consisting of 112,347 tons of PMC copper, 7,310 tons of purchased copper, and 12,616 tons of toll smelted copper. Total cathode production, grading 99.97% copper, was 132,043 tons compared with a capacity of 142,000 tons. PMC processed copper concentrates grading 44% copper, which were produced by Messina Ltd. at its operations near the Limpopo River on the border with Zimbabwe. PMC improved its haulage fleet utilization by the installation of an updated computerized dispatch system, and lowered expenditures by the replacement of slurry systems based on high-cost imported aluminum with emulsion explosives. A plan to crush ore in the open pit mine and convey it to a surface installation was under review. Cost of cathode production was $0.417 per pound, up 27% from that of 1984.

Prieska Copper Mines (Pty.) Ltd. (PCM), owned by AVL, 51%, and USX Corp., 49%, was expected to close operations in 1987 owing to the diminished reserves and lower grades. Mining was by sublevel open stoping in a highly mechanized operation employing a work force of 2,400. For the fiscal year ending June 30, 1985, output was 2.9 million tons of ore grading 1.09% copper and yielding 92,764 tons of copper concentrate grading 29.3% copper. Concentrates were shipped mainly to Europe and the Far East via Saldanha Bay.

O'okiep Copper Co. Ltd. realized its first profit in 1985 since 1979, and produced 21,000 tons of blister copper, while operating at about 55% of capacity. About 5,000 tons was on a toll basis. Ore feed to concentrators at the Spiktakel and Carolusberg Mines graded 1.89% copper. Respective capacities were 1,500 tons and 4,000 tons per day, and respective recoveries were 89% and 90%. Measured reserves were 17.2 million tons averaging 1.84% copper. Blister copper was shipped overseas for refining, but may be shipped to PMC in 1986.

Black Mountain Mineral Development Co. (Pty.) Ltd., owned by GFSA, 56%, and Phelps Dodge Corp., 44%, produced 1.3 million tons of ore and 26,500 tons of concentrate grading 26.5% copper, all for export. Measured reserves were 5.6 million tons averaging 0.62% copper.

Gold.—The Witwatersrand Basin remained the single most important source of gold in the world, with total gold sales by the Republic of South Africa of $7 billion. Of about 150 million tons of ore and tailings treated in 1985, 31% was sands, slimes, and other tailings from which about 570,000 troy ounces of gold was recovered. In the year ending March 31, 1985, East Rand Gold and Uranium Co. Ltd. (ERGO) treated 20.5 million tons of slimes and sands and recovered about 200,000 troy ounces of gold. A new carbon-in-leach plant near Springs, valued at $54 million and having a design capacity of 66,000 tons per day, was undergoing commissioning by ERGO. It was to treat 288 million tons of slimes from 11 impoundment sites for gold recovery by carbon-in-leach treatment over a 9-year period, followed by conversion to a flotation plant for recovery of gold, pyrite, and uranium.

Ore production by 33 major gold producers that were members of the CM was 105 million tons at an average grade of 0.195 troy ounces of gold per ton. Total working revenue for these mines was $6.4 billion, or $63.54 per ton of ore milled, equivalent to $298 per troy ounce of gold recovered. The average production cost per ton of ore milled was $31, equivalent to about $155 per troy ounce of gold produced. An average working profit of about $32 per ton of ore milled was thus realized, or $143 per troy ounce of gold recovered. The highest working profits on a troy-ounce basis were by Kloof Mine, $228; West Driefontein Mine, $225; and East Driefontein Mine, $215.

Kruggerand sales by the International Gold Corp. (Intergold) of CM were 694,121 troy ounces for the 6 months ending June 1985, down 50% from the corresponding 1984 period. Intergold ceased reporting such sales in July, and in November, the South African Mint suspended production of Kruggerands owing to low demand.

AAC proceeded with the merger of its major gold mining operations in the Orange Free State. The new company, Free State Consolidated Gold Mines Ltd. (Freegold), would incorporate the existing Free State Geduld, President Brand, President Steyn, and Western Holdings Mines into northern and southern regions and would be the world's largest gold producer at about 3.6 million troy ounces per year, or 16% of total South African gold output. The combined labor force of Freegold would be about 105,000, or nearly 20% of total gold mine employment. The merger would lower working costs, extend mine life, and increase revenue and productivity. Construction continued on a new $73 million recovery plant at the President Brand Mine to treat 390,000 tons of ore per month. The new plant would replace the existing facilities and provide a 30% increase in capacity.

Other facilities planned or under way include a second mill to treat an additional 100,000 tons of ore per month at the Doornkop section of the Randfontein Estates gold mine; a new recovery plant by Rand Mines Properties Ltd., costing $870,000, to treat 23,000 tons of ore per month at Pilgrim's Rest; the commissioning of a new mill at the south division of Western Deep Levels Mine to treat up to 360,000 tons of ore per month; the doubling of Kloof Gold Mining Co.'s current milling capacity of 180,000 tons of ore per month at a cost of $500 million; and the commissioning of the No. 6N shaft by the Hartebeestfontein Gold Mining Co. Ltd. at a cost of $42 million.

Table 5.—Republic of South Africa: Gold production and ore reserves, by producer

Producer	Production (troy ounces)				Developed ore	
	1982	1983	1984	1985[p]	Thousand metric tons	Troy ounces per ton
AAC Joint Metallurgical Scheme	114,492	115,981	129,066	121,777	NA	NA
Barberton	38,160	45,252	56,521	55,945	NA	NA
Blyvooruitzicht	643,372	593,708	501,381	426,084	5,085	0.620
Bracken	106,544	115,103	110,042	122,333	1,900	.167
Buffelsfontein	883,827	966,204	1,011,519	1,230,771	9,936	.315
Consolidated Murchison Ltd	16,551	18,683	25,302	[e]27,000	NA	NA
Deelkraal	217,574	204,746	234,642	231,032	4,542	.205
Doornfontein	348,440	319,533	314,906	306,528	5,378	.285
Driefontein Consolidated Ltd.:						
East Driefontein	1,134,433	1,092,511	1,110,646	914,205	8,344	.438
West Driefontein	1,333,809	1,270,662	1,238,930	1,157,435	6,863	.503
Durban Deep	269,195	251,863	244,734	242,645	2,393	.151
East Rand Gold and Uranium Co. Ltd	187,567	197,341	207,694	222,965	NA	NA
East Rand Proprietary Mine	343,814	357,037	335,017	329,590	5,346	.212
Elandsrand	261,652	316,955	343,813	378,430	5,065	.279
Free State Geduld	816,671	873,803	860,009	857,626	8,695	.411
Grootvlei	229,367	227,505	247,445	220,342	6,610	.164
Harmony	1,021,333	1,042,295	1,037,310	1,057,147	4,051	.205
Hartebeestfontein	959,876	968,663	996,778	926,921	19,334	.363
Kinross	322,141	392,866	432,748	473,474	9,400	.289
Kloof	893,742	978,852	1,048,190	1,001,173	6,109	.555
Leslie	125,729	125,308	148,170	125,507	2,300	.173
Libanon	343,129	328,423	285,440	282,116	6,659	.199
Loraine	260,749	270,960	278,271	286,604	8,566	.238
Marievale	35,848	39,381	38,790	36,533	610	.180
President Brand	807,418	771,165	726,580	670,869	8,387	.363
President Steyn	801,611	834,292	783,615	738,752	13,907	.308
Randfontein	869,838	952,903	998,781	1,035,606	9,101	.242
St. Helena	469,828	444,204	396,843			
				397,441	10,780	.289
St. Helena-Beisa	20,708	44,918	40,526			
Stilfontein	401,100	396,354	346,623	319,215	5,422	.286
Unisel	277,782	296,494	291,385	298,391	4,800	.241
Vaal Reefs	2,531,865	2,572,281	2,659,969	2,615,636	34,308	.354
Venterspost	208,353	195,785	203,315	188,844	9,654	.189
Western Areas	544,087	582,732	567,878	527,657	4,701	.251
Western Deep Levels	1,269,179	1,268,501	1,158,907	1,204,613	6,955	.570
Western Holdings	1,290,955	1,287,296	1,252,472	1,244,062	16,098	.275
West Rand Consolidated	122,478	127,960	140,142	130,457	6,109	.202
Winkelhaak	422,313	467,842	471,709	445,956	10,600	.282
Witwatersrand Nigel	30,498	27,653	25,984	26,171	NA	NA
Other	378,594	463,684	558,828	646,387	NA	NA
Total or average	21,354,622	21,847,699	21,860,921	21,524,240	268,008	.311

[e]Estimated. [p]Preliminary. NA Not available.

Sources: Chamber of Mines of South Africa. Quarterly Analysis of Working Results, Oct.-Dec. 1981-85; supplements to the Mining Journal (London), 1981-86. Consolidated Murchison Ltd. Annual Reports 1981-85.

Iron Ore and Concentrate.—Output from 14 mines was about 25 million tons containing an estimated 15 million tons of iron. The South African Iron and Steel Industrial Corp. (Iscor) was the largest producer with about 17 million tons of ore from the Sishen Mine in northwestern Cape Province. About 18.9 million tons was shipped via the Sishen-Saldanha Bay railroad and exported, and about 3.6 million tons was stockpiled at the port. Iscor also operated the Bruce Mine for Associated Manganese Mines of South Africa Ltd. Sishen employed 3,000 people, and operated 6 days per week, 24 hours per day. Minable reserves at Sishen were about 850 million tons, and production costs were estimated at $1.37 per ton.

The Waterval Mine of G&W Base and Industrial Minerals (Pty.) Ltd. produced specularite for use as a coloring agent in bricks and tiles. Garieb Minerals (Pty.) Ltd. produced hematite from the Atties Mine for cement use.

Iron and Steel.—Iscor, the major steelmaker, produced 6.94 million tons of crude steel from about 10.8 million tons of iron ore, 5 million tons of coking coal, 0.5 million tons of other coal, and nearly 1 million tons of dolomite. Exports were about 2.5 million tons to about 80 countries, and were expected to comprise about 47% of total production in 1986. Local sales declined about 22% owing to the recession. Iscor had a $155 million, 3-year modernization program under way, including a 300,000-ton-per-year new coal reduction iron plant at the Pretoria Works. The new process was predicted to be about 30% less expensive than traditional blast furnace operations. A continuous annealing line was also being built at the Vanderbijlpark Works.

Exports of scrap iron and steel were about 150,000 tons, and 1986 exports were expected to increase to over 250,000 tons valued at about $18 million.

The Stainless Steel Development Association sought Government protection from imports for the country's stainless steel industry, which had a total market of about 60,000 tons per year. Nearly 50% of the total was supplied by imports. Middleburg Steel & Alloys (Pty.) Ltd. (MSA) was the sole producer with capacity of 95,000 tons of coil, plates, and sheets per year. Total stainless steel industry employment was 15,000, and sales turnover of fabricated products was about $275 million. MSA expected to double its current 10,000-ton-per-year output of its 3CR12 stainless steel owing to expanded markets for the new corrosion-resistant alloy.

Ferroalloys.—The Republic of South Africa was a leading world producer of ferroalloys, and production increased as export demand rose for manganese alloys, particularly ferrosilicomanganese. Ferroalloy producers included Consolidated Metallurgical Industry Ltd.; Ferralloys (Pty.) Ltd.; Ferrometals (Pty.) Ltd.; Metalloys Ltd.; MSA; Rand Carbide (Pty.) Ltd.; Transalloys (Pty.) Ltd.; and Tubatse Ferrochrome (Pty.) Ltd. Gencor gained complete control of Tubatse with the purchase of Union Carbide's 49% interest in that company. Batlhako Ferrochrome (Pty.) Ltd. was a new ferrochrome producer constructing a 20,000-ton-per-year charge chrome facility in Bophuthatswana.

Lead.—Lead concentrate was produced and exported by Black Mountain Mineral Development from the Black Mountain Mine. Another 9,000 tons of lead concentrate per year grading 65% lead was to be produced from the Pering Mine under development in 1985. Lead metal was from imports and scrap recyclers, the latter having a production capacity of 39,000 tons. Consumption was in lead batteries, 69%; electric cable sheathing, 17%; and the remainder in pipes, sheets, and chemicals such as lead antiknock compounds for motor fuel.

Manganese.—Output was mainly metallurgical grade, 85% of which was from the Kalahari Field in northern Cape Province. The main producing mines were Mamatwan and Wessels Mines, owned by Samancor, which was 50% Gencor, 26.4% AAC, and the remainder, institutions and private investors through the Johannesburg Stock Exchange. Samancor also had the Hotazel, Lohatla, Middelplaats, and Smartt Mines.

The Rand London Mine in western Transvaal, owned by Rand London Manganese Mines (Pty.) Ltd., produced chemical-grade ore.

The country's two manganese metal producers, Delta Manganese (Pty.) Ltd. and Electrolytic Metal Corp., merged their operations in August 1985 to form Manganese Metal Co. (Pty.) Ltd. (MMC). The former companies' respective plants at Nelspruit and Krugersdrop, with capacities of 26,000 and 17,000 tons per year, were both to remain operational. Nearly all of MMC's output was exported.

Molybdenum.—The Republic of South Africa has no known commercial molybdenum deposits, although mineralization was found in small uranium deposits, and in conjunction with tungsten in northwestern Cape Province. Domestic consumption in 1985 was supplied by imports of $3.1 million of combined molybdenum oxides, metal, and ferromolybdenum.

Nickel.—Production was as a byproduct of three producers of PGM and one producer of copper, PMC. Reserves were 5.5 million tons, as reported by the Minerals Bureau of South Africa, and were in the basic and ultrabasic phases of the BIC. The main ore horizons were the Merensky Reef, the UG2 chromite seam, and the Plat Reef. Pegmatoidal ore bodies within the BIC, while containing PGM and vanadium, were devoid of nickel.

Platinum-Group Metals.—Higher demand led to improved price performance and subsequently greater production as all three major PGM producers reported increased profits. While the Merensky Reef of the BIC was the major source of PGM, all three mining concerns exploited the UG2 seam with its higher rhodium content.

Wesplat completed construction of its base metal refinery at Brakpan for the production of copper cathode and nickel-cobalt sulfate from PGM matte. The matte formerly was shipped to Norway for processing. Output in 1985 was about 165,000 troy ounces and included production from both the Merensky Reef and UG2 seam. Production of ore from the UG2 was being expanded to 80,000 tons per month, and monthly output of Merensky Reef ore was about 100,000 tons. Reserves were 150 million tons in the Merensky Reef grading 0.17 troy ounce of PGM per ton and 260 million tons in the UG2 seam grading 0.16 troy ounce of PGM per ton.

Rustenburg Platinum Holdings Ltd. (RPH) commenced exploitation of the UG2 seam. RPH also exploited the Plat Reef. The UG2 seam was mined at the company's Union section, and processing was at the Ivan plant. RPH was also considering construction of a new PGM refinery at a cost of about $90 million at the Rustenburg section in Bophuthatswana.

East Rand Consolidated Ltd. (ERC) attempted to raise $13 million through a rights offer to assist its subsidiary, Vansa Vanadium South Africa Ltd. (Vansa), to develop PGM and vanadium resources at its titaniferous magnetite deposit at Kennedy's Vale.

GFSA was close to a decision on developing a new PGM mine near Northam in western Transvaal. Output would be about 250,000 troy ounces of PGM per year.

Silicon.—Domestic silicon consumption in the form of ferrosilicon and silicon metal was about 45% and 10%, respectively, of production.

Tin.—Exports of tin metal and tin in concentrate were about one-half of the production of tin contained in concentrates in 1985. About 60% of locally produced and imported tin was used in tinplating.

All three tin producers, Rooiberg Tin Ltd., Union Tin Mines Ltd., and Zaaiplaats Tin Mining Co. Ltd., were unable to maintain ore grades and suffered subsequent drops in production. The Rooiberg Mine, the largest producer, experienced higher unit costs owing to a decline in tonnage mined, and had an increase in labor costs of 22%. The company expected to trim its labor force of 2,556 in 1986. GFSA's Union Mine exploited support pillars and higher grade ore pockets, but an increase in average grade was to be necessary at lower yearend prices to sustain operations in 1986.

Titanium.—Richards Bay Iron and Titanium (Pty.) Ltd. commenced construction of its third furnace at Richards Bay, which would expand titanium slag production capacity by about 50% to an estimated 600,000 tons per year.

Vanadium.—Strategic Metals Corp. of the United States purchased Union Carbide's vanadium subsidiary, Vametco Minerals Co., in Bophuthatswana. Vametco was one of three vanadium producers in the Republic of South Africa using the salt-roast, acid-leach process to recover mainly vanadium pentoxide from vanadiferous titaniferous magnetite.

Highveld Steel and Vanadium Corp. Ltd. (HSVC) commissioned its second iron plant in late 1985. The plant, built in 1983, consisted of three prereduction kilns and a single 63-megavolt-ampere furnace. Its operational status increased the annual vanadium pentoxide production capacity for HSVC by about 3,000 tons to 22,700 tons.

A public offering was made by ERC to enable Vansa to process 200,000 tons of vanadiferous magnetite from an opencast operation at Kennedy's Vale to produce 3,000 tons of vanadium pentoxide per year.

Zinc.—Ore reserves and grade declined at PCM, and production was expected to cease at current prices and low reserves.

The Pering Mine of Shell South Africa (Pty.) Ltd. in northern Cape Province, southwest of Vryburg, commenced preproduction stripping, with ore production expected to commence in late 1986. Ore production capacity would be about 1 million tons per year; zinc concentrate production, 60,000 tons per year grading 55% zinc; and lead concentrate production, 9,000 tons per year grading 65% lead. Most of the concentrate produced would go to Zinc Corp. of South Africa Ltd., for processing at its Spring refinery. Reserves were a minimum of 18.4 million tons of ore grading 3.61% zinc and 0.64% lead. Capital investment was estimated at $30 million.

INDUSTRIAL MINERALS

Andalusite and Related Minerals.—Andalusite was produced in the Transvaal at six mines in 1985: the Andafrax, Havercroft, Hoogenoeg, Kruperspost, Timeball, and Walverdiend. Concentrates produced from these operations graded 52% to 60% alumina. Sillimanite production was from the Pella and Niemoller Mines in northwestern Cape Province, and alumina content of concentrates produced varied from 50% to 72%. Natural corundum was included in the latter concentrates.

Asbestos.—Total extractable reserves of all types of asbestos were 8 million tons. Output was from 10 mines: the Penge Mine produced amosite; the Msauli, Kaapschoop, and Stella Mines produced chrysotile; and the Bretby, Emmarentia, Klipfontein, Pomfret, Wandrag, and Whitedale Mines produced crocidolite, which was shipped to the Marencor plant for processing. Mine production was 26,000 tons per month and salable product output was 2,500 tons per month. Total employment was about 1,800, mainly from Bophuthatswana.

Msauli Asbestos Ltd. increased output of chrysotile asbestos and reported a net income of $2.5 million in 1985. A new incline shaft was commissioned, which improved access to higher grade ore and led to a 9% increase in overall recovery. A new subvertical shaft was to be commissioned in February 1986.

Cement.—The recession in the building trades severely impacted the cement and stone industries. Total installed capacity was about 12 million tons, and capacity utilization was 64% compared with 80% in 1984. The three largest producers accounted for about 98% of total capacity. Of the 20 existing plants, 7 used the wet process and were all mothballed at yearend.

Anglo-Alpha Ltd., which commissioned a new $137 million kiln at its Union Lime Co. Ltd. (ULCO) works in northern Cape Province in November, planned to operate the plant only as need arose. Anglo-Alpha's cement capacity with the new kiln was 3.6 million tons, or about 36% of the Republic of South Africa's total production capacity. Installed capacity at ULCO was 1.8 million tons.

Blue Circle Cement Co. Ltd. (BCC) completed a $73 million, 1-million-ton-per-year expansion program at its Lichtenburg plant in July, thereby raising plant capacity to 2.5 million tons per year. BCC had about 24% of the country's total cement-making capacity, and was owned 57.6% by Darling & Hodgson Ltd., a Gencor subsidiary, and 42% by Blue Circle Industries Ltd. of the United Kingdom.

Pretoria Portland Cement Ltd. (PPC), which was nearing completion of its $137 million, 600,000-ton-per-year cement plant at Dwaalboom in northern Transvaal, mothballed the plant pending an upturn in construction. PPC had about 50% of the country's total cement-making capacity.

Prices for cement were set by producers, who followed a formula set by the price controller, which was generally 15% above cost of production plus transportation.

Diamond.—There were 58 active diamond mining operations in 1985. Of these, 19 mined kimberlite, 21 mined alluvial ore, and 18 were marine mining areas. Tailings were reprocessed in 15 of these operations. De Beers Consolidated Mines Ltd., through its own mines, accounted for 95% of total diamond recovery.

The Finsch Mine, an open pit operation in the De Beers' Kimberly Div., commenced installation of a 1,070-meter-long conveyor belt with a capacity of 1,000 tons per hour in a decline shaft to transport ore from the existing open pit, replacing the current truck transport for fuel savings. The decline shaft was part of preparations under way to mine underground exclusively by 1990. Output at full production would be 550,000 tons per month of ore and waste, or about 6 million tons per year. Sublevel stoping using trackless equipment and cemented roadways was to be employed. In 1985, 5.2 million tons of ore was treated yielding 94.82 carats per 100 tons. About 198,000 tons of old tailings was also retreated.

The Wesselton Mine was one of four underground mines in the Kimberly Div., all serving a single treatment plant. Ore treated was 1.362 million tons grading 25.88 carats per 100 tons and yielding 352,455 carats. Kimberlite ore was crushed to minus 32 millimeters and then transported via conveyor to the treatment plant. Material from a stockpile of about 9,000 tons, consisting of blended ore and retreated waste, was fed to 24 primary washing pans at the rate of 3 tons per hour per pan. Screening, washing, hydrocycloning, and heavy-medium separation resulted in a final concentrate of 50 to 60 tons per day. The concentrate was fed to grease belts and an X-ray section prior to hand sorting and final classification and valuation.

De Beers' Namaqualand Div. produced 5.02 million tons of ore yielding 920,403 carats, or 18.35 carats per 100 tons. Overburden stripping was 8 million tons compared with 15.2 million in 1984.

The Premier Div., comprising the Premier Mine, treated 7.7 million tons of ore and produced 2,684,000 carats. Underground output was 5.5 million tons and graded 37.7 carats per 100 tons. Dump material graded 27.05 carats per 100 tons compared with 31.49 carats in 1984.

Activity in the offshore diamond leases increased. About 10 small permit holders operated offshore, including the Government-owned State Alluvial Diggings.

Table 6.—Republic of South Africa: Marketed diamond output, by Province

Province	1983 Output (carats)	1983 Price per carat	1984 Output (carats)	1984 Price per carat	1985[p] Output (carats)	1985[p] Price per carat
Mine diamond:						
Transvaal	2,673,249	$22.37	2,570,183	$28.17	2,700,601	$22.45
Cape Province	6,184,238	27.54	6,078,008	26.55	6,147,626	30.27
Orange Free State	99,188	74.21	92,656	44.15	68,143	64.73
Total or average	8,956,675	26.51	8,740,847	27.29	[1]8,916,369	28.34
Alluvial diamond:						
Transvaal	36,353	200.79	44,195	163.92	52,617	161.78
Cape Province	1,316,729	156.55	1,335,326	103.75	1,232,406	94.63
Orange Free State	602	48.66	344	512.82	1,079	359.50
Total or average	1,353,684	157.69	1,379,865	106.00	1,286,102	97.85
Grand total	10,310,359	43.74	10,120,712	37.54	10,202,471	36.75

[p]Preliminary.
[1]Data do not add to total shown because of independent rounding.

Sources: Minerals Bureau, Mineral Production and Sales Statistics, 1983, 1984, and 1985. R1=$0.8991 for 1983, R1=$0.6954 for 1984, and R1=$0.4564 for 1985.

Feldspar.—Production stabilized, but exports were nonexistent in 1985 owing to the high cost of transport and low material value. Potassic feldspar made up 98% of production. Local sales were almost entirely as ground material, mainly for the glass industry.

Gypsum.—PPC let a $2.6 million contract for construction of a synthetic gypsum plant at its Jupiter plant near Germiston using limestone and sulfuric acid. Completion of the plant was expected in midyear 1986, and output would be 95,000 tons per year, replacing natural gypsum mined and shipped from Copperton in northern Cape Province, a distance of about 800 kilometers from Germiston.

Lime and Limestone.—Limestone production was from 43 sites, and output stabilized due to continued inactivity in the building trades. Output was by five major producers entirely from opencast mines. Limestone sales in terms of percent of total value to the various sectors was as follows: agriculture, 18.9%; cement, 37.7%; metallurgy, 14.5%; and other, 29%. About 66% of lime sales were as unslaked lime, lump form; ground unslaked lime made up 19%; and slaked lime, 12%.

Magnesite.—The Strathmore Mine northeast of Barberton was the sole producer of magnesite in 1985. About 14% of production was used in agriculture and magnesium chemicals. The remainder was primarily for refractory bricks and cement.

Mica.—Output was entirely as ground mica, mainly muscovite, by three main producers and was generally a coproduct of feldspar production from pegmatoidal ore bodies in eastern Transvaal. About 80% of the marketable product was wet ground.

Potash.—There were no known evaporite deposits of potash minerals in the Republic of South Africa, and domestic consumption was mainly from imports. Ocean floor glauconite deposits lying between 200-meter and 500-meter depths remained unminable at current prices. Iscor produced about 3,000 tons of sinter products annually from its iron ore plant at Vanderbijlpark, containing 30% to 60% potassium chloride, and sales were to the agricultural sector.

MINERAL FUELS

Coal.—Recoverable coal reserves were about 58 billion tons, 98% of which was bituminous and 2%, anthracite. Only about 1.6% was of coking quality. There were 19 operational coalfields in 1985 having about 100 collieries, including 21 that were mining anthracite. Run-of-mine coal production was about 210 million tons, and salable coal output was about 173 million tons. Of salable coal, Gencor and AAC accounted for 43% of total sales, South African Coal, Oil and Gas Corp. Ltd. (Sasol), 21%; and BRL, about 10%. Transvaal supplied 86.8% of total salable coal; Orange Free State, 6.3%; and the remainder came from Natal. About 35% was recovered by opencast mining methods, and 65% from underground using highly mechanized extraction methods. Run-of-mine productivity averaged 325.4 tons per worker per month.

The Electricity Supply Commission operated 20 coal-fired stations with an installed capacity of 21,904 megawatts, or about 85% of total capacity, and accounted for about 63 million tons of coal consumption.

Coal output by Sasol was about 35 million tons, from which synthetic fuels and more than 60 other products or chemicals were produced.

Coal export capacity was 44 million tons per year for Richards Bay, 4 million tons per year for Durban, and 1.9 million tons for the ports of Port Elizabeth, East London, and Maputo, the latter in Mozambique. About 700,000 tons was exported by railroad to neighboring countries.

Rand Mines nearly completed development of the Majuba Mine for commissioning in early 1986. Development cost was about $320 million, and design capacity at full production was 12 million tons per year. Total employment would be about 2,800 people for the underground operation. The 2.8-meter-thick Gus seam at a depth of 285 to 400 meters was the main seam, and reserves were about 970 million tons. It would be the Republic of South Africa's deepest coal mine.

The Zululand Mine commenced production of anthracite in June, and full production capacity of 875,000 tons per year was expected to be reached in early 1986. Output was for both local sales and exports.

The Council for Scientific and Industrial Research sponsored studies into the recovery and utilization of fine coal. Large-scale pilot plant studies were under way for recovery of good-quality coals from colliery slimes, and for the froth flotation of less than 50-micrometer-size-particle coal for improved recovery.

Uranium.—Output of uranium was by 12 producers from 15 plants, and was all as a byproduct or coproduct. The sole primary producing mine, Beisa Mine of Gencor, was shut down, and about $100 million of plant equipment was sold. AAC accounted for 47% of the Republic of South Africa's total production; Gencor, 17%; JCI, 16%; BRL, 7%; AVL, 7%; and the remainder, by GFSA and PMC. Uranium consumption was about 289 tons per year of uranium equivalent, and about 90% of total output was for export. The Koeberg nuclear powerplant reached its full power rating of 1,930 megawatts in September.

Western Deep Levels Mine terminated production at its uranium recovery facility and reconverted it for gold recovery.

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[1]Physical scientist, Division of International Minerals.
[2]Where necessary, values have been converted from South African rands (R) to U.S. dollars at the rate of R1=US$0.6954 for 1984 and R1=US$0.4564 for 1985.

Table 7.—Republic of South Africa: Production of U_3O_8, by producer

(Kilograms)

Company or mine	1981	1982	1983	1984	1985[p]
AAC Joint Metallurgical Scheme[1]	1,093,416	863,361	718,928	596,787	602,104
Blyvooruitzicht	315,502	252,270	289,156	233,092	--
Buffelsfontein	631,750	580,500	611,000	613,500	713,500
East Rand Gold and Uranium Co. Ltd	302,194	264,814	229,885	216,131	150,997
Harmony	580,428	591,090	623,600	496,680	426,300
Hartebeestfontein	478,663	429,103	441,446	436,283	428,367
Palabora Copper	234,206	257,879	218,635	159,769	217,828
Randfontein	591,774	462,837	491,067	592,776	609,332
St. Helena-Beisa	--	253,612	454,792	353,294	--
Vaal Reefs	1,693,569	1,721,782	1,877,421	1,962,977	1,881,828
West Driefontein	242,327	224,601	174,566	159,638	86,705
West Rand Consolidated	190,258	--	--	--	--
Western Areas	--	170,638	282,465	305,403	311,836
Western Deep Levels	212,484	183,394	173,841	145,632	54,036
Miscellaneous	668,320	577,176	541,190	489,646	261,369
Total	7,234,891	6,833,057	7,127,992	6,761,608	5,744,202

[p]Preliminary.
[1]Includes recovery of U_3O_8 from concentrates and tailings produced by the Free State Geduld, Free State Saaiplaas, President Brand, President Steyn, Welkom, and Western Holdings Mines, all subsidiaries of Anglo American Corp. Ltd. in the Orange Free State Province.

Sources: Chamber of Mines of South Africa. Quarterly Analysis of Working Results, Oct.-Dec. 1981-85; Republic of South Africa Department of Mineral and Energy Affairs. Quarterly Statistical and Other Data on Minerals, Oct.-Dec. 1981-82; Republic of South Africa Department of Mineral and Energy Affairs. Annual Reports 1981-83; Palabora Mining Co. Ltd. Annual Reports 1981-85; and East Rand Gold and Uranium Co. Ltd. Annual and Quarterly Reports, 1981-85.

The Mineral Industry of Spain

By John R. Craynon and Roman V. Sondermayer[1]

Conditions in the mineral industry in Spain improved in 1985. The output of most mineral commodities increased slightly. Spain retained its position as an important producer of minerals and processor of imported minerals and related materials. Spanish production of several minerals was of world importance. Spain produced approximately 22% of the world's strontium minerals, 23% of the mercury, 11% of the pyrites, 7% of the gypsum, 5% of the magnesite, 4% of the smelter zinc, 3% of the mined zinc, 2% of the potash, and 2% of the refined copper. Production of other minerals and fuels was of domestic or local significance only.

Preparations for entry into the European Economic Community (EEC) on January 1, 1986, especially in the aluminum and steel sectors, were the major mineral-related events in 1985. The announced plans for closure of the Almadén mercury mine, the expansion of Rio Tinto Minera S.A.'s (RTM) precious metals plant, and the discovery of glauberite in central Spain were other significant happenings in the mineral industry.

PRODUCTION

The mineral industry of Spain was controlled by governmental and private organizations. Mining and mineral activities were situated throughout the country.

Table 1.—Spain: Principal mineral industry companies and locations, by commodity

Commodity	Major companies	Location of principal facilities
Alumina	Alúmina de España S.A	Plant at San Ciprián.
Aluminum	Alúminio Español S.A	Do.
Do	Endasa S.A	Plant at Avilés, La Coruña, Sabiñánigo.
Bituminous coal	Hunosa S.A	Mines in Astúrias.
Cement	Asland S.A	7 plants at various locations.
Copper ore	Rio Tinto Minera S.A	Mines at Rio Tinto.
Copper, refined	do	Refinery at Huelva.
Ferroalloys	Sociedad Española de Carburos Metálicos S.A.	Plant at Berga.
	Hidro Nitro Españolas S.A	Plant at Monzón.
	Ferroaleaciones Españolas S.A	Plant at Medina del Campo.
Iron ore	Cía. Andalusa de Minas S.A	Mine at Marquesado.
Lead ore	Sociedad Minera y Metallúrgica de Peñarroya de España.	Mines at Mantas de los Azules, Unión.
Lead, smelter	do	Smelter at Santa Lucía.
Mercury	Minas de Almadén y Arrayanes S.A	Mines and smelter at Almadén.
Petroleum, refined	Empresa Nacional del Petróleo S.A	Refineries at Valle de Escombreras, Puertollano, Tarragona.
Do	Cía. Española de Petróleos S.A	Refineries at St. Cruz de Tenerife, Algeciras.
Potash	Potasas de Navarra S.A	Mine near Pamplona.
Do	Minas de Potasas de Suria S.A	Mine near Suria.
Do	Unión Explosivos Rio Tinto S.A	Mines at Balsarney-Sallent and Cardona.
Pyrite	Tharsis Sulfur and Copper Co. Ltd	Mines at Tharsis and La Zarza.
Steel	Empresa Nacional Siderúrgica S.A	Works at Avilés, Felguera, Gijón-Moreda, Gijón-Verina.
Do	Altos Hornos de Vizcaya S.A	Work at Baracaldo-Sestao.
Zinc ore	Real Cía. Asturiana de Minas S.A	Mines at Reocín and Rubiales.
Zinc, smelter	do	Electrolytic zinc plant at San Juan de Nieva.

Table 2.—Spain: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984[p]	1985[e]
METALS					
Aluminum:					
Bauxite	8,930	7,361	5,208	7,263	7,000
Alumina	695,000	[r]673,000	737,000	741,569	725,000
Metal:					
Primary	396,600	366,500	357,614	380,830	[2]370,118
Secondary	40,000	[e]35,000	36,000	40,600	38,000
Antimony, mine output, metal content	646	459	489	583	575
Cadmium metal	303	286	278	290	300
Copper:					
Mine output, metal content	50,923	47,614	49,964	63,105	[2]56,447
Metal:					
Blister:					
Primary	87,900	105,000	100,000	97,000	100,000
Secondary	20,000	30,000	18,000	30,000	25,000
Total	107,900	135,000	118,000	127,000	125,000
Refined:					
Primary	137,100	[e]151,300	[r e]141,500	118,100	125,000
Secondary	15,000	[e]20,600	[r e]17,100	38,300	30,000
Total	152,100	[2]171,900	158,600	156,400	155,000
Gold, mine output, metal content troy ounces	98,381	109,858	162,296	123,330	125,000
Iron and steel:					
Iron ore and concentrate (including byproduct concentrate):					
Gross weight thousand tons	8,565	8,370	7,449	7,261	[2]6,452
Iron content do	4,218	4,130	3,512	3,558	[2]3,189
Metal:					
Pig iron do	6,423	5,991	5,398	5,338	[2]5,477
Ferroalloys, electric-furnace do	293	259	253	291	300
Steel:					
Crude do	12,662	13,160	12,731	13,484	[2]14,235
Castings and forgings do	250	209	156	156	[2]138
Total do	12,912	13,369	12,887	13,640	[2]14,373
Semimanufactures do	10,244	9,970	10,787	10,703	[2]11,050

See footnotes at end of table.

Table 2.—Spain: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984[p]	1985[e]
METALS —Continued					
Lead:					
Mine output, metal content	80,200	73,271	82,453	96,638	[2]86,730
Metal:					
Primary	83,000	99,500	107,800	110,088	110,000
Secondary	34,100	32,100	36,000	49,912	45,000
Mercury:					
Mine output, metal content 76-pound flasks	49,545	50,832	43,250	22,680	20,000
Metal do.	46,008	48,808	41,075	44,090	45,000
Silver, mine output, metal content thousand troy ounces	5,347	3,787	1,496	4,999	5,000
Tantalum minerals (tin byproduct):					
Gross weight kilograms	58,390	53,630	47,000	31,950	32,000
Tantalum content do.	16,463	14,142	15,066	9,739	10,000
Tin:					
Mine output, metal content	564	518	444	438	[2]465
Metal, primary	4,400	3,700	3,700	3,500	3,500
Titanium dioxide[e]	40,000	40,000	35,000	34,000	38,000
Tungsten, mine output, metal content	437	545	517	565	[2]530
Uranium, mine output, U_3O_8 content	290	280	283	366	[2]304
Zinc:					
Mine output, metal content	182,045	167,000	167,715	230,378	[2]227,777
Metal, primary and secondary	179,500	181,800	189,900	207,400	[2]205,300
INDUSTRIAL MINERALS					
Barite	52,695	50,031	52,410	68,919	65,000
Bromine[e]	400	350	330	300	350
Cement, hydraulic, other than natural thousand tons	28,751	29,569	30,632	25,435	25,500
Clays:					
Attapulgite	42,227	42,296	44,654	43,907	44,000
Bentonite	110,000	112,326	82,530	72,582	73,000
Kaolin, marketable:					
Crude	71,665	72,956	63,480	56,640	75,000
Washed	189,990	165,936	191,632	262,633	275,000
Refractory, not further described	529,416	453,425	453,952	516,166	500,000
Other thousand metric tons	10,994	11,318	10,262	9,006	10,000
Diatomite and tripoli	38,111	63,365	55,638	73,013	60,000
Feldspar	129,593	131,071	116,137	136,943	120,000
Fluorspar:					
Gross weight:					
Acid-grade	213,616	157,205	190,749	253,221	[2]266,467
Metallurgical-grade	43,511	37,075	41,585	42,445	[2]40,330
Total	257,127	194,280	232,334	295,666	[2]306,797
CaF_2 content:					
Acid-grade	259,500	197,550	190,749	246,121	[2]259,017
Metallurgical-grade	31,500	29,247	41,585	33,710	[2]31,336
Total	291,000	226,797	232,334	279,831	[2]290,353
Gypsum and anhydrite, crude thousand tons	5,288	5,048	5,620	5,365	5,250
Kyanite, andalusite, and related materials	6,151	5,105	4,486	3,000	3,500
Lime, hydrated and quicklime thousand tons	1,051	1,100	1,000	1,088	1,100
Magnesite:					
Calcined	135,023	154,421	173,876	169,191	170,000
Crude	476,392	533,595	597,137	691,542	650,000
Mica	3,524	3,428	1,300	990	1,000
Nitrogen: N content of ammonia thousand tons	743	538	615	620	610
Pigments, mineral:					
Ocher	15,522	11,709	9,879	10,316	10,500
Red iron oxide[e]	25,000	23,000	20,000	20,000	22,000
Potash salts, K_2O equivalent	731,642	691,931	656,726	[e]677,000	[2]649,857
Pumice	937,851	970,480	1,002,301	829,827	900,000
Pyrite including cuprous, gross weight thousand tons	2,400	[e]2,200	2,306	2,329	[2]2,459
Salt:					
Rock including byproduct from potash works thousand tons	2,300	2,213	2,008	2,156	2,100
Marine and other do.	1,393	1,077	1,149	1,233	1,200
Sand and gravel: Silica sand[3] do.	1,832	1,611	2,100	2,267	2,300
Sepiolite	288,499	329,243	345,932	237,570	250,000

See footnotes at end of table.

Table 2.—Spain: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984[p]	1985[e]
INDUSTRIAL MINERALS —Continued					
Sodium compounds, n.e.s.:					
Sodium carbonate, manufactured[e] thousand tons	500	500	500	550	550
Sodium sulfate:					
Natural:					
Glauberite, Na_2SO_4 content	55,097	92,737	130,566	214,198	200,000
Thenardite, Na_2SO_4 content	132,340	117,776	132,513	152,829	130,000
Manufactured[e]	175,000	170,000	170,000	170,000	160,000
Stone:					
Calcareous:					
Chalk thousand tons	277	397	377	362	NA
Dolomite do	1,999	1,967	2,020	2,112	NA
Limestone do	78,673	83,831	84,080	77,468	NA
Marble do	694	665	685	623	NA
Marl do	6,210	6,380	6,346	5,772	NA
Basalt do	1,138	1,269	1,064	1,992	NA
Granite do	7,514	7,671	7,527	7,853	NA
Ofite do	659	846	1,044	1,212	NA
Phonolite do	568	680	449	472	NA
Porphyry do	341	309	461	475	NA
Quartz do	627	455	502	372	NA
Quartzite do	347	432	602	831	NA
Sandstone do	1,791	1,807	1,365	1,599	NA
Serpentine do	342	303	360	376	NA
Other do	26,819	25,308	23,659	23,055	NA
Strontium minerals:					
Gross weight	36,000	34,900	34,500	27,000	27,000
Sr_2O_4 content	33,120	32,108	31,740	24,840	25,000
Sulfur:					
S content of pyrites thousand tons	1,118	1,029	1,073	1,094	[2]1,133
Byproduct:					
Of metallurgy do	135	130	[e]120	[e]125	115
Of petroleum do	12	10	[e]8	[e]9	9
Of coal (lignite) gasification do	3	3	[e]3	[e]3	2
Total do	1,268	1,172	1,204	1,231	1,259
Talc and steatite	69,068	69,686	69,467	72,237	73,000
MINERAL FUELS AND RELATED MATERIALS					
Coal (marketable):					
Anthracite thousand tons	4,863	5,205	5,370	5,476	[2]5,857
Bituminous do	9,080	10,217	10,049	9,814	[2]10,380
Lignite do	20,986	23,882	24,524	24,303	[2]23,504
Total do	34,929	39,304	39,943	39,593	[2]39,741
Coke, metallurgical do	NA	NA	3,422	2,842	3,000
Gas, natural: Marketed million cubic feet	55	105	183	6,245	[2]9,486
Peat	39,012	60,092	39,622	55,561	50,000
Petroleum:					
Crude thousand 42-gallon barrels	8,955	11,170	21,693	16,361	15,222
Refinery products:					
Liquefied petroleum gases do	11,228	10,834	12,597	14,964	[2]13,642
Naphtha do	9,891	12,138	18,606	23,709	[2]24,973
Gasoline, motor do	44,871	38,505	47,787	52,350	[2]57,019
Jet fuel do	15,720	15,816	16,968	18,160	[2]19,312
Kerosine do	581	3,231	1,418	1,860	[2]3,309
Distillate fuel oil do	78,270	75,055	74,771	78,067	[2]85,887
Residual fuel oil do	148,371	123,762	108,391	108,238	[2]94,719
Lubricants including grease do	(4)	(4)	(4)	(4)	[2]2,856
Other do	41,552	49,896	45,927	28,420	[2]43,411
Refinery fuel and losses do	6,391	8,108	10,405	1,112	[2]5,582
Total do	356,875	337,345	336,870	326,880	[2]350,710

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through Aug. 1, 1986.
[2]Reported figure.
[3]Includes sand obtained as a byproduct of feldspar and kaolin production.
[4]Included with "Refinery products: Other."

TRADE

Trade in mineral commodities continued to be significant. Imports of minerals, metals, and fuels amounted to $15.2 billion[2] in 1985. Exports of these materials were valued at $8.2 billion and represented 51% of imports and 34% of exports. Imported crude petroleum and petroleum products accounted for 33% of the value of all imports.

Table 3.—Spain: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS			
Aluminum:			
Ore and concentrate	558	--	Pakistan 555; Tunisia 3.
Oxides and hydroxides	20,725	4,856	Sweden 9,680; United Kingdom 3,102.
Ash and residue containing aluminum	4	--	All to Portugal.
Metal including alloys:			
Scrap	95	--	West Germany 73; Portugal 21.
Unwrought	231,244	16,338	Netherlands 95,616; Turkey 46,062; Japan 25,589.
Semimanufactures	27,325	4,833	Japan 5,034; France 3,477.
Antimony: Metal including alloys, all forms	465	--	Netherlands 301; France 108; United Kingdom 17.
Cadmium: Metal including alloys, all forms	184	--	All to Netherlands.
Chromium:			
Ore and concentrate	15	--	All to Tunisia.
Oxides and hydroxides	176	--	Republic of South Africa 51; West Germany 45; Switzerland 32.
Cobalt: Metal including alloys, all forms	65	--	West Germany 45; Netherlands 18.
Columbium and tantalum:			
Ore and concentrate	45	32	Netherlands 13.
Metal including alloys, all forms:			
Columbium (niobium)	4	--	All to United Kingdom.
Tantalum	66	--	West Germany 24; Netherlands 20; Singapore 20.
Copper:			
Ore and concentrate	50,205	--	Yugoslavia 16,316; Japan 13,649; Sweden 9,137.
Matte and speiss including cement copper	1,418	--	All to Belgium-Luxembourg.
Oxides and hydroxides	108	108	
Sulfate	1,202	--	France 789; Netherlands 96; Libya 74.
Metal including alloys:			
Scrap	450	--	France 169; West Germany 132; Belgium-Luxembourg 99.
Unwrought	71,887	71	Italy 29,742; France 15,315; Netherlands 13,947.
Semimanufactures	15,593	880	Iran 2,623; United Kingdom 2,006; Portugal 1,832.
Gold: Metal including alloys, unwrought and partly wrought troy ounces	96,453	--	Switzerland 28,454; West Germany 5,144.
Iron and steel:			
Iron ore and concentrate:			
Excluding roasted pyrite thousand tons	1,973	--	Netherlands 671; France 530; West Germany 455.
Pyrite, roasted do.	14	--	France 13; United Kingdom 1.
Metal:			
Scrap	4,024	--	Belgium-Luxembourg 2,376; United Kingdom 1,454.
Pig iron, cast iron, related materials	18,863	35	Italy 7,706; West Germany 2,853; Portugal 1,689.
Ferroalloys:			
Ferroaluminum	14,308	838	United Kingdom 4,172; France 2,375; Sweden 2,348.
Ferrochromium	24,579	4,514	Italy 7,004; West Germany 5,753.
Ferromanganese	956	--	Netherlands 811; Sweden 115; Turkey 20.
Ferromolybdenum	45	--	All to West Germany.
Ferrosilicomanganese	5,237	1,871	West Germany 2,395; Belgium-Luxembourg 375.
Ferrosilicon	8,233	--	West Germany 6,200; United Kingdom 1,227; Turkey 675.
Silicon metal	6,287	457	Japan 4,328; West Germany 592.
Unspecified	612	524	Sweden 82; Belgium-Luxembourg 6.
Steel, primary forms	739,240	97,025	Turkey 237,467; Japan 98,721.

See footnotes at end of table.

Table 3.—Spain: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued			
Iron and steel —Continued			
Metal —Continued			
Semimanufactures:			
Bars, rods, angles, shapes, sections thousand tons	4,090	519	U.S.S.R. 472; Libya 272.
Universals, plates, sheets do	1,054	400	West Germany 66; Egypt 34.
Hoop and strip do	33	1	France 13; West Germany 4; U.S.S.R. 4.
Rails and accessories do	5	--	Nicaragua 3; West Germany 1; India 1.
Wire do	75	5	Libya 21; Portugal 13; France 6.
Tubes, pipes, fittings do	599	237	U.S.S.R. 91; France 35; West Germany 24.
Lead:			
Ore and concentrate	42,322	--	United Kingdom 10,893; Belgium-Luxembourg 9,872; U.S.S.R. 7,519.
Oxides	79	--	Portugal 46; Australia 17; Chile 5.
Ash and residue containing lead	15,440	--	Portugal 10,700; Belgium-Luxembourg 3,977; France 755.
Metal including alloys:			
Scrap	5,026	--	Portugal 5,000; United Kingdom 26.
Unwrought	61,488	2,150	U.S.S.R. 37,960; Yugoslavia 4,000; Italy 3,903.
Semimanufactures	87	--	West Germany 81; Andorra 4; Portugal 2.
Magnesium: Metal including alloys, semimanufactures	2	--	France 1.
Manganese:			
Ore and concentrate, metallurgical-grade	23	--	All to Portugal.
Metal including alloys, all forms	2,637	1	Cuba 295; France 235; Poland 230.
Mercury 76-pound flasks	46,139	15,892	West Germany 5,365; Belgium-Luxembourg 4,437.
Nickel:			
Oxides and hydroxides	1	--	Mainly to France.
Ash and residue containing nickel	67	--	Austria 47; Japan 11; West Germany 8.
Metal including alloys:			
Scrap	328	--	West Germany 126; Austria 91; France 65.
Semimanufactures	30	--	France 22; West Germany 2; Italy 2.
Platinum-group metals: Metals including alloys, unwrought and partly wrought troy ounces	192,906	3,440	Panama 185,000.
Silicon, high-purity	1	--	Mainly to Nicaragua.
Silver:			
Ore and concentrate value, thousands	$119	--	All to Belgium-Luxembourg.
Metal including alloys, unwrought and partly wrought thousand troy ounces	5,144	24	United Kingdom 3,299; Netherlands 439; West Germany 122.
Tin:			
Ore and concentrate	6	--	All to Netherlands.
Oxides	2	--	Mainly to West Germany.
Metal including alloys:			
Scrap	99	--	United Kingdom 59; Portutal 40.
Unwrought	400	--	Netherlands 160; Denmark 65; Portugal 60.
Semimanufactures	9	--	Syria 4; Venezuela 2; Mozambique 1.
Titanium:			
Ore and concentrate	18,202	9,168	France 1,849; Morocco 1,068.
Metal including alloys, scrap	14	--	All to Italy.
Tungsten:			
Ore and concentrate	870	16	West Germany 636; Netherlands 138; Japan 27.
Metal including alloys, scrap	1	--	All to West Germany.
Uranium and/or thorium: Ore and concentrate	2	--	All to Morocco.
Zinc:			
Ore and concentrate	83,756	--	Italy 16,072; Romania 15,060; Belgium-Luxembourg 11,831.
Oxides	2,373	--	Belgium-Luxembourg 696; Italy 526; West Germany 448.
Blue powder	90	--	All to West Germany.
Matte	122	--	All to Portugal.
Ash and residue containing zinc	12,550	--	West Germany 8,619; Netherlands 1,859; Belgium-Luxembourg 1,041.
Metal including alloys:			
Scrap	2,657	--	United Kingdom 2,634; Belgium-Luxembourg 22.
Unwrought	106,004	15,928	China 38,638; U.S.S.R. 13,503.
Semimanufactures	286	8	Guinea 170; India 20; Morocco 17.

See footnotes at end of table.

Table 3.—Spain: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued			
Zirconium: Ore and concentrate	307	--	Argentina 150; Portugal 62; Venezuela 36.
Other:			
Oxides and hydroxides	284	45	United Kingdom 76; Netherlands 74.
Ashes and residues	5,238	--	Norway 4,170; Belgium-Luxembourg 573; United Kingdom 299.
INDUSTRIAL MINERALS			
Abrasives, n.e.s.:			
Natural: Corundum, emery, pumice, etc	1,791	--	West Germany 815; Portugal 253; United Kingdom 216.
Artificial:			
Corundum	195	--	Morocco 110; Portugal 50; France 24.
Silicon carbide	3,750	--	France 1,460; Belgium-Luxembourg 1,001; United Kingdom 830.
Dust and powder of precious and semiprecious stones including diamond value, thousands	$25	$4	West Germany $8; Mexico $4.
Grinding and polishing wheels and stones	2,778	236	France 436; West Germany 381; Austria 351.
Asbestos, crude	518	--	Portugal 512; Morocco 6.
Barite and witherite	51,833	--	West Germany 19,970; Gabon 12,900; Angola 6,760.
Boron materials:			
Crude natural borates	358	--	Tunisia 130; Italy 117; Portugal 72.
Oxides and acids	36	--	All to Portugal.
Cement thousand tons	10,795	1,677	Saudi Arabia 4,192; Egypt 2,256.
Chalk	9,147	--	Algeria 4,800; Portugal 2,256; Tunisia 1,200.
Clays, crude:			
Bentonite	29,986	--	Portugal 10,854; Netherlands 4,550; Egypt 2,256.
Chamotte earth	1,008	--	Cuba 492; Saudi Arabia 256; Portugal 142.
Kaolin	108,994	--	Italy 41,267; West Germany 16,750; Finland 6,419.
Unspecified	45,557	--	Netherlands 16,671; United Kingdom 7,250; France 6,194.
Diamond:			
Gem, not set or strung carats	1,309	--	Belgium-Luxembourg 867; United Kingdom 191; Saudi Arabia 122.
Industrial stones do	69,025	22,815	Ireland 20,380; West Germany 5,705.
Diatomite and other infusorial earth	2,233	--	United Kingdom 506; France 444; Austria 329.
Feldspar, fluorspar, related materials:			
Feldspar	3,482	--	Syria 1,972; France 1,149; Tunisia 290.
Fluorspar	156,137	26,252	Italy 46,906; Canada 26,007.
Unspecified	5	--	All to Dominican Republic.
Fertilizer materials:			
Crude, n.e.s	3,817	--	West Germany 1,802; United Kingdom 1,099; France 556.
Manufactured:			
Ammonia	37	--	France 24; Mauritania 7; Cape Verde 4.
Nitrogenous	199,252	--	Ireland 40,302; Belgium-Luxembourg 37,451; India 35,151.
Phosphatic	150	--	United Kingdom 140; Andorra 10.
Potassic	586,897	24,611	France 100,737; Norway 68,510; China 64,012.
Unspecified and mixed	221,008	--	China 62,625; Nigeria 50,000; Libya 33,114.
Graphite, natural	3	--	All to Morocco.
Gypsum and plaster thousand tons	2,275	1,101	Denmark 211; Sweden 144.
Iodine	1	--	Mainly to Saudi Arabia.
Kyanite and related materials	70	--	Netherlands 58; Portugal 12.
Lime	10,010	--	France 3,240; Guinea 3,000; Ivory Coast 1,599.
Magnesium compounds:			
Magnesite	330	--	France 184; Malaysia 126; Saudi Arabia 19.
Oxides and hydroxides	123,237	3,641	France 41,622; United Kingdom 26,150; West Germany 20,688.
Mica:			
Crude including splittings and waste	49	--	All to Andorra.
Worked including agglomerated splittings	98	--	Italy 37; West Germany 21; Turkey 17.
Nitrates, crude	1,037	--	Belgium-Luxembourg 1,000; Argentina 36.

See footnotes at end of table.

Table 3.—Spain: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1984	Destinations, 1984	
		United States	Other (principal)
INDUSTRIAL MINERALS —Continued			
Phosphates, crude	45	--	Andorra 23; France 22.
Pigments, mineral:			
Natural, crude	45	--	France 24; Belgium-Luxembourg 20.
Iron oxides and hydroxides, processed	10,285	766	United Kingdom 1,128; France 683.
Potassium salts, crude	49	--	All to Andorra.
Precious and semiprecious stones other than diamond:			
Natural value, thousands	$550	$53	Saudi Arabia $222; Switzerland $84; Belgium-Luxembourg $83.
Synthetic do	$324	$39	Switzerland $182; Italy $38.
Pyrite, unroasted	537,197	290,136	Norway 57,185; Iceland 42,900.
Sodium compounds, n.e.s.:			
Carbonate, manufactured	55,147	--	Argentina 13,853; Republic of South Africa 12,100; Uruguay 9,730.
Sulfate, manufactured	118,048	--	West Germany 17,818; Egypt 15,770; Italy 13,918.
Stone, sand and gravel:			
Dimension stone:			
Crude and partly worked	284,352	267	Italy 244,061; France 12,037; Japan 11,650.
Worked	317,025	21,249	France 183,375; West Germany 46,263; Saudi Arabia 21,242.
Dolomite, chiefly refractory-grade	121,601	15,000	United Kingdom 102,183; Algeria 1,330.
Gravel and crushed rock	32,790	1,753	Morocco 20,850; France 2,369; United Kingdom 1,945.
Quartz and quartzite	353,108	--	Norway 239,880; Sweden 52,193; France 49,919.
Sand other than metal-bearing	201,548	--	Andorra 190,397; Greece 4,550; United Kingdom 4,010.
Sulfur:			
Elemental:			
Crude including native and byproduct	1,107	--	France 930; Portugal 112; Morocco 36.
Colloidal, precipitated, sublimed	135	--	All to France.
Dioxide	108	--	All to Portugal.
Sulfuric acid	257,289	18,213	Brazil 87,156; Italy 47,917; Morocco 42,041.
Talc, steatite, soapstone, pyrophyllite	33,124	--	Belgium-Luxembourg 21,052; United Kingdom 4,109; Finland 3,000.
Vermiculite	539	--	Italy 489; Iraq 19; France 18.
Other:			
Crude	719,161	1,800	Belgium-Luxembourg 263,710; France 146,406; West Germany 97,128.
Slag and dross, not metal-bearing	79,752	--	France 42,346; Portugal 29,655; West Germany 5,971.
MINERAL FUELS AND RELATED MATERIALS			
Asphalt and bitumen, natural	3,150	--	Lebanon 2,800; Gambia 200; Algeria 80.
Carbon:			
Carbon black	12,637	--	France 8,305; Portugal 2,638; Italy 595.
Gas, carbon	5,264	--	Morocco 3,850; Portugal 1,320; Italy 23.
Coal: Bituminous	3,432	--	Portugal 1,977; United Kingdom 1,421.
Gas, natural: Liquefied	3,972	--	Italy 3,971.
Peat including briquets and litter	169	--	Cuba 98; Guatemala 58; Saudi Arabia 12.
Petroleum:			
Crude thousand 42-gallon barrels	1,213	--	Libya 1,186; France 27.
Refinery products:			
Liquefied petroleum gas do	1,180	108	Netherlands 423; France 296; Portugal 161.
Gasoline do	10,430	1,233	Netherlands 3,461; France 2,029; Belgium-Luxembourg 1,280.
Mineral jelly and wax do	62	(2)	Netherlands 38; West Germany 8; Mexico 6.
Kerosene and jet fuel do	3,880	191	United Kingdom 840; Iran 590; Italy 518.
Distillate fuel oil do	5,342	195	Netherlands 903; Mauritania 718; bunkers 1,453.
Lubricants do	2,190	60	France 1,082; Mexico 173; India 121.
Residual fuel oil do	43,296	112	United Kingdom 10,019; France 5,482; bunkers 10,256.
Bitumen and other residues do	3,469	344	Libya 1,074; Portugal 352.
Bituminous mixtures do	364	--	Libya 212; Nigeria 14; Mali 12.
Petroleum coke do	3	--	Portugal 2.

[1]Table prepared by Jozef Plachy. Data for 1983 were not available at the time of publication.
[2]Less than 1/2 unit.

Table 4.—Spain: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS			
Alkali and alkaline-earth metals:			
Alkali metals	67	--	West Germany 64; France 1.
Alkaline-earth metals	26	--	France 7; West Germany 7; Canada 6.
Aluminum:			
Ore and concentrate ... thousand tons	1,812	--	Guinea 1,719; Guyana 38; Greece 21.
Oxides and hydroxides	23,040	92	France 12,296; West Germany 6,297; United Kingdom 2,616.
Ash and residue containing aluminum	7,281	489	Netherlands 2,107; Austria 1,986; France 591.
Metal including alloys:			
Scrap	6,036	348	Portugal 2,592; France 1,480; Switzerland 741.
Unwrought	10,585	--	Iceland 8,483; France 1,272; West Germany 650.
Semimanufactures	18,669	733	West Germany 5,083; United Kingdom 4,271; Italy 2,825.
Antimony:			
Ore and concentrate	436	--	Thailand 297; Morocco 72; Peru 23.
Oxides and hydroxides	321	--	U.S.S.R. 108; Belgium-Luxembourg 55; France 48.
Metal including alloys, all forms	21	--	Hong Kong 9; China 5; Italy 3.
Arsenic:			
Oxides and acids	100	--	France 68; Belgium-Luxembourg 25; West Germany 7.
Metal including alloys, all forms	28	--	All from Sweden.
Bismuth: Metal including alloys, all forms	102	10	United Kingdom 43; Belgium-Luxembourg 24; Mexico 15.
Cadmium: Metal including alloys, all forms	31	([2])	West Germany 17; Belgium-Luxembourg 6; France 6.
Chromium:			
Ore and concentrate	114,162	--	Albania 73,279; Republic of South Africa 25,991; Turkey 13,812.
Oxides and hydroxides	284	37	West Germany 171; Poland 55.
Metal including alloys, all forms	58	1	United Kingdom 48; West Germany 4; Japan 2.
Cobalt:			
Oxides and hydroxides	84	14	Belgium-Luxembourg 32; Australia 15.
Metal including alloys, all forms	119	3	West Germany 32; Zaire 24; Norway 16.
Columbium and tantalum: Metal including alloys, all forms, tantalum	7	6	NA.
Copper:			
Ore and concentrate	146,958	--	Papua New Guinea 70,753; Morocco 36,801; Mexico 30,251.
Matte and speiss including cement copper	8,032	--	France 2,411; Israel 2,210; West Germany 1,395.
Oxides and hydroxides	581	2	West Germany 218; Norway 146; Italy 137.
Sulfate	33	([2])	France 24; Netherlands 8.
Ash and residue containing copper	22,994	793	Peru 8,695; Republic of South Africa 3,351; Norway 1,920.
Metal including alloys:			
Scrap	23,321	2,827	France 6,667; United Kingdom 1,437.
Unwrought	46,512	120	Chile 35,081; Belgium-Luxembourg 8,338; Finland 1,136.
Semimanufactures	38,668	277	France 13,544; Italy 6,307; West Germany 4,609.
Gold:			
Waste and sweepings ... value, thousands	$205,728	$186	Switzerland $171,059; France $25,013; Panama $3,321.
Metal including alloys, unwrought and partly wrought ... troy ounces	21,991	643	West Germany 16,067; Italy 2,522; Switzerland 2,347.
Hafnium: Metal including alloys, all forms	22	--	All from Republic of South Africa.
Iron and steel:			
Iron ore and concentrate:			
Excluding roasted pyrite ... thousand tons	4,220	--	Brazil 2,576; Venezuela 557; Australia 446.
Pyrite, roasted ... do	4	--	All from Belgium-Luxembourg.
Metal:			
Scrap ... do	5,020	534	United Kingdom 2,332; France 1,083; U.S.S.R. 531.
Pig iron, cast iron, related materials	138,206	35	Trinidad and Tobago 61,607; Republic of South Africa 28,368; Brazil 17,141.

See footnotes at end of table.

Table 4.—Spain: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued			
Iron and steel —Continued			
Metal —Continued			
Ferroalloys:			
Ferrochromium	52,294	1,138	Republic of South Africa 37,467; Zimbabwe 4,693; Albania 3,984.
Ferromanganese	1,045	(2)	West Germany 856; France 183.
Ferromolybdenum	67	--	West Germany 28; France 10; Netherlands 10.
Ferronickel	8,690	--	France 5,619; Dominican Republic 2,606; New Caledonia 166.
Ferrosilicochromium	2,368	--	Zimbabwe 1,746; Republic of South Africa 600; France 22.
Ferrosilicomanganese	1,601	--	Portugal 1,600.
Ferrosilicon	2,750	(2)	France 1,535; Bulgaria 600; Yugoslavia 295.
Silicon metal	906	--	Portugal 772; France 133.
Unspecified	3,269	1	France 1,179; West Germany 1,113; Brazil 110.
Steel, primary forms	416,352	14	France 116,617; West Germany 89,908; Netherlands 59,358.
Semimanufactures:			
Bars, rods, angles, shapes, sections	143,224	586	West Germany 54,560; France 32,135; United Kingdom 23,302.
Universals, plates, sheets	406,195	110	West Germany 181,648; France 94,409; Netherlands 45,719.
Hoop and strip	90,061	298	West Germany 42,891; France 15,802; Italy 9,443.
Rails and accessories	1,869	--	United Kingdom 702; France 372; Belgium-Luxembourg 249.
Wire	16,657	18	Belgium-Luxembourg 6,994; France 5,171; Sweden 1,252.
Tubes, pipes, fittings	45,820	2,537	Japan 11,247; France 8,939; West Germany 7,238.
Castings and forgings, rough	2,089	2	Italy 1,132; France 603; West Germany 253.
Lead:			
Ore and concentrate	88,050	--	Morocco 27,560; Ireland 12,898; Italy 12,846.
Oxides	2	(2)	West Germany 1; United Kingdom 1.
Ash and residue containing lead	8,549	--	Belgium-Luxembourg 8,527; Greece 22.
Metal including alloys:			
Scrap	226	38	Canada 94; France 83.
Unwrought	4,938	--	France 2,723; West Germany 1,623; Netherlands 534.
Semimanufactures	90	4	West Germany 45; Italy 23; France 7.
Lithium: Ore and concentrate	100	59	China 20; West Germany 16.
Magnesium: Metal including alloys:			
Scrap	10	--	All from France.
Unwrought	1,260	721	France 358; Norway 116.
Semimanufactures	26	12	West Germany 6; Italy 3.
Manganese:			
Ore and concentrate, metallurgical-grade	417,653	1	Republic of South Africa 136,565; Ghana 86,052; Gabon 75,501.
Oxides	1,011	(2)	Republic of South Africa 507; West Germany 266; Belgium-Luxembourg 211.
Metal including alloys, all forms	504	94	France 119; United Kingdom 104.
Mercury ... 76-pound flasks	37	--	West Germany 29; Austria 7.
Molybdenum:			
Ore and concentrate	3,446	629	Chile 1,471; United Kingdom 663.
Metal including alloys, semimanufactures	39	14	Belgium-Luxembourg 12; Austria 8.
Nickel:			
Matte and speiss	2,376	227	Cuba 1,112; Canada 600.
Oxides and hydroxides	82	--	Canada 81; Italy 1.
Ash and residue containing nickel	200	--	France 107; West Germany 93.
Metal including alloys:			
Scrap	21	--	Netherlands 20; Cameroon 1.
Unwrought	4,778	767	Canada 1,654; Zimbabwe 609.
Semimanufactures	1,279	18	Netherlands 751; West Germany 187; France 141.
Platinum-group metals:			
Waste and sweepings ... value, thousands	$6,823	--	France $2,771; United Kingdom $1,288; Mexico $1,069.
Metals including alloys, unwrought and partly wrought ... troy ounces	20,609	932	West Germany 6,720; Switzerland 5,273; Republic of South Africa 2,604.
Rare-earth metals	24	--	Austria 14; Andorra 5; Brazil 5.

See footnotes at end of table.

Table 4.—Spain: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued			
Selenium, elemental	45	2	United Kingdom 24; Canada 18.
Silicon, high-purity	65	([2])	France 64.
Silver:			
Ore and concentrate ---- value, thousands	$38,046	$978	Papua New Guinea $21,820; Morocco $4,707; Honduras $2,036.
Waste and sweepings ---- do	$47,541	$4,820	France $24,021; Mexico $5,147; Netherlands $5,052.
Metal including alloys, unwrought and partly wrought ---- troy ounces	514,416	82	West Germany 211,843; United Kingdom 109,024; France 46,715.
Tellurium, elemental	9	2	United Kingdom 3; Peru 2.
Tin:			
Ore and concentrate	4,351	--	Burma 2,041; Thailand 1,783; Zaire 486.
Oxides	268	--	United Kingdom 150; Italy 65; West Germany 52.
Ash and residue containing tin	37	14	Zimbabwe 23.
Metal including alloys:			
Unwrought	85	([2])	United Kingdom 27; Singapore 20; Thailand 12.
Semimanufactures	82	([2])	United Kingdom 28; West Germany 26; France 18.
Titanium:			
Ore and concentrate	187,789	NA	Australia 104,605; Norway 58,769; Canada 21,827.
Oxides	1,092	2	West Germany 441; Belgium-Luxembourg 270; France 260.
Metal including alloys:			
Scrap	492	97	France 329; West Germany 30.
Unwrought	100	44	France 22; Austria 2.
Semimanufactures	502	106	West Germany 381; Italy 29.
Tungsten:			
Oxides and hydroxides	1	--	All from United Kingdom.
Metal including alloys:			
Unwrought	3	([2])	France 1; West Germany 1.
Semimanufactures	379	([2])	Belgium-Luxembourg 366; Austria 7.
Vanadium: Oxides and hydroxides	540	([2])	Finland 421; Republic of South Africa 72; West Germany 25.
Zinc:			
Ore and concentrate	72,157	--	Ireland 25,196; Peru 22,491; Canada 16,699.
Oxides	353	--	West Germany 278; Italy 32; Netherlands 22.
Blue powder	21	--	Belgium-Luxembourg 20.
Matte	2,200	--	West Germany 858; France 622; United Kingdom 241.
Ash and residue containing zinc	1,243	234	France 349; United Kingdom 21.
Metal including alloys:			
Scrap	564	20	France 309; United Kingdom 80; Belgium-Luxembourg 79.
Unwrought	230	--	West Germany 116; France 114.
Semimanufactures	947	--	Belgium-Luxembourg 361; West Germany 322; France 211.
Zirconium: Ore and concentrate	34,909	--	Australia 18,220; Republic of South Africa 16,634.
Other:			
Oxides and hydroxides	171	6	France 63; United Kingdom 53; Belgium-Luxembourg 41.
Ashes and residues	6,076	2	Italy 3,977; West Germany 1,060; Australia 501.
INDUSTRIAL MINERALS			
Abrasives, n.e.s.:			
Natural: Corundum, emery, pumice, etc	865	18	Italy 338; Ecuador 140; France 133.
Artificial:			
Corundum	5,461	48	West Germany 1,649; France 1,532; Austria 1,383.
Silicon carbide	1,867	1	Norway 616; West Germany 560; France 221.
Dust and powder of precious and semiprecious stones including diamond ---- value, thousands	$3,383	$584	Ireland $2,636; Belgium-Luxembourg $53.
Grinding and polishing wheels and stones	1,478	9	Italy 417; West Germany 356; Austria 299.
Asbestos, crude	47,471	38	Zimbabwe 25,924; Canada 6,598; Republic of South Africa 5,767.

See footnotes at end of table.

Table 4.—Spain: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued			
Barite and witherite	392	--	France 374; West Germany 12.
Boron materials:			
Crude natural borates	98,174	39,893	Turkey 58,242; Italy 36.
Oxides and acids	159	--	Italy 86; France 63; United Kingdom 10.
Bromine	284	--	Israel 251; France 32.
Cement	54,752	52	Norway 48,100; France 3,843; Netherlands 1,004.
Chalk	8,153	10	France 8,016; West Germany 100; Belgium-Luxembourg 27.
Clays, crude:			
Bentonite	31,234	1,569	Morocco 23,299; Greece 1,460.
Chamotte earth	7,774	3,414	France 4,342; Italy 10.
Kaolin	187,549	9,209	United Kingdom 160,574; France 15,472.
Unspecified	21,884	80	United Kingdom 12,667; France 4,704; West Germany 2,831.
Cryolite and chiolite	1,068	--	Denmark 1,049; Greenland 10; France 9.
Diamond:			
Gem, not set or strung carats	49,194	--	Belgium-Luxembourg 27,815; Israel 9,851; India 8,811.
Industrial stones do	132,575	NA	Republic of South Africa 121,446; Netherlands 6,465.
Diatomite and other infusorial earth	2,579	764	France 1,571; Italy 132.
Feldspar, fluorspar, related materials:			
Feldspar	18,067	--	France 16,816; Portugal 432; West Germany 408.
Fluorspar	240	--	France 220; West Germany 20.
Unspecified	2,738	--	Canada 2,351; Norway 340; France 45.
Fertilizer materials:			
Crude, n.e.s	1,865	18	Netherlands 1,043; Italy 394; France 386.
Manufactured:			
Ammonia	622,446	12,053	Mexico 111,820; U.S.S.R. 88,476; France 59,978.
Nitrogenous	130,868	1,540	West Germany 45,940; Netherlands 33,507; United Kingdom 15,329.
Phosphatic	17,477	--	Denmark 10,000; Belgium-Luxembourg 4,781; Tunisia 2,019.
Potassic	649	7	France 606; West Germany 34.
Unspecified and mixed	48,890	9,458	Morocco 16,105; Belgium-Luxembourg 7,653.
Graphite, natural	2,005	--	West Germany 758; Madagascar 547; China 397.
Gypsum and plaster	13,662	([2])	Morocco 12,782; United Kingdom 667.
Iodine	189	--	Japan 164; Chile 25.
Lime	3,253	275	Repubic of South Africa 2,169; France 370.
Kyanite and related materials	263	--	West Germany 134; Morocco 94; France 33.
Magnesium compounds:			
Magnesite	4	--	United Kingdom 3; Austria 1.
Other	65,619	437	Greece 21,259; United Kingdom 14,001; Italy 13,528.
Mica:			
Crude including splittings and waste	1,271	35	France 487; India 252; Austria 173.
Worked including agglomerated splittings	180	76	China 37; Belgium-Luxembourg 25.
Nitrates, crude	17,102	--	All from Chile.
Phosphates, crude thousand tons	2,895	--	Morocco 2,642; Senegal 140; Togo 78.
Phosphorus, elemental	69	--	Republic of South Africa 30; West Germany 26; Canada 7.
Pigments, mineral:			
Natural, crude	169	--	United Kingdom 71; Belgium-Luxembourg 36; West Germany 28.
Iron oxides and hydroxides, processed	6,842	19	West Germany 5,345; France 451; Italy 279.
Potassium salts, crude	21	--	All from France.
Precious and semiprecious stones other than diamond:			
Natural value, thousands	$4,279	$63	Thailand $2,194; India $837; Brazil $193.
Synthetic do	$3,124	$539	Switzerland $949; France $471.
Pyrite, unroasted	151	--	Italy 139; West Germany 8.

See footnotes at end of table.

Table 4.—Spain: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1984	Sources, 1984	
		United States	Other (principal)
INDUSTRIAL MINERALS —Continued			
Salt and brine	1,118	8	United Kingdom 598; Netherlands 437; West Germany 44.
Sodium compounds, n.e.s.:			
Carbonate, manufactured	2,809	(2)	Italy 1,712; Portugal 983; France 112.
Sulfate, manufactured	599	--	France 390; West Germany 160; Belgium-Luxembourg 48.
Stone, sand and gravel:			
Dimension stone:			
Crude and partly worked	127,506	--	Portugal 36,051; Italy 34,619; Finland 25,318.
Worked	5,426	18	Italy 3,478; Portugal 1,301; France 454.
Dolomite, chiefly refractory-grade	6,838	--	France 2,870; Italy 2,688; Norway 661.
Gravel and crushed rock	50,927	--	Morocco 42,919; France 7,128; United Kingdom 443.
Quartz and quartzite	7,524	2	Yugoslavia 4,947; Sweden 1,560; West Germany 623.
Sand other than metal-bearing	38,397	79	Morocco 22,556; France 10,180; Republic of South Africa 4,058.
Sulfur:			
Elemental:			
Crude including native and byproduct	46,595	--	France 45,815; West Germany 780.
Colloidal, precipitated, sublimed	463	1	West Germany 462.
Sulfuric acid	21,197	--	United Kingdom 10,516; Portugal 5,538; France 4,868.
Talc, steatite, soapstone, pyrophyllite	9,365	153	France 6,808; Belgium-Luxembourg 1,046; Norway 803.
Vermiculite	46,528	--	U.S.S.R. 36,445; Turkey 5,200; Republic of South Africa 4,787.
Other:			
Crude	18,768	377	Norway 5,562; Morocco 4,757; Finland 1,392.
Slag and dross, not metal-bearing	3,238	--	France 1,588; West Germany 1,033; Republic of South Africa 270.
MINERAL FUELS AND RELATED MATERIALS			
Asphalt and bitumen, natural	825	558	Trinidad and Tobago 159; United Kingdom 80.
Carbon:			
Carbon black	2,066	182	West Germany 1,106; Netherlands 379; France 330.
Gas carbon	17,661	218	France 14,460; Netherlands 1,998; West Germany 498.
Coal:			
Bituminous thousand tons	6,995	1,877	Republic of South Africa 1,636; Poland 1,635.
Lignite including briquets do.	480	(2)	East Germany 477; France 2.
Coke and semicoke do.	272	(2)	Poland 65; West Germany 63; East Germany 62.
Gas, natural:			
Gaseous million cubic feet	776	--	Mauritania 775.
Liquefied thousand tons	1,790	--	Algeria 1,127; Libya 663.
Peat including briquets and litter	36,984	15	West Germany 30,308; Finland 2,474; Netherlands 2,176.
Petroleum:			
Crude thousand 42-gallon barrels	324,652	--	Mexico 62,735; Iraq 44,738; Iran 42,864.
Refinery products:			
Liquefied petroleum gas do.	11,181	36	Saudi Arabia 5,131; Qatar 1,779; United Kingdom 888.
Gasoline do.	11,502	(2)	Algeria 4,496; Romania 918; U.S.S.R. 858.
Naphtha and white spirit do.	25	1	Netherlands 7; China 6; Republic of South Africa 3.
Mineral jelly and wax do.	169	165	France 2.
Kerosene and jet fuel do.	13,528	988	U.S.S.R. 6,467; United Kingdom 1,196.
Lubricants do.	436	41	Italy 142; France 122; Belgium-Luxembourg 43.
Residual fuel oil do.	10,120	3,523	Netherlands Antilles 2,156; East Germany 955.
Bitumen and other residues do.	25	--	France 24.
Bituminous mixtures do.	58	(2)	France 40; Belgium-Luxembourg 11; United Kingdom 3.
Petroleum coke do.	6,675	6,036	United Kingdom 416; Argentina 111.

NA Not available.
[1]Table prepared by Jozef Plachy. Data for 1983 were not available at the time of publication.
[2]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Aluminum.—The Spanish aluminum industry underwent significant restructuring during 1985. The process of reorganization began when Pechiney sold its 37% interest in Alúminio de Galicia S.A. (ALUGASA) to the state-owned holding company Instituto Nacional de Industria (INI) for $18.5 million. This enabled INI to proceed with the planned merger of ALUGASA into Empresa Nacional del Alúminio S.A. (ENDASA), in which it held a 63.5% share. Aluminum Co. of Canada Ltd. (ALCAN) agreed to reduce its share in ENDASA to 23%, giving INI 72% of the new entity. The remainder of the stock in ENDASA was owned by various Spanish banks. The merger, which was designed to make the Spanish industry competitive after entry into the EEC, was completed during the third quarter of 1985.

Because of the merger, some production capacity was eliminated. The ENDASA Valladolid smelter, with a 25,000-ton-per-year rated capacity, was closed in midsummer. The plant had been producing only 15,000 tons annually since 1983. The No. 1 potline at the 100,000-ton-per-year Avilés plant was closed in two stages during the year. This closure reduced Spanish capacity by an additional 20,000 tons per year. Primary production capacity amounted to 338,000 tons annually by yearend.

Iron and Steel.—Modernization and reorganization continued throughout the steel industry as Spain prepared for the 3-year transition to full adherence to EEC production quotas. As a significant steelmaking member of the community, Spain prepared itself for the inevitable cuts in capacity and the altered trading patterns that will result.

Altos Hornos de Vizcaya S.A. (AHV), which is 20% owned by USX Corp. (formerly United States Steel Corp.), continued the modernization of its Sestao works near Bilbao and of its Ansio works. Two of the three continuous slab casters to be installed at the Sestao facility were brought onstream during 1985. The three casters will have a total capacity of 2.1 million tons per year and were expected to eventually reduce the cost of slab production by 20%.

The company also completed the installation of three 100-ton oxygen converters and the updating of its main blast furnace at Sestao. These improvements increased AHV's capacity to about 2.4 million tons per year. Reconstruction of the hot-strip mill at the Ansio works proceeded on schedule during the year.

Two other Spanish steelmakers began modernization of their facilities. Aceros Especiales del Norte S.A. (Acenor) ordered continuous casters for its works at Hernani, Basauri, and Vitoria. The three casters, scheduled for startup in the spring of 1986, were designed for the production of specialty steels.

Empresa Nacional Siderúrgica S.A. (ENSIDESA) focused its program of modernization on its Avilés works. Work began on a 2.5-million-ton-per-year-capacity oxygen converter shop, which was scheduled for commissioning at the end of 1987. Two continuous slab casters were also being installed in the melting shop.

The hot-strip mill at Avilés was also being rebuilt. Work to increase the weights of coils produced and to increase the capacity to 2.3 million tons annually was expected to be completed in mid-1986. A new 750,000-ton-per-year-capacity continuous bloom caster was being installed at the Verina works. The facility was forecast to be operational in November 1986.

At yearend, ENSIDESA began production of Galvalume, a zinc-aluminum coated sheet manufactured under a license from Bethlehem Steel Corp. The company modified its No. 1 galvanizing line at the Avilés works, which had a production capacity of 140,000 to 150,000 tons per year. ENSIDESA will market the product in Europe under the name Algafort.

ENSIDESA signed a $250 million contract with Promsyrioimport of the U.S.S.R. to provide 800,000 tons of steel products over a 4-year period. The principal item involved will be cold-rolled sheet, although the contract allowed for tinplate to be included eventually. Total Spanish exports of steel to the U.S.S.R. amounted to about 1 million tons in 1985, of which one-third was from ENSIDESA.

Lead and Zinc.—Spain's reserves of lead in ore reportedly were about 3.5 million tons. This represents 3% of the world's total and nearly all of the reserves of the 12 EEC countries. Most of these reserves lie in the pyrite belt in the southwestern part of the country. The lead is a constituent of complex polymetallic sulfides, making processing more difficult.

Exploracion Minera Internacional España S.A. (Exmines), which is 48% owned by Cominco Ltd., experienced several problems during 1985 at its Rubiales lead-zinc mine, which led to decreased output. Severe ground failures in several working stopes and pillars caused temporary work stoppages. Hydraulic backfill broke out of a closed stope, creating additional production difficulties. Production of lead and zinc was expected to fall far short of 1984 levels and 1985 targets.

Mercury.—State-owned Minas de Almadén y Arrayanes S.A. announced the planned closure of the 2,000-year-old Almadén Mine. The mine, which has been in continuous operation since Roman times, will be phased out by 1989. Company officials estimated that 70% to 80% of Spain's approximately 50,000-flask annual production was already being produced at the El Entredicho opencast mine, which opened in 1981. Another new mine, the Las Cuevas underground mine, was scheduled to open in 1988. The mine will have two shifts and a truck ramp extending to 300 meters deep. Plans called for Las Cuevas to produce 10,000 to 15,000 flasks per year to make up for Almadén's present output. A new flotation plant and a state-of-the-art smelter were planned for a site near the El Entredicho Mine. The low-grade ores obtained from the new mines will require more intensive processing than the ore from the old mine.

Company officials believed that reserves at the two new mines will be adequate to maintain the present level of production for approximately 20 years. Indications were that mining may continue underground at El Entredicho after the surface ore is exhausted.

Precious Metals.—RTM began an expansion of production of precious metals at its mine in the Province of Huelva. The project, which was estimated to cost $30 million, will double the capacity for ore treatment to 5 million tons annually and will make possible the treatment of lower grade materials. Management of RTM planned that gold production will remain at about 130,000 troy ounces and silver production will double to 3.9 million troy ounces by 1987 when the work is completed.

Tin.—The La Parrilla open pit tin and tungsten mine, located about 300 kilometers southwest of Madrid, brought a 70-ton-per-hour tailings concentrator on-line in mid-1985. The mine produced over 40% of Spain's tin concentrate prior to the installation of the triple-stage gravity separation process. The concentrate from this tailings plant, which assayed an average 2.5% tin, 13% tungsten, and 25% arsenic, was upgraded in the main processing plant. Total investment in the new plant, which can recover about 50 tons of cassiterite per year that was previously discarded, was only $30,000. The overall recovery in the concentrator was increased to 88%. La Parrilla was operated jointly by Minera Adelaida S.A. and Minera Bonilla S.A. In addition to tin and tungsten, the ore contained significant quantities of arsenic in the form of arsenopyrite. The arsenic was recovered as 32% pure arsenic trioxide product. In addition, the processing of the arsenopyrite was found on an experimental basis to yield 0.5 gram of gold per ton.

INDUSTRIAL MINERALS

Clays.—At the end of May Laporte Industries Ltd. of the United Kingdom purchased the 60% of shares in Minas de Gador S.A. it had not previously owned. An agreement was subsequently reached between Minas de Gador and Sociedad Tolsa S.A. to exchange certain mineral operations. Tolsa acquired the sepiolite business of Minas de Gador in exchange for its fuller's earth mine. In addition, Tolsa agreed to stop producing bentonite for 7 years. The agreement, which became effective in July, strengthened Tolsa's position as the sole Spanish producer of sepiolite and made Minas de Gador the largest producer of bentonite and the sole producer of bleaching earth.

Tolsa's monopoly on sepiolite production will be short lived, however. Minerales y Productos Derivados S.A. (Minersa) announced plans to begin production of sepiolite from a deposit near Madrid in late 1986. Minersa planned to form a special subsidiary to work the deposit and to build a processing plant to manufacture standard sepiolite products.

Sodium Sulfate.—Tolsa made an important discovery of glauberite, natural sodium sulfate, in the Tertiary Basin of central Spain. The company has been conducting exploration for several years and has also made a discovery in the Ebro Basin in northeastern Spain. The deposit in central Spain has thicknesses of over 30 meters and is made up of a layer of very pure glauberite that averages 43% sodium sulfate. Tolsa was conducting a feasibility study to determine the optimum processing and exploitation techniques. Spain was the only producer of natural sodium sulfate in Western Europe in 1985.

Strontium Minerals.—Spain remained the world's second largest producer of celestite in 1985. Celestite was produced from the Montevive Mine, located about 12 kilometers southwest of Granada. The deposit is a sedimentary hill, which is almost completely strontium minerals. The mine was operated by Herederos de Aurelio Fajardo Vilches, an associate company of Bruno S.A. The mineral was extracted by opencast techniques using selective mining. Production capacity was 60,000 tons of celestite concentrate per year. About two-thirds of the concentrate was exported to Japan. The majority of the remainder was sold in Europe or North America. A small amount of the output was sold to Promotora de Industria del Sur S.A. (Proinsur), the Spanish strontium chemicals producer situated north of Motril in southern Spain. Proinsur was doubling its capacity in response to improving conditions in the electrolytic zinc industry, the major market for the carbonate.

MINERAL FUELS

As in the past, domestic production of energy in Spain in 1985 was short of the country's needs. Imports of crude oil, natural gas, and coking coal were essential to meet demand. Petroleum and natural gas provided slightly more than one-half of the energy demand. Coal's share was about one-quarter, and the rest of the demand was met by hydropower, nuclear power, and other energy sources.

Coal.—Most of the bituminous coal and anthracite was produced in the Central Asturian Basin. Roughly one-third was produced by the Government-owned company Hulleros del Norte S.A. (Hunosa), which operated 31 mines and employed 21,000 workers. Losses amounting to $147 million were sustained during 1985. Natural conditions in the Asturian mines were partially responsible. Coal seams are narrow and dip at steep angles, ranging from 40° to subvertical. Consequently, mechanization is low; about 29% of mining operations were mechanized at yearend. Furthermore, the safety record of the mines in Asturia was poor; during the year, 35 miners were killed in Asturian coal mines, about one-half of all miners who lost their lives in Spain in the year.

To cut the costs of production and to increase productivity, the Government of Spain agreed to subsidize Hunosa, provided that Hunosa delivers the planned quantities of coal. It was, however, difficult to reach the planned targets owing to strikes opposing agreements reached between union leadership and Hunosa.

Petroleum and Natural Gas.—Exploration for oil and gas shifted from offshore to onshore operations, and of a total 33 wells drilled, 17 were onshore and 16 were offshore. Eleven wells onshore and six offshore were positive. Of the successful wells, eight were wildcats and nine were in known fields. However, none of the wildcat wells made a major discovery.

Modest crude oil production continued to decline owing to lower output from the Casablanca Field in the Mediterranean Sea. Domestic output of crude oil was about 2% of the country's consumption.

Two wells drilled by the Cía. de Investigacion y Exploracion Petrolifera S.A. discovered gas in southern Andalusia. Development of the Gavota Gasfield situated off northern Spain in the Atlantic Ocean continued, with full operation scheduled for the summer of 1986.

Production in the El Sarrablo Gasfield, the only producer of natural gas in Spain, increased to 9.4 billion cubic feet. Domestic output was far below demand, and imports of liquefied gas from Algeria and Libya were essential.

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[1]Physical scientists, Division of International Minerals.
[2]Where necessary, values have been converted from Spanish pesetas (Ptas) to U.S. dollars at the rate of Ptas170.05=US$1.00, the average rate in 1985.

The Mineral Industry of Sweden

By Richard H. Singleton[1]

Sweden's output of iron ore continued to increase as a result of product improvement by removal of its high-phosphorus content and cost reductions through improved productivity and processing efficiencies. Gold byproduct from copper mining and smelting became increasingly significant as a result of development of more efficient recovery methods. Production and export of ferrochromium increased significantly. Processing modifications allowed replacement of coke with less expensive coal in a steel plant blast furnace on a trial basis.

Overcapacity and competitive price lowering continued to harm the Swedish steel reinforcing bar industry. A restructuring and rationalization of Sweden's specialty steel industry virtually eliminated competition between the remaining few producers. Filing of petitions by the U.S. steel producers with the U.S. Government alleged dumping of specialty steel products into the United States. Dumping of Swedish heavy steel plate and hot-rolled sheet was cleared by the U.S. Government, but a countervailing U.S. duty was placed on cold-rolled strip.

Production and export of phosphate rock, a byproduct of iron ore production, increased. Production of ammonia and talc each decreased significantly while imports increased.

Sweden's economic upturn faltered somewhat in 1985, but improvements during the second half allowed industry to end the year in a stronger-than-anticipated economic position. The real gross domestic product (GDP) increased by 2.3% while mining and manufacturing activity increased 2% compared with 7% in 1984. The consumer-price-index rise decreased from 8% in 1984 to 6% while the wage-increase rise decreased from 10% to 7%. Unemployment remained near 3%. The positive balance of trade decreased by one-third to about $1.8 billion[2] while the current account balance decreased from a positive $0.4 billion in 1984 to a negative $1.1 billion in 1985. Short but costly strikes in May by nearly 70,000 white collar employees including customs agents affected mineral exports, especially steel. The Government introduced price controls in March in an attempt to lower the inflation rate. In May, the Government raised interest rates by 2%, thereby increasing the discount rate to 11.5%, the highest since 1981, and tightened controls on credit to check the accelerating outflow of private capital and the deteriorating trade balance caused partly by increased retail spending, especially for imported goods. The second half of 1985 saw an increased GDP, an improved balance of trade, and a return to a positive current account balance.

PRODUCTION AND TRADE

Production of iron ore, ferrochromium, and gold, in order of total value, each increased significantly, and most of the output of each continued to be exported. Total exports of iron ore increased somewhat in 1985, to 18.3 million tons, while iron ore pellet exports increased 35% to 5.7 million tons. Exports of ferrochromium increased 8% to 103,000 tons. Gold exports increased 3% in real value to approximately $50 million. Production of primary lead decreased significantly as lead exports decreased somewhat.

Production of phosphate rock increased by nearly one-half while exports increased 7% to 98,000 tons. A nearly threefold decrease in nitrogen output was more than counterbalanced by a 20% increase in ammonia imports to 278,000 tons of nitrogen content. Talc production decreased significantly as exports decreased by one-third to 9,400 tons. Domestic supply of talc was ensured by a significant increase in imports to about 26,000 tons.

Table 1.—Sweden: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984[p]	1985[e]
METALS					
Aluminum:					
Primary	82,717	78,898	82,156	82,903	[2]83,703
Secondary	24,724	26,903	27,740	23,777	25,000
Arsenic: Trioxide, refined[e]	[r]8,000	[r]7,000	[r]7,000	[r]7,500	7,500
Copper:					
Mine output, metal content	50,700	55,400	74,600	85,824	[2]91,845
Metal:					
Smelter:					
Primary	60,576	72,504	78,756	79,775	[2]74,668
Secondary	13,259	17,397	23,076	22,895	[2]26,017
Total smelter	73,835	89,901	101,832	102,670	[2]100,685
Refined:					
Primary	[r]51,494	50,217	48,975	49,654	[2]47,907
Secondary[e]	[r]10,398	[r]12,087	[r]14,382	[r]14,250	[2]16,745
Total refined	61,892	62,304	63,357	63,904	[2]64,652
Remelted	64,075	65,225	44,866	37,321	40,000
Gold:					
Mine output, metal content thousand troy ounces	70	77	103	122	[2]140
Metal including alloys[3] do.	148	148	206	244	[2]283
Iron and steel:					
Iron ore and concentrate:					
Gross weight thousand tons	23,225	16,143	13,212	18,123	[2]20,454
Iron content do.	15,073	10,490	8,588	11,180	[2]13,295
Metal:					
Pig iron and sponge iron do.	1,933	1,883	2,112	2,323	[2]2,424
Ferroalloys:					
Ferrochromium	145,716	[r]116,724	119,491	134,028	140,000
Ferrochromium-silicon	22,516	19,954	18,377	30,633	30,000
Ferromolybdenum	726	552	641	229	200
Ferrosilicon	18,619	14,177	19,406	23,278	25,000
Ferrotungsten	377	365	366	180	200
Ferrovanadium	129	8	(4)	(4)	--
Total	[r]188,083	[r]151,780	158,281	188,348	195,400
Steel, crude thousand tons	3,781	3,936	4,116	4,705	[2]4,813
Semimanufactures, rolled do.	3,272	4,435	3,598	3,988	4,000
Lead:					
Mine output, metal content	84,100	[r e]80,000	78,200	78,900	[2]73,500
Metal:					
Smelter:					
Primary:					
Crude	14,771	34,069	26,025	15,878	[2]13,700
Refined	7,024	29,621	36,780	49,758	[2]43,200
Total primary	21,795	63,690	62,805	65,636	[2]56,900
Secondary	22,000	19,900	18,800	27,737	20,000
Total smelter	43,795	83,590	81,605	93,373	76,900
Refined:					
Primary	7,000	29,600	36,780	49,758	[2]43,200
Secondary	22,000	19,900	18,800	27,737	20,000
Total refined	29,000	49,500	55,580	77,495	63,200
Selenium, elemental, refined	44	27	42	68	60
Silicon metal	14,340	14,852	20,340	20,206	20,000
Silver:					
Mine output, metal content thousand troy ounces	5,170	5,395	5,491	5,793	[2]6,102
Metal including alloys[3] do.	[r]6,845	8,018	10,218	9,809	[2]9,272

See footnotes at end of table.

Table 1.—Sweden: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984[p]	1985[e]
METALS —Continued					
Tungsten, mine output, metal content	312	268	365	385	[2]388
Zinc, mine output, metal content	180,900	[r]185,400	202,900	205,900	[2]206,800
INDUSTRIAL MINERALS					
Cement, hydraulic thousand tons	2,318	2,304	2,240	2,393	2,250
Clays: Kaolin	289	305	305	196	200
Feldspar, salable, crude and ground	40,341	54,669	52,913	49,833	50,000
Fluorspar concentrate	--	--	2,042	3,454	[2]3,169
Kyanite	--	--	--	--	2,200
Lime: Quicklime, hydrated lime, dead-burned dolomite thousand tons	642	581	610	648	700
Nitrogen: N content of ammonia do	79	77	49	49	[2]18
Phosphate rock (byproduct):					
Gross weight do	124	131	107	128	[2]187
P_2O_5 content do	48	50	41	49	[2]72
Pyrite, gross weight do	419	426	430	418	[2]427
Quartz	13,881	13,485	13,041	17,539	17,000
Sodium sulfate[e] thousand tons	100	100	100	100	100
Stone:					
Dimension, mostly unfinished:					
Granite do	126	115	120	132	130
Limestone do	27	27	15	15	15
Sandstone do	3	3	3	4	3
Slate do	66	59	28	22	20
Crushed:					
Dolomite do	[r]455	[r]656	630	812	800
Granite do	10,210	10,715	9,892	9,873	10,000
Limestone:					
For cement manufacture do	1,352	1,181	918	986	1,000
For lime manufacture do	841	611	759	687	700
For other construction and industrial uses do	2,183	2,125	2,117	2,039	2,000
Chalk (ground) do	34	34	38	37	40
Marl do	2,259	2,431	2,717	2,718	2,700
For agricultural uses (ground) do	143	151	184	153	150
For other uses (ground) do	74	71	67	108	100
Total do	6,886	6,604	6,800	6,728	6,690
Quartzite do	1,338	1,275	1,410	1,433	1,400
Sandstone do	164	141	140	138	140
Other do	515	571	610	666	600
Sulfur:					
S content of pyrite do	[r]202	[r]206	208	230	225
Byproduct:					
From metallurgy[e] do	[r]99	[r]109	[r]125	[r]132	130
From petroleum do	37	22	20	25	25
Total do	[r]338	[r]337	353	387	380
Sulfuric acid do	832	856	928	930	930
Talc and steatite	15,581	17,753	21,056	17,882	14,000
MINERAL FUELS AND RELATED MATERIALS					
Carbon black thousand tons	26	23	24	26	25
Coke, metallurgical do	1,101	1,148	1,159	[e]1,150	1,200
Peat, for agricultural use[e] do	[r]60	[r]60	[r]60	[r]60	60
Petroleum:					
Crude thousand 42-gallon barrels	45	105	172	98	[2]68
Refinery products:					
Liquefied petroleum gas do	951	928	1,299	1,891	[2]2,124
Naphtha do	1,802	1,343	1,640	1,700	[2]1,096
Gasoline, motor do	20,222	19,346	21,326	27,931	26,305
Jet fuel do	1,224	1,544	2,256	3,784	3,264
Kerosene do	124	124	155	116	[2]225
Distillate fuel oil do	34,525	33,122	35,219	34,137	[2]34,495
Residual fuel oil do	35,664	31,242	36,157	27,999	[2]25,375
Other do	3,690	4,126	4,129	4,853	[2]5,275
Refinery fuel and losses do	4,612	3,682	4,988	5,175	[2]3,938
Total do	[r]102,814	[r]95,457	107,169	107,586	[2]102,097

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through Aug. 31, 1986.
[2]Reported figure.
[3]Includes values in blister copper.
[4]Revised to zero.

Table 2.—Sweden: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides	632	296	40	West Germany 210; Denmark 40.
Metal including alloys:				
Scrap	5,053	3,150	--	Finland 965; Norway 761; West Germany 639.
Unwrought	39,164	38,173	--	Netherlands 11,578; West Germany 10,415; United Kingdom 5,028.
Semimanufactures	55,766	46,287	1,349	United Kingdom 10,030; Denmark 7,815; West Germany 6,217.
Cadmium: Metal including alloys, all forms	58	15	15	
Chromium:				
Ore and concentrate	12	6	--	All to Norway.
Oxides and hydroxides	19	6	NA	NA.
Metal including alloys, all forms	1	49	8	Finland 31; Netherlands 10.
Cobalt: Metal including alloys, all forms	67	58	2	United Kingdom 14; France 10; India 8.
Copper:				
Ore and concentrate	33,829	71,079	--	Finland 46,332; West Germany 10,920; China 10,129.
Oxides and hydroxides	1	41	NA	NA.
Sulfate	23	6	NA	NA.
Ash and residue containing copper	8,498	9,238	--	Belgium-Luxembourg 6,537; Spain 2,700.
Metal including alloys:				
Scrap	1,963	1,575	--	Denmark 827; West Germany 637.
Unwrought	67,123	66,033	91	Belgium-Luxembourg 26,816; United Kingdom 16,352; West Germany 11,527.
Semimanufactures	76,468	83,254	16,220	West Germany 9,211; Denmark 9,199.
Gold:				
Waste and sweepings value, thousands	$6,410	$4,596	NA	West Germany $2,514; United Kingdom $1,125; Italy $792.
Metal including alloys, unwrought and partly wrought do	$39,755	$48,751	NA	NA.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite thousand tons	14,193	17,615	79	Belgium-Luxembourg 4,068; West Germany 4,033; France 2,669.
Pyrite, roasted	5	237	--	Norway 168; United Kingdom 51.
Metal:				
Scrap	20,585	21,667	--	West Germany 6,598; Italy 4,872; Denmark 2,489.
Pig iron, cast iron, related materials	130,684	115,358	3,327	Japan 17,244; West Germany 16,631; United Kingdom 10,847.
Ferroalloys:				
Ferrochromium	108,726	95,793	NA	NA.
Ferromanganese	663	673	NA	Turkey 180; Finland 136; Netherlands 55.
Ferromolybdenum	737	193	NA	Finland 44; United Kingdom 35; Norway 23.
Ferrosilicochromium	362	2,279	NA	West Germany 2,132; Belgium-Luxembourg 59.
Ferrosilicomanganese	1	11	NA	NA.
Ferrosilicon	18,990	20,564	NA	NA.
Unspecified	507	933	46	Finland 399; United Kingdom 133; Netherlands 99.
Steel, primary forms	326,289	587,005	323,098	Greece 41,128; West Germany 34,678.
Semimanufactures:				
Bars, rods, angles, shapes, sections	815,154	861,080	58,388	West Germany 214,593; Denmark 90,373; United Kingdom 75,768.
Universals, plates, sheets	824,989	911,508	161,047	West Germany 178,370; Denmark 120,863; Norway 107,749.
Hoop and strip	118,868	120,853	10,603	West Germany 26,435; Denmark 12,913.
Rails and accessories	35,663	33,387	([2])	Norway 16,156; Italy 11,594; West Germany 2,637.
Wire	69,439	74,858	9,943	West Germany 11,931; Finland 7,593; Denmark 6,918.
Tubes, pipes, fittings	210,188	236,390	28,533	West Germany 37,899; France 22,815.
Castings and forgings, rough	2,224	4,326	88	Norway 954; Denmark 808; Finland 759.

See footnotes at end of table.

Table 2.—Sweden: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued				
Lead:				
Ore and concentrate	51,317	47,918	--	West Germany 24,294; Belgium-Luxembourg 16,682.
Oxides	55	6	NA	NA.
Metal including alloys:				
Scrap	513	458	--	Denmark 457.
Unwrought	55,411	63,406	--	West Germany 11,693; U.S.S.R. 10,856; Norway 7,857.
Semimanufactures	604	143	2	United Kingdom 66; Jordan 27; Egypt 26.
Magnesium: Metal including alloys:				
Scrap	338	556	--	West Germany 284; Denmark 239.
Semimanufactures	10	74	--	Norway 40; Finland 24.
Manganese:				
Ore and concentrate, metallurgical-grade	509	--		
Oxides	4	1	NA	NA.
Metal including alloys, all forms	111	68	NA	Finland 57.
Mercury 76-pound flasks	3,306	2,813	NA	Netherlands 2,407; Norway 116; United Kingdom 116.
Molybdenum:				
Ore and concentrate	1,458	745	--	Netherlands 378; West Germany 180; Finland 96.
Oxides and hydroxides	28	--		
Metal including alloys, all forms	5	71	--	West Germany 52; United Kingdom 17.
Nickel:				
Ore and concentrate	--	402	--	Finland 366; Japan 36.
Matte and speiss	117	--		
Metal including alloys:				
Scrap	1,620	613	--	United Kingdom 138; India 132; Spain 114.
Unwrought	482	622	--	Netherlands 540; Austria 20; United Kingdom 20.
Semimanufactures	1,295	1,417	324	France 212; United Kingdom 205.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$4,112	$1,849	$14	Finland $537; Netherlands $517; Norway $496.
Silicon, high-purity do	$22,793	$23,466	NA	NA.
Silver:				
Waste and sweepings[3] do	$29,520	$14,967	$715	United Kingdom $6,690; West Germany $4,460; Switzerland $1,261.
Metal including alloys, unwrought and partly wrought thousand troy ounces	6,752	7,780	([2])	Mainly to West Germany.
Tin: Metal including alloys:				
Unwrought	56	64	--	Finland 38; Denmark 10; West Germany 5.
Semimanufactures	27	24	([2])	Norway 18; Singapore 4.
Titanium:				
Ore and concentrate	34	27,049	--	Finland 27,044.
Oxides	68	17	NA	United Arab Emirates 14.
Metal including alloys, all forms	211	275	55	United Kingdom 181; West Germany 30.
Tungsten:				
Ore and concentrate	752	498	--	West Germany 208; Austria 138; United Kingdom 88.
Oxides and hydroxides	--	10	NA	NA.
Metal including alloys, all forms	44	111	7	West Germany 53; Austria 20; United Kingdom 16.
Zinc:				
Ore and concentrate	369,570	428,451	--	Finland 92,269; Norway 80,699; France 72,692.
Oxides	274	461	NA	Norway 240; West Germany 112; United Kingdom 37.
Ash and residue containing zinc	28,790	31,391	--	Norway 27,551; Belgium-Luxembourg 3,302.
Metal including alloys:				
Scrap	3,619	3,067	--	Norway 1,211; West Germany 915; Belgium-Luxembourg 282.
Unwrought	1,098	613	--	Norway 233; Netherlands 159; Denmark 158.
Semimanufactures	8	29	([2])	West Germany 14; Norway 11.

See footnotes at end of table.

Table 2.—Sweden: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued				
Zirconium:				
Ore and concentrate	109	81	--	Denmark 70.
Metal including alloys, all forms	21	38	--	United Kingdom 24; France 14.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	2	10	--	Finland 5; United Kingdom 2.
Artificial:				
Corundum	23	36	NA	NA.
Silicon carbide	388	882	NA	Norway 606; Finland 275.
Dust and powder of precious and semiprecious stones including diamond value, thousands	$47	$38	--	West Germany $9; Netherlands $6; Switzerland $6.
Grinding and polishing wheels and stones	1,941	2,046	7	West Germany 473; Finland 283; United Kingdom 276.
Asbestos, crude	135	--		
Barite and witherite	1	48	--	Norway 25; Denmark 23.
Boron materials: Oxides and acids	58	7	NA	NA.
Cement	554,533	760,854	NA	Egypt 400,904; Saudi Arabia 247,413.
Chalk	10,246	9,293	--	Finland 3,564; Norway 2,511; Republic of South Africa 1,521.
Clays, crude:				
Kaolin	160	5,505	--	Finland 3,389; Belgium-Luxembourg 2,018.
Unspecified	1,527	3,519	--	Norway 3,262; United Kingdom 172.
Cryolite and chiolite	1	--		
Diamond:				
Gem, not set or strung value, thousands	$5,061	$3,883	--	Finland $2,585; Belgium-Luxembourg $783; Denmark $212.
Industrial stones do	$302	$75	--	United Kingdom $48; Argentina $14; Finland $9.
Diatomite and other infusorial earth	694	71	--	Norway 31; Netherlands 12; Yugoslavia 10.
Feldspar, fluorspar, related materials:				
Fluorspar	4,794	1,847	--	Finland 1,027; West Germany 710.
Unspecified	24,690	29,681	--	United Kingdom 12,041; East Germany 7,070; West Germany 3,379.
Fertilizer materials:				
Crude, n.e.s	5,431	1,720	--	Norway 1,540; Denmark 164.
Manufactured:				
Ammonia	111	234	NA	Norway 178.
Nitrogenous	172,973	229,802	--	NA.
Phosphatic	79,306	84,510	--	NA.
Potassic	179	2	--	NA.
Unspecified and mixed	120,976	215,753	--	United Kingdom 33,049; Denmark 17,172; undetermined 154,669.
Graphite, natural	13	117	48	United Kingdom 63.
Gypsum and plaster	789	496	--	Finland 356; Denmark 72; Norway 63.
Lime	15,081	15,446	NA	Norway 9,027; Denmark 5,040.
Magnesium compounds	240	502	--	Norway 240; Finland 160; Denmark 75.
Mica:				
Crude including splittings and waste	58	28	--	Finland 22; Denmark 6.
Worked including agglomerated splittings	3	3	NA	Norway 1.
Nitrates, crude	2,495	9	--	NA.
Phosphates, crude	77,198	91,286	--	Norway 91,256.
Pigments, mineral: Iron oxides and hydroxides, processed	140	321	NA	Taiwan 192; Norway 53; Finland 14.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$1,553	$3,234	--	Belgium-Luxembourg $2,965; Denmark $134; West Germany $50.
Synthetic do	$19,291	$23,042	$97	Ireland $22,929.
Pyrite, unroasted	97	13,452	--	Italy 13,346; Denmark 64.
Salt and brine	6,646	5,342	--	Denmark 3,744; Norway 623; Finland 560.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	16,388	95	NA	NA.
Sulfate, manufactured	92,110	103,340	NA	NA.

See footnotes at end of table.

Table 2.—Sweden: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked thousand tons	201	182	1	West Germany 60; Italy 55; Denmark 19.
Worked do	16	21	1	Denmark 11; West Germany 4; Norway 4.
Dolomite, chiefly refractory-grade do	41	46	(2)	Saudi Arabia 14; Denmark 7; Netherlands 7.
Gravel and crushed rock do	1,941	1,810	2	Denmark 839; West Germany 449; Netherlands 332.
Limestone other than dimension do	834	782	--	Finland 669; Denmark 75; Norway 30.
Quartz and quartzite do	273	477	(2)	Norway 449; Iceland 19.
Sand other than metal-bearing do	144	140	(2)	Norway 60; Denmark 59; West Germany 19.
Sulfur:				
Elemental:				
Crude including native and byproduct	1,641	1,588	--	Finland 1,586.
Colloidal, precipitated, sublimed	12	116	NA	NA.
Dioxide	26,263	24,412	NA	Finland 15,382; West Germany 3,127; United Kingdom 2,622.
Sulfuric acid	51,852	4,336	NA	Norway 4,070; Kuwait 42; Thailand 34.
Talc, steatite, soapstone, pyrophyllite	13,768	14,619	--	Norway 3,787; Finland 3,638; Netherlands 3,604.
MINERAL FUELS AND RELATED MATERIALS				
Carbon black	39,729	15,150	NA	Poland 5,124; Finland 3,017; Norway 2,728.
Coal: Bituminous	1,051	22,935	--	United Kingdom 19,366; Ireland 2,215.
Coke and semicoke	129,522	206,037	--	Finland 192,373; United Kingdom 11,731.
Peat including briquets and litter	23,190	32,859	--	Norway 12,435; Denmark 11,358; United Kingdom 3,345.
Petroleum refinery products:				
Liquefied petroleum gas value, thousands	$25,366	$31,935	$1,876	United Kingdom $11,260; France $10,749; Netherlands $2,964.
Gasoline thousand 42-gallon barrels	7,071	7,522	(2)	Denmark 3,522; Norway 2,143; West Germany 883.
Mineral jelly and wax do	8	5	(2)	Norway 3; Denmark 1.
Kerosene and jet fuel do	531	287	--	Denmark 146; Norway 89; Greenland 51.
Distillate fuel oil do	19,010	19,366	--	Denmark 10,104; West Germany 4,956; Norway 1,437.
Lubricants do	848	1,006	(2)	United Kingdom 198; Netherlands 174; Norway 161.
Residual fuel oil do	20,330	18,241	508	United Kingdom 6,885; Denmark 3,863; West Germany 3,005.
Bitumen and other residues do	589	1,185	--	Norway 621; Denmark 347; West Germany 88.
Bituminous mixtures do	60	55	10	Finland 7; Belgium-Luxembourg 6; Norway 4.

NA Not available.
[1]Table prepared by Jozef Plachy.
[2]Less than 1/2 unit.
[3]May include other precious metals.

Table 3.—Sweden: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS				
Aluminum:				
Ore and concentrate	45,459	61,749	--	Australia 21,322; France 16,851; Guyana 6,887.
Oxides and hydroxides	202,775	251,174	53	Jamaica 65,992; Panama 59,904; West Germany 47,682.
Metal including alloys:				
Scrap	2,816	2,114	--	Norway 1,070; Denmark 332; Cyprus 183.
Unwrought	49,662	48,468	(2)	Norway 37,739; France 3,018; Finland 2,737.
Semimanufactures	80,669	83,378	4,011	West Germany 24,853; United Kingdom 7,971; Norway 7,779.
Antimony: Metal including alloys, all forms	15	2	NA	NA.
Arsenic: Metal including alloys, all forms	730	3,036	--	Chile 3,035.
Cadmium: Metal including alloys, all forms	218	241	NA	Finland 147; Norway 62; Japan 30.
Chromium:				
Ore and concentrate	341,947	580,363	NA	Finland 252,584; Albania 144,343; Turkey 71,485.
Oxides and hydroxides	776	956	--	Poland 520; West Germany 326; United Kingdom 66.
Metal including alloys, all forms	187	282	NA	United Kingdom 207; France 62; China 12.
Cobalt:				
Oxides and hydroxides	6	6	3	France 2.
Metal including alloys, all forms	233	363	5	Belgium-Luxembourg 116; West Germany 70; Netherlands 42.
Copper:				
Ore and concentrate	89,331	49,877	--	Norway 24,274; Spain 10,855; United Kingdom 4,883.
Matte and speiss including cement copper	8,053	4,327	--	All from France.
Oxides and hydroxides	697	817	NA	Yugoslavia 302; Australia 177; Norway 139.
Sulfate	853	1,097	NA	Norway 335; U.S.S.R. 315; Czechoslovakia 126.
Ash and residue containing copper	29,532	40,115	34	West Germany 20,952; Brazil 13,394; United Kingdom 2,453.
Metal including alloys:				
Scrap	22,368	18,566	3,886	France 4,770; United Kingdom 3,262.
Unwrought	75,891	65,146	83	West Germany 13,173; Chile 10,597; Belgium-Luxembourg 10,148.
Semimanufactures	29,885	36,572	139	West Germany 15,405; United Kingdom 4,298; Finland 4,125.
Gold:				
Waste and sweepings value, thousands	$428	$299	NA	Finland $129; Norway $84; Denmark $68.
Metal including alloys, unwrought and partly wrought do.	$8,164	$5,021	$34	United Kingdom $2,343; West Germany $2,028.
Iron and steel:				
Iron ore and concentrate	19,201	38,920	--	Norway 38,390.
Metal:				
Scrap	450,890	839,378	8,752	United Kingdom 415,657; U.S.S.R. 193,086; West Germany 80,996.
Pig iron, cast iron, related materials	48,084	49,169	120	Canada 10,951; U.S.S.R. 9,722; Brazil 6,956.
Ferroalloys:				
Ferrochromium	36,878	47,632	1,317	Republic of South Africa 23,014; Albania 9,116; Greece 3,492.
Ferromanganese	28,743	31,582	--	Norway 20,194; France 5,979; Republic of South Africa 4,350.
Ferromolybdenum	1,091	1,634	131	Belgium-Luxembourg 425; Austria 338; United Kingdom 248.
Ferronickel	12,875	21,483	NA	New Caledonia 10,567; Greece 3,812; Dominican Republic 3,409.
Ferrosilicochromium	1,215	1,450	NA	U.S.S.R. 882; Republic of South Africa 558.
Ferrosilicomanganese	12,083	12,221	NA	Norway 11,277; Republic of South Africa 880.
Ferrosilicon	23,905	27,814	NA	Norway 23,037; U.S.S.R. 2,878.
Unspecified	2,899	3,826	13	U.S.S.R. 885; Belgium-Luxembourg 669; West Germany 640.

See footnotes at end of table.

Table 3.—Sweden: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal —Continued				
Steel, primary forms	131,581	113,802	260	West Germany 39,691; United Kingdom 21,136; Finland 18,136.
Semimanufactures:				
Bars, rods, angles, shapes, sections	422,959	467,579	2,231	West Germany 104,076; United Kingdom 59,531; France 54,532.
Universals, plates, sheets	817,859	870,186	374	West Germany 238,990; Belgium-Luxembourg 167,247; France 110,974.
Hoop and strip	136,315	147,289	48	West Germany 61,436; Poland 20,655; Belgium-Luxembourg 17,214.
Rails and accessories	3,748	5,192	3	West Germany 2,053; United Kingdom 1,931; Austria 649.
Wire	25,216	26,995	45	Belgium-Luxembourg 8,898; France 4,420; West Germany 4,244.
Tubes, pipes, fittings	287,460	334,702	1,461	West Germany 76,956; United Kingdom 45,926; Finland 45,460.
Castings and forgings, rough	9,615	9,774	2	Denmark 2,381; West Germany 2,123; Poland 2,018.
Lead:				
Ore and concentrate	12,539	21,845	--	Australia 10,024; Canada 8,307; Greenland 2,117.
Oxides	2,682	--		
Metal including alloys:				
Scrap	2,984	10,170	--	Denmark 6,802; Norway 2,250; Nigeria 829.
Unwrought	3,900	3,333	--	Denmark 2,008; West Germany 516; United Kingdom 377.
Semimanufactures	1,026	992	1	West Germany 821; Netherlands 143; Denmark 19.
Magnesium: Metal including alloys:				
Unwrought	1,198	1,754	114	Norway 1,634.
Semimanufactures	96	138	21	West Germany 55; Norway 26; Switzerland 13.
Manganese:				
Ore and concentrate, metallurgical-grade	21,593	486	50	France 264; Hungary 79; Netherlands 78.
Oxides	240	213	102	West Germany 48; Spain 42.
Metal including alloys, all forms	1,442	977	68	Republic of South Africa 731; France 159.
Mercury ... 76-pound flasks	928	580	--	Netherlands 145; Turkey 145; West Germany 87.
Molybdenum:				
Ore and concentrate	5,238	6,347	1,916	Netherlands 2,080; Belgium-Luxembourg 1,228.
Oxides and hydroxides	232	--		
Metal including alloys, all forms	50	71	11	West Germany 29; Austria 16; United Kingdom 11.
Nickel:				
Matte and speiss	4,059	2,935	--	Australia 2,917; Canada 17.
Metal including alloys:				
Scrap	3,365	4,556	1,004	West Germany 1,702; United Kingdom 1,253; Canada 597.
Unwrought	9,562	12,932	2,143	Canada 2,194; United Kingdom 1,734.
Semimanufactures	997	975	165	United Kingdom 593; West Germany 97.
Platinum-group metals: Metals including alloys, unwrought and partly wrought ... value, thousands	$37,586	$33,011	$5,600	Switzerland $13,345; United Kingdom $5,345; West Germany $4,578.
Selenium, elemental	37	107	13	United Kingdom 40; Netherlands 29; West Germany 17.
Silicon, high-purity	324	330	--	France 233; Norway 88.
Silver:				
Ore and concentrate[3] ... value, thousands	$35,004	$31,060	--	Peru $24,383; France $5,217; Canada $667.
Waste and sweepings[3] ... do	$11,118	$7,907	$3,860	Finland $1,892; France $1,635.
Metal including alloys, unwrought and partly wrought ... thousand troy ounces	5,401	5,562	NA	West Germany 3,312; United Kingdom 932; France 804.

See footnotes at end of table.

Table 3.—Sweden: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Tin: Metal including alloys:				
Scrap	--	12	--	All from Finland.
Unwrought	365	440	(2)	United Kingdom 143; Denmark 68; Singapore 45.
Semimanufactures	141	143	(2)	Netherlands 66; West Germany 38; United Kingdom 37.
Titanium:				
Ore and concentrate	2,233	4,620	NA	Sri Lanka 1,700; Norway 1,430; Australia 1,320.
Oxides	3,749	3,729	60	Norway 1,775; Finland 705; West Germany 523.
Metal including alloys, all forms	536	289	NA	Japan 133; U.S.S.R. 72; United Kingdom 45.
Tungsten:				
Ore and concentrate	681	813	NA	China 327; Australia 115; Canada 108.
Metal including alloys, all forms	163	154	7	Israel 67; Netherlands 42; United Kingdom 20.
Zinc:				
Ore and concentrate	45	--		
Oxides	1,308	1,151	--	Netherlands 237; Norway 227; West Germany 213.
Blue powder	662	414	--	Norway 366; West Germany 26; Finland 21.
Ash and residue containing zinc	22,132	23,339	NA	West Germany 16,571; Italy 3,945; France 1,294.
Metal including alloys:				
Scrap	(2)	7	--	All from Cyprus.
Unwrought	36,034	38,187	1	Norway 17,802; Finland 13,900; Netherlands 2,216.
Semimanufactures	206	183	(2)	West Germany 126; Norway 39.
Zirconium:				
Ore and concentrate	3,984	3,272	NA	Republic of South Africa 3,164; Australia 94.
Metal including alloys, all forms	186	125	11	France 89; United Kingdom 15.
Other:				
Oxides and hydroxides	r835	939	41	United Kingdom 415; West Germany 173; Belgium-Luxembourg 169.
Ashes and residues	25,179	21,681	206	Norway 8,866; Spain 4,260; United Kingdom 4,226.
Base metals including alloys, all forms	r292	140	19	Denmark 40; Hungary 18; United Kingdom 17.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	1,221	1,172	13	Iceland 781; Italy 145; Netherlands 90.
Artificial:				
Corundum	5,593	6,775	559	West Germany 3,884; Netherlands 715; Austria 618.
Silicon carbide	5,262	6,786	NA	Norway 4,953; West Germany 1,655.
Dust and powder of precious and semiprecious stones including diamond value, thousands	$2,349	$2,770	$66	Switzerland $2,176; Ireland $224; Netherlands $155.
Grinding and polishing wheels and stones	2,525	2,941	46	Austria 1,025; West Germany 503; France 342.
Asbestos, crude	1,000	1,000	--	All from Canada.
Barite and witherite	4,986	5,321	--	West Germany 4,571; China 355; United Kingdom 240.
Boron materials:				
Crude natural borates	14,355	20,761	8,224	Netherlands 6,714; Turkey 4,643.
Oxides and acids	458	748	43	France 539; United Kingdom 90; Netherlands 49.
Cement	268,048	232,420	41	East Germany 127,470; Poland 81,322; Denmark 14,602.
Chalk	29,719	31,569	10	West Germany 11,810; Norway 10,665; Denmark 6,126.
Clays, crude:				
Bentonite	2,903	6,653	1,122	United Kingdom 4,292; West Germany 995.
Kaolin	336,310	403,377	24,118	United Kingdom 351,852; Czechoslovakia 13,294.
Unspecified	32,435	32,138	7,483	United Kingdom 13,759; West Germany 4,005.

See footnotes at end of table.

Table 3.—Sweden: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Cryolite and chiolite	433	396	--	All from Denmark.
Diamond:				
Gem, not set or strung value, thousands	$14,895	$12,780	$115	Belgium-Luxembourg $8,192; United Kingdom $837; Netherlands $557.
Industrial stones do.	$646	$639	$42	Netherlands $221; United Kingdom $149; Belgium-Luxembourg $120.
Diatomite and other infusorial earth	3,149	2,566	490	Denmark 1,187; Spain 328.
Feldspar, fluorspar, related materials:				
Fluorspar	6,476	11,419	--	Norway 10,237; Finland 931.
Unspecified	12,465	11,932	--	Mexico 8,821; East Germany 2,293; France 511.
Fertilizer materials:				
Crude	532	372	--	West Germany 255; Finland 113.
Manufactured:				
Ammonia	213,005	232,188	--	U.S.S.R. 182,110; Mexico 15,037; Norway 12,883.
Nitrogenous	504,849	569,034	NA	Mainly from Norway.
Phosphatic	60	--		
Potassic value, thousands	$18,911	$18,666	$204	West Germany $11,469; U.S.S.R. $2,611; East Germany $2,407.
Unspecified and mixed	275,626	367,520	24	Norway 216,478; Netherlands 64,878; Belgium-Luxembourg 49,410.
Graphite, natural	396	674	1	West Germany 322; China 152; Norway 73.
Gypsum and plaster	257,108	299,024	118	Spain 151,318; East Germany 135,743.
Lime	4,772	8,433	26	Belgium-Luxembourg 5,060; West Germany 1,130.
Magnesium compounds	20,752	29,965	105	China 10,096; Greece 5,732; Spain 2,781.
Mica:				
Crude including splittings and waste	438	422	15	Norway 171; United Kingdom 125; France 57.
Worked including agglomerated splittings	78	61	1	Switzerland 41; Belgium-Luxembourg 13; West Germany 5.
Nitrates, crude	7,400	4,200	--	Chile 4,199.
Phosphates, crude	724,394	774,210	186,967	U.S.S.R. 326,607; Morocco 260,611.
Phosphorus, elemental	40	36	--	All from West Germany.
Pigments, mineral: Iron oxides and hydroxides, processed	6,100	6,007	8	West Germany 5,114; United Kingdom 309; Denmark 129.
Potassium salts, crude	1,701	1,863	--	All from West Germany.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$2,517	$2,602	$9	Thailand $1,035; Belgium-Luxembourg $661; West Germany $281.
Synthetic do.	$2,703	$1,771	$1,452	Hong Kong $98; Ireland $82; United Kingdom $48.
Pyrite, unroasted	168	14,749	--	Norway 14,542; West Germany 170.
Salt and brine thousand tons	1,103	1,225	([2])	Netherlands 338; West Germany 311; Poland 134.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	119,072	121,331	--	East Germany 54,174; West Germany 25,961; Netherlands 15,419.
Sulfate, manufactured	18,318	19,236	NA	U.S.S.R. 5,346; East Germany 4,185; Belgium-Luxembourg 4,157.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	5,257	4,325	--	Finland 1,858; Norway 1,394; Republic of South Africa 631.
Worked	7,026	9,861	--	Portugal 3,990; Italy 2,986; Finland 678.
Dolomite, chiefly refractory-grade	127,304	131,527	734	United Kingdom 54,338; Norway 36,275; Belgium-Luxembourg 31,411.
Gravel and crushed rock	50,862	71,084	923	Norway 21,463; Denmark 16,259; Finland 15,068.
Limestone other than dimension	40,508	47,333	--	Denmark 24,051; United Kingdom 11,504; Norway 10,710.
Quartz and quartzite	56,457	64,190	12	Spain 54,933; Finland 4,720; West Germany 4,351.
Sand other than metal-bearing	300,941	331,813	96	Denmark 170,425; Belgium-Luxembourg 135,958.

See footnotes at end of table.

Table 3.—Sweden: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Sulfur:				
Elemental:				
Crude including native and by-product	4,919	14,995	--	France 6,932; Poland 5,675.
Colloidal, precipitated, sublimed	5,962	9,525	--	Poland 7,596; Norway 1,819.
Dioxide	5,444	8,648	(2)	Norway 8,648.
Sulfuric acid	1,834	25,705	--	Finland 10,145; Norway 8,506; West Germany 4,591.
Talc, steatite, soapstone, pyrophyllite	22,315	22,945	53	Norway 7,829; Finland 7,569; Belgium-Luxembourg 5,006.
Other:				
Crude	239,821	214,580	108	Norway 192,243; West Germany 16,053; Denmark 3,355.
Slag and dross, not metal-bearing	40,062	26,715	10	Netherlands 9,235; West Germany 7,784; Denmark 4,488.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	661	796	250	Trinidad and Tobago 500; West Germany 25.
Carbon black	9,472	11,970	245	West Germany 7,005; Netherlands 3,468; United Kingdom 1,079.
Coal:				
Anthracite thousand tons	32	18	--	United Kingdom 14; Norway 3.
Bituminous do	3,054	3,931	1,569	Poland 1,464; U.S.S.R. 310.
Lignite including briquets do	6	9	--	West Germany 5; East Germany 3.
Coke and semicoke do	237	264	21	West Germany 68; Norway 55; United Kingdom 42.
Gas, natural: Gaseous thousand cubic feet	476	529	--	Belgium-Luxembourg 265.
Peat including briquets and litter	10,971	9,653	--	Finland 7,542; U.S.S.R. 1,204.
Petroleum:				
Crude thousand 42-gallon barrels	102,678	95,661	--	United Kingdom 47,734; Norway 24,033; U.S.S.R. 7,046.
Refinery products:				
Liquefied petroleum gas do	2,458	4,477	--	United Kingdom 3,793; Bahrain 239; Saudi Arabia 185.
Gasoline do	22,218	18,918	4	Finland 4,007; Denmark 3,764; Netherlands 2,756.
Mineral jelly and wax do	125	128	1	West Germany 75; Hungary 18; United Kingdom 9.
Kerosene and jet fuel do	3,657	2,687	(2)	Netherlands 1,259; Finland 534; Algeria 343.
Distillate fuel oil do	26,547	20,508	(2)	United Kingdom 4,917; U.S.S.R. 4,258; East Germany 4,166.
Lubricants do	2,533	2,115	35	U.S.S.R. 708; United Kingdom 339; Netherlands 331.
Residual fuel oil do	21,829	17,004	267	U.S.S.R. 7,361; Norway 2,121; East Germany 1,419.
Bitumen and other residues do	408	275	NA	Mainly from Finland.
Bituminous mixtures do	45	41	1	Finland 24; France 8.
Petroleum coke do	276	312	105	United Kingdom 142; Japan 38.

[r]Revised. NA Not available.
[1]Table prepared by Jozef Plachy.
[2]Less than 1/2 unit.
[3]May include other precious metals.

COMMODITY REVIEW

METALS

Copper.—Two large mines in northern Sweden accounted for about 75% of Sweden's production of copper concentrate. These were Boliden Mineral AB's Aitik Mine (43%) and Luossavaara Kiirunavaara AB's (LKAB) Viscaria Mine (32%). Two of Boliden Mineral's other mines, also in northern Sweden, Stekenjokk and Kristineberg, were responsible for 9% and 6%, respectively, of Sweden's output. The balance of Sweden's copper concentrate was taken from 10 other Boliden Mineral mines. The Viscaria Mine accounted for most of Sweden's increased output in 1985. This mine showed its first profit, although modest, as a result of increased production, improved recovery efficiencies, a better grade of concentrate, and higher copper prices.

Gold.—Boliden AB, Sweden's only gold producer, improved gold recovery from its complex sulfide ores as a byproduct from its copper smelting, such that gold output accounted for nearly 20% of the value of the company's gross metal sales. Boliden Mineral, Sweden's only producer of gold containing concentrates, produced 39% of Sweden's output at its large Aitik copper mine, which was also Sweden's largest gold mine. Two other concentrators, at Boliden and Kristineberg, accounted for another 39%, and Boliden Mineral's new Enasen gold mine accounted for 15% of Sweden's mined gold. A gravity separation step based on a five-stage Reichert cone was introduced ahead of secondary grinding at Boliden to prevent overgrinding of larger gold particles, thereby improving gold recovery from complex copper-lead-zinc ores taken from the Renstrom and Langdal Mines from 75% to 80%. The process had been developed by Boliden Mineral during the 1982-84 period. Similar equipment was being installed in other Boliden Mineral concentrators.

Boliden Mineral decided to begin mining the Holmtjarn gold deposit in the Skellefteå area in early 1986. The ore was to be processed at the Kristineberg concentrator.

In early 1985, Boliden Metall AB completed the installation at its Ronnskar smelter of new equipment for processing gold slimes from copper and silver refining and for gold recovery from copper-silver alloy scrap at a total cost of about $1.5 million. Gold metal production capacity increased by 30%, and production increased by 16% in 1985. Included in the new processing was separation of the platinum-group metals.

Iron Ore.—Production of iron ore increased for the second year, by 13% to about 20.5 million tons, 88% of which was produced by LKAB. The Kiruna Mine, north of the Arctic Circle, produced two-thirds of LKAB's iron ore and most of the balance continued to be taken from its nearby Malmberget Mine. Of the total LKAB production, about one-sixth was high-phosphorus lump ore, all from Kiruna, one-third was sinter fines, including some Kiruna high-phosphorus material, and nearly all of the balance was pellets for which there was an increasing demand. Pellets were 43% of LKAB's iron ore sales. Increased pellet production had required development by LKAB of methods of reducing the phosphorus content of its ores. Much of the Kiruna concentrate was pelletized at the Svappavaara plant to produce mostly olivine-type pellets. All Kiruna iron ore products were shipped by rail to Narvik on the west coast of Norway for export. Nearly one-half of Malmbergets' products was shipped to Svensk Stål AB's (SSAB) steel plant in Luleå on the east coast of Sweden, and the balance was exported.

Iron and Steel.—In April at its Luleå steel complex, SSAB began injection of powdered coal directly into the blast furnace, thereby replacing some of the coke with less expensive coal. Approximately 85 kilograms of coal was being injected per ton of pig iron product at a savings of $4 per ton of pig iron. Trials of further refining the method, including plasma heating and oxygen enrichment of the air blast, were in progress. The aim was to double the coal use already demonstrated.

Competition between the three major Swedish producers of steel reinforcing bars led to overcapacity and price reductions in 1985 such that all of the producers operated at a loss in this area. Any one of them, Halmstads Järnverks AB, the largest, or the smaller SSAB or Smedjebacken Boxholm Stål AB, could have alone supplied the domestic market, which had shrunk over a 15-year period to about 150,000 tons per year. The export market, about 200,000 tons per year, was tight because of overcapacity in the European Economic Community and in Norway. Imports decreased because of the lowered domestic prices. Although the producers recognized that mutual agreements on rationalization and a price increase were essential, talks between them during the fourth quarter failed to resolve the problem. However, the talks were continuing at yearend.

The U.S. Government cleared SSAB of dumping charges on its heavy plate and hot-rolled sheet. United States Steel Corp. and other U.S. industry sources had alleged the existence of Swedish Government subsidies and that injuries had occurred to the U.S. steel industry. However, U.S. imports of SSAB's cold-rolled strip were subjected to a countervailing duty of 8.77% effective October 1985. Total value of SSAB's exports to the United States had been nearly $60 million per year.

A major restructuring and rationalization program of the Swedish specialty steel industry was nearly completed in 1985. Only two major privately owned stainless steel producers then remained, Avesta AB, the largest, owned mostly by A. Johnson & Co. Group and Skandinaviska Enskilda Bank, and AB Sandvik Steel. The stainless steel industry had formerly consisted of four companies that included, in addition to Avesta and Sandvik, Nyby Uddeholm AB and Fagersta AB. These latter two companies retained a financial interest in the two new producers. Unit operations producing crude steel for the stainless sector were reduced, thereby reducing capacity by 150,000 tons and reducing the number of rolling mills for stainless steel. The companies produced different end products, no longer competed, and both became more profitable. Avesta was undergoing further restructuring at yearend. It also announced that it would invest $6 million, partly to increase its capacity to produce 2-meter-wide stainless cold-rolled coil. Uddeholm Tooling AB evolved as the only remaining major producer of tool steel and thereby became Sweden's third major producer of specialty steels. SKF Steel AB remained Sweden's sole producer of low-alloy and bearing steels. Specialty steels, three-quarters of which were exported, provided one-third of Sweden's steel production tonnage and 60% of sales value.

A number of U.S. steel producers filed petitions with the U.S. Government near yearend alleging that imports of Swedish specialty steels, particularly stainless and heat-resistant steel tubes and stainless wire, were causing them injury and that Swedish Government subsidization occurred during the restructuring of the industry. This was denied by both the Swedish Government and the Swedish specialty steel industry.

Lead.—Production of primary smelted lead decreased 13% because of equipment breakdowns in Boliden Metall's Ronnskar lead plant and humidity problems associated with the raw materials.

Silicon.—Uddevalla Kiselmetallverk AB, a venture company formed by Skandinaviska Malm AB, announced plans to begin construction in the spring of 1986 of a 30,000-ton-per-year silicon metal plant in Uddevalla on the west coast of Sweden. Production costs were expected to be significantly reduced through purchase by the Uddevalla district heating system of about 50 megawatts (MW) of surplus heat from the plant, which was scheduled to go on-stream in 1988.

Silver.—Boliden AB announced cancellation of its plan to mine the Dammsjö Lake silver deposit, about 80 miles northwest of Stockholm, claimed to be the largest in Europe, because of the high cost of environmental conditions imposed by the Swedish Government in its approval statement. The Government demanded payment of $1.1 million to the local government to cover contingent environmental damages as well as restoration of three old waste sites. Expected annual yield from the mine had been concentrate containing 120 tons of silver.

INDUSTRIAL MINERALS

Kyanite.—Mining and beneficiation of kyanite began in Sweden by a new company, Svenska Kyanite AB, in Varmlandia County in western Sweden, 60 miles north of Lake Vanern. A quartzite containing about 30% kyanite was quarried at a depth of 160 feet in the main reserve at Halsjöberg. Total reserves at the mining site were about 1.3 million tons of kyanite and this increased to approximately 4 million tons including probable reserves in the area. Crushed material was hauled to a new 25,000-ton-per-year beneficiation plant at Persberg, south of the mine. A total of 2,200 tons of product containing 96% kyanite and of good grade for refractory applications was produced in 1985. Mining occurred only in the summer and fall because of weather conditions, whereas the beneficiation plant was a year-round operation. The initial mining occurred in the fall of 1984. The beneficiation method had been developed by LKAB, the parent of the new company, and consisted of froth flotation and high-intensity magnetic separation. LKAB placed Svenska Kyanite in its subsidiary, Svenska Forshammer AB, which had extensive background in marketing of raw materials for refractory products. Total investment in the venture had been $1.5 million. At yearend, Svenska Forshammer was sold by LKAB to Ernstromgruppen AB. Svenska Kyanite was then owned by Svenska Forshammer, 59%; and Ulf Juvel AB, 41%.

Nitrogen.—A group of Swedish companies together with Superfos A/S, Denmark's large fertilizer producer, announced at the end of August that agreement had been reached on construction of the Nynas Energy Chemicals Complex at Nynashamn, south of Stockholm near Sweden's east coast. The major product, ammonia, was to be produced at a rate of 450,000 tons per year from hydrogen made by the gasification of coal using a process developed by Texaco Inc. Sweden was dependent on imports for more than 90% of its ammonia supply. The feasibility of the process was dependent upon delivery of large amounts of waste heat to the city of Stockholm. Nitrogen and oxygen required for the processing was to be supplied from an air separation plant built by AGA Gas AB, a large Swedish industrial group. Argon byproduct, 500 million cubic feet per year, from the air separation plant, would relieve Sweden's reliance on imported argon for its specialty steel industry and still allow about two-thirds of it to be exported. The 900,000 tons per year of required coal was to be imported. Shareholders were to be AGA, 30%; Superfos, 20%, with an option to take another 10%; and 30% by a joint company formed by the Government-owned Swedish Investment Bank and A. Johnson & Co. Group, a privately owned Swedish trading and industrial organization. Shareholders were being sought for the remainder. Construction was scheduled to begin in mid-1986 with plant completion by late 1989. Total estimated capital cost of the project was $420 million. Superfos was expected to buy most of the ammonia product.

MINERAL FUELS

A new energy bill, submitted to Parliament in February and approved in June, reaffirmed the policies similarly legislated in 1981. These included a commitment to completely phase out nuclear power during the first decade of the next century; a plan to further reduce oil consumption from the current 50% to 40% of total energy use by 1990; a decision not to develop, for ecological reasons, the hydropower potential of four rivers in northern Sweden; a decision to subject coal burning to rigorous environmental controls; development of renewable energy sources in addition to wood, especially wind, but also including the sun, excess industrial heat, peat, and biomass materials including industrial and domestic organic waste materials; and promotion of energy conservation measures. Spokespersons for industrial energy sources, particularly nuclear, stated that this policy appeared to be inconsistent with future energy demand.

In 1985, demand for imported oil leveled off after 4 years of decline. Imports increased to about 102 million barrels. Major import sources, in order of volume, were the United Kingdom, Norway, and the U.S.S.R. Norway's Den Norske Stats Oljeselskap A/S took over Esso Europe Inc.'s Swedish oil marketing facilities including one-eighth of Sweden's retail gasoline sales, after Swedish Parliamentary approval in December. Oil use in heating continued to be reduced. For example, district heating in Malmö was reduced to zero, with replacement by coal and waste industrial heat. Also, unit heating plants were converted from oil to natural gas and electricity.

Sweden's final 2 of 12 nuclear reactors, Forsmark 3, north of Stockholm and Oskar 3 on the southwest coast, were put into operation. About one-half of Sweden's electricity was then being generated by nuclear power. Total nuclear capacity was increased to 9,500 MW and represented a capital investment of about $6 billion over a 15-year period. Oskar 3, the last to be dedicated, in October, was Sweden's largest reactor with a capacity of 1,055 MW, about twice the size of some of the earlier reactors. Industry stated that its designed lifespan was 40 to 50 years. Construction of a replacement steam generator at the Ringhals 2 nuclear reactor, an 800-MW unit started in 1974, was uncertain pending approval by Government authorities. Svensk Kärnbränslehantering AB, Sweden's nuclear fuel handling company, discontinued prospecting for uranium. Most of Sweden's uranium supply came from Australia and Canada. Established Swedish ore resources had been increased, but their quality did not warrant exploitation.

The coal-fired Handelo cogeneration plant in Norrköping was commissioned in late 1984 with capacity to generate 180 MW of heat and 80 MW of electricity. Coal imports increased by about 20% to 4.8 million tons in 1985. Most of the increase was in steam coal, mainly from Poland. Metallurgical coal imports, mostly from the United States, held steady at about 1.8 million tons.

Imports of natural gas began in June for the first time. The gas, from the Danish North Sea, was delivered through a 13-mile submarine pipeline across the Oresund from Copenhagen to Malmö in accordance with a contract between state-owned Swedegas AB and Dansk Olie og Naturgas A/S, in which the annual volume supplied was to increase from 6.4 billion cubic feet in 1986 to 15.5 billion cubic feet from 1992 to 2003. This would satisfy only less than 1% of Sweden's total energy requirements. Construction of Sweden's gas distribution grid continued in 1985. The main line reached Hasslarp, about 40 miles to the north of Malmö by yearend and was expected to reach Gothenburg by 1987. The Oresund pipeline and the main lines were owned by

Swedegas. A new company, Sydgas AB, was formed in 1985 to operate the grid.

Consumption of electricity increased significantly; the increase was 14% in southern Sweden, reaching the level that had been earlier predicted for 1990. This was caused primarily by increased industrial activity and increased use of electricity for domestic heating.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Swedish krona (SKr) to U.S. dollars at the rate of SKr8.59=US$1.00, the average for 1984.

The Mineral Industry of Switzerland

By John R. Craynon[1]

The production of minerals remained a minor part of the economy of Switzerland during 1985. Although many small mineral deposits were known, only a few were being commercially exploited. Production of aluminum, iron and steel, and petroleum refinery products took place using imported raw materials. The domestic mining and minerals industry was limited to the production of cement, gypsum, lime, salt, sand and gravel, and a small amount of natural gas. Environmental concerns were of considerable importance in determining the limitation of mining activity. The production of mineral products remained a small part (between 1% and 2%) of the gross national product, preliminarily estimated as $92.1 billion[2] in 1985, which represents a 5.8% increase from 1984 figures. About 2% of the total work force was directly employed in the Swiss minerals industry. The startup of a natural gasfield and the modernization of a cement plant were the major mineral-related events in 1985.

PRODUCTION

The mineral industry remained privately owned except for the Government-owned salt monopoly. The major private producers during 1985 were Schweizerisches Aluminium A.G., which produced aluminum; La Raffinerie du Sud S.A. and La Raffinerie de Cressier S.A., which produced petroleum refinery products; Vigier Cement Ltd., which produced cement; and Von Roll Ltd. and Monteforno Acciaierie Laminatoi S.A., which produced steel.

Table 1.—Switzerland: Production of mineral commodities[1]

(Thousand metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984[p]	1985[e]
METALS					
Aluminum, smelter, primary ---- metric tons	82,202	75,256	75,974	79,173	80,000
Iron and steel:					
Pig iron and blast furnace ferroalloys	30	[e]35	[e]30	[e]25	20
Electric-furnace ferroalloys[e]	5	5	4	5	5
Steel, crude	966	950	[e]900	[e]900	1,000
Semimanufactures[e]	700	720	700	700	800
Lead, refined, secondary ---- metric tons	4,000	3,000	2,000	2,000	2,000
INDUSTRIAL MINERALS					
Cement, hydraulic	4,348	4,099	4,140	4,181	4,200
Gypsum[e]	85	75	75	75	80
Lime	57	46	42	40	50
Nitrogen: N content of ammonia[e]	33	33	33	30	30
Salt	431	362	306	372	350
Sodium compounds: Sodium carbonate[e] metric tons	46	45	45	44	45

See footnotes at end of table.

Table 1.—Switzerland: Production of mineral commodities[1] —Continued

(Thousand metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984[p]	1985[e]
INDUSTRIAL MINERALS —Continued					
Sulfur, byproduct, all sources ____ metric tons__	3,364	2,965	2,711	2,878	3,000
MINERAL FUELS AND RELATED MATERIALS					
Gas, manufactured ______ million cubic feet__	1,379	1,864	1,850	[e]1,900	1,900
Petroleum refinery products:					
Liquefied petroleum gas thousand 42-gallon barrels__	1,092	1,297	1,180	1,608	1,600
Gasoline, all kinds ____________ do____	10,371	9,041	9,624	8,683	8,600
Jet fuel ________________ do____	1,851	1,814	2,030	2,030	2,000
Kerosene ________________ do____	46	41	37	26	25
Distillate fuel oil ____________ do____	13,201	12,800	13,479	13,272	13,500
Residual fuel oil ____________ do____	3,615	3,315	4,547	4,703	4,800
Other refinery products ________ do____	768	756	702	838	800
Refinery fuel and losses ________ do____	1,766	1,692	1,265	1,220	1,200
Total ________________ do____	32,710	30,756	32,864	32,380	32,525

[e]Estimated. [p]Preliminary.
[1]Table includes data available through May 15, 1986.
[2]In addition to the commodities listed, a variety of crude construction materials (common clay, sand and gravel, and stone) is undoubtedly produced, but output is not reported, and available general information is inadequate to make reliable estimates of output levels.

TRADE

Switzerland remained a net importer of mineral commodities. Most of the imported minerals were processed domestically and exported as finished products. Total exports of raw mineral products, including reexports, were very limited. Fuels made up about 37% of the total value of raw material imports. Alumina, iron and steel, and nonferrous metals were also major imports.

Table 2.—Switzerland: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS				
Alkali and alkaline-earth metals:				
Alkali metals ______________	1	24	(2)	West Germany 23.
Alkaline-earth metals __ kilograms__	41	104	(2)	West Germany 22.
Aluminum:				
Ore and concentrate ______ do____	25	25	NA	NA.
Oxides and hydroxides ________	239	288	16	West Germany 115; Italy 19.
Metal including alloys:				
Unwrought including scrap ____	56,825	53,895	1,166	West Germany 27,594; Italy 17,142; France 1,442.
Semimanufactures ________	84,512	92,225	8,751	West Germany 15,953; France 14,548; United Kingdom 8,850.
Antimony: Metal including alloys, all forms ________________	5	3	NA	NA.
Arsenic: Oxides and acids __ kilograms__	235	144	NA	NA.
Beryllium: Metal including alloys, all forms ______________ do____	416	246	--	Belgium-Luxembourg 18; unspecified 226.
Chromium: Oxides and hydroxides ____	12	19	(2)	France 10; West Germany 4; Italy 1.
Cobalt: Oxides and hydroxides _______	3	(2)	--	Mainly to Republic of South Africa.
Columbium and tantalum: Metal including alloys, all forms, tantalum kilograms__	292	381	3	West Germany 99; France 45; Italy 17.
Copper:				
Ore and concentrate ______ do____	--	215	NA	NA.
Sulfate ________________	24	9	NA	West Germany 2; Belgium-Luxembourg 1.

See footnotes at end of table.

Table 2.—Switzerland: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued				
Copper —Continued				
Metal including alloys:				
Scrap	18,887	15,518	151	West Germany 4,859; Hungary 2,803; Italy 2,408.
Unwrought	7,078	5,968	54	West Germany 4,441; Italy 1,047; Austria 395.
Semimanufactures	22,670	25,779	2,446	West Germany 9,953; France 3,123; Italy 2,753.
Gold: Metal including alloys, unwrought and partly wrought thousand troy ounces	17,934	28,607	(2)	Portugal 65; West Germany 55; unspecified 28,315.
Iron and steel:				
Iron ore and concentrate, pyrite roasted	41	75	--	Peru 53; France 15; West Germany 3.
Metal:				
Scrap	149,485	106,295	--	Italy 85,645; West Germany 14,663; France 1,855.
Pig iron, cast iron, related materials	1,006	1,240	27	West Germany 1,082; Spain 30.
Ferroalloys:				
Ferroaluminum	--	1	--	NA.
Ferrosilicon	119	140	NA	Peru 43; West Germany 37; Iran 25.
Silicon metal	4,963	5,866	384	West Germany 5,415; Italy 47.
Unspecified	r676	206	NA	West Germany 61; Peru 39; Egypt 26.
Steel, primary forms	14,467	11,952	--	Italy 5,526; France 4,401; West Germany 1,393.
Semimanufactures:				
Bars, rods, angles, shapes, sections	472,090	546,698	2,005	West Germany 348,335; Italy 127,095; France 29,667.
Universals, plates, sheets	194,555	131,071	1,298	West Germany 112,047; Austria 6,795; Netherlands 3,259.
Hoop and strip	35,579	33,664	47	Austria 14,897; West Germany 10,518; France 4,141.
Rails and accessories	1,376	1,489	10	Italy 851; West Germany 248; Algeria 178.
Wire	17,231	19,804	551	West Germany 11,070; France 3,442; Italy 1,081.
Tubes, pipes, fittings	155,049	185,068	2,435	West Germany 80,819; Netherlands 16,981; France 14,617.
Castings and forgings, rough	10,649	8,913	19	West Germany 4,188; France 1,935; Netherlands 524.
Lead:				
Oxides	6	12	--	Iran 4; Ivory Coast 3; Austria 2.
Metal including alloys:				
Scrap	5,980	10,077	--	Italy 5,081; Austria 2,874; West Germany 966.
Unwrought	7,694	6,815	(2)	Italy 3,784; West Germany 1,857; Netherlands 701.
Semimanufactures	51	30	(2)	Austria 23; Italy 3; France 2.
Magnesium: Metal including alloys:				
Unwrought including scrap	259	210	--	West Germany 161; Italy 24; France 11.
Semimanufactures	404	613	96	Italy 237; France 102.
Manganese: Oxides	1	9	--	U.S.S.R. 5; Sweden 2.
Mercury 76-pound flasks	28	232	--	West Germany 201.
Molybdenum: Metal including alloys, all forms	6	13	(2)	Czechoslovakia 5; Brazil 2; West Germany 2.
Nickel: Metal including alloys:				
Scrap	318	422	--	West Germany 368; United Kingdom 52; Japan 2.
Unwrought	27	12	(2)	West Germany 11.
Semimanufactures	351	482	21	West Germany 130; France 103; Ireland 52.
Platinum-group metals: Metals including alloys, unwrought and partly wrought thousand troy ounces	773	1,253	57	Japan 557; West Germany 264; United Kingdom 134.
Rare-earth metals including alloys, all forms kilograms	36	42	1	United Kingdom 2.

See footnotes at end of table.

Table 2.—Switzerland: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984 United States	Destinations, 1984 Other (principal)
METALS —Continued				
Silver:				
Waste and sweepings[3] value, thousands	$288,500	$213,201	$9	Spain $172,550; West Germany $29,604; France $4,300.
Metal including alloys, unwrought and partly wrought thousand troy ounces	11,814	15,573	5	Netherlands 796; Italy 447; unspecified 12,383.
Tin: Metal including alloys:				
Scrap	76	43	--	West Germany 31; Netherlands 7; Italy 5.
Unwrought	196	179	(4)	West Germany 96; Italy 36; France 29.
Semimanufactures	12	26	--	Algeria 5; West Germany 5; Iraq 5.
Titanium: Oxides	86	162	(4)	Belgium-Luxembourg 75; Austria 35; West Germany 29.
Tungsten: Metal including alloys, all forms	45	70	(4)	West Germany 35; Belgium-Luxembourg 12; Austria 10.
Uranium and thorium: Oxides and other compounds	3	2	(4)	West Germany 1.
Zinc:				
Oxides	19	9	--	West Germany 6; France 2.
Blue powder	23	39	--	West Germany 34; Austria 5.
Metal including alloys:				
Scrap	1,618	1,184	--	Italy 575; West Germany 406; France 90.
Unwrought	249	118	--	Italy 93; West Germany 25.
Semimanufactures	r5	87	--	Austria 46; France 17; Italy 10.
Other:				
Ores and concentrates	105	86	--	Portugal 27; Yugoslavia 18; West Germany 6.
Ashes and residues	14,044	15,763	--	Belgium-Luxembourg 4,968; West Germany 3,239; Italy 2,996.
Base metals including alloys, all forms	r352	345	66	West Germany 193; France 24.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	28	25	NA	NA.
Artificial:				
Corundum	220	207	2	West Germany 131; Israel 17; France 15.
Silicon carbide	5,573	6,547	NA	NA.
Dust and powder of precious and semiprecious stones including diamond kilograms	4,273	3,513	270	Netherlands 1,298; France 447; West Germany 277.
Grinding and polishing wheels and stones	1,512	1,842	10	United Kingdom 525; West Germany 319; Algeria 171.
Asbestos, crude	389	35	(4)	Austria 23; West Germany 4; Bahamas 3.
Barite and witherite	16	30	1	Ivory Coast 9; Thailand 6; Austria 5.
Boron materials:				
Crude natural borates	3	1	--	All to West Germany.
Oxides and acids	13	5	--	Yugoslavia 2; Iraq 1; Peru 1.
Cement	21,341	17,552	(4)	West Germany 17,353; Italy 59; Bulgaria 50.
Chalk	2,851	989	13	France 765; West Germany 166; Hungary 25.
Clays, crude	5,752	28,190	(4)	West Germany 27,895; Austria 149; Yugoslavia 53.
Cryolite and chiolite kilograms	350	1,515	--	Mainly to Peru.
Diamond:				
Gem, not set or strung value, thousands	$675,005	$1,022,908	$71,696	United Kingdom $549,953; Belgium-Luxembourg $139,997.
Industrial stones do	$47,136	$44,663	$1,639	Italy $19,530; France $5,273; Austria $4,510.
Diatomite and other infusorial earth	86	32	(4)	France 7; West Germany 1; Yugoslavia 1.
Feldspar, fluorspar, related materials	97	169	--	Peru 100; Portugal 17; Thailand 14.
Fertilizer materials:				
Crude, n.e.s	1,570	2,441	--	Austria 1,266; France 963; Saudi Arabia 83.

See footnotes at end of table.

Table 2.—Switzerland: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Fertilizer materials —Continued				
Manufactured:				
Ammonia	3	10	--	Cuba 5; Colombia 1; Iraq 1.
Nitrogenous	1,434	1,946	(2)	East Germany 868; West Germany 583; Austria 245.
Phosphatic	120	19	--	United Arab Emirates 7; West Germany 6; Saudi Arabia 6.
Unspecified and mixed	5,238	4,448	(2)	West Germany 1,201; Saudi Arabia 867; France 486.
Graphite, natural	10	14	2	West Germany 2; Thailand 2.
Gypsum and plaster	r17,771	13,847	34	France 13,603; Austria 93; West Germany 91.
Lime	3,452	2,464	15	West Germany 1,888; Norway 325; Denmark 167.
Magnesium compounds:				
Magnesite, crude	(2)	(2)	--	NA.
Oxides and hydroxides	35	16	--	West Germany 6; Spain 1; unspecified 8.
Mica:				
Crude including splittings and waste	75	75	--	West Germany 59; Portugal 4; Burma 3.
Worked including agglomerated splittings	445	397	(2)	India 60; United Kingdom 54; Sweden 48.
Nitrates, crude	2	--		
Phosphates, crude kilograms	26	--		
Phosphorus, elemental	71	(2)	NA	NA.
Pigments, mineral:				
Natural, crude	20	32	NA	NA.
Iron oxides and hydroxides, processed	24	49	(2)	France 13; West Germany 4.
Potassium salts, crude	36	21	--	Saudi Arabia 11; West Germany 7.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$214,582	$213,566	$32,622	United Kingdom $39,965; France $39,587.
Synthetic do	$16,473	$18,674	$3,744	West Germany $3,136; Spain $1,745.
Salt and brine	548	102	(2)	France 44; West Germany 23; Angola 12.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	21,304	21,287	--	Italy 10,827; West Germany 10,169; France 276.
Sulfate, manufactured	584	596	--	Italy 562; France 17; Austria 6.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	30,598	27,507	--	West Germany 12,745; Italy 9,133; France 4,544.
Worked	8,529	9,618	2	West Germany 8,478; Austria 633; France 238.
Dolomite, chiefly refractory-grade	10	17	NA	West Germany 13.
Gravel and crushed rock	34,537	50,497	4	France 37,525; West Germany 12,199.
Limestone other than dimension	38	21	NA	West Germany 18.
Quartz and quartzite	35,195	33,169	7	Italy 31,990; West Germany 822; Austria 159.
Sand other than metal-bearing	13,958	16,287	--	Italy 10,270; France 5,058; West Germany 795.
Sulfur:				
Elemental:				
Crude including native and byproduct	6,260	8,151	--	Italy 6,969; West Germany 732; Yugoslavia 377.
Colloidal, precipitated, sublimed	3	3	--	Yugoslavia 2.
Dioxide	(2)	4	--	NA.
Sulfuric acid	11,069	11,071	(2)	West Germany 9,825; Austria 752; France 403.
Talc, steatite, soapstone, pyrophyllite	137	126	--	Austria 39; Yugoslavia 26; France 17.
Other:				
Crude	r2,248	5,370	(2)	Austria 2,794; West Germany 1,946; France 136.
Slag and dross, not metal-bearing	r32,940	30,347	--	West Germany 23,768; Italy 5,198; Austria 1,370.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	255	2	--	Mainly to West Germany.
Carbon: Carbon black	172	125	(2)	Czechoslovakia 59; France 29; West Germany 16.
Coal: Anthracite and bituminous	138	2,503	--	United Kingdom 2,399; Italy 104.

See footnotes at end of table.

Table 2.—Switzerland: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984 United States	Destinations, 1984 Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Coke and semicoke	(2)	3,194	--	Netherlands 1,818; West Germany 1,375.
Peat including briquets and litter	1,522	1,906	--	Austria 1,690; West Germany 134; France 49.
Petroleum:				
Crude ... 42-gallon barrels	3	4	NA	NA.
Refinery products:				
Liquefied petroleum gas ... do	478,129	334,173	12	Italy 278,562; Yugoslavia 43,488; West Germany 10,104.
Gasoline ... do	1,513	21,930	--	Austria 20,732; France 502; West Germany 246.
Mineral jelly and wax ... do	2,542	527	126	West Germany 94; Austria 63.
Kerosene and jet fuel ... do	736	287	(2)	Austria 101; United Kingdom 54; West Germany 46.
Distillate fuel oil ... do	96,458	171,796	--	Austria 161,427; West Germany 10,340.
Lubricants ... do	93,506	95,361	4,389	West Germany 20,125; Italy 18,557; France 6,048.
Residual fuel oil ... do	1,357,894	2,215,556	--	West Germany 1,891,207; Austria 198,954; France 125,401.
Bitumen and other residues ... do	182	109	--	Denmark 79; France 6; Spain 6.
Bituminous mixtures ... do	5,805	21,592	--	West Germany 7,090; Denmark 5,248; France 4,109.
Petroleum coke ... do	198	319	--	West Germany 182; Italy 137.

[r]Revised. NA Not available.
[1]Table prepared by staff, Branch of Geographic Data.
[2]Less than 1/2 unit.
[3]May include other precious metals.

Table 3.—Switzerland: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984 United States	Sources, 1984 Other (principal)
METALS				
Alkali and alkaline-earth metals:				
Alkali metals	615	592	2	West Germany 498; United Kingdom 88.
Alkaline-earth metals	1	2	(2)	West Germany 1.
Aluminum:				
Ore and concentrate	1,254	2,370	--	France 2,364.
Oxides and hydroxides	149,241	162,234	172	Australia 128,131; Ireland 19,840; West Germany 9,671.
Metal including alloys:				
Unwrought including scrap	57,751	63,189	66	Iceland 20,559; West Germany 14,562; Norway 13,109.
Semimanufactures	53,318	56,440	322	West Germany 27,442; Belgium-Luxembourg 6,909; France 6,855.
Antimony: Metal including alloys, all forms	60	34	--	China 17; Yugoslavia 16.
Arsenic: Oxides and acids	22	4	--	NA.
Beryllium: Metal including alloys, all forms ... kilograms	756	1,308	741	West Germany 257.
Chromium: Oxides and hydroxides	449	576	1	West Germany 376; Italy 158; Poland 20.
Cobalt: Oxides and hydroxides	2	2	--	United Kingdom 1.
Columbium and tantalum: Metal including alloys, all forms, tantalum ... kilograms	974	1,650	540	West Germany 652; Austria 343.

See footnotes at end of table.

Table 3.—Switzerland: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Copper:				
Ore and concentrate kilograms	50	300	--	NA.
Sulfate	697	851	--	France 192; Czechoslovakia 170; U.S.S.R. 143.
Metal including alloys:				
Scrap	2,201	3,290	277	West Germany 1,286; U.S.S.R. 432; Israel 320.
Unwrought	9,044	9,948	53	West Germany 4,054; Belgium-Luxembourg 2,915; Austria 1,243.
Semimanufactures	70,997	82,358	675	West Germany 36,681; France 14,478; United Kingdom 9,608.
Gold: Metal including alloys, unwrought and partly wrought thousand troy ounces	24,229	24,637	1	France 67; Spain 35; unspecified 24,491.
Iron and steel:				
Iron ore and concentrate, pyrite, roasted	8,016	10,049	--	West Germany 8,588; Italy 1,336; Republic of South Africa 103.
Metal:				
Scrap	146,802	272,801	28	West Germany 220,121; Netherlands 22,695; France 12,463.
Pig iron, cast iron, related materials	79,383	79,443	3	West Germany 34,277; France 14,737; Canada 13,583.
Ferroalloys:				
Ferroaluminum	338	286	18	United Kingdom 164; France 78; Belgium-Luxembourg 21.
Ferrosilicon	5,954	8,049	--	Norway 2,191; U.S.S.R. 1,998; West Germany 1,831.
Silicon metal	263	179	(2)	West Germany 104; Norway 48; Italy 25.
Unspecified	12,854	17,269	--	France 4,835; Norway 4,716; West Germany 4,541.
Steel, primary forms	148,192	203,080	24	West Germany 81,498; Netherlands 36,117; France 26,916.
Semimanufactures:				
Bars, rods, angles, shapes, sections	569,465	596,647	530	Italy 178,767; West Germany 166,890; France 85,997.
Universals, plates, sheets	690,768	731,224	39	West Germany 208,972; Belgium-Luxembourg 122,334; France 100,099.
Hoop and strip	207,867	253,015	393	West Germany 128,116; Netherlands 35,842; France 28,834.
Rails and accessories	42,788	45,968	(2)	Austria 24,529; West Germany 11,448; Italy 6,209.
Wire	34,150	39,364	61	West Germany 13,077; Austria 5,192; Belgium-Luxembourg 5,188.
Tubes, pipes, fittings	120,678	148,623	73	West Germany 68,601; Italy 20,192; France 16,539.
Castings and forgings, rough	7,855	12,775	4	West Germany 4,791; France 1,846; East Germany 1,767.
Lead:				
Ore and concentrate	2	(2)	NA	NA.
Oxides	210	155	--	West Germany 119; France 25; Netherlands 10.
Metal including alloys:				
Scrap	63	(2)	--	Mainly from West Germany.
Unwrought	10,429	8,167	--	France 2,787; Canada 2,292; United Kingdom 1,520.
Semimanufactures	1,769	1,535	2	West Germany 1,334; Belgium-Luxembourg 164; France 21.
Magnesium: Metal including alloys:				
Unwrought including scrap	2,162	2,361	141	Norway 991; Italy 668; Canada 310.
Semimanufactures	32	22	(2)	West Germany 18; Italy 2.
Manganese: Oxides	998	1,161	--	Greece 676; Belgium-Luxembourg 193; Japan 143.
Mercury 76-pound flasks	1,163	1,789	NA	West Germany 808; Spain 645; Yugoslavia 286.

See footnotes at end of table.

Table 3.—Switzerland: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984 United States	Sources, 1984 Other (principal)
METALS —Continued				
Molybdenum: Metal including alloys, all forms	10	21	(2)	Austria 14; West Germany 6.
Nickel: Metal including alloys:				
Scrap	94	70	(2)	Austria 18; United Kingdom 12; Italy 11.
Unwrought	895	901	2	Canada 165; Netherlands 144; Republic of South Africa 122.
Semimanufactures	928	1,327	73	West Germany 788; United Kingdom 232; Ireland 78.
Platinum-group metals: Metals including alloys, unwrought and partly wrought thousand troy ounces	1,220	1,784	318	West Germany 608; United Kingdom 498.
Rare-earth metals including alloys, all forms	4	5	(2)	Austria 2; France 2.
Silver:				
Waste and sweepings[3] value, thousands	$184,400	$122,831	$2,143	Spain $71,190; Greece $9,857; West Germany $7,109.
Metal including alloys, unwrought and partly wrought thousand troy ounces	37,708	35,301	11	West Germany 1,067; United Kingdom 455; unspecified 33,443.
Tin: Metal including alloys:				
Scrap	1	8	--	Mainly from Italy.
Unwrought	890	791	6	Malaysia 228; Bolivia 158; Netherlands 98.
Semimanufactures	263	345	1	West Germany 201; France 73; Belgium-Luxembourg 47.
Titanium: Oxides	2,134	2,290	240	West Germany 908; Belgium-Luxembourg 456.
Tungsten: Metal including alloys, all forms	42	75	2	United Kingdom 19; West Germany 15; Italy 14.
Uranium and thorium: Oxides and other compounds	16	13	1	France 8; West Germany 2.
Zinc:				
Ore and concentrate	(2)	2	--	All from West Germany.
Oxides	1,815	1,330	(2)	France 692; West Germany 317; United Kingdom 198.
Blue powder	2,942	3,077	--	Belgium-Luxembourg 1,422; Netherlands 507; West Germany 467.
Metal including alloys:				
Scrap	342	466	--	Italy 356; West Germany 97.
Unwrought	20,330	21,441	1	Poland 7,923; West Germany 3,459; Norway 3,307.
Semimanufactures	r1,146	1,162	68	West Germany 657; Belgium-Luxembourg 186; Yugoslavia 90.
Other:				
Ores and concentrates	3,262	3,889	1	Republic of South Africa 1,489; West Germany 708; Australia 579.
Ashes and residues	392	977	NA	Italy 549; United Kingdom 176; West Germany 148.
Base metals including alloys, all forms	r1,097	1,097	123	Republic of South Africa 319; Netherlands 176; West Germany 163.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	3,870	3,720	84	West Germany 3,223; Italy 349.
Artificial:				
Corundum	5,862	7,009	164	West Germany 3,772; Austria 2,056; Yugoslavia 569.
Silicon carbide	1,923	1,535	--	West Germany 1,393; Norway 122; U.S.S.R. 14.
Dust and powder of precious and semiprecious stones including diamond kilograms	4,623	8,117	1,080	Ireland 3,674; France 3,014.
Grinding and polishing wheels and stones	1,602	1,797	25	West Germany 901; Italy 260; Austria 157.
Asbestos, crude	12,211	4,772	49	U.S.S.R. 1,623; Canada 1,362; West Germany 1,017.
Barite and witherite	1,393	1,294	--	West Germany 893; France 359; Italy 40.
Boron materials:				
Crude natural borates	10,089	6,346	5,267	Netherlands 920; West Germany 131.
Oxides and acids	632	444	--	France 245; West Germany 77; Yugoslavia 60.
Cement	265,092	309,577	27	Italy 135,541; West Germany 98,160; France 41,261.

See footnotes at end of table.

Table 3.—Switzerland: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Chalk	23,961	30,558	8	France 26,795; Italy 1,665; Austria 1,283.
Clays, crude	177,438	171,026	1,802	West Germany 71,661; United Kingdom 62,566; France 25,703.
Cryolite and chiolite	58	55	--	Denmark 40; Austria 15.
Diamond:				
Gem, not set or strung value, thousands	$748,931	$1,198,752	$96,944	United Kingdom $741,322; Panama $54,999.
Industrial stones do	$51,802	$43,446	$3,727	Ireland $34,924; West Germany $1,874.
Diatomite and other infusorial earth	10,209	6,244	245	Denmark 4,223; France 983; Italy 285.
Feldspar, fluorspar, related materials	7,571	11,890	--	Italy 5,460; West Germany 4,185; France 1,000.
Fertilizer materials:				
Crude, n.e.s	19,962	19,104	19	France 12,867; Italy 3,291; West Germany 2,434.
Manufactured:				
Ammonia	17,815	22,074	--	Austria 10,543; France 7,856; Czechoslovakia 2,056.
Nitrogenous	88,537	93,870	39	Austria 35,562; West Germany 17,940; Italy 13,893.
Phosphatic	107,070	107,781	800	France 68,851; Belgium-Luxembourg 32,210; Netherlands 5,528.
Unspecified and mixed	160,316	185,249	40,048	France 52,630; West Germany 29,930.
Graphite, natural	112	141	--	West Germany 68; Italy 40; Austria 16.
Gypsum and plaster	67,524	66,404	25	West Germany 38,511; France 15,238; Italy 12,164.
Lime	69,865	74,213	--	West Germany 38,190; Italy 35,835.
Magnesium compounds:				
Magnesite, crude	r5	(2)	--	NA
Oxides and hydroxides	r4,441	4,941	4	Austria 3,192; Spain 1,096; Greece 220.
Meerschaum, amber, jet kilograms	502	3	--	NA.
Mica:				
Crude including splittings and waste	480	753	3	France 441; West Germany 127; United Kingdom 78.
Worked including agglomerated splittings	341	373	(2)	France 252; Belgium-Luxembourg 78; India 30.
Nitrates, crude	74	13	--	West Germany 10; Austria 3.
Phosphates, crude	5,873	6,423	--	Morocco 5,708; Israel 493; France 142.
Phosphorus, elemental	4,032	4,437	125	Italy 1,118; France 1,049; U.S.S.R. 945.
Pigments, mineral:				
Natural, crude	278	325	NA	Austria 115; France 109; West Germany 90.
Iron oxides and hydroxides, processed	2,143	2,832	27	West Germany 2,683; United Kingdom 63; Italy 39.
Potassium salts, crude	96,524	111,788	--	France 92,419; West Germany 16,557; East Germany 2,808.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$258,599	$281,680	$34,413	Panama $42,114; United Kingdom $37,625.
Synthetic do	$7,051	$8,162	$1,475	France $2,951; West Germany $1,210.
Pyrite, unroasted	156	154	--	West Germany 71; France 68; Italy 15.
Salt and brine	2,004	2,084	1	France 1,723; West Germany 203; Israel 44.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	5,009	5,188	(2)	East Germany 2,493; West Germany 852; France 843.
Sulfate, manufactured	17,598	17,480	NA	Austria 9,028; West Germany 8,071; France 379.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked thousand tons	125	142	(2)	West Germany 55; France 30; Italy 24.
Worked do	102	114	(2)	Italy 88; Portugal 8; West Germany 6.
Dolomite, chiefly refractory-grade do	21	21	--	Italy 17; West Germany 2; France 1.
Gravel and crushed rock do	5,444	5,445	1	France 3,146; West Germany 1,220; Italy 706.

See footnotes at end of table.

Table 3.—Switzerland: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Stone, sand and gravel —Continued				
Limestone other than dimension thousand tons	18	19	--	Italy 9; France 7; West Germany 3.
Quartz and quartzite do	23	23	(2)	Italy 14; West Germany 7; Spain 2.
Sand other than metal-bearing do	1,192	1,355	(2)	Italy 558; France 351; West Germany 314.
Sulfur:				
Elemental:				
Crude including native and by-product	39,336	46,043	--	West Germany 45,876; France 152.
Colloidal, precipitated, sublimed	198	138	(2)	France 71; West Germany 58.
Dioxide	39	44	--	Italy 36.
Sulfuric acid	3,236	2,764	(2)	West Germany 2,424; Austria 253; France 39.
Talc, steatite, soapstone, pyrophyllite	11,991	13,368	13	Austria 9,071; Italy 1,814; France 1,172.
Other:				
Crude	89,734	106,342	453	West Germany 54,740; Spain 14,593; France 13,018.
Slag and dross, not metal-bearing	32,553	36,238	--	West Germany 23,314; France 11,724; Austria 677.
MINERAL FUELS AND RELATED MATERIALS				
Carbon:				
Asphalt and bitumen, natural	1,879	1,870	146	Trinidad and Tobago 1,412; West Germany 182.
Carbon black	4,629	4,708	103	West Germany 2,923; France 1,080; Italy 360.
Gas carbon	98	161	--	All from West Germany.
Coal:				
Anthracite and bituminous	344,274	543,702	177,049	West Germany 189,501; Republic of South Africa 58,187.
Briquets of anthracite and bituminous coal	11,083	11,851	--	West Germany 9,783; Belgium-Luxembourg 1,435; France 510.
Lignite including briquets	29,866	30,234	--	West Germany 28,419; East Germany 1,725.
Coke and semicoke	74,883	87,730	--	West Germany 62,050; France 20,012; Netherlands 4,135.
Peat including briquets and litter	75,697	59,215	--	West Germany 49,625; U.S.S.R. 8,428; Austria 379.
Petroleum:				
Crude thousand 42-gallon barrels	30,645	30,073	--	Libya 15,114; Algeria 5,720; Saudi Arabia 3,226.
Refinery products:				
Liquefied petroleum gas do	12,139	13,594	(2)	West Germany 7,076; Netherlands 6,496.
Gasoline do	16,818	18,187	314	Belgium-Luxembourg 6,515; West Germany 4,149; Italy 2,732.
Mineral jelly and wax do	106	109	(2)	West Germany 64; France 14; Austria 9.
Kerosene and jet fuel do	601	488	(2)	Belgium-Luxembourg 179; Netherlands 132; France 77.
Distillate fuel oil do	38,031	35,366	240	U.S.S.R. 12,812; Netherlands 7,015; Belgium-Luxembourg 4,523.
Lubricants do	574	563	8	West Germany 140; Netherlands 124; Italy 114.
Residual fuel oil do	1,717	1,687	--	West Germany 1,091; Belgium-Luxembourg 349; France 137.
Bitumen and other residues do	1,061	944	(2)	West Germany 544; France 218; Italy 160.
Bituminous mixtures do	59	62	(2)	West Germany 42; France 11; Netherlands 4.
Petroleum coke do	995	342	175	West Germany 167.

[r]Revised. NA Not available.
[1]Table prepared by staff, Branch of Geographic Data.
[2]Less than 1/2 unit.
[3]May include other precious metals.

COMMODITY REVIEW

METALS

Aluminum.—The aluminum plant at Martigny, operated by Usine d'Aluminium Martigny S.A., was damaged in early spring by explosives set by environmentalists protesting the building of a dam for hydropower generation. The plant was out of production for 3 months.

Gallium.—Swiss Aluminium Ltd. (Alusuisse), Lonza Ltd., and Alcan Aluminium Ltd. announced in August that Alcan had acquired the gallium purification business of Alusuisse and Lonza in Neuhausen about 20 miles north of Zurich. The operation, at Alusuisse's Research and Development Center, will continue under a tolling arrangement between Alcan and Alusuisse. Existing production facilities, analytical equipment, and personnel will be utilized. The plant reportedly had a capacity of 10 tons per year.

Precious Metals.—Expansion began at the precious metals refinery of Compagnie des Metaux Precieux S.A. (Metalor). Construction of a $12.1 million plant near Neuchatel, about 25 miles from Bern, was expected to be finished by September 1986, and the plant should be operational by yearend. Silver refining, as well as the production of silver-based powders and salts, will be moved to the new facility from the company's existing Neuchatel refinery. The space vacated by these operations will be used for expansion of the gold and other precious metals refining circuits. The company's capacity in 1985 was approximately 200 tons of gold per year, 115 tons of silver, 0.7 ton of palladium, and 0.3 ton of platinum.

INDUSTRIAL MINERALS

Jura-Cement-Fabriken, in Aarau west of Zurich, was modifying an existing preheater kiln with a precalcining unit, increasing the capacity of the kiln by 1,800 tons per day. The company was also adding a 220-ton-per-hour roller mill for raw grinding, a 13-ton-per-hour coal mill, and a reciprocating grate cooler. The equipment was expected to be on-line during the third quarter of the year.

The new precalcining unit started up at the Perlmooser Zementwerke Mannersdorf AG plant near Zurich in 1984 and was brought up to full capacity during 1985.

MINERAL FUELS

Switzerland remained a net importer of mineral fuels during 1985. Hydroelectric and nuclear powerplants accounted for 59% and 40%, respectively, of the electrical power generated. Electrical power and fuelwood remained the only energy sources that did not have to be imported.

Natural Gas.—The gasfield at Finsterwald in northwestern Switzerland, with total reserves of only 3.5 billion feet, came on-line during April. Although output of the field was modest, it was linked to the Transitgas pipeline by Lucerne Energie Aktion Gesellschaft, the Lucerne subsidiary of Swisspetrol Holding A.G. Swisspetrol, encouraged by the field's development, continued its current 8-year (1983-90), $150 million program to search for indigenous natural gas and petroleum reserves.

Nuclear Power.—A new nuclear powerplant, near Leigstadt on the Rhine River, was inaugurated on October 8, 1985. The plant, a 950-megawatt-hour, General Electric, boiling-water reactor, moderated and cooled by light water, is Switzerland's fifth and largest nuclear plant. In operation since December 1984, the plant provided 6.9 megawatts of electrical power through October 1985, or 15% of the total electrical production for that period. Construction began in 1974 and cost an equivalent $2.3 billion.

A similar 950-megawatt plant, scheduled for construction at Kaiseraugst, was issued a general license in March. Work was scheduled to begin in 1989 with commissioning to occur in 1995. A joint agreement was reached with Électricité de France to build a 1,100-megawatt nuclear plant at an as yet undetermined location to supply both Switzerland and France.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Swiss francs (SwF) to U.S. dollars at the rate of SwF2.4571=US$1.00, the average rate in 1985.

The Mineral Industry of Taiwan

By E. Chin[1]

Taiwan is an island impoverished of minerals and fuels. The total value of mine output in 1985 was $414 million.[2] Eighty-four percent of the value was from the small amounts of coal, oil, and natural gas produced. Metal ore mining was virtually nonexistent. The remainder of the value of mine production was from a collection of small operations for industrial minerals. Primary metal production in Taiwan was dominated by a 6-million-ton-per-year steel output capacity. The only other primary metal production was copper electrorefining, which has averaged less than 50,000 tons per year since 1982.

Taiwan's gross domestic product (GDP) in 1985 was $59 billion in current prices. Input of the mining sector to GDP was only 0.6%. In comparison, manufacturing accounted for 41% of the GDP, followed by wholesale and retail trade, 14%; transportation and communications, 6%; agriculture, 6%; construction, 4%; water, electricity, and gas, 4%; banking and insurance, 4%; and other, 20%.[3] Employment in the mining and quarrying sector was 34,300 persons, compared with 2.3 million in manufacturing, 630,000 in commerce; 360,000 in transportation and communications; and 350,000 in construction. Monthly working hours in the mining and quarrying sector averaged 179 hours while monthly earnings averaged $408.

Selected wholesale prices for 1985 included iron ore, $27 per ton; steel scrap, $129 per ton; pig iron, $152 per ton; electrolytic copper, $1.59 per kilogram; aluminum ingot, $1.24 per kilogram; lead, $0.60 per kilogram; and compound fertilizers, $212 per ton. The wholesale price for coal was $77 per ton; fuel oil, $169 per kiloliter; and gasoline, $0.65 per liter.

Nuclear power is an important energy source in Taiwan. In 1985, there were six reactors in operation with a combined installed capacity of 5,144 megawatts, or 33% of total power generation capacity. Seven additional reactors were to be constructed to boost nuclear power's share of total installed capacity to 41%. However, the nuclear expansion program has encountered resistance mainly because of safety considerations and cost. The construction of two reactors, initially scheduled to begin in 1981, was postponed again.

Although the Government was encouraging local plants to install pollution control equipment, initial purchases were expected to be made by state-run enterprises and large private companies. Pollution control projects for the Chinese Petroleum Corp., Taiwan Sugar Corp., China Petrochemical Development Corp., and Taiwan Machinery Manufacturing Corp. were estimated to cost collectively $133 million.

In July 1985, a revised copyright law was enacted that stiffens penalties for violators and provides specific protection for computer software. A proposed fair trade law would also provide criminal penalties for people engaged in unfair competition practices. In addition, amendments were to be proposed to strengthen the patent law to provide protection for chemical compounds excluding pharmaceuticals.

Taiwan has a well educated and highly productive labor force. In 1985, over 90% of the labor force was under 55 years of age. Six percent were classified as illiterate. About 55% have graduated from secondary school or other institutions of higher learning. The unemployment rate was only about 2%. Taiwan prohibits strikes, and disputes were arbitrated by labor authorities.

Kaohsiung and Keelung are Taiwan's largest ports. Kaohsiung has a container handling capacity of over 1.7 million tons, and Keelung, 1.2 million tons. The top container ports in the world are Rotterdam, New York, Hong Kong, Kobe, Kaohsiung, Singapore, and Keelung, in order of capacity.

PRODUCTION

Taiwan has a very weak minerals resource base, and its mine output of any one mineral was of little consequence by world standards. For the past 5 years, the total value of mine production has declined annually from $559 million in 1981 to $414 million in 1985. Output of crude oil and associated natural gas was valued at $234 million in 1985, followed by coal, $120 million, and all other mining output, $60 million.

There was virtually no mine production of metallic minerals with the exception of very small quantities of gold and sporadic output of inconsequential amounts of copper ore and iron sands. In terms of output, the carbonate minerals—limestone, marble, and dolomite, in that order—dominated the nonfuel mining sector. Aside from aggregates, the remainder of the output was industrial minerals: asbestos, chiolite, clays, feldspar, gem stones, mica, salt, serpentine, sulfur, and talc.

State enterprises accounted for all of the output of oil and natural gas. The output of coal, dolomite, limestone, marble, and sulfur was by a mix of state-owned enterprises and private companies. The remainder of Taiwan's mineral production was by small private companies.

The metals producing sector was dominated by iron and steel, electrolytic copper, byproduct gold and silver, and secondary lead refining. The raw material for this sector was imported. The total value of metal production in 1985 was $3.3 billion, of which iron and steel accounted for 80%.

The total value of mining and manufacturing was estimated at $75 billion in 1985 and $76 billion in 1984. The mining sector accounted for 0.57% of the total value in 1984 compared with 0.55% in 1985.

Table 1.—Taiwan: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984	1985[p]
METALS					
Aluminum: Metal, primary	30,532	10,120	--	--	--
Copper:					
Mine output, metal content[e]	500	--	--	--	--
Metal, refined	53,230	47,377	37,960	48,436	46,734
Gold, primary troy ounces	56,695	71,770	52,361	37,794	30,633
Iron and steel: Metal:					
Pig iron thousand tons	1,610	2,695	3,415	3,360	[e]3,400
Ferroalloys:					
Ferromanganese	19,175	18,665	[r]21,763	19,803	18,508
Ferrosilicomanganese	14,376	21,311	18,509	23,082	22,688
Ferrosilicon	17,523	16,930	18,304	23,714	17,272
Steel, crude thousand tons	3,143	4,078	5,017	5,224	[e]5,000
Lead, refinery, secondary[e]	30,000	35,000	38,000	[r]44,300	44,400
Silver, primary troy ounces	[r]214,881	[r]504,092	[r]345,273	364,274	366,078
INDUSTRIAL MINERALS					
Asbestos	2,317	2,392	2,819	1,355	625
Cement, hydraulic thousand tons	14,342	13,432	14,810	14,234	14,418
Clays:					
Fire clay	34,879	35,577	36,926	52,479	63,446
Kaolin	90,836	87,532	102,895	79,411	76,605
Feldspar	17,215	[r]10,620	11,866	15,452	11,055
Gypsum:					
Precipitated	1,985	1,320	1,522	1,882	2,199
Other	4,054	725	1,500	--	--
Lime	[r]179,971	[r]138,126	[r]131,862	117,496	105,132
Mica	85	44	311	304	114
Nitrogen: N content of ammonia	406,097	317,647	310,594	268,427	206,781
Pyrite, gross weight	40	--	--	--	--
Salt, marine	351,330	262,103	79,188	218,491	173,898
Sodium compounds, n.e.s.:					
Caustic soda	372,996	358,736	295,349	350,527	386,505
Carbonate (soda ash)	72,064	59,220	93,820	107,210	112,018

See footnotes at end of table.

Table 1.—Taiwan: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984	1985[p]
INDUSTRIAL MINERALS —Continued					
Stone:					
Dolomite thousand tons	359	261	228	258	231
Limestone do.	13,221	11,378	13,183	12,936	12,722
Marble do.	[r]8,892	[r]8,581	9,281	9,542	10,259
Serpentine do.	118	119	116	123	208
Sulfur:					
S content of pyrite	21	--	--	--	--
Byproduct, all sources	9,849	20,080	26,936	28,705	42,949
Total	9,870	20,080	26,936	28,705	42,949
Talc	24,774	30,661	27,053	18,680	17,560
MINERAL FUELS AND RELATED MATERIALS					
Carbon black	23,406	21,313	32,968	39,842	43,264
Coal, bituminous thousand tons	2,446	2,384	2,236	2,011	1,858
Coke do.	219	159	150	141	132
Gas, natural:					
Gross[e] million cubic feet	59,000	48,000	48,000	49,000	44,000
Marketed do.	53,042	43,526	43,689	44,698	39,731
Petroleum:					
Crude thousand 42-gallon barrels	1,150	874	847	855	743
Refinery products:					
Gasoline do.	13,008	14,154	17,422	17,518	25,408
Kerosene do.	--	98	86	61	282
Distillate fuel oil do.	20,769	19,792	21,898	21,972	23,852
Residual fuel oil do.	60,286	57,133	58,019	56,426	56,080
Lubricants do.	802	702	835	951	856
Asphalt do.	1,813	2,271	2,406	2,311	2,999
Other[2] do.	1,562	1,442	3,449	8,517	9,916
Refinery fuel, losses and not reported[e 3] do.	24,201	25,000	27,000	27,000	30,000
Total do.	122,441	120,592	131,115	134,756	149,393

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Includes data available through July 2, 1986.
[2]Naphtha, solvent oil, and base oil.
[3]Includes liquefield petroleum gas and jet fuel.

TRADE

The value of Taiwan's exports in 1985 was estimated at $30 billion, and that for imports, $20 billion. The United States, Japan, and Hong Kong, in that order, continued to be Taiwan's major trading partners. Shipments to the United States accounted for 48% of total exports, followed by Japan, 11%; Hong Kong, 8%; Canada, the Federal Republic of Germany, and Australia, 3% each; and the United Kingdom, 2%. In comparison, imports from Japan accounted for 28% of total receipts, followed by the United States, 24%; Saudi Arabia, 7%; the Federal Republic of Germany and Australia, 4% each; and Kuwait, 3%.

The values of metal products and basic metals exported were $1.7 billion and $689 million, respectively. Exports of chemicals were valued at $1.3 billion; glass products, $179 million; cement, $103 million; and miscellaneous minerals, $7 million. The cost of fuels dominated imports. Receipts of crude oil were valued at $3.3 billion, and for coal, $522 million. Imports of chemicals were valued at $2.9 billion; basic metals, $1.9 billion; metal products, $153 million; metal ores, $178 million; miscellaneous minerals, $128 million; and industrial mineral products, $121 million.

Because it is resource poor, Taiwan imported raw materials to produce value-added goods for export. The largest export earners in 1985 were textile and wearing apparel, $8.1 billion; electrical and electronic products, $6.4 billion; and transportation equipment and machineries, $1.2 billion each.

On July 18, 1985, the Executive Yuan approved in principle to end the classification of gold and silver as foreign exchange. The Ministry of Finance was directed to study the changes in customs regulation and propose adjustments in duties affecting imports of gold and silver.

Table 2.—Taiwan: Exports and reexports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides	3,426	3,564	--	Republic of Korea 2,551; Indonesia 500; Panama 250.
Metal including alloys, all forms	13,503	15,396	711	Hong Kong 6,716; Japan 4,625; Singapore 2,185.
Chromium: Oxides and hydroxides	--	6	--	Indonesia 5; Saudi Arabia 1.
Columbium and tantalum: Metal including alloys, all forms, tantalum	83	22	14	Japan 4.
Copper:				
Matte and speiss including cement copper	30	13	--	All to Japan.
Sulfate	315	910	--	Costa Rica 500; Singapore 144; Republic of Korea 100.
Metal including alloys:				
Scrap	8,095	6,495	270	Japan 6,081.
Unwrought	227	300	83	Japan 217.
Semimanufactures	8,387	14,635	1,094	Saudi Arabia 4,013; Singapore 3,936; Hong Kong 3,354.
Gold: Waste and sweepings	--	18	18	
Iron and steel: Metal:				
Scrap	279,854	202,414	22	Thailand 94,147; Japan 71,729.
Pig iron, cast iron, related materials	3,363	1,157	680	Australia 160; Japan 80.
Ferroalloys	6,322	5,852	21	Indonesia 1,959; Thailand 1,440; Pakistan 1,048.
Steel, primary forms	250,617	107,728	704	Malaysia 42,622; Japan 33,368; Singapore 13,251.
Semimanufactures thousand tons	1,846	1,852	207	Japan 569; Saudi Arabia 246; Hong Kong 225.
Lead:				
Ore and concentrate	--	15	--	All to Indonesia.
Oxides	20	21	--	Japan 18.
Metal including alloys, all forms	16,241	16,046	33	Republic of Korea 6,650; Japan 6,477.
Magnesium: Metal including alloys, all forms	361	495	141	Netherlands 242; Japan 98.
Manganese:				
Ore and concentrate	171	20	--	All to Thailand.
Oxides	10	1	--	All to Zaire.
Molybdenum: Metal including alloys, all forms kilograms	54	6,531	304	Japan 6,227.
Nickel: Metal including alloys:				
Scrap	1,423	1,825	--	Japan 1,819.
Unwrought and semimanufactures	116	57	3	Japan 42.
Platinum-group metals:				
Waste and sweepings[2]	26	62	([3])	Hong Kong 30; Japan 27.
Metal including alloys, unwrought and partly wrought troy ounces	6,012	482	--	All to Japan.
Rare-earth metals including alloys, all forms	1	23	--	Philippines 17; Indonesia 6.
Silicon, high-purity	1	26	([3])	Malaysia 20.
Silver:				
Ore and concentrate[2] value, thousands	--	$3	--	All to Japan.
Waste and sweepings	[r]8	1	--	All to Singapore.
Metal including alloys, unwrought and partly wrought troy ounces	22,506	8,809	--	Italy 4,437; Hong Kong 2,572.
Tin:				
Oxides kilograms	--	1,448	--	All to Republic of South Africa.
Metal including alloys, all forms	198	339	10	Hong Kong 222.
Titanium: Oxides	7,971	57	--	Singapore 38; Nigeria 10.
Tungsten: Metal including alloys, all forms	9	17	--	Japan 8; West Germany 5.
Uranium and/or thorium: Metal including alloys, all forms	66	137	70	Malaysia 54.
Zinc:				
Oxides	2,932	2,843	67	Japan 2,011; Philippines 462; Thailand 178.
Blue powder	733	865	--	Japan 864.
Metal including alloys, all forms	1,363	2,002	296	Japan 1,425; Indonesia 89.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	5	14	2	Philippines 5; Republic of South Africa 4.
Artificial: Corundum	329	426	--	Japan 370; Philippines 30.
Dust and powder of precious and semiprecious stones including diamond kilograms	1,462	2,844	139	Italy 2,197.
Grinding and polishing wheels and stones	1,945	2,888	865	Thailand 499; Indonesia 412; Singapore 328.
Asbestos, crude	31	100	--	All to Thailand.
Barite and witherite	50	--		
Boron materials: Oxides and acids kilograms	1,073	1,203	--	Malaysia 643; Zaire 560.

Table 2.—Taiwan: Exports and reexports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Cement ____ thousand tons__	4,056	3,467	1	Singapore 1,434; Hong Kong 874; Malaysia 272.
Clays, crude ____	805	974	--	Philippines 771; Japan 54.
Diamond:				
Natural:				
Gem, not set or strung thousand carats__	8,380	27,990	165	Oman 26,780.
Industrial stones ____do____	1,615	180	180	
Synthetic: Gem, not set or strung do____	5,500	34,420	3,330	Republic of Korea 15,385; Thailand 12,640.
Diatomite and other infusorial earth ___	95	226	--	Philippines 210.
Feldspar, fluorspar, related materials __	--	26	--	Hong Kong 19; Republic of Korea 4.
Fertilizer materials: Manufactured:				
Ammonia ____	415	153	--	Thailand 134; Hong Kong 15.
Nitrogenous ____	3,213	2,756	--	Japan 2,638; Thailand 100.
Potassic ____	10,250	6,600	--	All to Japan.
Unspecified and mixed ____	168	37,803	2	Thailand 35,000.
Graphite, natural ____	100	237	--	Japan 162; Indonesia 63.
Gypsum and plaster ____	734	228	NA	Indonesia 218.
Iodine ____ kilograms__	1,500	1,700	--	Indonesia 1,000; Philippines 450.
Magnesium compounds:				
Oxides and hydroxides ____	460	--		
Other ____	132	380	--	Indonesia 360.
Meerschaum ____ kilograms__	10	16	3	Malaysia 9; West Germany 2.
Mica, all forms ____	416	295	--	Japan 90; New Zealand 67; United Kingdom 54.
Pigments, mineral: Iron oxides and hydroxides, processed____	195	2	--	Malaysia 1; Zaire 1.
Precious and semiprecious stones other than diamond:				
Natural ____ kilograms__	52,990	129,304	77,201	Hong Kong 19,725; Italy 14,857.
Synthetic ____do____	31,366	79,016	56,529	France 5,460; Italy 4,521; Japan 3,926.
Salt and brine____	672	1,239	72	Brunei 500; Hong Kong 400.
Sodium compounds, n.e.s.: Sulfate, manufactured____	13,657	33,168	--	Japan 9,100; Philippines 5,946; Indonesia 4,950.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked ____	7,192	9,300	184	Japan 7,079; Republic of Korea 402.
Worked____	r39,048	44,926	1,265	Saudi Arabia 33,241; Japan 5,670.
Dolomite, chiefly refractory-grade __	8,495	25,612	5	Japan 23,800.
Gravel and crushed rock ____	369,081	274,864	48	Japan 269,799.
Limestone other than dimension ___	718	157	--	Japan 65; Hong Kong 50.
Quartz and quartzite____	112	135	--	Indonesia 83; Japan 28; Hong Kong 24.
Sand other than metal-bearing ____	290,232	273,333	--	Japan 271,452.
Sulfur:				
Elemental:				
Crude including native and byproduct ____	1,728	2,783	--	Indonesia 2,342; Philippines 231.
Colloidal, precipitated, sublimed_	105	219	--	Indonesia 200.
Sulfuric acid____	635	1,298	--	Hong Kong 1,039; Australia 94.
Talc, steatite, soapstone, pyrophyllite __	1,823	1,007	--	Indonesia 572; Singapore 126; Malaysia 101.
Other:				
Crude____	2,798	2,902	100	Japan 2,131; Malaysia 319.
Slag and dross, not metal-bearing ___	78,339	82,686	--	Japan 65,732; Philippines 16,212.
MINERAL FUELS AND RELATED MATERIALS				
Carbon black ____	4,170	5,691	--	Indonesia 3,374; Thailand 1,055; Republic of South Africa 884.
Coal, all grades including briquets thousand tons__	30	17	--	Thailand 13.
Coke and semicoke____	10,374	12,031	--	Indonesia 8,505; Philippines 1,150; Thailand 750.
Peat including briquets and litter ____	--	49	--	All to Japan.
Petroleum, refinery products:				
Liquefied petroleum gas thousand 42-gallon barrels__	15	--		
Gasoline, motor__42-gallon barrels__	--	25	--	Japan 17.
Mineral jelly and wax ____	787	1,157	--	Japan 535; Indonesia 346; Singapore 157.
Kerosene and jet fuel thousand 42-gallon barrels__	6,105	10,021	--	Japan 6,091; Singapore 2,784; Hong Kong 538.
Distillate fuel oil ____do____	6,308	7,582	--	NA.
Lubricants____do____	841	821	603	United Arab Emirates 92; Japan 40.

rRevised. NA Not available.

[1]Table prepared by Audrey D. Wilkes.

[2]May include other precious metals.

[3]Less than 1/2 unit.

Table 3.—Taiwan: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS				
Aluminum:				
Ore and concentrate	36,805	55,241	--	All from Malaysia.
Oxides and hydroxides	5,052	7,189	161	Japan 6,572.
Metal including alloys:				
Scrap	25,766	6,483	3,967	Australia 473; Republic of South Africa 394; United Kingdom 224.
Unwrought	139,145	99,923	15,455	Australia 25,886; Republic of South Africa 19,443; Bahrain 11,344.
Semimanufactures	23,187	22,801	840	Japan 11,045; Australia 5,150.
Arsenic: Oxides and acids	311	432	--	France 332; Philippines 36.
Chromium:				
Ore and concentrate	1,751	3,514	--	Philippines 2,136; Republic of South Africa 1,368.
Oxides and hydroxides	2,181	2,528	394	Japan 1,222; Italy 489.
Cobalt: Oxides and hydroxides	56	43	1	Belgium-Luxembourg 35.
Copper:				
Ore and concentrate	134,083	212,923	11,000	Canada 106,536; Philippines 54,090.
Sulfate	299	448	33	Japan 384.
Metal including alloys:				
Scrap	30,441	34,016	23,717	Hong Kong 3,341; Singapore 1,585; Saudi Arabia 1,417.
Unwrought	64,006	91,134	3,423	Chile 34,427; Philippines 14,841; Peru 12,448.
Semimanufactures	44,523	52,877	1,666	Japan 39,286; Republic of Korea 7,449.
Gold:				
Bullion troy ounces	112,515	964,801	--	United Kingdom 434,038; West Germany 300,001; Switzerland 230,762.
Metal including alloys, unwrought and partly wrought thousand troy ounces	1,088	1,677	989	Japan 646.
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite thousand tons	4,957	5,199	(2)	Australia 2,630; Brazil 2,034.
Pyrite, roasted	13,757	15,151	NA	Philippines 15,000.
Metal:				
Scrap	735,515	577,658	354,777	Hong Kong 134,863; Japan 45,635.
Pig iron, cast iron, related materials	223,693	217,749	317	Brazil 135,775; Japan 72,399.
Ferroalloys	10,641	15,767	170	Republic of South Africa 9,099; Philippines 1,049.
Steel, primary forms	132,701	279,319	89	Republic of Korea 52,995; Brazil 47,954; Zimbabwe 26,751.
Semimanufactures thousand tons	1,139	1,327	30	Japan 1,147.
Lead:				
Ore and concentrate	228	11	5	Philippines 6.
Oxides	3,235	2,959	5	Australia 2,650; Mexico 260.
Metal including alloys:				
Scrap	48,215	56,773	26,242	Saudi Arabia 7,429; Kuwait 5,534; Jordan 4,585.
Unwrought	17,540	11,596	55	Australia 7,043; Japan 3,852.
Semimanufactures	43	130	17	Japan 82.
Magnesium: Metal including alloys, all forms	843	836	131	Norway 359; France 273.
Manganese:				
Ore and concentrate	106,195	97,160	--	Republic of South Africa 42,535; Gabon 23,718; Australia 16,467.
Oxides	1,369	1,709	(2)	Japan 979; Singapore 252; Republic of South Africa 124.
Metal including alloys, all forms	16	22	(2)	France 9; Republic of South Africa 5.
Mercury 76-pound flasks	254	324	31	Belgium-Luxembourg 131; Japan 93.
Molybdenum: Metal including alloys, all forms	71	90	80	Japan 7.
Nickel:				
Matte and speiss	429	1,949	--	All from Canada.
Metal including alloys:				
Scrap	133	136	113	Singapore 12.
Unwrought	4,060	4,497	18	Canada 2,656; Norway 700; Finland 270.
Semimanufactures	268	399	57	Australia 106; Japan 66; Canada 51.
Platinum-group metals:				
Ore and concentrate[3] value, thousands	$5	$33	--	United Kingdom $32.
Metals including alloys, unwrought and partly wrought thousand troy ounces	57	80	17	Japan 52.

See footnotes at end of table.

Table 3.—Taiwan: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Rare-earth metals including alloys, all forms	100	150	(2)	Japan 113.
Selenium, elemental	48	9	--	Japan 8.
Silicon, high-purity	1,271	1,634	56	Norway 504; Canada 405; Spain 186.
Silver:				
Waste and sweepings[3] value, thousands	$337	$896	$861	Australia $1.
Metal including alloys, unwrought and partly wrought thousand troy ounces	1,264	5,720	3,820	Japan 1,146; West Germany 485.
Tin: Metal including alloys, all forms	1,899	2,575	13	Malaysia 1,116; Hong Kong 465; Thailand 380.
Titanium: Oxides	9,436	10,302	222	Japan 5,336; West Germany 2,944; Australia 1,321.
Tungsten:				
Ore and concentrate	34	(2)	(2)	
Metal including alloys, all forms	35	48	4	Japan 38.
Uranium and/or thorium: Oxides and other compounds	99	12	(2)	Japan 6; France 5.
Zinc:				
Oxides	201	280	34	Japan 139; Republic of Korea 68.
Blue powder	585	231	(2)	Netherlands 119; Greece 47.
Metal including alloys:				
Scrap	43,701	13,322	9,039	West Germany 913; United Kingdom 577; Australia 549.
Unwrought	65,158	51,585	106	Australia 21,004; Canada 13,053; Japan 10,719.
Semimanufactures	792	953	4	Japan 803.
Other: Ashes and residues	14,004	22,883	8,545	Australia 5,157; Japan 2,889.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	2,635	3,240	466	Japan 2,410.
Artificial: Corundum	8,360	9,740	40	Japan 4,681; Brazil 3,107; Hong Kong 1,438.
Asbestos, crude	37,939	31,764	351	Canada 20,115; Republic of South Africa 8,797.
Barite and witherite	2,867	7,914	--	Mainly from Thailand.
Boron materials:				
Crude natural borates	1,569	1,474	--	Netherlands 838; Japan 636.
Oxides and acids	1,491	1,266	1,201	Japan 25; France 21.
Bromine	45	57	56	NA.
Cement	1,362	1,108	68	Denmark 680; Japan 216.
Clays, crude:				
Bentonite	9,396	14,040	12,469	Japan 1,123.
Fire clay	830	947	16	Japan 543; Hong Kong 300.
Kaolin	58,509	82,337	35,377	Malaysia 14,577; Hong Kong 11,391; Indonesia 9,278.
Unspecified	124,044	142,106	5,489	Hong Kong 73,660; Japan 43,310; India 11,040.
Cryolite and chiolite	85	143	--	All from Denmark.
Diamond:				
Natural:				
Gem, not set or strung thousand carats	1,515	80	--	Hong Kong 65.
Industrial stones do	8,380	175,535	10	Canada 175,000; Japan 510.
Synthetic:				
Gem, not set or strung do	200	335	310	France 20.
Industrial stones do	700	15,480	80	Republic of Korea 13,605; Japan 1,385.
Diatomite and other infusorial earth	3,143	4,692	2,995	Japan 1,407.
Feldspar, fluorspar, related materials	99,169	110,482	601	Thailand 29,787; Japan 26,998; Hong Kong 23,348.
Fertilizer materials: Manufactured:				
Nitrogenous	135,942	171,290	10	Saudi Arabia 158,865.
Phosphatic	3	20	18	Japan 1.
Potassic	152,833	186,908	(2)	Canada 112,350; Israel 42,363.
Unspecified and mixed	11,438	15,581	14,062	West Germany 659; Japan 527.
Graphite, natural	10,957	6,574	7	Republic of Korea 4,767; Japan 900; Sri Lanka 550.
Gypsum and plaster	349,224	332,696	669	Thailand 244,124; Australia 43,630; Japan 35,826.
Iodine	12	19	1	Japan 18.

See footnotes at end of table.

Table 3.—Taiwan: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Magnesium compounds:				
Oxides and hydroxides	7,327	7,454	43	Japan 6,919.
Other	17,736	20,264	--	India 13,710; Malaysia 5,480.
Mica:				
Crude including splittings and waste	224	294	1	Japan 124; Singapore 118; India 51.
Worked including agglomerated splittings	204	203	3	Japan 172.
Phosphates, crude	228,636	367,089	23,445	Jordan 215,336; Morocco 65,683.
Phosphorus, elemental	885	1,137	306	Republic of South Africa 541; Netherlands 259.
Pigments, mineral:				
Natural, crude	42	9	--	Japan 7.
Iron oxides and hydroxides, processed	15,314	17,757	69	Japan 14,129; West Germany 1,895.
Precious and semiprecious stones other than diamond:				
Natural	2,158	2,985	132	Brazil 1,137; Republic of South Africa 950.
Synthetic	30	27	6	Italy 16.
Salt and brine	584,903	711,505	23	Australia 711,384.
Sodium compounds, n.e.s.: Carbonate, manufactured	14,098	15,631	15,630	NA.
Stone, sand and gravel:				
Dimension stone: Crude and partly worked	34,078	52,168	30	India 16,948; Italy 11,440; Republic of Korea 4,551.
Dolomite, chiefly refractory-grade	1,283	2,444	17	Japan 1,131; United Kingdom 540.
Limestone other than dimension	5,425	1,940	NA	Mainly from Japan.
Quartz and quartzite	824	818	8	Sweden 315; Japan 237; Hong Kong 101.
Sand other than metal-bearing	3,087	15,628	29	Australia 7,882; Malaysia 6,300.
Sulfur:				
Elemental:				
Crude including native and byproduct	48,380	63,374	999	Canada 47,586; Japan 14,789.
Colloidal, precipitated, sublimed	205,885	243,935	70,435	Canada 123,261; Japan 41,452.
Sulfuric acid	80,271	82,535	132	Philippines 55,826; Japan 26,565.
Talc, steatite, soapstone, pyrophyllite	6,662	9,915	1,093	Republic of Korea 2,842; Japan 2,490; Thailand 1,374.
Vermiculite	589	302	--	Republic of South Africa 252; India 50.
Other:				
Crude	116,912	133,780	993	Republic of Korea 111,250; Japan 11,590.
Slag and dross, not metal-bearing	23,710	6,862	70	Japan 6,610.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	105	71	71	
Carbon black	3,382	4,133	992	Australia 1,520; Japan 985; West Germany 339.
Coal, all grades including briquets thousand tons	6,510	7,684	2,144	Australia 3,518; Republic of South Africa 1,038.
Coke and semicoke	99,465	203,000	(2)	Mainly from Japan.
Peat including briquets and litter	86	144	(2)	Finland 128.
Petroleum:				
Crude thousand 42-gallon barrels	137,487	130,361	--	Saudi Arabia 64,899; Kuwait 24,597; United Arab Emirates 13,542.
Refinery products:				
Liquefied petroleum gas do	3,388	5,001	--	Saudi Arabia 3,182; Kuwait 839.
Mineral jelly and wax do	90	102	6	Japan 54; Brazil 23.
Distillate fuel oil do	5,276	9,622	8,714	Singapore 735.
Lubricants do	450	483	154	Japan 217.
Nonlubricating oils do	90	87	29	Japan 45.
Petroleum coke do	322	298	291	Japan 7.

NA Not available.
[1]Table prepared by Audrey D. Wilkes.
[2]Less than 1/2 unit.
[3]May include other precious metals.

COMMODITY REVIEW

METALS

The large industrial firms in Taiwan were Government enterprises. State-run metal producing, processing, and consuming operations included China Steel Corp., Taiwan Aluminium Corp. (Talco), Tang Eng Iron Works Co. Ltd., Taiwan Metal Mining Corp. (TMMCO), Chung Hsin Electric & Machinery Manufacturing Corp., Metal Industries Development Center, Taipei Iron Works, Taiwan Machinery Manufacturing, China Shipbuilding Corp., and the Central Mint of China. Jurisdiction over the energy sector was exercised by the Chinese Petroleum Corp., China Petrochemical Development, and Taiwan Power Co. (Taipower). Other Government enterprises included Kaohsiung Ammonium Sulfate Corp., Taiwan Alkali Co. Ltd., Taiwan Fertilizer Co. Ltd., and Taiwan Salt Works.

In 1984 and 1985 calendar years, there was no mine output of metallic ores. Taiwan's primary metal industry was limited to copper, iron and steel, and nickel, all of which require imported raw materials. Steel scrap was generated by the country's large ship scrapping facilities. Production of refined secondary lead was from imported scrap and storage batteries. Doré bullion was recovered from the anode sludge in the electrolytic refining of copper.

Aluminum.—Production of aluminum at Talco's 50,000-ton-per-year smelter in Kaohsiung ceased in 1982. Negotiations during 1983-84 to reopen the plant as a joint venture with Aluminum Co. of America were not fruitful. Subsequently, the Government assumed Talco's debts and placed the plant under the management of China Steel. Talco continued limited operation of its two rolling mills. In 1985, Talco produced about 6,000 tons of aluminum sheet and 1,700 tons of foil from imported ingot.

Copper.—While offers to sell TMMCO's 50,000-ton-per-year refinery at Juifang near Keelung were unsuccessful during 1983-84, the refinery continued operating throughout the period. In 1985, the Government assumed TMMCO's debt and placed the refinery under the management of Taipower. During the year, the refinery was operated at 93% capacity, producing refined copper and byproduct gold and silver from anode slimes. TMMCO used imported concentrate primarily from Canada and the Philippines for refinery feedstock.

Iron and Steel.—China Steel advertised tenders to expand its annual steel capacity at Kaohsiung from 3.2 million tons to 5.7 million tons. The expansion was planned to include the addition of a blast furnace with a capacity of 6,400 tons per day, two 150-ton oxygen converters, a 2.4-million-ton-per-year continuous slab caster, and a 400,000-ton-per-year annealing line. Other facilities included coke ovens and a sinter plant. Companies from Japan, the United Kingdom, and the Federal Republic of Germany submitted bids for various equipment and components.

China Steel operated the country's only integrated iron and steel facility. China Steel was able to produce 461 types of steel products and held 5 domestic and international patents each in steelmaking technology. It was also one of the most profitable steel producers in the world. There were also about 100 small operations in Taiwan with an aggregate annual steel capacity of 2.8 million tons; these operations produced about 1.6 million tons of steel.

Tang Eng operated a 130,000-ton-per-year stainless steel plant in Kaohsiung. Stainless steel slabs produced by Tang Eng were hot rolled by China Steel and returned for cold rolling. Stainless steel output was consumed by Tang Eng and other domestic fabricators of stainless steel manufactures.

Nickel.—Talent Metals Corp. operated a 7,000-ton-per-year nickel smelter at Kaohsiung. Talent Metals was a joint venture between Inco Ltd. of Canada (30% equity ownership) and Taiwanese interests. Nickel oxide was imported from Canada to produce shot and pig. Tang Eng was the major customer for the nickel produced by Talent Metals. Sixty percent of Tang Eng's production capacity was nickel-based stainless steel.

INDUSTRIAL MINERALS

Taiwan produced a limited variety of industrial minerals. State-owned operations accounted for all of the output of salt from evaporites in the coastal region around Chiayi, Kaohsiung, Tainan, and Tainan City. Mine production of gypsum ceased in 1984, which was formerly a state-run operation. Private companies accounted for all of the output of asbestos, chiolite, clays, feldspar, gem stones, mica, serpentine, and talc. Production of each was insignificant by world standards. All of the asbestos output was from Hualien; chiolite from Hualien, Ilan, Miaoli, and Nantou; clays from Hsinchu, Hualien, Ilan, Kaohsiung, Keelung, Miaoli, Nantou, and Taitung; feldspar from Hualien and Ilan; gem stones from Hualien and Kaohsiung; mica from Hualien and Taitung; serpentine from Hualien, Ilan, and Taitung; and talc from Hualien and Ilan.

There were both Government and private operations for the production of coal, dolomite, limestone, and marble. Private companies accounted for 95% of the output of coal, 51% of the dolomite, 98% of the limestone, and 92% of the marble. Over 98% of the sulfur was recovered from oil refining at Kaohsiung by Chinese Petroleum.

Cement.—During the past 5 years, annual production of cement averaged 14 million tons from 11 companies operating 17 plants. Close to 75% of the output was domestically consumed and the remainder exported. All of the large producers had captive limestone quarries while only the small plants purchased limestone.

The Government has encouraged industry to diversify in order to ensure financial stability during recessionary periods. Taiwan Cement Corp., the country's largest producer, was to manufacture precision optoelectronic devices in a joint venture with a U.S. company.

Fertilizer Materials.—Lacking indigenous resources, Taiwan imported phosphate primarily from Jordan, Morocco, and the United States and potash from Canada, Israel, Jordan, and the United States. The fertilizer industry was dominated by two large Government-run companies. The value of total fertilizer output in 1985 was $242 million, down 12% from that of 1984. Production was about 1 million tons per year. Virtually all of the output was domestically consumed with less than 2% exported.

Taiwan Fertilizer switched to naphtha as a feedstock for the production of ammonia and urea. Hitherto, Chinese Petroleum was providing natural gas for fertilizer production. By utilizing the naphtha, the drain on natural gas demand was diverted to other users.

Titania.—Formosa Plastics Group applied to the Ministry of Economic Affairs for permission to construct a 30,000-ton-per-year titanium dioxide plant. Formosa Plastics has signed a draft agreement for technical cooperation with Kerr-McGee Chemical Corp. of the United States for the $100 million project. In August 1985, the Ministry approved the application of E. I. du Pont de Nemours & Co. Inc. for the construction of a 60,000-ton-per-year titania plant. Du Pont's plant, estimated to cost $160 million, was to be in the Changpin Industrial Park in Changwa County. The domestic consumption of titania was 30,000 tons per year, which was met through imports. The proposed surfeit in supply was to be exported.[4]

MINERAL FUELS

Taiwan produced insignificant quantities of fuel from domestic resources. Coal production was less than 1.9 million tons in 1985; crude oil, about 118,000 kiloliters; and associated natural gas, a little more than 1.1 billion cubic meters. Total supply of energy was 38 million kiloliters of oil equivalence, of which imported fuels accounted for 28 million kiloliters. Crude oil accounted for 73% of the imported fuels; coal, 20%; and petroleum products, 7%. Domestic output of energy totaled 10 million kiloliters of oil equivalence. Nuclear power accounted for 60%; natural gas, 14%; coal, 13%; hydropower, 10%; and oil, 3%.

Total energy consumption was 33 million kiloliters of oil equivalence. The largest consumer was the transportation sector, which accounted for 12%, followed by chemicals, 10%; industrial mineral products and metallic products, 9% each; energy, 7%; miscellaneous manufactures, 5%; agriculture, 4%; timber, 3%; food, 2%; textiles, 2%; mining, less than 1%; and other, the remainder.

Coal.—Annual coal production has steadily decreased from 3.2 million tons in 1976 to 1.9 million tons in 1985. In 1976, there were 184 mining operations: 2 Government operations, producing 64,000 tons, and 182 private operations, producing 3.2 million tons. In 1985, 2 Government mines produced 12,500 tons, and 125 private operations, the remainder. Mine production from Taipei Prefecture accounted for 58% of the total output, followed by Keelung 13%; Miaoli, 12%; Hsinchu, 7%; Taoyuan, 6%; and other, 4%.

Because of a series of mine disasters in 1984, the Government adopted stringent safety regulations and shut down 40 mines. In June 1985, an explosion in the Hai Shan Mine claimed 7 lives and injured 22. This disaster renewed outcries from upgrading mine safety to totally shutting down the industry. Meanwhile, the Government was reducing subsidies to private coal mine operations and seeking ways to retrain miners laid off by closures.

Oil and Natural Gas.—The state-owned Chinese Petroleum and McDermott International Inc. of the United States will undertake the joint development of the CBK Gasfield off the coast of northwest Taiwan near Hsinchu. Drilling will be carried out with the assistance of Vetco Offshore Inc. also of the United States. Steel plates used in the pipeline were being produced by China Steel. Steel-pipe underwater stanchions and portions of the drilling towers were being manufactured by China Shipbuilding Corp. Development of the CBK Gasfield was expected to be completed by August 1986. The field was expected to begin yielding 1.5 million cubic meters of natural gas per day by January 1987. This was Taiwan's first attempt to exploit offshore deposits of fossil fuels.[5]

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from New Taiwan dollars (NT$) to U.S. dollars at the rate of NT$40.23=US$1.00 in 1985.

[3]Council for Economic Planning and Development (Taipei). Industry of Free China. V. 65, No. 2, Feb. 1986, pp. 52-53.

[4]Industry Development and Investment Center (Taipei). Taiwan Industrial Panorama. V. 13, No. 9, Sept. 1985, p. 1.

[5]Council for Economic Planning and Development (Taipei). Industry of Free China. V. 64, No. 6, Dec. 1985, p. 26.

The Mineral Industry of Thailand

By Gordon L. Kinney[1]

Thailand's mineral industry generally remained stagnant in 1985 as a sharp decline in the production of tin, Thailand's most important nonfuel mineral, was barely offset by increased production of other minerals, particularly lignite and zinc. The value of mineral production increased slightly from that of 1984 to $412 million[2] as world mineral prices generally remained depressed.

Thailand produced 36 minerals and 3 fossil fuels in commercial quantities. Low world prices for several of the important minerals continued to affect the output. The country ranked high among market economy countries as a producer of tantalum (first), tin (third), and fluorite, barite, and tungsten, in the top 10 worldwide. It also produced domestically important amounts of antimony, condensate, crude oil, glass sand, gypsum, iron ore, kaolin, lead, lignite, limestone, manganese, natural gas, and zinc.

It has been the Government's policy to get the best value from production and use of nonrenewable resources. As such, the forthcoming Sixth National Economic and Social Development Plan, which is to begin in 1986, emphasizes the following development strategy: (1) more efficient mining and processing to produce more marketable mineral products at high recovery rates; (2) better market awareness and capability for export-oriented minerals; (3) more promotion incentives for industrial minerals; (4) more Government research to support the industry; and (5) stress on technology transfer in all forms at all levels.[3]

Foremost in economic importance in the Thai mineral industry was the continued favorable development of mineral fuels. Production of natural gas surpassed demand for the first time, and a number of offshore gas wells had to be capped while industrial demand catches up. Small onshore oilfields contribute significantly to Thailand's needs. Development of large lignite deposits in the north continued. Lignite for electric power generation was scheduled for major increases in coming years, and industrial use of lignite began to take on more importance. Commercial production of zinc metal from the Tak refinery should make Thailand self-sufficient when design capacity is reached.

A major mineral that was not being utilized but had great potential was the potash deposits interbedded in the extensive rock salt layers of the Khorat Plateau. These are the only known potash deposits in South and Southeast Asia. Detailed exploration was under way by at least one company. Development of these deposits will be very costly; financing could be the inhibiting factor.

Of less economic significance to Thailand but of considerable worldwide publicity was the collapse of the International Tin Council's (ITC) price support system in October. Thai miners had long been agitating for lower tin taxes. Suspension of world tin trade and the drop in price finally forced a significant lowering in tin taxes. The ITC's production quota had been causing a hardship on the Thai tin industry for several years. However, while important to thousands of tin miners, tin exports were no longer as important to the Thai economy as they were in past years. In 1980, tin exports rated fourth in export value after rice, tapioca, and rubber. In 1984, tin exports dropped to eighth in value, accounting for 3% of Thai exports, and were expected to be ninth in value in 1985.

Development of the minerals sector has been an important goal in Thailand's economic plan. The potential for considerable expansion exists and if properly developed could contribute to lowering Thailand's high balance-of-trade deficit. The best potential appears to exist in potassium and nitrogen fertilizer, gas- and oil-based petrochemicals, gas-based iron and steel, and deep offshore tin mining.

In 1985, gross domestic product (GDP) growth was estimated to be 4% in real terms, compared with 6% in 1984. A good deal of the growth was attributable to ongoing energy, infrastructure, and construction projects. Although 1985 growth was respectable, it did not yield improvements in individual welfare that such growth would yield in a developed economy. Growth was projected to decline further in 1986.[4] Most of the decline in national growth resulted in the agricultural sector. Exceptionally low world prices for Thailand's major commodities depressed farm incomes and squeezed profit margins for everyone trading in agricultural products. Since agriculture was the biggest single sector of GDP, low world farm prices affected the export-oriented economy extremely hard.

Other major reasons for Thailand's lower economic growth were external including low growth rates in industrialized countries, growing global trade protectionism, and the fluctuating value of the U.S. dollar.

PRODUCTION

The value of mining output increased during the year with lignite, limestone, fluorite, and zinc leading the major minerals. The value of tin concentrate, however, dropped from $271 million in 1984 to $195 million in 1985. Lignite output more than doubled in 1985, while iron ore, lead ore, and gypsum production increased to a lesser extent. The fossil fuels also increased in value and importance to the economy. Natural gas production increased such that supply outpaced demand and a number of production wells in the Gulf of Thailand had to be shut in until the Thai industrial sector can develop more uses for gas. Thailand completed its first full year of zinc metal production, which eliminated expensive imports of the past and saved $17 million in much needed foreign exchange. At full production, the plant is expected to save about $40 million at current zinc prices. Annual cement capacity reached 9.4 million tons in 1985. Several new kilns were under construction and capacity could reach 12 million tons per year by 1989 if the old kilns are retained in service. Fertilizer development continued to move forward at a glacial pace. High costs and difficulty in financing projects were the main reasons that nitrogen or potash fertilizers have not been made from domestic materials.

Table 1.—Thailand: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984	1985[p]
METALS					
Antimony:					
Ore and concentrate:					
Gross weight	2,820	1,567	2,808	4,636	2,917
Metal content[e]	1,199	666	1,193	1,970	1,240
Metal, smelter	36	28	13	--	135
Columbium and tantalum ores and concentrates, gross weight:[2]					
Columbite and tantalite	49	39	549	477	268
Stuverite (mixed columbite-tantalite)	44	10	275	30	--
Iron and steel:					
Iron ore:					
Gross weight	62,472	26,750	40,304	60,670	93,800
Iron content	34,360	14,713	22,167	33,369	51,590

See footnotes at end of table.

Table 1.—Thailand: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984	1985[p]
METALS —Continued					
Iron and steel —Continued					
Metal:					
Pig iron	10,310	6,338	159	--	--
Ferroalloys:					
Ferromanganese	369	--	--	--	--
Ferrosilicon	280	--	--	--	--
Steel:					
Crude	300,000	312,158	243,900	380,971	447,032
Semimanufactures (selected):					
Bars	109,711	229,203	385,000	281,934	319,802
Galvanized iron sheets	151,620	126,890	123,679	132,455	128,681
Tinned plates	78,834	62,227	73,119	91,974	68,175
Lead:					
Mine output, metal content of 42.5% Pb concentrate	17,283	18,580	21,015	16,662	46,245
Metal: Ingot, secondary	548	929	3,174	6,198	7,536
Manganese ore:					
Chemical-grade, over 75% MnO_2	5	12	--	8	27
Battery- and chemical-grade, 75% MnO_2	5,205	3,398	4,804	6,110	3,930
Metallurgical-grade, 46% to 50% MnO_2	5,707	4,348	1,906	2,577	455
Total	10,917	7,758	6,710	8,695	4,412
Rare-earth metals:					
Monazite concentrate, gross weight	107	162	277	298	245
Xenotime	45	46	38	28	24
Tin:					
Mine output, metal content	31,474	26,109	19,943	21,960	16,864
Metal, smelter, primary	32,636	25,479	18,467	19,729	17,996
Titanium: Ilmenite concentrate, gross weight	37	18	205	536	488
Tungsten concentrate:					
Gross weight	2,348	1,661	1,092	1,439	1,137
Metal content	1,209	855	562	741	586
Zinc:					
Mine output, gross weight	--	--	--	147,993	276,909
Mine output, metal content	--	--	--	41,438	77,535
Metal, smelter, primary	--	--	--	([3])	62,108
Zirconium ore and concentrate, gross weight	104	196	199	290	878
INDUSTRIAL MINERALS					
Barite	307,046	330,948	187,437	174,918	230,970
Cement, hydraulic thousand tons	6,263	6,609	7,263	8,240	[e]8,200
Clays:					
Ball clay	1,856	2,200	4,960	2,520	7,988
Kaolin	14,086	17,846	36,350	58,616	106,704
Kaolinite (dickite)	7,450	--	--	--	--
Diatomite	128	80	425	471	410
Feldspar	24,243	19,326	47,908	74,404	104,392
Fluorspar:					
Crude mine output:					
High-grade	157,311	176,084	159,959	230,228	263,059
Low-grade	113,667	106,609	77,716	64,940	91,500
Total	270,978	282,693	237,675	295,168	354,559
Salable product:					
Acid-grade (beneficiated low-grade)	55,181	81,024	46,689	57,151	35,840
Metallurgical-grade	157,311	176,084	159,959	230,228	263,059
Total	212,492	257,108	206,648	287,379	298,899
Graphite	1,800	630	86	--	--
Gypsum	540,383	753,433	760,361	1,110,660	1,273,459
Phosphate rock, crude	2,610	4,265	5,158	3,075	4,072
Salt:					
Rock	11,000	11,100	5,679	9,850	12,786
Other[e]	165,000	165,000	165,000	165,000	165,000
Sand, silica	76,330	82,820	116,094	166,787	157,571
Stone:					
Calcite	2,325	1,020	1,871	1,272	1,040
Dolomite	7,510	9,662	7,927	10,364	16,160
Limestone for cement manufacture only thousand tons	5,486	6,371	8,936	9,223	9,845
Marble	8,016	9,311	26,428	37,927	21,479
Marl for cement manufacture only thousand tons	1,787	458	--	--	--
Quartz, not further described	20	7,531	15,159	20,687	27,305
Shale for cement manufacture only thousand tons	1,124	1,248	1,200	1,564	1,448
Talc and related materials:					
Pyrophyllite	10,370	19,989	18,875	26,851	42,002
Talc	1,665	2,009	1,273	1,628	1,476

See footnotes at end of table.

Table 1.—Thailand: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984	1985[p]
MINERAL FUELS AND RELATED MATERIALS					
Coal: Lignite thousand tons	1,686	1,964	1,866	2,337	5,146
Natural gas (gross production) million standard cubic feet	--	47,036	56,762	85,506	133,000
Petroleum:					
Crude thousand 42-gallon barrels	[e]100	[4]3,832	2,401	5,387	7,590
Natural gas condensate do.	--	NA	2,379	3,008	[e]4,000
Refinery products:					
Gasoline do.	11,558	12,366	13,365	12,620	[e]14,000
Jet fuel do.	5,941	5,648	6,275	6,432	[e]7,000
Kerosene do.	2,293	2,277	2,725	1,539	[e]2,000
Distillate fuel oil do.	17,331	17,879	19,198	17,409	[e]17,000
Residual fuel oil do.	17,018	15,201	13,591	15,494	[e]16,000
Liquefied petroleum gas do.	1,730	1,255	1,434	1,541	[e]2,000
Naphtha do.	1,275	[e]1,300	([3])	--	--
Asphalt do.	854	[e]900	([3])	--	--
Refinery fuel and losses and unspecified do.	[e]1,740	[e]1,710	[e]1,700	2,671	[e]2,000
Total do.	59,740	58,536	[r]58,288	57,706	[e]60,000

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Includes data available through July 23, 1986.
[2]Excludes columbium- and tantalum-bearing tin slags, which make Thailand the world's largest source of newly mined tantalum.
[3]Revised to zero.
[4]Includes natural gas condensate.

TRADE

Much of Thailand's mineral industry was based on exports of crude and processed ores. The major exceptions were tin and zinc metal. Tin exports increased marginally in 1984 then declined about 4% in 1985 because of the ITC controls and the October tin crisis. A corollary of the tin export controls was the apparent increase in tin smuggling. Between 5,000 and 10,000 tons of tin concentrate was believed to have been smuggled out of the country in each of 1984 and 1985. Some Thai sources estimated that the amount was considerably higher than that in 1985. Tin exports accounted for about 82% of annual mineral export value through 1982, but the percentage dropped subsequently because of ITC quotas. In 1984, the percentage was 74% and fell even further in 1985 to 70%.

Several mineral exports remained important but were overlooked because of the tin market publicity. Thailand has been the world's major source of tantalum, exported in several forms of tin smelter slag. These exports were scheduled to stop 12 months before the projected opening of a domestic tantalum processing plant under construction in Phuket. The plant was structurally complete by yearend, and slag exports should have declined or been stopped during 1985.

Antimony, barite, columbium, metallurgical- and acid-grade fluorite, and gypsum exports increased significantly in value in 1984. Construction on a new export-oriented feldspar mine was begun in 1985. It is designed to produce 27,000 tons of feldspar and 10,000 tons of quartz per year. The output from the natural gas separation plant has produced more condensate than can presently be used, so the surplus was exported on a temporary basis. Plans for exporting liquefied natural gas were still being discussed at various levels of government and with private industry. The grass-roots project would require an investment of several billion dollars and, realistically, was several years away from the start of construction.

Table 2.—Thailand: Exports and reexports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS				
Aluminum: Metal including alloys, all forms	908	1,220	27	Malaysia 694; Singapore 187.
Antimony: Ore and concentrate	3,037	5,491	2,671	Republic of Korea 949; Belgium-Luxembourg 753; France 310.
Columbium and tantalum: Ore and concentrate	125	274	186	West Germany 80.
Copper: Sulfate	32	164	--	Japan 136.
Gold: Waste and sweepings grams	--	[2]9,000	--	India 7,500; Philippines 1,000.
Iron and steel: Metal:				
Scrap	1,712	3,548	143	Japan 3,101.
Pig iron, cast iron, related materials kilograms	6,209	75	--	All to Singapore.
Semimanufactures:				
Tubes, pipes, fittings	52,502	105,453	2,182	Iran 30,860; Japan 12,925; Hong Kong 12,022.
Unspecified	756	10,651	84	Australia 10,020; Singapore 239; Laos 137.
Lead: Ore and concentrate	42,737	42,004	--	Japan 20,000; Netherlands 11,371; Republic of Korea 8,600.
Manganese:				
Ore and concentrate, metallurgical-grade	([3])	4,100	--	All to Taiwan.
Oxides	--	[4]36	--	All to Hong Kong.
Silver:				
Waste and sweepings kilograms	250	--		
Metal including alloys, unwrought and partly wrought thousand troy ounces	3,304	181	180	Hong Kong 1.
Tin: Metal including alloys:				
Unwrought	18,876	19,538	6,799	Netherlands 6,869; Japan 3,251.
Semimanufactures kilograms	1,500	--		
Tungsten: Ore and concentrate	1,207	1,885	1,271	West Germany 269; Netherlands 127.
Zinc:				
Oxides	88	46	--	Mainly to Sri Lanka.
Metal including alloys, all forms	153	216	([3])	Laos 193.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.: Grinding and polishing wheels and stones	87	41	4	Burma 34.
Barite and witherite	205,443	205,557	91,431	Indonesia 48,700; Saudi Arabia 26,268; Brunei 12,078.
Cement	172,786	87,327	--	Malaysia 61,730; Nepal 11,065.
Diamond:				
Gem, not set or strung carats	49,115	119,784	--	Brunei 28,428; Hong Kong 20,927; Belgium-Luxembourg 20,724.
Unsorted do.	373	4,030	--	Hong Kong 4,015.
Diatomite and other infusorial earth	153	--		
Feldspar	12,621	16,982	5	Taiwan 11,100; Malaysia 2,485.
Fertilizer materials: Manufactured: Unspecified and mixed	435	903	--	Saudi Arabia 855.
Fluorspar	183,002	230,137	3,300	Japan 96,553; Taiwan 53,571; Republic of Korea 29,104.
Gypsum and plaster	491,127	779,708	--	Taiwan 257,350; Indonesia 160,972; Malaysia 159,742.
Precious and semiprecious stones other than diamond:				
Natural kilograms	103,502	138,337	2,177	Hong Kong 117,117; Malaysia 5,742; Taiwan 5,186.
Synthetic do.	180	404	([3])	Switzerland 150; Singapore 81; Italy 53.
Salt and brine	47,482	52,971	--	Malaysia 35,321; Singapore 17,117.
Sodium compounds, n.e.s.: Sulfate, manufactured	250	232	--	All to Laos.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	408	441	40	Bangladesh 400.
Worked	1,542	809	17	Singapore 266; Brunei 216; Burma 160.
Dolomite, chiefly refractory-grade	6,993	5,376	--	Singapore 5,076.
Limestone other than dimension	3,471	4,049	--	Malaysia 4,046.
Quartz and quartzite	13,604	15,401	--	Japan 14,500.
Sand other than metal-bearing	1,721	962	--	Malaysia 951.
Sulfur: Elemental	1,418	110	--	Philippines 90.
Talc, steatite, soapstone, pyrophyllite	5,153	8,343	--	Sri Lanka 4,260; Philippines 4,000.

See footnotes at end of table.

Table 2.—Thailand: Exports and reexports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
MINERAL FUELS AND RELATED MATERIALS				
Carbon black	2,251	4,081	--	Indonesia 2,609; Sri Lanka 939.
Petroleum refinery products:				
Kerosene and jet fuel 42-gallon barrels	88,443	192,371	--	NA.
Lubricants do.	462,136	680,743	--	NA.
Unspecified do.	3,141	7,511	728	NA.

NA Not available.
[1]Table prepared by Audrey D. Wilkes.
[2]Includes 7,500 grams of other precious metals exported to India.
[3]Less than 1/2 unit.
[4]Synthetic manganese dioxide.

Table 3.—Thailand: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS				
Aluminum:				
Ore and concentrate	3,557	11,652	--	Malaysia 5,962; China 5,690.
Oxides and hydroxides	11,409	10,724	52	Japan 6,064; China 3,754.
Metal including alloys, all forms	69,618	55,447	8,062	Australia 21,235; Canada 13,272; Bahrain 2,068.
Antimony:				
Ore and concentrate	776	1,645	--	Burma 1,585.
Metal including alloys, all forms	157	[2]27	--	All from China.
Arsenic:				
Ore and concentrate: Arsenic trisulfide	5	2	--	Do.
Oxides and acids	139	97	--	France 57; China 40.
Chromium:				
Ore and concentrate	108	78	--	Belgium-Luxembourg 42; Finland 36.
Oxides and hydroxides	339	415	105	West Germany 253.
Metal including alloys, all forms kilograms	13	2,578	--	United Kingdom 2,201.
Cobalt:				
Oxides and hydroxides	8	12	1	Belgium-Luxembourg 5; Canada 3.
Metal including alloys, all forms kilograms	169	310	--	West Germany 77; Belgium-Luxembourg 75; Japan 75.
Columbium and tantalum: Metal including alloys, all forms: Tantalum	--	152	--	All from United Kingdom.
Copper: Metal including alloys, all forms	28,802	30,440	69	Japan 12,680; Zambia 9,758; Taiwan 2,803.
Gold: Metal including alloys, unwrought and partly wrought troy ounces	145,799	76,486	8,751	Japan 36,899; Singapore 30,627.
Iron and steel: Metal:				
Scrap	641,288	494,354	79,206	Taiwan 91,369; Republic of Korea 68,771; Canada 48,733.
Pig iron, cast iron, related materials	17,094	16,032	4	Japan 9,097; China 3,058; Brazil 2,100.
Ferroalloys:				
Ferrochromium	240	80	--	Switzerland 36; West Germany 18; Sweden 16.
Ferromanganese	4,017	3,386	--	Belgium-Luxembourg 1,449; Norway 981; Australia 540.
Ferronickel	--	100	--	All from Belgium-Luxembourg.
Ferrosilicomanganese	731	1,186	--	Taiwan 450; Norway 389; Australia 120.
Ferrosilicon	3,538	3,606	--	Norway 1,433; France 711; Taiwan 640.
Silicon metal	6	13	--	Norway 8; Japan 5.
Unspecified	2,143	1,502	25	Taiwan 353; Norway 296; Belgium-Luxembourg 241.
Steel, primary forms	521,217	514,746	2,614	Brazil 134,186; Republic of Korea 101,517; Japan 67,895.
Semimanufactures thousand tons	1,495	1,113	13	Japan 823; Brazil 49.

See footnotes at end of table.

Table 3.—Thailand: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Lead:				
Oxides	436	334	--	Australia 224; West Germany 44.
Metal including alloys, all forms	20,538	14,203	8	Australia 7,192; Japan 2,585; Singapore 1,589.
Magnesium: Metal including alloys, all forms	25	53	40	France 5.
Manganese:				
Ore and concentrate:				
Chemical-grade	--	48	--	Japan 35; Australia 13.
Metallurgical-grade	--	24	--	All from Burma.
Oxides	309	2,458	--	Belgium-Luxembourg 2,100; Japan 261.
Metal including alloys, all forms	10	43	5	United Kingdom 34.
Mercury 76-pound flasks	246	151	--	China 55; Japan 45.
Nickel: Metal including alloys, all forms	949	1,146	6	West Germany 528; Canada 199; Netherlands 140.
Platinum-group metals: Metals including alloys, unwrought and partly wrought troy ounces	1,511	27,810	--	United Kingdom 26,428.
Silver:				
Ore and concentrate[3]	1,133	1,848	--	China 1,800.
Metal including alloys, unwrought and partly wrought troy ounces	384,169	1,499,444	31,283	France 1,139,582.
Titanium:				
Ore and concentrate	1,235	781	--	Australia 775.
Oxides	846	1,135	2	Japan 530; Belgium-Luxembourg 272; Australia 121.
Tungsten: Metal including alloys, all forms	5	7	([4])	Japan 5.
Zinc:				
Oxides	548	457	3	Japan 169; Taiwan 149; China 104.
Blue powder	52	45	--	United Kingdom 20; Norway 19.
Metal including alloys:				
Unwrought	36,258	44,966	--	Australia 23,919; Canada 8,336; Japan 5,255.
Semimanufactures	556	420	3	United Kingdom 140; Norway 120; West Germany 51.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	2,492	2,253	19	Netherlands 1,590; India 504.
Artificial:				
Corundum	579	545	1	Japan 516.
Silicon carbide	331	393	--	Switzerland 113; China 77; West Germany 55.
Dust and powder of precious and semiprecious stones, including diamond kilograms	29	1,338	5	Italy 1,320.
Grinding and polishing wheels and stones	2,512	1,955	3	Japan 768; Taiwan 523; China 147.
Asbestos, crude	55,967	66,545	8,465	Canada 36,497; Botswana 5,621; Switzerland 3,481.
Boron materials: Oxides and acids	231	171	147	China 10; West Germany 10.
Cement	11,065	6,357	NA	Japan 5,767; France 570.
Clays, crude	15,253	16,464	4,264	China 3,985; Australia 2,256; Japan 1,782.
Diamond:				
Gem, not set or strung carats	279,956	215,836	53,318	India 106,003; Belgium-Luxembourg 26,134; Ghana 11,016.
Industrial stones do	1,400	13,261	--	Ghana 6,427; Belgium-Luxembourg 3,458; China 2,275.
Unsorted do	250,769	962,260	--	Taiwan 600,000; Australia 175,000; Belgium-Luxembourg 68,302.
Diatomite and other infusorial earth	60	98	52	China 30; West Germany 11.
Feldspar and nepheline syenite	1,512	1,142	2	India 608; Japan 414.
Fertilizer materials: Manufactured:				
Ammonia	2,307	2,289	1	Japan 1,137; Indonesia 831.
Nitrogenous	506,493	440,390	4,000	Japan 297,811; U.S.S.R. 54,200; West Germany 41,506.
Phosphatic	5,407	1,002	--	Netherlands 1,000.
Potassic	72,719	41,671	--	U.S.S.R. 27,800; Canada 5,251; West Germany 4,895.
Unspecified and mixed	880,057	763,087	61,054	Republic of Korea 294,503; Romania 124,305; Norway 60,449.

See footnotes at end of table.

Table 3.—Thailand: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Fluorspar	1,783	703	--	Finland 319; Japan 218.
Graphite, natural	733	532	--	China 234; Republic of Korea 120; Sri Lanka 81.
Gypsum and plaster	661	570	110	West Germany 236; Japan 178.
Iodine kilograms	1,569	2,895	6	West Germany 1,167; Japan 1,001.
Magnesium compounds:				
Magnesite, crude	r3,681	7,007	--	Japan 4,464; China 2,029.
Oxides and hydroxides	2,884	4,258	2	China 2,676; Japan 1,412.
Other	300	256	--	All from Singapore.
Mica, all forms	212	348	23	Japan 107; India 96; China 40.
Pigments, mineral:				
Natural, crude	2	62	--	China 60.
Iron oxides and hydroxides, processed	2,607	2,232	32	West Germany 1,454; Japan 406; India 187.
Precious and semiprecious stones other than diamond:				
Natural kilograms	166,418	170,030	8,819	Burma 122,127; Australia 15,407; Brazil 11,345.
Synthetic do	16,097	33,168	19,636	Taiwan 4,957; Switzerland 2,892; West Germany 1,573.
Salt and brine	21,149	10,324	9,638	United Kingdom 365.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	81,985	96,779	33,773	Romania 31,051; Kenya 15,000.
Sulfate, manufactured	20,023	12,654	26	Indonesia 4,822; China 3,400; Japan 1,352.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	6,880	5,267	(4)	Italy 4,529.
Worked	1,048	704	16	Italy 653.
Dolomite, chiefly refractory-grade	278	296	--	Norway 205; Taiwan 70.
Gravel and crushed rock	1,452	1,007	--	France 882; China 50.
Limestone other than dimension	--	36	--	Taiwan 35.
Quartz and quartzite	70	272	2	Hong Kong 170; Italy 64.
Sand other than metal-bearing	310	431	62	Norway 216; Republic of Korea 92.
Sulfur:				
Elemental:				
Crude including native and by-product	30,991	41,380	--	Canada 31,507; Singapore 9,467.
Colloidal, precipitated, sublimed	257	288	(4)	West Germany 103; Taiwan 90.
Dioxide	24	32	--	Singapore 23; Australia 8.
Sulfuric acid	16,895	18,040	15	Philippines 14,949; Japan 2,998.
Talc, steatite, soapstone, pyrophyllite	19,159	17,423	45	Republic of Korea 8,963; China 7,890.
MINERAL FUELS AND RELATED MATERIALS				
Carbon black	4,531	3,784	64	China 1,553; Taiwan 996; Japan 472.
Coal, all grades including briquets	117,581	190,230	NA	Australia 125,867; Indonesia 55,530.
Coke and semicoke	51,573	35,375	(4)	Japan 23,241; China 11,306.
Petroleum:				
Crude thousand 42-gallon barrels	48,901	45,046	--	Saudi Arabia 23,001; Malaysia 11,327; Brunei 7,272.
Partly refined do	6,112	5,003	--	All from Saudi Arabia.
Refinery products do	13,922	32,096	112	Singapore 22,430; Saudi Arabia 1,969; Indonesia 1,467.

rRevised. NA Not available.
[1]Table prepared by Audrey D. Wilkes.
[2]Excludes unreported quantities imported from the United Kingdom and West Germany valued at $130.
[3]May include other precious metals.
[4]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Antimony.—BP Minerals International Ltd., a subsidiary of British Petroleum Ltd., and the Thai firm Siam Cement Co. Ltd. signed a contract with the Thai Government for the right to develop an antimony deposit at Bor Thong in Chon Buri Province, about 120 kilometers southeast of Bangkok. The firm for the project has been named Associated Minerals Co. Ltd. and was initially owned jointly by BP Minerals (44.1%), Siam Cement (45.9%), and the Thai Government (10%). The Government has the option to increase its equity to 25% if the output exceeds 10,000 tons of concentrate per year.

The 5,640-acre mining concession is in a major antimony producing area of the country. All production in the area had been under control of the Government-owned Mines Organization. The reserves were not known and the new company planned to spend at least $1.3 million on exploration.

Steel.—The country's modest steel industry was experiencing a mild recovery after a slump in the early 1980's. Production increased significantly in 1984 and was believed to be heading for a national production record in 1985. The pattern of production has been gradually changing. The Thai steelmakers were producing sections, channels, and angles whereas they were limited to mostly bars and rods only a few years ago. The industry also produced a small amount of galvanized sheet, welded pipe, and tinplate. Two companies were adding new equipment to produce billets during the year, and a third company was beginning a 4-year expansion program to increase its capacity to 50,000 tons per year of round bars and 40,000 tons per year of section bars. Virtually all of the steel was produced in electric arc furnaces from scrap or was imported in the form of ingot, billet, or coil. There was not enough demand for sheet steel to justify the high capital cost of a modern rolling mill.

The Department of Mineral Resources (DMR) has studied the possibility of an integrated steel complex. With no coking coal or high-grade iron ore available domestically, a blast furnace-based plant with its high capital cost was not practical. However, a direct-reduced-iron electric-furnace plant based on natural gas has been judged a possibility. Location, capacity, and above all, the financing arrangements for such a plant have yet to be worked out.

Tantalum and Columbium.—The 1984 strengthening of the tantalum market reportedly persuaded the Thailand Tantalum Industry Corp. Ltd. (TTIC) to go ahead with plans to construct a smelter to process low-grade tantalum-bearing tin smelter slags. The low-grade slags would presumably be imported from smelters in other Southeast Asian countries. The smelter would complement TTIC's chemical processing plant for high-grade tin slags and tantalite concentrates. The chemical plant construction was completed late in 1985, and plans were to start commercial production by late 1986.

Thailand Smelting and Refining Co. Ltd. (Thaisarco) and TTIC signed an agreement in May covering the sale of high-tantalum-grade tin slags produced by Thaisarco to TTIC for use in its Phuket plant. Sales began in July and the slags will be stockpiled until the plant is completed. The sales will remove the slags from the export market. Previously processed abroad, the slags constituted up to 40% of the world supply of new tantalum.

A potential problem with the chemical plant operation could involve the supply of tin-slag raw material. If tin production drops much below the depressed levels of 1985, there may be insufficient high-grade slag to keep the plant operating profitably. Completion of the TTIC plant will make Thailand the world's only integrated tantalum producer and processor. With control of up to 40% of the world output, Thailand would become a dominant force in the world market. The TTIC plant was also to have the capability to process byproduct columbium, which occurs in tin smelter slags as well.

Tin.—In April, the ITC allowed the buffer stock manager to let the price of tin in Kuala Lumpur fall below the ITC floor price. The decision was made to give the stock manager more flexibility to regulate the price of tin. From then through the remainder of the year, the problem of regulating the price of world tin at an artificially high level became more difficult and more expensive. Finally, on October 24, the ITC losses from tin sales and the high cost of interest on the money borrowed for buffer stock purchases became more than could be tolerated, and the support price system collapsed. As a result, tin trading was suspended on the London Metal Exchange and on the Kuala Lumpur Tin Market. The suspension continued through yearend with no immediate solution in sight.

Thailand's contribution to ITC's losses, paid by tin miners and Thai taxpayers, mounted in proportion to its share of the world market. The declining price of tin during the year put a squeeze on the Thai tin miners, and many of the small tin producers were no longer able to operate at a profit. Pressure mounted on the Government to reduce the tax rate on tin to compete with other tin producing nations.

Thailand's tax on tin was a combination of several taxes, fees, charges, and royalty and amounted to more than 27% of gross smelter return. The Government allowed a small decrease in the taxes in midyear and later agreed to reduce by 50% the tax on tin consumed domestically. By early December, the Government royalty had been reduced considerably more for exported material. Pressure by the miners continued on the Government to quit the ITC because of the low production quota for Thailand and ITC's failure to maintain high prices. One result of ITC's low production quota for Thailand was the demise of Billiton Thailand Ltd.'s tin mining operation off Phuket. The company announced it would cease operating its dredger permanently on May 31 because it could not run the dredge profitably at the allowed production quota.

By November, it was reported that 48 Thai tin mines had halted operations—14 of them permanently. By yearend, one-third to one-half of the southern tin mines had shut down or severely cut back operations. Total employment had gone from 37,000 in 1984 to 22,000 at yearend 1985. Depending on the price of tin when trading resumes, the majority of the remaining mines could also be forced to stop operating, at least temporarily. In an effort to prevent further mine closings, the Thai Government planned to lift the 20-year-old ban on the export of tin concentrate. This could help the industry operate if a free-scale tin market emerges.

In December, the Thaisarco smelter began setting up local purchases and sales and using buyer-seller agreement prices. The DMR then stepped in and established a local tin market as an interim arrangement to keep the miners and smelter working until the London Metal Exchange and the Kuala Lumpur Tin Market reopened. This arrangement continued through yearend.

In order to encourage more domestic consumption of tin, the Ministry of Industry granted licenses to three companies to build small tin smelters. Thai Solder Industry Ltd. would have a 360-ton-per-year metal capacity and a 600-ton-per-year solder capacity. Siam Charoen Tin Smelting Co. Ltd. would have a 360-ton-per-year tin metal capacity, and Charoen Karnrae Co. Ltd. would produce 360 tons per year of pewter and solder.[5]

Also being considered was the reopening of the 3,000-ton-per-year Thai Pioneer Enterprise Ltd. smelter in Pathum Thani Province north of Bangkok. It would have a distinct cost advantage in using central and northern tin concentrates. Shipping costs would be reduced by two-thirds for the local miners.

Tungsten.—In 1983, the DMR began a survey of tungsten mineralization in a 6,000-square-kilometer area in northern Thailand. The department announced in March 1985 that five deposits of economic value had been discovered in the Khun Tan Mountains and nearby areas in Chiang Rai, Chiang Mai, Lampang, and Lamphun Provinces. Detailed surveys were under way to delineate the reserves.

At the beginning of 1985, there were nine wolframite mines and three scheelite mines operating in Thailand. In addition, 191 mines turned out a mixed tin-tungsten ore. In midyear, a jointly owned firm began operating under the corporate name Thai-Swedish Mining Co. Ltd. at Wiang Pa Pao, Chiang Mai Province. The company was licensed to produce 300 tons of scheelite concentrate per year and had invested $3 million in the project.

STC Mining Co. Ltd. acquired the Pilok tungsten mine in Kanchanaburi Province. The mine was formerly owned and operated by the Thai Government. STC Mining planned to upgrade operations by adding new equipment and facilities.[6]

Zinc.—The new Tak zinc refinery operated satisfactorily during the year and may have reached the first year's planned monthly output by midyear. The plant began trial operations in late 1984, well ahead of schedule. The high-grade hemimorphite ($Zn_4Si_2O_7(OH)_2 \cdot H_2O$) and smithsonite ore ($ZnCo_3$) is mined at Mae Sot and trucked 80 kilometers to Tak by an independent contractor. The 350,000 tons of ore needed per year is to be mined from September to May.

The mine was not expected to be operated during the monsoon rains but enough ore will be stockpiled under cover to sustain the refinery year-round. After fine grinding, the ore is hot leached in sulfuric acid, and the zinc sulfate is purified and passed to the electrolytic cell house. The precipitated zinc is stripped, melted, and cast into ingots for sale. Completion of the plant will make Thailand self-sufficient in zinc for the first time. Some surplus may be available for export in 1986. The waste filter cake from the operation contained a high percentage of cadmium plus small amounts of arsenic, copper, nickel, and tin. Commercial extraction of cadmium from the waste was not considered practical under present market conditions but this could change in the future. For this reason, and to avoid surface water contamination, the filter cake was being stored in a lined pond for possible future reclamation.[7]

INDUSTRIAL MINERALS

Cement.—The cement industry capacity reached 9.4 million tons in 1985 with the completion of some updating and support equipment installations. Major expansions at two company's operating plants were under way during the year.

Siam Cement was installing a third kiln at its Kaeng Khoi District plant in Saraburi Province, north of Bangkok. Startup of the 1.6-million-ton-per-year kiln has been rescheduled for 1987, as construction fell somewhat behind original plans. Negotiations for a fourth kiln at Kaeng Khoi were under way at yearend—the winning bidder to be announced in June 1986. Expansion of the company's Thung Song plant in southern Thailand was being planned at yearend.

Siam City Cement Co. Ltd.'s expansion is a new plant of 1,750,000-ton-per-year capacity at Tambol Tabkwang, also in Kaeng Khoi District. Most of the equipment was ordered from F. L. Smidth and Co. A/S of Denmark and Mitsui & Co. Ltd. of Japan. The plant will have a single 5,500-ton-per-day precalciner kiln but a double line of raw cement grinding and coal grinding mills. Completion of the plant was expected in 1987.

The country's third cement company was Jalaprathan Cement Co. Ltd. It has dropped plans for a new plant at Cha-am. The Thai Board of Investment (BOI) withdrew its tax and operating privileges when it appeared that enough expansion capacity had been already committed.

Fertilizer Materials.—*Nitrogenous.*—The National Fertilizer Corp. moved another step toward building the country's first nitrogen and compound fertilizer production complex. There has been a fertilizer mixing operation that produces nitrogen-phosphorus-potash (NPK) fertilizer mixes from imported urea, phosphoric acid, and potassium compounds. During the last several years, not all of the steps have been forward. Problems have occurred that set back the plans a number of times. Determining the financing and equity arrangements has been particularly troublesome, with many changes being made since 1981, both in the groups involved and the holdings of each. Finally, in May 1985, a letter of intent was issued to a consortium of Chiyoda Chemical Engineering and Construction Co. (Japan), Marubeni Corp. (Japan), and Voest-Alpine AG (Austria) for the construction of the first section of the complex, consisting of the ammonia and urea production facility and the urea granulation plant. A second consortium, Davy McKee Corp. (United Kingdom), C. Itoh & Co. Ltd. (Japan), and Mitsubishi Engineering Co. (Japan), received a letter of intent for the second phase of construction, which consists of the sulfuric acid and phosphoric acid plants and the monoammonium phosphate-diammonium phosphate and NPK granular plant.

Even with letters of intent, construction had not been started at yearend because of extremely complex financing. Several international loan agencies and at least 10 Thai banks and industrial companies were involved. A basic question underlying the financial problems has been whether the project can be financially viable. World prices for urea have dropped from $225 to $80 per ton in recent years. Detractors of the project claim that fertilizer can be imported at far less cost than what the plant will have to charge using the relatively expensive offshore gas.

Proponents of the complex maintained that fertilizer prices will soon go up and that the long-planned eastern seaboard industrial development scheme would be jeopardized if this key complex is not built. If and when construction starts, the schedule calls for completion in 38 months. The complex is designed to supply 80% of Thailand's present fertilizer needs. The nitrogen component and the energy needs are to be supplied by the offshore natural gas. Phosphorus and potassium are to be imported initially, but it was hoped that the potassium would be eventually supplied from the undeveloped carnolite or silvite deposits on the Khorat Plateau in northeast Thailand. Currently known deposits of phosphate are small and scattered and could not furnish the needs of the complex.

Potash.—The two fertilizer consortiums that were granted exploration and development concessions in 1984 were approved for promotional privileges by the BOI on April 10, 1985. The action normally grants special tax benefits and import privileges to the receiving company.

Thai Potash Co. Ltd. (Duval Corp. of the United States, CRA Exploration Pty. Ltd. of Australia, Siam Cement of Thailand, and the Thai Government) was planning to explore its 3,500-square-kilometer area in Khan Kaen and Maha Sarakham Provinces during the next 5 years. At least three drill holes were planned for completion by yearend 1985. Late in 1985, it was learned that Duval was to pull out of the consortium because of financial problems. Its 35% interest would be transferred to CRA Exploration, which already held 35% of the equity.

Developing the 2-million-ton-per-year mine and potash refinery would provide tremendous job opportunities and economic benefits to the underdeveloped northeast. The start of the $350 million project was by no means assured at yearend 1985. Funding for the detailed exploration work was apparently available, but the country's tight fiscal restraints could delay progress beyond exploration for months.

The consortium of Khorat Potash Co. Ltd., Amax Exploration Inc. of the United States, Siam Cement of Thailand, and the Thai Government ran into trouble when Amax Exploration had a dispute with the Thai Ministry of Industry. As a result, Amax Exploration was banned indefinitely from doing any further business with the Thai Government. Negotiations for the 144-square-kilometer area of Sakhon Nakhon Province had been under way for at least 4 years.

Mineral Sands.—Heavy mineral sands and their associated minerals may soon be exploited on a commercial scale in Thailand. Several projects were being planned. In March, Bhanupat Co. Ltd. was granted promotional privileges by the BOI for mining beach sands at Ao Noi in Prachuap Kheri Khan Province along the southern part of the western shore of the Gulf of Thailand. An aggregate total of about 5,000 tons per year of the following minerals would be produced: leucoxene, zircon, ilmenite, rutile, xenotime, and columbite-tantalite in descending order of abundance.[8]

The DMR announced discovery of a 3-kilometer-long beach sand deposit at Bang Berd Beach in Chumphorn Province south of the Ao Noi discovery. The deposit apparently contained significant amounts of monazite. DMR was conducting a gamma ray spectrometer survey and was drilling the deposit to assess the reserves.[9]

Titanium Oxide Australia Pty. Ltd. was examining the possibility of establishing a 30,000-ton-per-year titanium dioxide pigment plant in the eastern seaboard industrial area of Rayong Province. The plant would initially operate on imported ilmenite or rutile, but it was hoped that domestic mineral sands and byproduct titanium minerals from the tantalum processing facility would eventually be sufficient for the plant.

Salt and Soda Ash.—The long-planned Association of South East Asian Nations joint venture soda ash project in Thailand has been shelved. The project was proposed in 1976 and had been the cause of political, financial, and technical wrangling ever since. It appeared that even a scaled-down version of the original 400,000-ton-per-year plant could not have operated at a profit. Limited funds, a high infrastructure cost, and inability to compete with less expensive material from abroad were the main factors in canceling the project.

The Thai-Asahi Group received approval from the Government to produce 100,000 tons per year of rock salt at Phimai in northeast Thailand. The output would mainly be used in the company's caustic soda plant. At yearend, the viability of the project was being reassessed because of the generally weaker economic climate. The $6.3 million project would need strong tax concessions to succeed.

Other Industrial Minerals.—The BOI has approved for promotional privileges a group of eight new marble companies and two mixed marble and granite processing companies. They were of various sizes and had a planned combined output of 1.4 million square meters of polished surface per year. Total capital investment was to exceed $23 million. All of the ownerships planned were Thai. Granting of BOI privileges does not ensure funding will be available for the companies but it does indicate the Government's interest in developing new mineral industries and export products.

One of the eight, Asia Marble Co. Ltd., was already operating in Lop Buri Province before the granting of the promotion certificate. It is not likely that all of the remaining projects will become operational. The 1.4 million square meters of proposed capacity would more than saturate the domestic market.

Also receiving promotional privileges was Asia Mineral Resources Co. Ltd., which plans to mine barite, bentonite, calcite, feldspar, and talc in Saraburi Province. Stockholders in the venture are from Australia, Taiwan, Thailand, and the United Kingdom.

S. K. Mineral Co. Ltd. began operating a fluorite mine and dressing plant with a capacity of 60,000 tons per year of metallurgical-grade fluorite. The plant operated under the name of Krabi International Fluorite Co. Ltd.[10]

Development of the feldspar industry has continued the past several years mainly because of the domestic ceramic industry's desire for indigenous material for its increasing requirements. Both sodium and potassium feldspars are mined in several areas of the country. Domestic consumption has gone from 11,000 tons in 1982 to more than 40,000 tons in 1984. However, local consumption was believed to have been considerably higher than the official figures. Exports have gone from less than 1,000 tons in 1980 to over 12,000 tons in 1984. The potash feldspar in particular was found to be comparable in quality to imported material and has accounted for increased production, consumption, and exports. Most of the potash feldspar comes from Tak Province in the north near the Burma border. Pong Erawan Co. Ltd. held large reserves in Tak Province and started modest production from a newly discovered deposit in midyear.

MINERAL FUELS

Coal.—To encourage domestic industries to use indigenous natural gas, the Government reportedly increased the import duty on coal from 10% to a maximum of 25%.[11]

Sakol Coal Co. Ltd. has received Government permission to open a subbituminous coal mine in Lampang Province in northern Thailand. The mine was to be designed for an output of 120,000 tons per year and will involve an investment of about $2.3 million. The company was originally approved under the name Mae Teap Co. Ltd.

Lignite.—Expansion of the Mae Moh lignite mine in Lampang for domestic power generation continued during the year. A contract for the removal of 90 million cubic meters of overburden over the next 6 years was awarded to a Thai company, BME/Sahakol. A continuous mining system has been installed with technical assistance from Australian and West German companies. The elaborate spreader system uses a combination of rail-mounted tripper car and mobile conveyors to move the overburden. Main belt width was 1,800 millimeters and traveled at five meters per second. Capacity of the system was rated at 10,000 tons per hour and had moved several million tons of overburden by yearend.

The seventh generating unit was completed in September. Equipment for the No. 8 generator complex (300 megawatts) was being ordered at yearend. Total construction costs are expected to be $225 million, about one-half of which is being funded by the Asian Development Bank. The electric company also had received approval for the No. 9 unit and for feasibility studies on the No. 10 unit (units 9 and 10 were to be 300 megawatts each).[12] At yearend, the Thai Cabinet postponed plans for the 9th and 10th units because of the heavy foreign debt burden and because the 8th unit will serve the expected demand. Lignite currently accounts for 11% of total Thai electric power.

Sujac Lignite Co. Ltd. has received Government permission to open a lignite mine at Mae Sot, in northwest Thailand. Planned output for the Thai-owned company is 100,000 tons per year from an investment of $1.7 million.

Phrae Lignite Co. Ltd. planned to expand production at its Ban Phu Mine in Li District in northern Thailand from 200,000 tons in 1985 to 300,000 tons in 1986. Phrae Lignite also planned to open a new lignite mine nearby at Ban Hong where it has reserves of 4 million tons.

Natural Gas.—Union Oil Co. of Thailand, Mitsui Oil Exploration Co. Ltd., and South East Asia Petroleum Exploration Co. Ltd. now have respective interests of 70%, 20%, and 10% in the gasfields of the second sales contract. Two other fields—Satun and Platong—were officially opened in June, although the contract for supplying at least 150 million cubic feet per day was met before its March 31, 1985, deadline.

With production from the new fields, Thailand had an oversupply of natural gas, a complete turnaround from 1981-82. Production capacity was 450 million cubic feet per day of gas and 20,000 barrels per day of condensate. Petroleum Authority of Thailand's (PTT) demand, however, was 350 million cubic feet per day during 1985. Union Oil was therefore forced to shut in 30 to 50 wells during the period.

Exploration in Union Oil's concession, therefore, has slowed down. The company was believed to have demobilized two of its five drill rigs by yearend and may reduce to only two during 1986.

Union Oil forecasted that the production at some of the operating fields would decline in the early 1990's. Union Oil has five additional undeveloped gasfields in the gulf and these could maintain production in the 1990's. A third contract, however, would have to be negotiated with PTT before development could be started.[13]

Negotiations for a contract between Texas Pacific Thailand Inc. and PTT have been under way for 7 years and were no nearer to an agreement than when the gas was discovered in 1977. At yearend, Texas Pacific was apparently willing to sell rather than develop the concession because it was not likely to get any return on the $112 million investment. The Thai Government has reportedly offered $50 million cash plus $0.25 per million British thermal units of gas produced. The Government has already formed Thai LNG Co. with the idea of entering into an agreement with a Japanese consortium to make and export liquefied natural gas. The gas from the Texas Pacific concession would be piped ashore, liquefied, and shipped to Japan. The scheme would help greatly toward balancing the large Thai trade deficit with Japan. The cost of the project would be billions of dollars and under present economic conditions appeared unlikely to proceed beyond a feasibility study for several years.

The PTT and Thai Shell Exploration and Production Ltd. have agreed to a 25%-75% joint venture to build a small gas separation plant in Kampaeng Phet Province. The plant would produce 35,000 tons of liquefied petroleum gas per year for the domestic market in northern Thailand. The Ministry of Finance must approve the $12 million project.[14]

Petroleum.—Thai Shell began to scale down its onshore exploration operations, although it planned to explore its new offshore B6/27 concession block. Thai Shell ended 1985 with two operating onshore rigs. Plans for 1986 were to bring in an offshore rig after seismic work has been assessed, and at least one well was to be started in 1986. Onshore, 6 exploration and 19 production wells were drilled in 1985 and 6 exploration and 15 production wells were planned for 1986.

In October, Thai Shell and PTT signed a joint venture agreement for exploration and development in Thai Shell's onshore concessions. This was PTT's first joint venture and allowed for technology transfer to the national oil company. PTT paid $50 million for a 25% interest.

Thai Shell brought its new Sirikit West Oilfield on-line early in the year at 600 barrels per day. When development is complete, the field is to produce 1,200 to 1,500 barrels per day, which will be transported eastward to the main Sirikit Oilfield. Twenty kilometers east of Sirikit Oilfield, the Pru Krathiam D well produced 500 barrels per day of 18° gravity oil. Thai Shell planned to begin production from this field at 1,500 barrels per day in 1986. Ten more development wells were planned for the field.[15]

Esso Exploration and Production Khorat Inc. has stopped exploration in its onshore concessions pending the outcome of negotiations over the price of natural gas in its Nam Phong Field.

Elsewhere onshore, the newer concessionaires were mainly engaged in seismic surveying in their areas. Newcomer BP Petroleum Development Ltd. finished 600 line-kilometers in 1985 and planned to shoot another 900 line-kilometers in 1986. Terra Marine International Inc. shot 630 line-kilometers in 1985 and planned its first well for late 1986. British PLC and Promet Exploration Thailand Ltd. planned to start seismic work early in 1986.

In the latest round of bidding for exploration and production rights, six companies received approval and two had signed contracts by yearend. Several hold or have applied for more than one concession area. They were Gopher Oil Ltd. (Canada), Bass Straits Oil and Gas Holdings NL, BP Petroleum (on and offshore), Premier Consolidated Oilfield PLC, British PLC, and Southwest Consolidated Resources PLC.

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[1]Physical scientist, Division of International Minerals.
[2]Where necessary, values have been converted from Thai baht (B) to U.S. dollars at the rate of B23.64=US$1.00 in 1984 and B27.14=US$1.00 in 1985.
[3]Industrial Minerals. No. 221, Feb. 1986, p. 40.
[4]U.S. Embassy, Bangkok, Thailand. State Dep. Airgram A-40, Dec. 31, 1985, p. 4.
[5]Metals Week. Feb. 11, 1985, p. 6.
[6]Mining International. V. 2, No. 10, Oct. 1985, p. 64.
[7]Mining Magazine. V. 152, No. 3, Mar. 1985, p. 198.
[8]Business in Thailand. V. 16, No. 7, July 1985, p. 191.
[9]International Mining. V. 2, No. 9, Sept. 1985, p. 86.
[10]Business in Thailand. V. 16/10, 11, and 17/2, Oct.-Nov. 1985, and Feb. 1986.
[11]Petroleum News. V. 16, No. 12, Mar. 1986, p. 52.
[12]Mining Magazine. V. 153/5, Nov. 1985, p. 349.
[13]Petroleum News. V. 16/6, Sept. 1985, p. 47.
[14]U.S. Embassy, Bangkok, Thailand. State Dep. Airgram 64530, R281005Z, Jan. 1986.
[15]Petroleum News. V. 16, No. 10, Jan. 1986, p. 66.

The Mineral Industry of Tunisia

By Kevin Connor[1]

Tunisia's only major mineral contribution to the world mineral supplies in 1985 continued to be phosphate rock and chemical fertilizers. Tunisia produced approximately 3.5% of the world supply of phosphate rock concentrate, converting almost two-thirds of this raw material into downstream phosphatic chemical fertilizers. Crude petroleum remained Tunisia's most important export commodity, accounting for approximately 10% of the country's gross domestic product. The country's oil production, although less than 1% of the total world crude output, accounted for 35% of its export receipts. Phosphate-related exports accounted for approximately 17% of the country's total export receipts and remained the third largest foreign exchange earner, slightly behind textiles.

Government Policies and Programs.—New petroleum exploration legislation went into effect during September. The new code was designed to encourage further foreign exploration programs in areas of Tunisia where small oil and gas fields have been discovered, yet owing to their limited size, have not been commercially developed. The new legislation was to give royalty and other tax breaks for companies willing to further evaluate or develop these small fields. Important lead-zinc ore projects were under way in northern Tunisia, as well as industrial salt developments in the south.

PRODUCTION

Two Government agencies were responsible for nearly all of the nonpetroleum mineral production in Tunisia in 1985. These were the Compagnie des Phosphates de Gafsa (CPG), which consisted of eight phosphate mining operations, and Société Tunisienne d'Expansion Minière (SOTEMI), which controlled five lead-zinc ore mines, one iron ore mine, and two barite and fluorspar mining operations. The combined labor force of these two agencies, which excludes limestone operations for cement manufacture, totaled over 19,000 persons, of which approximately 70% was miners.

Table 1.—Tunisia: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984[p]	1985[e]
METALS					
Iron and steel:					
Iron ore and concentrate, gross weight thousand tons	396	275	316	308	[3]309
Metal:					
Pig iron do.	[r]158	[r]97	147	150	150
Steel, crude[e] do.	[r]160	[r]100	[r]150	[r]150	150
Lead:					
Mine output, metal content	5,661	4,988	4,570	4,056	[3]3,553
Metal:					
Primary[4]	17,530	15,320	10,398	8,400	10,000
Secondary[e]	500	500	500	500	500
Total[e]	18,030	15,820	10,898	[r]8,900	10,500
Silver metal, primary thousand troy ounces	84	115	90	[e]85	[4]26
Zinc, mine output, metal content	[r]8,200	[r]8,388	7,548	6,660	5,500
INDUSTRIAL MINERALS					
Barite	24,671	30,654	20,250	12,100	20,000
Cement, hydraulic thousand tons	2,020	1,783	2,850	3,310	3,500
Clays, construction do.	[3]352	350	350	350	350
Fluorspar, chemical- and metallurgical-grade	34,844	33,209	34,013	44,510	[3]40,612
Gypsum[e]	75,000	75,000	[r]80,000	[r]85,000	90,000
Lime thousand tons	466	[e]500	580	600	600
Phosphate rock, gross weight do.	4,596	4,196	5,924	5,346	[3]4,530
Salt, marine do.	467	421	375	330	[3]405
MINERAL FUELS AND RELATED MATERIALS					
Gas, natural:					
Gross[e] million cubic feet	28,000	28,000	28,000	28,000	28,000
Marketed do.	13,703	14,883	14,503	14,080	14,000
Petroleum:					
Crude thousand 42-gallon barrels	41,600	39,324	42,649	42,251	42,000
Refinery products:					
Gasoline do.	1,391	1,498	1,546	1,794	1,800
Kerosene do.	1,837	2,277	2,085	2,402	2,400
Distillate fuel oil do.	3,156	3,025	2,988	3,156	3,000
Residual fuel oil do.	4,380	3,545	3,937	3,936	4,000
Other do.	414	445	460	394	400
Refinery fuel and losses do.	1,336	197	235	160	200
Total do.	12,514	10,987	11,251	11,842	11,800

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through May 23, 1986.
[2]In addition to the commodities listed, a variety of crude construction materials (common clays, sand and gravel, and stone) is produced, but output is not reported and available information is inadequate to make reliable estimates of output levels. Limestone quarried for cement manufacture is substantial; however, information is inadequate to make accurate estimates of output levels.
[3]Reported figure.
[4]From domestic and imported ores.

TRADE

Exports of high-quality crude petroleum, along with a variety of phosphate fertilizer products, accounted for approximately one-half of Tunisia's total export receipts in 1985. Exports of zinc concentrates, lead metal, and some petroleum refinery products were also important. Total exports decreased 5% owing to the country's reduced income from petroleum sales, which decreased 9% in revenues as a result of a small drop in volume traded and a 7% drop in the international market price. The export receipts for fertilizer sales increased 7%.

Owing to strict import licensing austerity measures, overall imports dropped 20%. Major mineral trading between Tunisia and the United States was limited to crude petroleum exports to the United States. Tunisia imported little or no mineral raw materials from the United States, while the United States continued to be a major supplier of heavy equipment to Tunisia. Exploration by U.S. petroleum companies constituted the largest category of U.S. investment in Tunisia, with expenditures of approximately $150 million.[2]

To encourage and improve U.S. investment opportunities in Tunisia, in June, the United States and Tunisian Governments signed a tax treaty eliminating double taxation of corporate income. Also, before year-end, an agreement between U.S. oil companies and the Tunisian Government was reached on reducing the income tax base for expatriate employees, another tax burden that was impeding U.S. investment in the country.

Table 2.—Tunisia: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS				
Aluminum: Metal including alloys:				
Scrap	184	721	--	Netherlands 287; France 229; Belgium-Luxembourg 178.
Unwrought	313	190		All to Belgium-Luxembourg.
Semimanufactures	12	152	--	Algeria 123; France 29.
Copper:				
Matte and speiss including cement copper	24	3	--	All to France.
Metal including alloys:				
Scrap	1,909	2,234	--	Spain 945; France 608; West Germany 343.
Semimanufactures	59	19	--	Libya 15; France 3.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite	2,201	2	--	All to Netherlands.
Metal:				
Scrap	11	790	--	Belgium-Luxembourg 527; France 244.
Semimanufactures:				
Bars, rods, angles, shapes, sections value, thousands	$33	$1	--	All to Syria.
Universals, plates, sheets	12	1	1	
Hoop and strip	6	--		
Wire	--	593	--	Algeria 591.
Tubes, pipes, fittings	1,611	8,228	920	Algeria 6,068; Spain 541.
Castings and forgings, rough	13	4	--	United Kingdom 2; West Germany 1.
Lead:				
Ore and concentrate	10,028	4,500	--	All to France.
Metal including alloys:				
Scrap	200	621	--	Belgium-Luxembourg 438; Italy 183.
Unwrought	3,515	5,949	--	Algeria 2,846; Switzerland 1,100; France 1,002.
Semimanufactures	25	--		
Mercury value, thousands	--	$2	--	All to United Kingdom.
Silver: Metal including alloys, unwrought and partly wrought do	$1,154	$331	--	All to Belgium-Luxembourg.
Zinc:				
Ore and concentrate	23,194	13,026	--	Yugoslavia 4,750; France 4,250; Italy 3,820.
Metal including alloys:				
Scrap	--	21	--	All to Netherlands.
Semimanufactures	--	126	--	Belgium-Luxembourg 103; Netherlands 23.
Other:				
Ores and concentrates	12	1,750	--	All to Italy.
Ashes and residues	512	248	--	Spain 119; Belgium-Luxembourg 70.
Base metals including alloys, all forms	49	--		
INDUSTRIAL MINERALS				
Cement	--	4,010	--	Algeria 2,010; Libya 2,000.
Clays, crude	40	--		
Diamond: Gem, not set or strung value, thousands	$1,908	$3,576	--	Belgium-Luxembourg $3,532.
Feldspar, fluorspar, related materials	--	3,150	--	All to West Germany.
Fertilizer materials: Manufactured:				
Nitrogenous	--	51,793	--	United Kingdom 34,503; France 13,066.
Phosphatic	590,724	909,996	--	France 215,070; Italy 123,132; Iran 84,054.
Unspecified and mixed	454,531	11,604	--	Italy 3,365; United Kingdom 3,264; Spain 2,936.
Gypsum and plaster	3,236	--		
Phosphate, crude thousand tons	1,186	1,140	--	France 299; Romania 184; Poland 168.

See footnotes at end of table.

Table 2.—Tunisia: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Precious and semiprecious stones other than diamond: Natural value, thousands	$1,435	$1,673	--	Belgium-Luxembourg $1,663.
Salt and brine	288,069	261,337	32,800	Italy 98,239; Bulgaria 30,500.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	100	80	--	All to United Arab Emirates.
Worked value, thousands	$62	$5	--	Algeria $4; Libya $1.
Quartz and quartzite	NA	2	--	Italy 1; Spain 1.
Sand other than metal-bearing	4	4	--	All to Italy.
Sulfur: Sulfuric acid	--	31,874	--	Turkey 18,730; Greece 12,840.
Other: Crude	--	12	--	All to Libya.
MINERAL FUELS AND RELATED MATERIALS				
Petroleum refinery products:				
Gasoline, motor thousand 42-gallon barrels	1,329	1,572	--	France 1,036; Netherlands 305.
Kerosene and jet fuel do	525	269	--	Italy 12; bunkers 232.
Distillate fuel oil do	29	19	--	Italy 3; bunkers 13.
Lubricants do	1	9	NA	Mainly to Greece.
Residual fuel oil do	12	15	--	Mainly bunkers.
Bituminous mixtures do	--	(2)	--	All to Algeria.

NA Not available.
[1]Table prepared by Virginia A. Woodson.
[2]Less than 1/2 unit.

Table 3.—Tunisia: Imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS				
Alkaline- and rare-earth metals	1	17	--	Ireland 16.
Aluminum:				
Oxides and hydroxides	23,235	24,139	--	Italy 21,930; France 1,989.
Metal including alloys:				
Unwrought	239	854	--	Egypt 302; France 249; Netherlands 198.
Semimanufactures	2,882	3,935	NA	Italy 1,177; France 737; Spain 530.
Chromium:				
Ore and concentrate	25	36	--	Belgium-Luxembourg 21; Spain 15.
Oxides and hydroxides	28	59	--	West Germany 26; Italy 25.
Cobalt: Oxides and hydroxides value, thousands	$7	$1	--	All from Belgium-Luxembourg.
Copper:				
Matte and speiss including cement copper	124	40	--	All from Italy.
Metal including alloys:				
Unwrought	171	412	--	Italy 389; France 11.
Semimanufactures	5,981	8,927	2	France 4,791; Belgium-Luxembourg 2,279; Spain 986.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite	11,061	--		
Metal:				
Pig iron, cast iron, related materials	1,792	2,518	11	Norway 1,489; France 711.
Ferroalloys:				
Ferromanganese	216	229	--	Norway 199; France 30.
Unspecified	925	1,295	--	Sweden 523; Norway 522.
Steel, primary forms	14,916	15,269	--	West Germany 15,258.
Semimanufactures:				
Bars, rods, angles, shapes, sections	186,527	138,147	1	Spain 74,025; France 19,031; Italy 12,709.
Universals, plates, sheets	90,644	113,978	3	France 28,606; West Germany 26,157; Italy 23,388.

See footnotes at end of table.

Table 3.—Tunisia: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Iron and steel —Continued				
Metal —Continued				
Semimanufactures —Continued				
Hoop and strip	2,392	3,906	NA	France 2,285; Italy 1,185.
Rails and accessories	31,812	6,295	--	France 5,294; Italy 811.
Wire	5,000	2,931	(2)	France 1,461; Italy 706.
Tubes, pipes, fittings	24,043	32,416	1,278	France 9,875; Italy 7,516; West Germany 5,359.
Castings and forgings, rough	214	241	--	Spain 89; Belgium-Luxembourg 91; Italy 43.
Lead:				
Ore and concentrate	11,928	6,319	--	All from Morocco.
Oxides	103	107	--	France 60; West Germany 35.
Metal including alloys:				
Scrap	--	4	--	All from France.
Semimanufactures	5	19	--	France 18.
Magnesium: Metal including alloys:				
Unwrought	1	1	--	All from France.
Semimanufactures	26	6	--	Italy 4.
Manganese: Oxides	5	34	--	France 32.
Mercury 76-pound flasks	29	232	--	All from Switzerland.
Molybdenum: Metal including alloys, all forms	(2)	2	--	Austria 1; Belgium-Luxembourg 1.
Nickel: Metal including alloys:				
Scrap value, thousands	$3	--		
Semimanufactures	43	34	NA	France 14; West Germany 7.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$6	$1	--	All from West Germany.
Silver: Metal including alloys, unwrought and partly wrought do	$121	$110	--	West Germany $41; Switzerland $27; France $22.
Tin: Metal including alloys:				
Scrap	--	1	--	All from France.
Unwrought	48	31	--	Indonesia 26; France 2.
Semimanufactures	36	21	--	West Germany 9; France 7; United Kingdom 3.
Titanium: Oxides	113	199	35	France 58; Belgium-Luxembourg 45; Italy 35.
Tungsten: Metal including alloys value, thousands	$28	$85	--	France $81.
Uranium and thorium: Metal including alloys, all forms do	$1	--		
Zinc:				
Oxides	209	135	--	France 64; Belgium-Luxembourg 40; West Germany 31.
Metal including alloys:				
Scrap	--	10	--	All from Italy.
Unwrought	1,503	1,552	--	Algeria 600; Spain 398; Italy 234.
Semimanufactures	85	113	--	France 80; Belgium-Luxembourg 26.
Other:				
Ores and concentrates	--	10	--	All from West Germany.
Oxides and hydroxides	157	173	51	West Germany 71; France 21.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	545	557	--	France 434; Greece 23.
Artificial: Corundum	143	259	--	Italy 115; Czechoslovakia 101.
Grinding and polishing wheels and stones	729	815	NA	Italy 611; France 90.
Asbestos, crude	3,728	6,075	27	Zimbabwe 1,653; West Germany 1,476; Greece 1,133.
Barite and witherite	136	139	--	France 107; Spain 20.
Boron materials:				
Crude natural borates	5	1	--	All from France.
Oxides and acids	64	28	--	France 24.
Cement	205,373	56,092	--	France 33,398; Denmark 7,015; Spain 6,973.
Chalk	2,332	2,197	--	France 1,523; Italy 654.
Clays, crude	23,171	25,795	52	Italy 7,439; France 5,894; Spain 3,855.
Diamond:				
Gem, not set or strung value, thousands	$3,284	$5,380	--	Belgium-Luxembourg $5,363.
Dust and powder do	$10	$10	--	All from Belgium-Luxembourg.
Diatomite and other infusorial earth	133	144	--	France 141.

See footnotes at end of table.

Table 3.—Tunisia: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Feldspar, fluorspar, related materials	1,537	2,329	--	France 1,724; Italy 324.
Fertilizer materials: Manufactured:				
Ammonia	133,945	158,654	--	U.S.S.R. 72,259; Libya 58,000.
Nitrogenous	81,919	34,064	--	Romania 29,531; France 2,705.
Potassic	7,318	4,665	--	Italy 1,650; Belgium-Luxembourg 1,500; Spain 1,050.
Unspecified and mixed	28	80	--	Belgium-Luxembourg 39; Netherlands 30.
Graphite, natural	6	2	--	France 1; Spain 1.
Gypsum and plaster	300	680	--	France 502; West Germany 151.
Lime	9	48	--	All from France.
Magnesite	102	513	--	Greece 425; Austria 31.
Mica:				
Crude including splittings and waste	167	106	10	Canada 66; France 16.
Worked including agglomerated splittings value, thousands	$8	$6	--	France $3; Austria $1; Belgium-Luxembourg $1.
Phosphate, crude	1	11	--	Pakistan 9; France 2.
Pigments, mineral: Iron oxides and hydroxides, processed	239	297	2	West Germany 221; Spain 38.
Precious and semiprecious stones other than diamond: Natural value, thousands	$1,516	$1,486	--	Belgium-Luxembourg $1,414.
Pyrite, unroasted	--	14	--	Italy 13; France 1.
Salt and brine	42	42	--	West Germany 40.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	6,551	8,929	--	Spain 6,076; Turkey 1,000.
Sulfate, manufactured	23,277	24,556	--	France 16,607; Italy 4,144; Spain 2,268.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	20,388	21,445	--	Italy 20,596.
Worked	82	1,655	--	Italy 1,618.
Dolomite, chiefly refractory-grade	320	535	--	Spain 200; France 168; Netherlands 102.
Gravel and crushed rock	26,977	42,415	--	Italy 36,734; Turkey 5,519.
Quartz and quartzite	1,166	1,250	--	Belgium-Luxembourg 1,202.
Sand other than metal-bearing	1,591	3,725	5	Belgium-Luxembourg 2,198; Netherlands 1,512.
Sulfur:				
Elemental:				
Crude including native and byproduct	982,412	997,537	39,066	Canada 321,710; Poland 287,355; Saudi Arabia 252,232.
Colloidal, precipitated, sublimed	1	1	--	Mainly from West Germany.
Sulfuric acid	30,773	969	5	France 646; Netherlands 96.
Talc, steatite, soapstone, pyrophyllite	136	1,536	--	France 1,195; Spain 245.
Other: Crude	19	16	--	France 14; West Germany 2.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	317	301	--	All from France.
Carbon: Carbon black	531	416	--	West Germany 337; France 67.
Coal	18,038	23,880	--	France 15,779; Morocco 5,108.
Coke and semicoke	84,377	83,568	--	West Germany 55,150; Algeria 17,903.
Peat including briquets and litter value, thousands	$4	$1	--	All from France.
Petroleum refinery products:				
Liquefied petroleum gas thousand 42-gallon barrels	1,134	1,505	--	Italy 735; Algeria 278; France 197.
Gasoline, motor do.	9	308	--	Italy 307.
Mineral jelly and wax do.	--	8	--	France 5; West Germany 1.
Kerosene and jet fuel do.	1,216	1,138	--	Italy 504; France 263; Algeria 159.
Distillate fuel oil do.	4,543	4,353	--	Italy 1,967; Algeria 824; Romania 391.
Lubricants do.	25	294	(3)	Turkey 141; Romania 115.
Residual fuel oil do.	4,188	3,065	--	Spain 731; Greece 553; Italy 361.
Bitumen and other residues do.	145	189	--	Italy 184.
Bituminous mixtures do.	6	4	--	France 3.

NA Not available.
[1]Table prepared by Virginia A. Woodson.
[2]Value only reported at $21,000.
[3]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Iron Ore.—As of yearend, no new reserves of hematite ore had been identified at Djebel Djerissa, and existing reserves continued to be rapidly depleted. Carbonate reserves at Djebel Djerissa were extensive, and the ore was amenable to sintering and upgrading to hematite; however, there was an inseparable magnesium oxide pollutant in the carbonate ore that continued to make it unattractive for use at the El Fouladh steel plant. Only an ore blend of no more than 30% upgraded carbonate could be used in 1985. Other known deposits of hematite in Tunisia were all identified as having problems of either limited reserves or deleterious associated minerals, making them uneconomical to develop. With the Government's plans to expand El Fouladh's steelmaking capacity by 40% by the beginning of 1988, new reserves of quality hematite or magnetite needed to be found quickly, or technical pollutant problems resolved economically, in order to prevent a substantial increase in the country's iron ore imports. El Fouladh's coking coal requirement of 80,000 tons in 1985 was imported. The plant's zinc requirement, which was used to galvanize some wire products, 350 tons, was also imported.

Iron and Steel.—Tunisia continued to have a fledgling steel industry with only one integrated mill. Twenty kilometers north of the capital city of Tunis at El Fouladh, the mill's original blast furnace, built in 1964, was still operating in 1985 along with an electric arc furnace installed in the mid-1970's. During 1985, the plant complex manufactured approximately 165,000 tons of steel slab, wire and rod from iron ore, and 25,000 tons of wire products from imported steel billets. Seventy percent of the plant's iron ore supply was produced domestically from Tunisia's only iron mine at Djebel Djerissa, approximately 200 kilometers southwest of El Fouladh. The remaining 30% of the plant's ore requirement was imported from Mauritania and Morocco. Total iron ore requirements at El Fouladh were 260,000 tons in 1985.

In November, El Fouladh officials issued a request for technical and cost proposals to expand the steel mill's manufacturing capacity by 100,000 tons per year. Preliminary plans called for adding one 50-ton-charge electric arc furnace and additional wire and bar mill equipment for installation in existing mills. Also, billets from the new arc furnace were to be 120 by 120 millimeters in cross section and 7.0 meters in length, twice the length of billets manufactured with existing mill equipment.

Lead and Zinc.—The lead and zinc industry in Tunisia continued to be stagnant in 1985, a condition prevailing since the mid-1970's. Within the sector, production of zinc concentrate continued to fare better than that of the lead subsector, mainly because of simpler processing requirements. The zinc has historically been shipped to Western Europe as a concentrate. Lead concentrate production on the other hand continued to be processed locally at the Megrine smelter, a facility that was badly in need of renovation in 1985. During the course of the year, a decision was reached within SOTEMI not to renovate the Megrine plant, Tunisia's sole lead smelter, but to build a new smelter complex between two minesites that were being modernized and expanded. These mines were expected to supply the majority of Tunisia's lead and zinc ore through the end of the 20th century. The mine expansion projects, Fedj Lehdoum and Boujaber, were under way, and ore production was to increase substantially for both locations over the next several years. Financing for the new smelter had not been found by yearend 1985 and was of major concern to SOTEMI officials and a priority item of pursuit for 1986.

The expansion project for the existing underground Fedj Lehdoum Mine was one-half completed by yearend, and mining operations in the expanded reserves were to begin by the first quarter of 1987. The existing mine had operated on a care-and-maintenance basis since 1977. In 1978, 3.5 million tons of additional reserves was identified, with 6% zinc content and 4.5% lead content. The production rate for the new mine was expected to increase steadily to 180,000 tons per year. Evaluation of reserves and the development of the expanded mining plans were conducted by a special study group, Compagnie Minière du Nord Ouest (COMINO), a subsidiary agency of SOTEMI.

The other major lead-zinc expansion project ongoing in 1985 was at Boujaber, an existing underground lead-zinc-silver mine. Measured and indicated reserves were 8 million tons of ore containing extractable quantities of barite, fluorspar, lead, silver, and zinc. Reserves contained up to 400,000 tons of lead-zinc metal, ranging from 2.5% to 3.5% lead-zinc in the upper strata, to 5% lead-zinc in the lower strata. Barite ore percentage was 45% in the upper strata, decreasing to 20% in the lower strata. Fluorspar percentage was 17% in the upper strata. Mine ore production, which was approximately 70,000 tons in 1984, was expected to increase to 150,000 tons per year by 1989. High-quality barite reserves were to be processed to produce very pure barite, at least 97% barium sulfate by weight, which was to be used at a lithophone plant to be built in Boujaber. Final evaluation and the selection of a contractor to build the lithophone plant, a Tunisian-Algerian venture, was to be made by early 1986. Algerian markets were targeted for the plant's production, which was to be used in making paint products. Tunisia's only silver production came from the Boujaber Mine, approximately 26,000 troy ounces for 1985. The parastatal company that handled the Fedj Lehdoum study, COMINO, also did the feasibility and design study work for the Boujaber project.

INDUSTRIAL MINERALS

Barite and Fluorspar.—An expansion project was under way throughout 1985 at the Zriba Mine in the Zaghwan region of northeastern Tunisia, the country's sole producer of fluorspar and majority producer of barite. Operating since 1981 under the direction of the Government agency Société Minière de Spath et Barytine, the mine supplied fluorspar to the aluminum fluoride plant of Société des Industries Chimiques du Fluor in Gabès. The proven reserves of fluorspar and barite at the Zriba Mine and nearby locations of Al-Jdidi and Al-Gibli, containing some lead and zinc, totaled 5.5 million tons. The project was to modernize the mine and expand production by approximately 50% to an annual production of 54,000 tons of fluorspar, 37,000 tons of barite, and 3,000 tons of lead-zinc concentrate. The estimated total cost of the project was $3 million. The Arab Mining Co. of Jordan was participating in the project with a 40% equity share of the project's cost.

Fertilizer Materials.—The Tunisian-Kuwaiti sulfuric acid and fertilizer manufacturing complex at Gafsa was completed and came on-line in midyear. The $77 million complex, Industries Chimiques de Gafsa, was 40% owned by the Petrochemical Industry Co. of Kuwait. The plant had a capacity to produce 495,000 tons per year of sulfuric acid, along with 102,000 tons per year of triple superphosphate and 158,000 tons per year of phosphoric acid. The entire sulfur feedstock requirements of Tunisia's chemical fertilizer industry were imported in 1985, amounting to almost 1.3 million tons.

Phosphate.—The Sra Ouertane phosphate deposit in the northwestern region of Tunisia, approximately 175 kilometers southwest of Tunis, was geologically classified in the Le Kef Basin, separate from existing phosphate rock mines in southern Tunisia's Gafsa Basin by more than 150 kilometers. As of yearend, evaluations completed on the Sra Ouertane phosphate ore showed notably different geological characteristics than the phosphate deposits of the Gafsa Basin, and in pilot tests required more ore beneficiation for use in fertilizer manufacture. All studies on evaluating the Sra Ouertane phosphate deposit were being initiated and managed by the Government agency Société d'Etudes des Phosphates du Sra Ouertane (SEPSO). A feasibility study completed by Zellars-Williams Co. of the Jacobs Engineering Group Inc. of the United States in mid-1985 was a two-part project that looked at two stages of production for a phosphate mine and beneficiation complex at Sra Ouertane. The initial stage-A production capacity was set at 1.2 million tons per year of ore, from an open pit mine in the Qued Koussein region of panel I in the southwestern portion of the Sra Ouertane ore body. Significant outcrops of ore in this area would facilitate opening the mine, which would use conventional open pit mining equipment, electric shovels, and trucks. Draglines were considered unnecessary. Drilling and blasting equipment would be required. Preliminary estimates of the western plateau reserves indicated more than 300 million tons of similar grade concentrate could be economically recovered. From the ore mined, production of 700,000 tons per year of triple superphosphate was proposed. This would be manufactured at on-site facilities, then shipped for export by existing rail to the Port of Halq al-Wadi, just north of Tunis.

A major beneficiation problem with the Sra Ouertane ore, classified as a carbonate, was resolved during the 2-year feasibility study. A proprietary technique was developed by Zellars-Williams and SEPSO to remove the carbon content of the ore economically. The estimated cost of the stage-A was $200 million. SEPSO contracted with

Zellars-Williams to do further engineering design work on stage-A, which was under way during 1985 and was expected to be completed by early 1986. SEPSO was expected to issue a tender for a technical and cost proposal for constructing the stage-A mine by mid-1986, with selection of a contractor to begin building stage-A facilities in 1987.

The second part of the study, under way in the latter half of 1985, was to evaluate a 6-million-ton-per-year ore mining scheme for the same area (stage-C). This study was proposing slurry transport of the beneficiated ore to Cap Serat on Tunisia's northwestern coastline, where installations to make triple superphosphate would be erected. Bechtel Engineering of the Bechtel Group Inc. of the United States was under contract, conducting an indepth study to evaluate the slurry transport scheme. Neither the proposed slurry pipeline nor the loadout port facilities for Cap Serat currently exist. Rail transport was a possible option but not considered likely, owing to the estimated high capital investment needed to build a rail line from Sra Ouertane to Cap Serat.

Work continued throughout the year on the new Kef Eddour Mine in the Gafsa Basin. The mine was scheduled to come onstream by 1987 and was expected to supply 1.4 million tons per year of phosphate concentrate for chemical fertilizer manufacture at the new Skhira complex on the east coast. Work at La Skhira continued and was expected to be completed before the end of 1986. The complex was to comprise two 550-ton-per-day phosphoric acid lines, two 1,750-ton-per-day sulfuric acid lines, and one 1,000-ton-per-day concentrated phosphoric acid line.

Under evaluation by CPG officials in the latter half of the year were technical and cost bids for constructing two new beneficiation plants. One of the wash plants would service the Kef Eddour Mine, while the other would wash ore from the Redeyef Mine, one of the oldest phosphate mines in Tunisia. The estimated cost of the two new beneficiation plants was $45 million.

Potassium.—Final design work began on a large-scale potassium sulfate manufacturing complex for Zarzis. Based on previous technical and economic studies on the Zarzis brine deposits, the Société de Developpement des Industries Chimiques du Sud secured a loan from the Government of France to build a 120,000-ton-per-year-capacity potassium sulfate plant at an estimated cost of $80 million. The new complex was to be integrated with the existing pilot operation at Zarzis, and should be operational by the end of 1988. Approximately one-half of the potash feedstock necessary for the plant's operations was to be imported; the rest being supplied from the local brine deposits. Domestic demand as well as exports appeared likely for the product, and the Port of Zarsis was being enlarged and equipped to handle the exports.

MINERAL FUELS

Petroleum.—*Exploration.*—The El Franig and Sabria Oilfields were discovered by the Amoco Tunisian Oil Co. in 1979-80. These were Amoco's first discoveries in Tunisia, situated in the company's Medinine southwestern concession, around and containing the Chort el Djerid lakebed. Three wells have been drilled at Franig, two of which were dry. The one producing well tested at 1,840 barrels of oil and 356,790 cubic meters of gas per day. Four wells have been drilled at Sabria; two were dry and two were marginally successful strikes. In the latter half of 1985, Amoco was offering an equity share (50%) of its Medinine concession for sale in return for the financing of a fifth well at Sabria, plus three other exploration wells, the locations of which would be determined at a later date. The drilling results of a fifth well at Sabria were considered necessary to Amoco's determination of whether to develop the Franig and Sabria Fields, and also as a further determination of the area's overall oil and gas potential. Negative results could discourage development of known reserves that were considered too small to justify the cost of field development and supporting infrastructure.

Another area where Amoco was drilling in 1985 was its newly acquired Douz permit concession, just south of its Medinine concession. Drilling operations began at Douz in February. Should further development of Sabria and Franig occur and if results were positive in the Douz concession, the field could easily be tied into an oil and gas gathering network at Sabria and Franig. The possibility exists that the Douz area might prove worthy of development on its own merits. Amoco also had a newly acquired permit concession offshore in north-central Tunisian continental waters, directly west of Bizerte. Aeromagnetic and seismic studies were ongoing in 1985, and results were being analyzed.

Refining.—Tunisia's sole petroleum refinery was operated by Société Tunisienne des Industries de Raffinage (STIR), owned by

Italian interests and the Government of Tunisia. The plant's original construction outside the coastal town of Bizerte, 30 kilometers north of Tunis, was completed in 1962 by Snamprogetti S.p.A. of Italy. The facility's initial capacity was 1.0 million tons per year. In 1985, the capacity and operating level of the facility was 1.5 million tons per year. The refinery's major products are propane, kerosene, gasoline, distillate fuel oil, and residual fuel oil. The lighter gas fractions, methane and ethane, were mostly flared off; however, a percentage of this gas was used to generate the facility's electrical needs and to heat the hydrocracking towers. The power generating station had two 1.8-megawatt electrical generators, each coupled to steam-driven turbines fueled by topped natural gas. The facility had a storage capacity of 300,000 tons of crude oil and equal storage for refined products.

STIR was well into the planning stage for expansion of the plant's refining capacity to 3.0 million tons per year. A request for technical and cost proposals was issued in July 1985, and a contractor to do both the engineering design and construction work was to be selected by early 1986. Companies expected to bid on the contract were Technipetrol and Snamprogetti, both of Italy; M. W. Kellogg Co. and Lummus Crest of the United States; and Triad Engineering of Canada.

Construction work was under way at the refinery to build two additional 100,000-ton-capacity crude oil storage tanks and four new 50,000-ton-capacity product storage tanks. Three new propane storage tanks were also under construction. Additional plans for the powerplant included a third electrical generator, also to be fueled by topped natural gas. Other equipment items were to await final design plans for the expanded refinery, although additional topping and cracking tower equipment was expected to be erected. STIR officials expected to collect and use almost all topped natural gas after expansion work was completed.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Tunisian dinars (D) to U.S. dollars at the rate of D0.82=US$1.00.

The Mineral Industry of Turkey

By Kevin Connor[1]

In 1985, Turkey's mining industry continued to produce a wide spectrum of minerals for both export and domestic markets. Boron minerals remained the most important in terms of export revenues, with chromite concentrates and ferrochrome production an important second export category. Turkey was the world's second largest producer of boron minerals and the seventh largest producer of chromite ore. Other major minerals produced for export were barite, bauxite, magnesite, and mercury. Mineral exports accounted for approximately 4% of Turkey's total export receipts. Bauxite, coal, copper, iron, a variety of industrial minerals, natural gas, and petroleum were exploited for domestic consumption.

After nearly a year of legislative effort, the Government made major revisions in the country's mining codes on June 4, further amending and modernizing mineral licensing procedures in Turkey. The new legislation refined the mining law amendments of 1983, which initially provided for returning back to the private sector those mining ventures nationalized in 1978. The Government expected the new mining codes to reduce or eliminate restrictions of the past and to encourage both local and foreign private investments.

Among the mining code changes were the freeing up of almost all minerals for exploitation by the private sector. Strategic minerals previously reserved for state exploitation were opened for private sector development. Provisionally, however, private firms, domestic or foreign, could only develop newly discovered deposits for asphaltite, boron, thorium, trona, and uranium. The new law also specified that mine output of these particular minerals by any private firms must be sold to Etibank, the Government's oldest and most important agency for developing the country's mineral resources. Another important change was the removal of a previous provision under which two different prospecting firms could hold licenses to exploit different minerals on the same acreage.

Government royalties, according to the new code, were to be assessed based on profits, not mine tonnage, as previously levied. Thereby, any mining ventures operating at a loss would be spared the burden of royalty taxation. As outlined under the new laws, royalty payments had two parts. The first, a 5% pretax of profits, was to be paid to the national treasury as payment for mineral rights. The second was a 5% pretax of profits going to Etibank to be deposited in a newly established mining fund. The mining fund would also receive the proceeds from forfeited guaranty bonds and confiscated ores and materials. The fund was to be administered by Etibank and used to finance mineral exploration, technological research and development, facility construction, stockpiling of critical minerals, and expenses of mining law implementation. All interested mineral prospectors can apply for financing from the fund.

Work continued all year on the Elbistan lignite powerplant project. The second boiler unit of the four-unit, 1.2-gigawatt plant came on-line in April, and completion of the third and fourth units was proceeding smoothly, with both expected on-line before yearend 1986. In conjunction with the powerplant project, an increase in coal production for the Elbistan lignite mine was expected. The Turkish Coal Authority was finalizing orders for 22 electric shovels, expected to be supplied by Sumitomo Heavy Industries and the Sumitomo Corp. of Japan. The cost of the mine equipment order was $44 million.[2]

PRODUCTION AND TRADE

Mining activity in Turkey represented slightly less than 2% of the country's gross national product in 1985. Production trends were consistent with those of 1984, with substantial increases registered in steel manufacturing and lignite production. Boron and chromite production increased modestly, allowing Turkey to remain a major world producer of these commodities.

Turkish exports of minerals were estimated at approximately $300 million for the year, with boron salts accounting for over 35% of the total revenues. Ferrochrome and chromite ore and concentrates accounted for approximately 25% of the export trade. Increases in exports of bauxite and fertilizer materials continued. Mineral exports represented 4.1% of Turkey's total foreign trade receipts.

By yearend 1986, Turkey was expected to become 1 of the world's top 20 steel producers, surpassing in capacity countries such as Australia, Austria, the Netherlands, and Sweden. With expansion programs at all three integrated steel complexes and at seven of the private electric arc producers, Turkey's capacity could well exceed the planned figure of 8 million tons of raw steel production for 1989. Turkey was forced to substantially increase imports of rolled steel products, billets, slabs, and scrap in 1985, worth nearly $1 billion. The country's raw steel consumption was estimated at 5.7 million tons, while production was 4.9 million tons, with a continuous casting ratio of approximately 73%. Imports rose dramatically in 1985, and exports of steel products increased 17% over the 1984 export total.

Table 1.—Turkey: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984[p]	1985[e]
METALS					
Aluminum:					
Bauxite	[r]589,728	508,392	306,360	131,568	[2]213,752
Alumina	131,400	84,204	57,420	75,120	[2]113,303
Metal, primary	[r]40,400	[r]36,300	30,400	37,900	50,000
Antimony:					
Ore, mine output:					
Gross weight	27,949	35,982	27,901	35,525	[2]42,340
Metal content[e]	838	1,079	840	[r]1,017	1,100
Smelter	1,126	1,454	1,267	1,821	1,900
Regulus	45	[r]141	198	42	[2]300
Chromite:					
Gross weight (34% to 43% Cr_2O_3)	[r]574,263	[r]618,028	514,992	688,917	[2]764,362
Salable product	[r]401,112	[r]452,445	345,610	487,405	500,000
Copper:					
Mine output, gross weight	2,656,767	2,699,619	2,184,872	2,466,158	[2]2,206,351
Metal:					
Smelter	[r]27,263	[r]25,683	19,113	32,023	[2]33,501
Refined	[r]22,400	32,200	31,800	39,000	35,000
Iron and steel:					
Iron ore, gross weight thousand tons	2,935	[r]3,055	4,151	4,037	[2]3,371
Metal:					
Pig iron and ferroalloys:					
Ferrochromium	40,775	39,862	30,175	48,081	48,000
Ferrosilicon	--	[e]4,300	[e]4,500	6,902	6,900
Pig iron and other ferroalloys thousand tons	[r]2,050	[r]2,174	2,719	2,868	[2]3,245
Steel, crude including castings do	[r]2,425	[r]2,843	3,835	4,290	[2]4,961
Lead:					
Mine output, metal content	8,400	10,700	9,100	14,600	14,400
Metal, smelter, primary	2,500	3,100	4,000	4,000	3,600
Manganese ore, gross weight	[r]14,932	[r]7,310	3,204	42,796	50,000
Mercury 76-pound flasks	[r]5,915	[r]7,129	4,680	5,272	6,000
Silver, mine output, metal content[e] thousand troy ounces	200	220	220	220	220
Tungsten, metal content of concentrate[e]	[2]153	150	325	[r]350	350
Zinc:					
Mine output, metal content	[r]30,800	[r]33,500	31,100	50,700	50,400
Metal, smelter, primary	18,100	14,900	14,300	19,500	12,000

See footnotes at end of table.

Table 1.—Turkey: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984[p]	1985[e]
INDUSTRIAL MINERALS					
Abrasives, natural: Emery	45,824	35,164	22,846	21,145	[2]15,648
Asbestos	3,860	958	1,510	1,499	1,500
Barite	185,555	[r]114,928	78,974	198,031	[2]166,212
Boron materials thousand tons	843	787	702	895	[2]1,537
Cement, hydraulic do.	15,043	15,778	13,595	15,738	[2]17,581
Clays:[r]					
Bentonite	NA	NA	NA	28,093	[2]46,855
Kaolin	44,795	[e]50,000	[e]50,000	54,932	[2]69,390
Other	NA	NA	NA	71,777	[2]168,719
Total	119,813	152,188	107,865	154,802	[2]284,964
Diatomite	[e]10,000	[e]10,000	9,600	2,540	3,000
Feldspar[e]	70,000	70,000	[2]9,212	10,000	20,000
Fluorspar	1,986	[e]2,000	[e]2,000	[e]2,000	2,000
Graphite	NA	3,360	4,805	NA	NA
Gypsum	90,470	[e]90,500	75,572	57,875	[2]78,058
Lime thousand tons	900	900	1,000	[e]1,000	1,000
Magnesite, crude ore	[r]783,960	[r]919,572	719,124	723,264	[2]1,200,849
Meerschaum kilograms	17,600	12,850	8,850	15,000	[2]15,800
Nitrogen: N content of ammonia	[r]283,700	[r]254,900	278,700	290,000	290,000
Perlite	45,000	121,527	28,693	60,452	60,000
Phosphate rock	42,500	[r]26,300	50,400	95,600	[2]37,400
Pyrites, cuprous, gross weight	67,632	[r]5,232	4,238	(3)	--
Salt, all types thousand tons	1,396	[r]1,314	[e]1,400	1,290	[2]1,066
Sodium compounds, n.e.s.:					
Carbonate[e]	60,000	60,000	60,000	60,000	60,000
Sulfate	65,822	65,188	61,942	83,026	80,000
Stone, sand and gravel, n.e.s.:					
Limestone thousand tons	[r]513	338	343	[e]350	350
Marble	[r]36,823	24,110	39,110	[e]40,000	40,000
Quartzite	197,883	[e]200,000	239,201	[e]240,000	[2]318,450
Sand, siliceous[e]	[2]113,826	110,000	110,000	110,000	110,000
Strontium minerals: Celestite[e]	15,000	15,000	[2]38,835	35,000	35,000
Sulfates, natural, n.e.s.: Aluminum sulfate (alunite)	11,543	[e]11,500	14,682	13,971	[2]11,578
Sulfur:					
Native, other than Frasch	[r]28,758	[r]31,805	34,899	40,722	[2]37,500
S content of pyrites[e]	29,217	[r]2,260	[r]1,831	(3)	--
Byproduct[e]	[r]73,000	[r]75,000	[r]75,000	[r]78,000	80,000
Total[e]	[r]130,975	[r]109,065	[r]111,730	[r]118,722	117,500
MINERAL FUELS AND RELATED MATERIALS					
Asphalt, natural thousand tons	560	523	[e]750	[e]750	750
Carbon black	18,108	19,922	[e]20,000	[e]20,000	20,000
Coal:[r]					
Anthracite thousand tons	7,284	7,223	6,122	7,103	[2]8,526
Bituminous do.	NA	NA	750	225	[2]523
Lignite do.	18,950	20,542	23,847	27,199	[2]35,833
Coke and semicoke:					
Metallurgical do.	1,875	2,102	2,380	2,401	2,400
Gashouse do.	[e]250	[e]300	121	100	100
Breeze do.	[e]100	[e]125	260	174	170
Total do.	[e]2,225	[e]2,527	2,761	2,675	2,670
Gas, natural:					
Gross[e] million cubic feet	29,000	[2]26,050	27,000	27,000	27,000
Marketed do.	3,000	3,500	[e]3,500	[e]3,500	3,500
Petroleum:					
Crude thousand 42-gallon barrels	16,918	16,697	15,779	14,941	15,110
Refinery products:					
Gasoline do.	16,341	15,140	16,956	18,380	[2]18,681
Jet fuel do.	1,716	2,360	2,263	2,472	[2]2,875
Kerosene do.	2,386	2,035	2,375	2,593	[2]3,585
Distillate fuel oil do.	38,557	43,580	47,664	50,570	[2]50,537
Residual fuel oil do.	23,431	26,490	34,178	38,433	[2]37,962
Lubricants do.	[e]1,000	[e]1,100	1,563	1,486	[2]1,174
Liquefied petroleum gas do.	3,742	3,430	4,865	5,585	[2]5,379
Naphtha do.	[e]210	[e]210	226	58	[2]205

See footnotes at end of table.

Table 1.—Turkey: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984[p]	1985[e]
MINERAL FUELS AND RELATED MATERIALS —Continued					
Petroleum —Continued					
Refinery products —Continued					
Asphalt thousand 42-gallon barrels	2,177	1,875	2,534	2,960	[2]3,405
Unspecified do.	3,814	4,480	7,532	9,787	[2]8,271
Refinery fuel and losses do.	[e]1,200	1,200	1,905	2,248	[2]2,388
Total do.	94,574	101,900	122,061	134,572	[2]134,462

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through Aug. 7, 1986. Limestone quarried for cement manufacture is substantial; however, information is inadequate to make accurate estimates of output levels.
[2]Reported figure.
[3]Revised to zero.

Table 2.—Turkey: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS				
Alkali and alkaline-earth metals	21	5,950	--	All to West Germany.
Aluminum:				
Ore and concentrate	57,332	46,845	--	All to France.
Oxides and hydroxides	--	16,846	--	U.S.S.R. 12,121; Iraq 4,700.
Metal including alloys:				
Scrap	11	14	--	Iraq 12.
Unwrought	1,244	18	--	All to Syria.
Semimanufactures	19,355	25,110	1,715	Iran 8,158; Iraq 5,513; Kuwait 2,783.
Chromium: Ore and concentrate	362,668	439,680	10,013	China 93,650; Sweden 68,900; Yugoslavia 68,016.
Copper: Metal including alloys:				
Unwrought	18	12	--	Libya 10; Cyprus 2.
Semimanufactures	11,678	12,273	633	Iraq 6,907; Iran 3,870.
Iron and steel:				
Iron ore and concentrate including roasted pyrite	--	8,400	--	All to Lebanon.
Metal:				
Scrap	219	3,348	--	West Germany 2,638; Iraq 295.
Pig iron, cast iron, related materials	16,052	60,169	--	Bulgaria 31,184; Italy 28,914.
Ferroalloys	32,825	56,472	41,600	Netherlands 11,550; China 2,000.
Steel, primary forms	132,911	324,515	29,473	Iran 117,834; Lebanon 71,731; Jordan 36,701.
Semimanufactures:				
Bars, rods, angles, shapes, sections	730,763	1,078,357	15,152	Iraq 613,569; Iran 243,985; Egypt 132,666.
Universals, plates, sheets	47,139	88,532	6,557	Iraq 57,063; Iran 13,232.
Hoop and strip	6,537	5,419	--	Iran 2,351; Iraq 1,894.
Rails and accessories	--	24	--	All to Iraq.
Wire	3,314	10,966	--	Iraq 7,210; Iran 1,793.
Tubes, pipes, fittings	134,374	205,472	5,086	Iran 140,164; Iraq 39,333.
Castings and forgings, rough	5,440	8,693	12	Iraq 6,510; Libya 890.
Lead:				
Ore and concentrate	2,725	76	--	All to West Germany.
Oxides	109	--		
Metal including alloys:				
Scrap	--	1	--	All to Libya.
Unwrought	7	5	--	Do.
Semimanufactures	107	22	--	Do.
Manganese: Oxides	320	--		
Mercury 76-pound flasks	7,020	7,861	2,002	Netherlands 4,902; United Kingdom 493.
Nickel:				
Matte and speiss	--	10	--	All to Saudi Arabia.
Metal including alloys, semimanufactures	--	38	--	Iraq 31; Saudi Arabia 6.
Silver: Metal including alloys, unwrought and partly wrought value, thousands	$38	--		

See footnotes at end of table.

Table 2.—Turkey: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued				
Titanium: Oxides	2,250	82	--	Iraq 81.
Tungsten:				
Ore and concentrate	180	452	65	Singapore 247; Austria 140.
Metal including alloys, all forms	305	--		
Uranium and thorium: Metal including alloys, all forms value, thousands	$3	--		
Zinc:				
Ore and concentrate	1,200	--		
Oxides	100	100	--	All to Iraq.
Metal including alloys:				
Unwrought	183	112	--	Belgium-Luxembourg 100; Iran 12.
Semimanufactures	15	10	--	Iraq 5; Jordan 5.
Other:				
Ores and concentrates	330	2,246	--	Belgium-Luxembourg 1,429; Yugoslavia 441.
Ashes and residues	--	429	--	West Germany 414.
Base metals including alloys, all forms	601	336	--	Bulgaria 125; United Kingdom 86; Netherlands 75.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	22,913	13,656	3,060	Netherlands 9,380; France 794.
Dust and powder of precious and semiprecious stones including diamond value, thousands	$12	--		
Grinding and polishing wheels and stones	320	47	--	Libya 22; West Germany 20.
Asbestos, crude	--	100	--	All to Iraq.
Barite and witherite	162,580	215,981	24,901	U.S.S.R. 73,303; Switzerland 48,196; Egypt 20,810.
Boron materials:				
Crude natural borates	622,537	802,555	166,220	Italy 143,070; France 69,795; Japan 65,050.
Oxides and acids	7,022	27,060	7,750	Belgium-Luxembourg 9,990; Italy 2,892; Japan 1,940.
Cement thousand tons	2,284	1,998	(2)	Egypt 746; Algeria 616; Libya 146.
Chalk	3,174	4,470	--	Lebanon 2,015; Iraq 1,906.
Clays, crude	64,183	89,528	--	Romania 54,174; Lebanon 12,768; West Germany 9,934.
Diatomite and other infusorial earth	15	364	--	Iraq 163; Syria 108; West Germany 89.
Feldspar, fluorspar, related materials	5,045	1,034	--	Kuwait 520; Jordan 394.
Fertilizer materials: Manufactured:				
Ammonia	r98	77	--	Iraq 74.
Nitrogenous	--	23,311	9,655	Bulgaria 11,000.
Phosphatic	77,951	160,185	2,000	China 80,950; Bulgaria 19,950; Egypt 16,885.
Potassic	--	201	--	Cyprus 200.
Unspecified and mixed	15,000	42,000	--	Nigeria 24,000; China 10,000; Cyprus 8,000.
Gypsum and plaster	2,651	854	--	Egypt 600; Lebanon 200.
Lime	2,638	7,360	--	Cyprus 4,592; Kuwait 877.
Magnesite	92,070	164,614	4,700	Austria 44,825; Romania 31,971; U.S.S.R. 20,886.
Meerschaum, amber, jet	5	6	--	Austria 5; West Germany 1.
Mica:				
Crude including splittings and waste	20	162	--	All to Kuwait.
Worked including agglomerated splittings value, thousands	--	$1	--	All to Cyprus.
Pigments, mineral:				
Natural, crude	197	--		
Iron oxides and hydroxides, processed	381	60	--	Iraq 48; Libya 12.
Precious and semiprecious stones other than diamond: Natural value, thousands	$1	--		
Pyrite, unroasted	15	--		
Salt and brine	6,258	29,343	--	Iraq 27,155; Cyprus 1,550.
Sodium compounds, n.e.s.: Manufactured:				
Carbonate	61,883	55,646	--	Syria 12,806; Iraq 10,610; Greece 9,640.
Sulfate	(3)	468	--	Iraq 451; Cyprus 15.

See footnotes at end of table.

Table 2.—Turkey: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984	
			United States	Other (principal)
INDUSTRIAL MINERALS —Continued				
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	40,739	31,165	37	Libya 6,166; Italy 6,160; West Germany 4,939.
Worked	8,704	24,798	183	Kuwait 8,431; Libya 6,442; Saudi Arabia 5,496.
Dolomite, chiefly refractory-grade	74	233	--	Iraq 173; Greece 40.
Gravel and crushed rock	8,965	10,128	--	Tunisia 6,888; Syria 1,499; Libya 1,150.
Limestone other than dimension	515	--		
Quartz and quartzite	160	148	--	Egypt 123; Iran 17.
Sand other than metal-bearing	750	38	NA	Greece 18; unspecified 20.
Sulfur:				
Elemental:				
Crude including native and by-product	--	200	--	All to Cyprus.
Colloidal, precipitated, sublimed	--	21	--	All to Austria.
Dioxide	--	56	--	All to Iran.
Sulfuric acid	--	65	--	All to Cyprus.
Talc, steatite, soapstone, pyrophyllite	679	1,202	--	Iraq 791; Libya 300.
Other:				
Crude	40,223	64,692	--	West Germany 37,043; United Kingdom 8,400.
Slag and dross, not metal-bearing	18,617	8,381	--	Lebanon 8,300.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	72	1,354	--	Cyprus 1,349.
Carbon black	575	880	--	All to Iraq.
Coal: Lignite including briquets	--	1,365	--	All to Cyprus.
Petroleum:				
Crude and partly refined thousand 42-gallon barrels	2,943	4,631	--	Italy 3,709; Greece 605.
Refinery products:				
Gasoline, motor do	1,813	3,698	--	Italy 1,880; Austria 473; France 425.
Kerosene and jet fuel do	919	1,550	252	Iran 614; Egypt 303.
Distillate fuel oil do	17	267	--	Mainly to Cyprus.
Lubricants do	4	161	--	Iran 153; Cyprus 6.
Residual fuel oil do	1,012	2,723	--	Italy 1,336; Greece 1,024.
Bitumen and other residues do	(2)	11	--	Mainly to Cyprus.
Bituminous mixtures do	1	3	--	Libya 1.

[r]Revised. NA Not available.
[1]Table prepared by Virginia A. Woodson.
[2]Less than 1/2 unit.
[3]Revised to zero.

Table 3.—Turkey: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984	
			United States	Other (principal)
METALS				
Alkali and alkaline-earth metals	1	6	--	West Germany 5; United Kingdom 1.
Aluminum:				
Ore and concentrate	1,025	7,675	--	Italy 3,598; France 1,992; Netherlands 986.
Oxides and hydroxides	258	211	NA	West Germany 162; United Kingdom 43.
Metal including alloys:				
Scrap	41	30	--	Italy 21; Cyprus 6.
Unwrought	59,953	68,493	--	Spain 41,524; Netherlands 3,709; U.S.S.R. 3,084.
Semimanufactures	915	1,417	(2)	West Germany 563; Netherlands 162; Switzerland 152.

See footnotes at end of table.

Table 3.—Turkey: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Arsenic: Oxides and acids	150	163	--	United Kingdom 87; Belgium-Luxembourg 45; Sweden 20.
Chromium:				
Ore and concentrate	11	--		
Oxides and hydroxides	308	409	--	West Germany 138; United Kingdom 138; Italy 133.
Cobalt: Oxides and hydroxides	60	37	--	Belgium-Luxembourg 34.
Columbium and tantalum: Metal including alloys, all forms, tantalum value, thousands	--	$1	--	All from Austria.
Copper:				
Ore and concentrate	16,202	23,292	--	Chile 18,196; Morocco 5,060.
Matte and speiss including cement copper	50	--		
Metal including alloys:				
Scrap	928	60	--	All from West Germany.
Unwrought	26,110	24,460	1,900	Chile 15,484; Belgium-Luxembourg 3,300.
Semimanufactures	10,820	10,297	414	West Germany 5,277; Belgium-Luxembourg 2,246.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite -- thousand tons	1,329	1,656	--	Republic of South Africa 764; Brazil 320; Liberia 250.
Metal:				
Scrap do	1	1,038	717	United Kingdom 136; U.S.S.R. 63.
Pig iron, cast iron, related materials do	68	43	NA	U.S.S.R. 19; Canada 10.
Ferroalloys:				
Ferromanganese do	21	26	--	Republic of South Africa 15; France 5.
Unspecified do	22	27	(3)	Yugoslavia 7; Romania 5; Brazil 4.
Steel, primary forms do	929	1,483	NA	Spain 233; Brazil 182; Bulgaria 170.
Semimanufactures:				
Bars, rods, angles, shapes, sections do	103	297	(3)	Spain 106; West Germany 36; Bulgaria 32.
Universals, plates, sheets do	317	370	(3)	Bulgaria 46; West Germany 39; Italy 34.
Hoop and strip do	3	4	(3)	West Germany 2; Austria 1.
Rails and accessories do	10	54	--	Republic of South Africa 34; France 18.
Wire do	2	6	(3)	Spain 2; Belgium-Luxembourg 1.
Tubes, pipes, fittings do	43	64	1	Yugoslavia 19; West Germany 10; U.S.S.R. 9.
Castings and forgings, rough do	5	2	(3)	West Germany 1; United Kingdom 1.
Lead:				
Oxides	109	201	--	United Kingdom 119; France 82.
Metal including alloys:				
Unwrought	8,735	10,179	1,009	Morocco 4,232; Spain 1,567; Mexico 1,106.
Semimanufactures	1	160	--	All from Belgium-Luxembourg.
Magnesium: Metal including alloys:				
Unwrought	124	62	--	Norway 39; France 20.
Semimanufactures value, thousands	$10	$10	--	Switzerland $6; West Germany $4.
Manganese:				
Ore and concentrate, metallurgical-grade	1,910	1,348	--	Republic of South Africa 984; Belgium-Luxembourg 268.
Oxides	320	602	--	West Germany 309; Republic of South Africa 208.
Nickel:				
Matte and speiss	651	817	19	Canada 410; United Kingdom 201; Austria 56.
Metal including alloys:				
Unwrought	29	2	--	Austria 1; United Kingdom 1.
Semimanufactures	155	197	(4)	West Germany 128; Austria 27; Japan 16.

See footnotes at end of table.

Table 3.—Turkey: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984 United States	Sources, 1984 Other (principal)
METALS —Continued				
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$360	$331	--	Italy $175; West Germany $139.
Silver: Metal including alloys, unwrought and partly wrought do	$356	$502	--	West Germany $407; Switzerland $65.
Tin:				
Oxides	3	21	--	All from West Germany.
Metal including alloys:				
Unwrought	995	853	--	Malaysia 334; Bolivia 193; Thailand 114.
Semimanufactures	4	10	--	West Germany 4; United Kingdom 4.
Titanium: Oxides	2,250	2,387	21	West Germany 1,050; France 540; United Kingdom 375.
Zinc:				
Oxides	250	894	--	West Germany 736; Netherlands 158.
Blue powder	29	23	--	All from West Germany.
Metal including alloys:				
Unwrought	7,910	18,374	--	Bulgaria 6,478; Belgium-Luxembourg 3,796; West Germany 2,401.
Semimanufactures	--	9	--	All from Belgium-Luxembourg.
Other:				
Ores and concentrates	3,894	4,073	--	Australia 2,645; United Kingdom 384; Netherlands 354.
Oxides and hydroxides	482	442	31	West Germany 322; Belgium-Luxembourg 49.
Ashes and residues	--	60	--	All from West Germany.
Base metals including alloys, all forms	142	71	1	Netherlands 45; United Kingdom 6.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	1	2	--	All from Italy.
Artificial: Corundum	1,490	1,848	--	West Germany 1,127; Austria 519.
Dust and powder of precious and semiprecious stones including diamond value, thousands	$295	$510	$264	Netherlands $144; Republic of South Africa $72.
Grinding and polishing wheels and stones	274	196	2	West Germany 45; Italy 38; Poland 20.
Asbestos, crude	20,575	21,872	--	Canada 6,670; U.S.S.R. 5,982; Republic of South Africa 4,088.
Barite and witherite	--	2	--	All from West Germany.
Boron materials: Oxides and acids value, thousands	$4	$1	--	Do.
Cement	1,594	5,932	375	West Germany 1,078; Italy 1,020; France 915.
Chalk	--	7	--	West Germany 3; unspecified 4.
Clays, crude	4,259	7,045	2,122	United Kingdom 4,296; West Germany 353.
Cryolite and chiolite	20	41	--	Denmark 40.
Diamond:				
Industrial stones value, thousands	$455	$446	--	Netherlands $282; Zaire $99.
Dust and powder do	$337	$510	$264	Netherlands $144; Republic of South Africa $72.
Diatomite and other infusorial earth	73	142	139	West Germany 1; Italy 1.
Feldspar, fluorspar, related materials	23	45	--	West Germany 40.
Fertilizer materials:				
Crude, n.e.s	--	55	--	All from West Germany.
Manufactured:				
Ammonia	668,424	548,733	35,768	U.S.S.R. 348,980; Libya 41,151; Trinidad and Tobago 30,871.
Nitrogenous	916,617	923,220	46,065	Romania 340,014; Italy 242,645; Yugoslavia 73.
Potassic	38,381	60,526	--	Israel 31,604; Belgium-Luxembourg 9,993; U.S.S.R. 9,425.
Unspecified and mixed	148,561	134,445	114,157	Romania 19,956.
Graphite, natural	334	474	--	West Germany 381; China 61.
Gypsum and plaster	--	3	--	Italy 1; United Kingdom 1.

See footnotes at end of table.

Table 3.—Turkey: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Magnesite	60	45	18	West Germany 20.
Mica:				
Crude including splittings and waste	39	25	--	France 15; Canada 5.
Worked including agglomerated splittings	63	46	1	Belgium-Luxembourg 22; Spain 9.
Phosphates, crude	922,641	727,758	--	Tunisia 244,701; Israel 174,256; Morocco 154,492.
Pigments, mineral:				
Natural, crude	19	23	--	All from Denmark.
Iron oxides and hydroxides, processed	381	536	5	West Germany 477; United Kingdom 37.
Precious and semiprecious stones other than diamond:				
Natural ----- value, thousands	$19	$8	--	All from West Germany.
Synthetic ----do	$20	$66	--	Switzerland $53; West Germany $7.
Pyrite, unroasted	89,995	166,070	--	Yugoslavia 72,943; Spain 43,266.
Salt and brine	81	94	--	West Germany 74; Netherlands 20.
Sodium compounds, n.e.s.: Manufactured:				
Carbonate	20,140	16,953	14	Italy 6,890; West Germany 4,034; Bulgaria 3,887.
Sulfate	55,758	119,600	17,704	Italy 47,331; West Germany 10,285; Netherlands 9,177.
Stone, sand and gravel:				
Dimension stone: Worked	--	2	1	United Kingdom 1.
Quartz and quartzite	266	374	--	West Germany 300; Denmark 40.
Sand other than metal-bearing	33	10,058	2,995	Belgium-Luxembourg 7,029.
Sulfur:				
Elemental:				
Crude including native and byproduct	76,878	20,998	20,996	West Germany 2.
Colloidal, precipitated, sublimed	140	4,844	--	Switzerland 4,824.
Dioxide	--	10	--	All from Israel.
Sulfuric acid	73,539	179,341	--	Philippines 37,620; Japan 32,377; Spain 28,823.
Talc, steatite, soapstone, pyrophyllite	321	585	--	West Germany 430; Italy 100.
Other: Crude	2,030	2,996	7	West Germany 1,182; United Kingdom 813.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	40	59	59	
Carbon black	7,701	12,669	65	Italy 9,179; West Germany 3,059.
Coal:				
Anthracite and bituminous thousand tons	902	1,928	1,259	Australia 504; West Germany 129.
Briquets of anthracite and bituminous coal	33	5,049	--	Canada 4,985; West Germany 60.
Lignite including briquets	11,831	60,795	--	Republic of South Africa 55,691; U.S.S.R. 5,104.
Coke and semicoke	78,919	172,112	38,767	Japan 106,606; Italy 16,838.
Petroleum:				
Crude thousand 42-gallon barrels	102,665	111,355	--	Iran 52,575; Iraq 29,092; Libya 19,487.
Refinery products:				
Liquefied petroleum gas value, thousands	$169,730	$115,310	--	Kuwait $89,678; Iraq $25,631.
Gasoline, motor thousand 42-gallon barrels	48	41	--	Mainly from Italy.
Mineral jelly and wax ---do	12	12	3	West Germany 5; Netherlands 3.
Kerosene and jet fuel ---do	(3)	3	(3)	Mainly from Netherlands.
Distillate fuel oil -----do	4,786	2,183	--	U.S.S.R. 1,187; Bulgaria 444; Albania 19.
Lubricants ---------do	113	129	19	Belgium-Luxembourg 24; Netherlands 23; United Kingdom 17.
Residual fuel oil ------do	3,019	1,902	--	Iran 553; Romania 442; Syria 318.
Bitumen and other residues do	--	(3)	--	Mainly from West Germany.
Bituminous mixtures ---do	98	2	(3)	Mainly from Belgium-Luxembourg.
Petroleum coke ------do	807	1,731	303	Syria 1,428.

NA Not available.
[1]Table prepared by Virginia A. Woodson.
[2]Value only reported at $18,000.
[3]Less than 1/2 unit.
[4]Value only reported at $11,000.

COMMODITY REVIEW

METALS

Chromite and Ferrochrome.—Etibank's Kefdag concentrator, the chromite ore processing plant at Guleman within Elazig Province, was on-line again at yearend 1985 as a 2-year project to modernize and upgrade the facility's equipment neared completion. The estimated $9 million project increased the concentrator's capacity from 75,000 tons per year of low-grade chromite oxide (Cr_2O_3), to 125,000 tons per year of 44% to 48% Cr_2O_3 concentrate. Historically, the ore grade from the Kefdag concentrator had been below expectations at 42% Cr_2O_3. Process technology and equipment, as well as supervision and personnel training, was supplied by Outokumpu Oy of Finland. In conjunction with this project, and also essentially completed during the year, was the estimated $33 million expansion project for the Etibank ferrochrome smelter at Elazig. The high-carbon ferrochrome capacity of the plant was increased from 44,000 to 150,000 tons per year. Outokumpu supplied the processing technology and equipment, and Elkem A/S of Norway supplied engineering services.

In March, Turkey's largest private mining company, Egemetal Madencilik AS, signed an agreement with Etibank and Bomar Resources Inc. of the United States for exploration and possible development of chromite reserves in the Orhaneli region near Bursa in northwestern Turkey. Project work for the year consisted of data collection on ore reserves and research and development planning. A new company, owned 40% by Etibank, 40% by Egemetal, and 20% by Bomar, was to be established. It would qualify for Government incentives granted to foreign capital investors. Under the agreement, Etibank would control mining, which would supply Egemetal's concentrator at Orthaneli. Bomar was to handle marketing and financing.

Also during the year, Bilfer Maden Ltd., the mining agency of Madencilik AS, reactivated several of its idle, marginally economic chromite mines. A total of 13 mines in 6 Provinces, which had been shut down during previous recessional years, were slated for eventual reopening sometime in 1986. Bilfer had been forced to cut back to producing refractory grades only, but the economics of the marginal mines had improved, and production of salable metallurgical-grade ore in 1986 was estimated at 70,000 tons. Bilfer produced only 25,000 tons in 1984. With further mine openings and increased production expected in 1986, salable tonnages were expected to be over 100,000 tons.

Copper.—At yearend, Phelps Dodge Corp. of the United States was nearing completion of a first-phase drilling program on its Cayeli copper-zinc deposit in northeastern Turkey. Approximately 40 core drill holes totaling over 6,000 meters had proven at least 25 million tons of sulfide ore grading 5.1% copper and 8.3% zinc. Core drilling was to continue in 1986 to better determine the extent of the mineralization. Also ongoing at the site was underground development for investigating ground-control conditions and enabling bulk samples to be collected for metallurgical testing. Phelps Dodge had a 40% interest in the project, which was 45% controlled by Turkey's Etibank and 6% by Gamma Industrie TAS, a private Turkish company. A final feasibility study to determine the copper project's viability was to begin by mid-1986.

The International Bank for Reconstruction and Development (World Bank) agreed in principle to a loan of $22 million to Etibank's copper agency, Black Sea Copper Works (BSCW), for development of copper mines near Murgul and Samsun. Also, BSCW announced plans for rehabilitation of the Samsun copper refining complex. A new copper smelter was to be built, and a complete refurbishment of the existing sulfuric acid plant was planned. The existing smelter at Samsun had operational problems since construction was completed in 1976. Its output of blister copper never reached one-half of the plant's design capacity of 40,000 tons per year. Construction of the new smelter was awarded to the Furukawa Co. Ltd. of Japan and Tabar Muhendislik of Turkey.

Iron Ore.—Turkiye Demir ve Celik Isletmeleri (TDCI), the Government iron and steel agency, continued to control over three-quarters of the country's domestic iron ore production. TDCI's iron ore requirements were supplied from about 40 different mines within the country, although its main supply continued to be the Divirigi Mine near Sivas. In August, a new 2-million-ton-per-year concentrating plant began operations at the mine, and construction of a 1.2-million-ton-per-year pelletizing plant was expected to be completed by April 1986. However, with another blast furnace completed at Iskenderun during 1985, TDCI was forced to start importing iron ore for the first time, at an average rate of 30,000 tons per month.

Iron and Steel.—Turkey's raw steel output for 1985 was approximately 4.9 million tons, with the majority of the production coming from the Iskenderun, Karabuk, and Eregli integrated plants. The Iskenderun and Karabuk plants were totally controlled by the Government agency TDCI, while the Eregli works on the Black Sea remained a joint venture, with TDCI the majority partner, although the plant was privately operated. TDCI was also part owner of the Izmir electric arc steel plant, Metas Izmir Metalurji Fabrikas TAS. Expansion plans were continuing throughout the year within both the Government and private steel manufacturing sectors. The Turkish Government's current industrial plans called for increasing the country's raw steel production to 8 million tons per year by 1989, with 30% of this total coming from the private electric arc steelmaking sector. The three main electric producers, Cukurova Celik Endustrisi AS, Colakoglu Metalurji AS, and Metas, had expansion programs under way during 1985, with a total production capacity of 2 million tons expected to be in place by the middle of 1986.

With inauguration of the No. 3 blast furnace at the Iskenderun integrated steel plant in October, Turkey's integrated steel sector capacity increased to 4.7 million tons per year, and total raw steel manufacturing capacity increased to 6.4 million tons per year. The 2,000-cubic-meter furnace, with a raw steel production capacity of 3,000 tons per day, was Turkey's largest blast furnace and doubled the Iskenderun plant's capacity to 2.2 million tons per year. Earlier in the year, a third 130-ton LD converter and a 700,000-ton-per-year medium section mill were commissioned at Iskenderun. Continuous casting capacity was also increased to 2.2 million tons per year with the final installation of a three-strand, continuous bloom caster and automation of two bar mills, each with a capacity of 500,000 tons per year. Full capacity at Iskenderun awaited completion of the No. 3 coke oven early in 1986.

Expansion work at the Karabuk plant was expected to raise steel capacity from 600,000 to 900,000 tons per year by 1989. Work was under way during 1985 in five sections of the plant. Modernization work was being carried out on the plant's No. 3 blast furnace by Martin & Pagnestecher GmbH of the Federal Republic of Germany. Capacity at the complex's sinter plant was being raised from 840,000 to 1.34 million tons per year. The contract was awarded to Romania's Uzin Exportimport, and work was expected to be completed by late 1987. Final work to replace the third and fourth batteries of the No. 2 coke oven plant was almost completed. Construction of new iron ore blending facilities was scheduled for completion in April 1986. TDCI believed that completion of the expansion and modernization work at Karabuk, Turkey's oldest integrated plant, would not boost capacity but improve efficiency and cut operating costs substantially. The plant's coking coal requirements were expected to decrease by up to 40% below the plant's premodernization requirements of 800,000 tons per year. In 1985, Karabuk produced an estimated 575,000 tons of raw steel and 460,000 tons of finished products.

Turkey's only flat-rolled steel producer, the Eregli Iron and Steel Works Association, was under expansion during the year with steel capacity expected to rise 10% to 2 million tons per year by yearend 1986. Included in the expansion work was modernization of the hot and cold rolling mills and sintering plant, installation of ladle refining, and improvements in the coal blending yard. The total cost of the work was estimated at $84 million. Estimated raw steel and flat products output at Eregli for the year was 1.6 million tons, with 350,000 tons of slab imports required.

INDUSTRIAL MINERALS

Cement.—Cement production in Turkey increased almost 12% in 1985, while exports of the commodity decreased slightly, from 1,998 million tons in 1984 to 1,853 million tons in 1985. Several new plant construction projects continued throughout the year. The 550,000-ton-per-year Urfa plant project, which was originally expected to be completed and on-line in 1985, was behind schedule and expected to begin manufacturing operations by mid-1986, according to the project consultant, Dyckerhoff Engineering GmbH. Construction work on the 600,000-ton-per-year Denizli cement plant was continuing, also behind schedule, but was expected on-line by 1987. Work on the Edirne project, a 550,000-ton-per-year grinding and packaging plant, continued throughout the year and was expected to be completed in 1987. Two cement companies upgrading plant equipment in 1985 were Bursa Cimento Fabrikasi AS, which was installing a cement mill and air separator at its new grinding facility, and Akcimento Ticaret AS, which was moving ahead with plans to install a disk reclaimer for its coal blending bed. Equipment for both upgrading projects was being supplied by F. L. Smidth of the United Kingdom.

Fertilizer Materials.—The Turkish fertilizer industry continued to rely heavily on imported raw materials for fertilizer production at its seven manufacturing centers in the northeastern and south-central areas of the country. Turkey has well delineated phosphate rock resources, but development prospects remained limited owing to poor rock grades and infrastructural constraints. Although efforts continued to evaluate substitutes of local materials for nitrogen requirements, imports of ammonia remained the major feedstock. Substitution of natural gas for the ammonia imports continued to look promising, either from locally produced sources or imports. TUGAS, Turkey's largest state-owned fertilizer company, reactivated its Gemlick ammonia project in October. The proposed 1,000-ton-per-day ammonia plant was to utilize natural gas as feedstock, instead of imported naphtha as originally planned in the late 1970's. The natural gas feedstock was expected to come from the U.S.S.R. via a pipeline. Also during the year, the IGSAS ammonia plant at Izmir was converted from naphtha to refinery gas feedstock. The substituted gas was being supplied from an adjacent oil refinery and was expected to save $20 million annually in foreign exchange.

At the end of May, officials of Turkey's Turkiye Gubre Sanayii, Kuwait's Petrochemical Industries Co. (PIC), and Tunisia's Industries Chimiques Maghrebines (ICM) signed an agreement for constructing a fourth fertilizer complex in Mersin, at an estimated cost of $230 million. PIC was expected to put up the majority of capital necessary for the project and would be the majority shareholder. ICM was to supply the phosphoric acid feedstock for the plant. The complex was expected to be completed by 1990, supplying 1,400 tons of diammonium phosphate per day, 1,500 tons of ammonium nitrate per day, and 1,150 tons of nitric acid per day. Imported materials for use in construction of the plants and product manufacture were to be exempt from taxes and custom duties.

Construction work was completed by yearend on a 330,000-ton-per-year nitrogen-phosphorus-potassium (NPK) plant at the Toros Fertilizer and Chemicals Co.'s Adana fertilizer complex. The plant was constructed by Técnicas Reunidas of Spain, and turnkey startup was scheduled for early January 1986. If operated at capacity, the output would double the Adana complex's NPK production. As an alternative product, the plant was capable of producing 200,000 tons per year of diammonium phosphate. The production was expected to supply domestic markets, although export to other Middle Eastern countries was a possibility. In addition to the NPK manufacturing unit, unloading and bagging facilities were expanded and a new 10,000-ton ammonia storage facility was constructed.

MINERAL FUELS

Natural Gas.—All of Turkey's nonassociated gas production was produced by the state-owned petroleum company, Turkiye Petrolleri Anonim Ortakliki (TPAO). The natural gas production in 1985 was all from the Thrace Basin. However, production was minor and natural gas did not play a significant role in Turkey's energy supply. Trade agreement terms between Turkey and the U.S.S.R. were almost finalized by yearend for importation of natural gas from the U.S.S.R. Gas supplies were to start at 1.5 billion cubic feet late in 1987, rising to 6.0 billion cubic feet in the 1990's. The TPAO subsidiary agency for oil pipelines, Botas, was to handle construction of a pipeline to transport the gas from the Bulgarian border across the Thrace Basin to Istanbul. Work on the pipeline was to begin in 1986.

Petroleum.—*Exploration.*—Since enactment of Turkey's petroleum exploration and development legislation of 1983, which improved the investment climate for international companies, Mobil Oil Corp., Amoco International Oil Co., Esso Oil Co., and Shell Oil Co. had all commenced or expanded exploration programs in Turkey. In 1985, Amoco Turkey Petroleum Co. conducted limited detailed survey work on its southeastern concession in Hakkari Province and preliminary geophysical work on its six western concessions, five offshore and one onshore along the country's Aegean Sea coastline. Esso Exploration Co. was awarded nine exploration concessions in April, five in eastern Provinces and four along the Syrian border near Iskenderun. At yearend, Esso Exploration was continuing with the drilling of its first exploration well in the Gulf of Iskenderun in southeastern Turkey.

Esso Oil had two other southeastern concessions in 1985, at Reyhanli in Hatay Province and near Sivan in Diyarbakir Province. Shell reported a small discovery near Diyarbakir in March from its Barbes Deep-1 well, which flowed 1,500 barrels per day (bbl/d) of 44° to 46° API crude.

Production.—The trend of declining petroleum production continued. Indigenous production of crude oil, which reached a peak of 25 million barrels in 1973, was approximately 15 million barrels in 1985. Also, as in previous years, Shell continued to be the biggest producer in Turkey with an output of approximately 20,000 bbl/d from 15 fields. Shell's major production fields were the Beykan and Kurkan Fields, with outputs of approximately 4,000 bbl/d and 3,500 bbl/d, respectively. TPAO was the second largest operator, producing approximately 17,500 bbl/d from 25 fields. TPAO's oldest production field, Raman, remained its largest producer with an output of approximately 6,600 bbl/d. Other major production sites for TPAO were the Bati Raman Field and the most recent major field developed in Turkey, the Guney Dincer Field. Mobil produced 4,500 bbl/d from its only production concession in Turkey, the Selmo Field. Almost all of Turkey's oil production was concentrated in the southern and southeastern sections of the country.

Refining and Transport.—Crude oil refining capacity for Turkey remained at 175 million barrels per year in 1985, with actual utilization of capacity at only 65%. There were four operating refineries: the Batman refinery with a capacity of 7.5 million barrels per year, the Aliaga refinery with a capacity of 34.5 million barrels per year, the Istanbul refinery with a capacity of 97.5 million barrels per year, and the Mersin refinery with a capacity of 33.75 million barrels per year. TPAO's subsidiary agency, Tupras, operated all of the refineries except the Mersin complex, which was collectively owned and operated by Shell, British Petroleum Ltd., and Mobil.

Work was essentially completed on TPAO's new Central Anatolian refinery by yearend. Commissioning and startup operations at the 38.5-million-barrel-per-year complex was expected early in 1986. Crude feedstock was to be supplied by Iraq through a 447-kilometer pipeline from Yumurtalik, the terminal port of the Iraq-Turkey Dortyol pipeline, which supplied crude oil from Iraq's Kirkuk Oilfields to Turkey's Mediterranean Ceyhan terminal.

Work on a second pipeline to run parallel with the existing Dortyol pipeline began at yearend 1985. The $225 million contract to build the Turkish portion of the 46-inch-diameter, 980-kilometer pipeline was awarded in November to a consortium comprised of Saipem S.p.A. of Italy and Kutlutas AS and Tefken AS of Turkey. The construction contract for the Iraqi portion of the pipeline was awarded also to the same consortium of companies. TPAO's Botas was financing the project through a $165 million Italian export credit and a $90 million loan, also from the Italian Government, guaranteed by the Turkish Government. Construction of the pipeline was expected to take 18 months.

[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Turkish lira (TL) to U.S. dollars at the rate of TL533=US$1.00.

The Mineral Industry of the U.S.S.R.[1]

By Richard M. Levine[2]

The Soviet minerals sector, including fuel extraction, was a major recipient of investment funds, absorbing 45% of industrial capital investment while producing 5% to 7% of the total value of industrial output.[3] Given the Soviet Union's endowment in mineral resources, these large investments in the mining industry secured its place as the world's leading mineral producing country and enabled it to be more self-sufficient in minerals than any other major industrialized country.

In 1985, the following production statistics were reported. Iron ore production increased 0.2%; crude steel, 0.2%; rolled steel, 0.7%; and steel pipes, 2%. Coal production increased 2%, which was only the second production increase in the past 7 years. Natural gas production continued its rapid growth, increasing 9%. Crude oil production, however, decreased for the second year in a row. The decrease, which limited the Soviets' export potential, affected Soviet hard currency earnings as it was compounded by lower world market prices for crude oil. Earnings from the sale of crude oil had accounted for about 60% of Soviet hard currency earnings in past years.

Conserving metal and eliminating waste remained a major issue for Soviet industry. In 1985, the U.S.S.R. Supreme Soviet decreed "the adoption of additional economic, organizational, legal, and other measures deemed necessary in the sphere of nature conservation and the rational utilization of natural resources," and called for "elaborating a long-term state program for environmental conservation and the rational utilization of the U.S.S.R.'s natural resources."[4] During 1986, the Soviets planned to achieve savings in raw materials by decreasing metal consumption per unit of national income by a record high 2.7% compared with the planned 1.9% reduction in 1985. Guidelines for the country's development to the year 2000 called for ensuring that 75% to 80% of the growth in demand for fuel, energy, and raw and other materials be achieved through conservation. There was much room for eliminating waste. For example, in 1985, every fourth ton of metal used in machine manufacturing was wasted, and those machines produced contained between 20% to 25% more metal than comparable units from advanced market economy countries. In addition, an excessive amount of metal was lost through corrosion.[5]

A large number of personnel changes occurred in the management of the economy. In the metals sector, a new Minister of Ferrous Metallurgy was appointed. This ministry was in charge of iron, manganese, and chrome ore mining as well as iron, steel, and ferroalloys production. The new appointment followed sharp criticism of the iron and steel industry's performance. It was stated that during the past decade ferrous metallurgy had not been fulfilling its plans and this situation had to be fundamentally changed.[6] The iron and steel industry was particularly faulted for having fallen behind in its goals to produce high-quality steel products needed to modernize the economy. The steel industry, it was stated, required modernization rather than expansion.[7] This replacement was one of a series of replacements of ministry heads, including those in charge of the petroleum industry, the coal industry, and the construction materials industry. A number of the ministerial changes were viewed as an effort to inject dynamism into lagging sectors of the economy.

Exploration.—The 1981-85 plan for the growth in reserves of a number of minerals including bauxite, coal, copper, lead, mercury, molybdenum, natural gas, nickel, phosphate, tin, tungsten, and zinc was reported fulfilled.[8] Also, the plan for the 4-1/2 year period from 1981 through mid-1985 for the growth in chrome, iron, and manganese reserves was reported fulfilled.[9] In the future, exploration was to emphasize increasing bauxite, iron, manganese, tin, and tungsten reserves. During the 1986-90 period, 70% of the appropriations for the Ministry of Geology were to be directed toward establishing additional reserves in the areas of existing chrome, copper, fluorspar, iron ore, lead, and other mining enterprises.[10]

Exploration costs for establishing new reserves more than doubled in the past decade, with the greatest increase in expenditures occurring in the fuel sector. To increase oil and gas reserves during the 1986-90 period, it was planned to increase deep drilling by 40% compared with the 1981-85 period, with a 90% increase in deep drilling in West Siberia and an 80% increase in the Pre-Caspian Depression. Accelerated exploration was also planned for coking coal and steam coal deposits.

The Soviet Union was engaged in a program of drilling super-deep exploratory holes, the deepest of which on the Kola Peninsula was planned to go to a depth of 15 kilometers; it had already reached 12 kilometers. Plans called for drilling 22 holes below a depth of 7,000 meters for exploratory and scientific research purposes. Twelve of these holes were specifically intended to explore the oil and gas potential of a number of regions including the Carpathian Mountains, the Pre-Caspian Depression, the Kyzylkum Desert, West Siberia, and the Komi A.S.S.R.

Technology.—During the 1986-90 period, plans called for producing 35% of copper, lead, and nickel using autogenous smelters. There was to be a 150% to 200% increase in the use of Soviet-developed autogenous, fluidized-bed smelters. Regarding other autogenous smelters, difficulties were being experienced in putting on-stream the Soviet-developed Kivtset autogenous smelter. The Kivtset, which is an acronym for oxygen-suspended, cyclone, electrothermal smelter, was to be used in processing ore from the rich polymetallic Nikolayevskoye deposit in the Kazakh S.S.R. (Kazakhstan) containing copper, iron, lead, rare metals, sulfur, and zinc. An experimental Kivtset unit to process Nikolayevskoye ore was in operation at the Irtysh copper smelter in Kazakhstan. The Kivtset smelter was supposed to permit complete extraction of metals, automate production, and protect the environment. However, the smelter had only been able to extract copper and functioned about one-half as efficiently as a conventional copper smelter. In addition, it was more polluting. Some of the problems in the development of the Kivtset were blamed on a hurried decision to develop the Nikolayevskoye deposit, forcing work on the Kivtset to be rushed.[11]

Government Policies and Programs.—The 1986 plan called for rolled steel output to increase almost 3% to 111.1 million tons and steel pipe output to increase 2.6% to 19.9 million tons. The growth in steel output in 1986 was to occur without any increase in iron ore extraction or coke or pig iron production. The 1986 plan called for an almost 3.7% increase in crude oil and gas condensate production to 4.5 billion barrels, which was about the peak output produced in 1983. Natural gas production was planned to increase 4% to 23.7 trillion cubic feet. Coal production was planned to increase about 1% to 733.9 million tons with the entire growth in output to come from open pit mining. In 1986, unspecified production increases were planned for aluminum, copper, nickel, and other unnamed nonferrous metals.

The new 12th 5-year plan (1986-90), which would guide all economic development for this period, was published. The new plan called for a modest growth in oil production of up to 4% over the peak level achieved in 1983 of 4.5 billion barrels to between 4.6 and 4.7 billion barrels in 1990. The lower range of the 1990 oil production goal was revised slightly downward from the goal published in the draft guidelines in November 1985, following the 27th Communist Party Congress of the U.S.S.R. in March 1985. Oil production had decreased in 1984-85, and the upper level of the 1990 target was almost 8% above the 1985 production level. Natural gas production, which experienced very rapid growth during the 1981-85 period, was planned to increase by as much as one-third to between 29.5 and 30.0 trillion cubic feet by 1990.

In steelmaking, the emphasis was to be placed on the production of quality steel and on converting to more modern technology, especially switching from open-hearth production, which still comprised 57% of steelmaking, to oxygen converter and electric arc steel furnaces and also doubling the percentage of continously cast steel, which comprised about 12% of steel production. Increases in steel production were planned to occur without any increase in pig iron production and with a decrease in coke consumption. Plans called for especially increasing the mining of aluminum raw materials, diamonds, gold, rare metals, tin, and tungsten. These were all minerals for which there was either a dependence on imports or which were sources of hard currency earnings. The latter was of concern with the drop in hard currency earnings from oil exports. These planned goals would in many cases not be met, and could be viewed as only indicating the direction the country planned to take to 1990.

PRODUCTION

Statistics on output, enterprise capacity, and production plans in physical units of output for nonferrous, precious and rare metals, and some nonmetallic minerals were classified as state secrets. Soviet trade data on precious metals had not been available for decades, and in 1976, the Soviets stopped publishing trade statistics for nonferrous metals. Production and trade data were available for some ferrous metals and some industrial minerals.

Some information was available on most mineral commodities that could be used to determine the relative size or growth of the mineral industry. However, Soviet information had to be carefully qualified. Making comparisons with market economy countries regarding production, consumption, production costs, labor productivity, etc., would be difficult owing to the great difference in economic systems.

Table 1.—U.S.S.R.: Estimated[1] production of mineral commodities[2]

(Thousand metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984	1985[P]
METALS					
Aluminum:					
Ore and concentrate:					
Bauxite, 26% to 57% alumina	4,600	4,600	4,600	4,600	4,600
Nepheline concentrate, 25% to 30% alumina	2,500	2,500	2,500	2,500	2,500
Alunite ore, 16% to 18% alumina	600	600	615	615	615
Alumina	2,800	3,000	3,200	3,300	3,500
Metal, smelter:					
Primary	1,800	1,850	2,000	2,100	2,200
Secondary	180	190	200	210	215
Total	1,980	2,040	2,200	2,310	2,415
Antimony, mine output, recoverable metal content tons	8,600	9,000	9,200	9,300	9,400
Arsenic, white (As_2O_3) do	7,750	7,800	7,900	8,000	8,100
Beryllium: Beryl, cobbed, 10% to 20% BeO do	1,800	1,850	1,900	1,900	1,900
Bismuth, mine output, recoverable metal content do	75	78	80	82	83
Cadmium metal, smelter do	2,900	2,950	3,000	3,000	3,000
Chromium:					
Chrome ore, crude	[3]3,300	3,350	3,350	3,350	[3]3,360
Chrome ore, marketable	2,900	2,940	2,940	2,940	2,950
Cobalt:					
Mine output, recoverable metal content tons	2,200	2,300	2,400	2,600	2,700
Metal, smelter do	4,300	4,300	[r]4,400	4,700	4,800
Copper:					
Ore:					
Gross weight, 0.5% to 2% Cu	83,000	83,000	84,000	85,000	86,000
Metal content, recoverable	570	560	570	590	600
Metal:					
Blister:					
Primary	673	680	700	735	750
Secondary	137	138	139	141	143
Refined:					
Primary	730	759	776	790	810
Secondary	137	138	139	141	143

See footnotes at end of table.

Table 1.—U.S.S.R.: Estimated[1] production of mineral commodities[2] —Continued

(Thousand metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984	1985[p]
METALS —Continued					
Gold, mine output, metal content thousand troy ounces	8,425	8,550	8,600	8,650	8,700
Iron and steel:					
Iron ore, 55% to 63% Fe[3]	242,417	244,411	245,200	247,104	248,000
Iron ore, metal content[3]	131,071	132,055	133,563	134,809	135,300
Agglomerated products:[4]					
Sinter	154,657	151,846	151,000	151,000	[3]148,000
Pellets	54,023	55,826	59,800	63,100	[3]65,000
Metal:					
Pig iron and blast furnace ferroalloys:					
Pig iron for steelmaking[3]	100,576	99,706	102,958	103,469	103,000
Foundry pig iron[4]	6,600	6,400	6,700	6,700	6,300
Spiegeleisen[5]	50	50	50	50	50
Ferromanganese[5]	550	550	650	550	550
Total[3 6]	107,766	106,723	110,453	110,893	110,000
Electric-furnace ferroalloys	[r]1,800	[r]1,900	[r]2,000	[r]2,100	2,200
Steel, crude[3]	148,445	[r]147,165	152,514	154,238	155,000
Steel, rolled[3]	102,969	102,306	106,443	107,299	108,000
Semimanufactures:[4]					
Sections	38,285	37,700	NA	NA	NA
Wire rods	7,877	7,880	[3]8,300	[3]8,400	[3]8,400
Pipe stock	6,122	6,245	[3]6,400	[3]6,400	[3]6,600
Tubes from ingots	1,917	1,848	[3]1,900	[3]1,900	[3]1,900
Strip	11,010	10,220	NA	NA	NA
Railroad track material	3,900	4,131	NA	NA	NA
Wheels, tires, axles	1,084	1,014	NA	NA	NA
Other and unspecified	59	63	NA	NA	NA
Total semimanufactures[6]	104,880	104,151	NA	NA	NA
Selected end products:					
Total pipes and tubes[3]	18,268	17,944	18,732	18,883	19,300
Cold-rolled sheet[4]	7,551	7,808	NA	NA	NA
Electrical sheet[4]	1,136	1,113	NA	NA	NA
Lead:					
Mine output, recoverable metal content	425	430	435	435	440
Metal, smelter:					
Primary	480	485	490	495	500
Secondary	235	245	255	260	265
Magnesium metal, including secondary	78	81	83	85	87
Manganese concentrate:[3]					
Gross weight	9,150	9,821	9,876	10,089	9,900
Metal content	2,761	2,957	2,976	2,994	2,900
Mercury metal, including secondary 76-pound flasks	63,000	64,000	64,000	64,000	65,000
Molybdenum, mine output, metal content tons	10,700	11,000	11,100	11,200	11,300
Nickel:					
Mine output, metal content	158	165	170	175	180
Metal, smelter	178	180	[r]185	191	198
Platinum-group metals, mine output, metal content thousand troy ounces	3,350	3,500	3,600	3,700	3,800
Silver metal including secondary do.	46,500	46,900	47,100	47,400	47,900
Tin:					
Mine output, recoverable metal content tons	[r]21,000	[r]22,000	[r]22,000	23,000	23,000
Metal, smelter:					
Primary do.	[r]23,000	[r]24,000	[r]24,000	25,500	25,500
Secondary do.	12,000	12,000	12,000	12,000	12,000
Total do.	[r]35,000	[r]36,000	[r]36,000	37,500	37,500
Titanium:					
Concentrates:					
Ilmenite do.	425,000	430,000	435,000	440,000	445,000
Rutile do.	10,000	10,000	10,000	10,000	10,000
Metal do.	38,500	40,000	41,000	41,500	43,000
Tungsten concentrate, metal content do.	8,700	9,000	9,100	9,100	9,200
Vanadium do.	9,500	9,500	9,500	9,500	9,500
Zinc:					
Mine output, recoverable metal content	790	800	805	810	810
Metal:					
Primary	[r]870	830	[r]860	890	900
Secondary	85	90	95	95	100

See footnotes at end of table.

Table 1.—U.S.S.R.: Estimated[1] production of mineral commodities[2] —Continued

(Thousand metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984	1985[p]
METALS —Continued					
Zirconium metal	75	80	80	80	85
INDUSTRIAL MINERALS					
Asbestos	[3]2,479	[r]2,700	[r]2,800	2,850	2,900
Barite	510	520	520	530	540
Boron minerals and compounds:					
Gross weight	200	200	200	200	200
B_2O_3 content	40	40	40	40	40
Bromine	68	68	68	70	70
Cement, hydraulic[3]	127,169	123,681	128,156	129,866	131,000
Clays: Kaolin including china clay	2,500	2,500	2,600	2,800	2,900
Corundum, natural tons	8,600	8,600	8,700	8,700	8,700
Diamond:					
Gem thousand carats	2,100	2,100	3,700	4,300	4,400
Industrial do	8,500	8,500	7,000	6,400	6,400
Total do	10,600	10,600	10,700	10,700	10,800
Diatomite	230	235	235	240	245
Feldspar	320	330	330	330	340
Fluorspar	530	540	540	550	560
Graphite	70	75	80	80	82
Gypsum	4,900	4,900	4,900	4,900	4,900
Iodine tons	2,000	2,000	2,000	2,100	2,100
Lime, dead-burned[3]	28,400	28,700	29,500	29,500	29,200
Lithium minerals, not further specified	55	60	60	60	60
Magnesite:					
Crude	4,800	4,900	5,000	5,000	5,000
Marketable product	2,400	2,450	2,500	2,500	2,500
Mica	47	48	49	49	50
Nitrogen: N content of ammonia	13,300	13,300	15,400	15,600	15,800
Perlite	[r]600	[r]600	[r]600	600	600
Phosphate rock:					
Crude ore:					
Apatite, 15% P_2O_5	[3]46,400	[3]48,000	49,000	49,500	50,000
Sedimentary rock	25,400	26,000	26,200	26,400	26,400
Total	71,800	74,000	75,200	75,900	76,400
Concentrate:					
Apatite, 38.2% to 39.6% P_2O_5	18,000	18,300	18,500	18,700	19,000
Sedimentary rock, 19% to 30% P_2O_5	12,700	13,000	13,100	13,200	13,200
Total	30,700	31,300	31,600	31,900	32,200
Potash:					
Ore, gross weight	63,000	66,000	[r]70,000	71,000	72,000
K_2O equivalent[3]	8,449	8,079	9,294	9,776	10,200
Pyrite, gross weight	8,000	7,800	7,600	7,600	7,500
Salt, all types[3]	15,200	15,800	16,200	16,500	17,000
Sodium compounds, n.e.s.:					
Carbonate[3]	4,860	4,763	5,099	5,116	5,200
Sulfate:					
Natural	350	360	360	360	370
Manufactured	250	250	250	250	260
Sulfur:					
Frasch	800	800	800	800	850
Other native	[r]1,800	[r]1,800	1,800	1,800	1,700
S content of pyrite	3,600	3,500	3,400	3,400	3,350
Byproduct:					
Of metallurgy	425	425	450	450	475
Of natural gas	2,650	2,700	2,750	2,800	2,900
Of petroleum	425	425	450	450	450
Total	[r]9,700	[r]9,650	9,650	9,700	9,725
Sulfuric acid[3]	24,095	23,801	24,714	25,338	26,000
Talc	500	510	510	520	520
MINERAL FUELS AND RELATED MATERIALS					
Coal:					
Anthracite	67,000	67,000	67,000	67,000	67,000
Bituminous	477,213	488,400	490,800	489,500	490,000
Lignite and brown coal[3]	159,831	162,700	158,300	155,800	169,000
Total[3 7]	704,044	718,100	716,100	712,300	726,000
Coke: Coke oven, beehive, breeze, gas coke	86,000	86,000	86,000	86,000	86,000

See footnotes at end of table.

Table 1.—U.S.S.R.: Estimated[1] production of mineral commodities[2] —Continued

(Thousand metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984	1985[p]
MINERAL FUELS AND RELATED MATERIALS —Continued					
Fuel briquets:					
From anthracite and bituminous coal	600	600	600	600	600
From lignite and brown coal	6,200	5,800	4,800	4,900	5,000
Total[3]	6,800	6,400	5,400	5,500	5,600
Gas, natural, marketed:					
As reported[3] million cubic meters	465,262	500,700	[r]535,700	587,400	643,000
Converted million cubic feet	16,430,000	17,700,000	18,900,000	20,700,000	22,700,000
Oil shale[3]	36,928	35,236	33,256	33,204	32,076
Peat:					
Agricultural use	[r]180,000	[r]180,000	[r]180,000	180,000	180,000
Fuel use	60,000	60,000	60,000	60,000	60,000
Petroleum:					
Crude:					
As reported, gravimetric units[3]	608,820	612,600	[r]616,300	612,700	595,000
Converted, volumetric units thousand 42-gallon barrels	4,475,800	4,500,000	4,530,000	4,500,000	4,370,000
Refinery products[8]	445,590	453,200	[r]451,200	450,200	450,000

[p]Preliminary. [r]Revised. NA Not available.
[1]Production estimated unless otherwise specified.
[2]Includes data available through Sept. 5, 1986.
[3]Reported in Soviet sources.
[4]Reported in United Nations sources.
[5]Estimate based on total of spiegeleisen and blast furnace ferromanganese reported by United Nations sources.
[6]Data may not add to totals shown because not all items comprising total are listed.
[7]Run-of-mine coal.
[8]Not distributed by type and, therefore, not suitable for conversion to volumetric units. Data include all energy products and some nonenergy products as well as refinery fuel and exclude petrochemical feedstocks, paraffin, petroleum coke, white spirit, unspecified minor nonenergy products, and refinery losses. Estimate published in United Nations sources.

TRADE

Minerals accounted for over 80% of Soviet hard currency earnings, and the Soviet Union provided its Council for Mutual Economic Assistance (CMEA)[12] partners with the majority of their raw material requirements in nonhard currency transactions. The U.S.S.R. was dependent on imports for only a small number of mineral commodities, and there was no mineral commodity for which it was entirely dependent on imports. Mineral exports to market economy countries in the 1980's included diamonds, gold, natural gas, petroleum and petroleum products, platinum-group metals, and a number of other metals and industrial minerals, depending on market conditions and domestic supply. The U.S.S.R. set prices to capture the percentage of the market necessary to meet hard currency earning targets rather than to cover production costs. In addition to hard currency transactions, the Soviet Union also engaged in mineral trade with developing countries, often in nonhard currency transactions in which considerations included both economic and political factors. In contrast to trade with market economy countries, the Soviets supplied the CMEA countries with the majority of the minerals required for their economic development. The Soviet Union, in return, was able to acquire some needed minerals from the CMEA countries.

In 1985, the major change in Soviet mineral trade was the fall in hard currency earnings from petroleum exports, which traditionally accounted for about 60% of Soviet hard currency earnings. The fall resulted from lower world market prices for crude oil, which the Soviets were not able to offset with increased exports owing to declining domestic oil production and a reduction in oil imports from the Middle East for reexport. Losses in hard currency earnings from petroleum exports were somewhat offset by increased sales of gold and natural gas. The reduction in Soviet hard currency earnings from petroleum exports could presage a reduction in Soviet hard currency imports and/or an increase in other mineral exports.

Regarding changes in Soviet mineral imports, the Soviets were becoming increasingly dependent on lead and zinc imports and were continuing to import manganese ore. During the past decade, the Soviet Union shifted from net exporters to net importers of zinc and lead, owing to depleting reserves. In 1983, the Soviet Union began importing manganese ore, and it appeared that the Soviet Union would for some time continue to import manganese either in the form of high-grade manganese ore or ferromanganese owing to the depletion of Soviet high-grade manganese ore reserves. With the development of the Astrakhan sour gas field north of the Caspian Sea, which was slated for completion during the 1986-90 period, the Soviet Union would switch from a net importer to a net exporter of sulfur, but work on Astrakhan had been considerably delayed.

Table 2.—U.S.S.R.: Mineral trade with the United States in 1985

(Metric tons unless otherwise specified)

Commodity[1]	Quantity
Leading U.S. exports:	
Automotive, diesel, and marine engine lubricating oil barrels	203,090
Lubricating oils do.	81,649
Oils, insulating or transformer do.	169,519
Petroleum coke, calcined	53,040
Phosphoric acid, 65% or more available phosphorus pentoxide equivalent	82,969
Leading U.S. imports:	
Ammonia, anhydrous	720,331
Ferrosilicon, containing 30% to 60% by weight of silicon, not containing over 2% by weight of magnesium	9,410
Gasoline, leaded barrels	884,039
Naphthas derived from petroleum, shale oil, natural gas, or combinations thereof (except motor fuel) do.	816,228
Oils, heavy fuel, testing under 25° API do.	818,866
Oils, light fuel, testing 25° API or more, Saybolt Universal viscosity at 100° F of less than 45 seconds do.	1,066,551
Palladium, metal content kilograms	7,294
Palladium, semimanufactured, metal content do.	1,197
Platinum sponge, metal content do.	465
Rhodium, metal content do.	407
Urea	412,755

[1]Leading items selected based on value in U.S. dollars.

Table 3.—U.S.S.R.: Estimated production, trade, and consumption of mineral commodities in 1985

(Thousand metric tons unless otherwise specified)

Commodity	Production	Exports	Imports	Apparent[1] consumption
METALS				
Aluminum:				
Bauxite	4,600	--	4,600	9,200
Nepheline concentrate	2,500	--	--	2,500
Alunite	615	--	--	615
Alumina	3,500	--	1,400	4,900
Metal:				
Unwrought and semimanufactured	2,200	650	([2])	1,550
Secondary	215	70	--	145
Antimony tons	9,400	600	300	9,100
Arsenic, white (As_2O_3) do.	8,100	50	--	8,050
Beryllium, 10% to 20% BeO do.	1,900	([2])	([2])	1,900
Bismuth do.	83	--	200	283
Cadmium do.	3,000	50	250	3,200
Chrome ore	2,950	[3]471	--	2,479
Cobalt tons	2,700	--	2,100	4,800
Copper:				
Mine output, metal content	600	([2])	150	750
Unwrought, unalloyed, semimanufactured	750	200	50	600
Secondary	143	15	([2])	128
Gold thousand troy ounces	8,700	7,200	--	1,500
Iron and steel:				
Iron ore	[3]248,000	[3 4]43,880	([2])	204,120
Pig iron and ferroalloys	[3]110,000	4,000	([2])	106,000
Steel:				
Crude	[3]155,000	800	([2])	154,200
Rolled	[3]108,000	6,000	9,000	111,000

See footnotes at end of table.

Table 3.—U.S.S.R.: Estimated production, trade, and consumption of mineral commodities in 1985 —Continued

(Thousand metric tons unless otherwise specified)

Commodity	Production	Exports	Imports	Apparent[1] consumption
METALS —Continued				
Lead:				
Mine output, metal content	440	--	60	500
Primary	500	100	60	460
Secondary	265	--	--	265
Magnesium metal	87	3	2	86
Manganese ore	9,900	[3]1,126	350	9,124
Mercury 76-pound flasks	65,000	5,000	--	60,000
Molybdenum tons	11,300	(2)	7,000	18,300
Nickel:				
Mine output, metal content	180	--	18	198
Smelter	198	60	--	138
Platinum-group metals thousand troy ounces	3,800	1,600	(2)	2,200
Silver do.	47,900	--	7,000	54,900
Tin:				
Mine output, metal content tons	23,000	--	2,500	25,500
Primary do.	25,500	--	16,500	42,000
Secondary do.	12,000	--	--	12,000
Titanium metal do.	43,000	3,500	--	39,500
Tungsten do.	9,200	(2)	7,200	16,400
Zinc:				
Mine output, metal content	810	--	90	900
Primary	900	80	50	870
Secondary	100	--	--	100
INDUSTRIAL MINERALS				
Asbestos	2,900	600	(2)	2,300
Barite	540	--	500	1,040
Cement	[3]131,000	[3]2,313	[3]945	129,632
Clays	2,900	(2)	(2)	2,900
Corundum, natural tons	8,700	7,000	--	1,700
Diamond:				
Gem thousand carats	4,400	2,500	(2)	1,900
Industrial stones do.	6,400	700	(2)	5,700
Diatomite	245	(2)	(2)	245
Feldspar	340	--	40	380
Fertilizer materials:				
Nitrogen: N content	15,800	3,700	100	12,200
Phosphate rock	32,200	4,500	--	27,700
Potash, K_2O equivalent	10,200	[3]2,270	--	7,930
Fluorspar	560	--	625	1,185
Graphite	82	(2)	(2)	82
Gypsum	4,900	--	(2)	4,900
Lime, dead-burned	[3]29,200	(2)	(2)	29,200
Magnesite, crude	5,000	30	800	5,770
Mica	50	--	7	57
Perlite	600	110	--	490
Salt, all types	17,000	[3]399	(2)	16,601
Sulfur, all types	9,725	300	1,200	10,625
Sulfuric acid	[3]26,000	[3]222	150	25,928
Talc	520	(2)	(2)	520
MINERAL FUELS AND RELATED MATERIALS				
Coal:				
Anthracite and bituminous	557,000	28,000	12,000	541,000
Lignite and brown coal	169,000	(2)	(2)	169,000
Gas, natural million cubic meters	[3]643,000	75,000	4,000	572,000
Oil shale	[3]32,076	--	--	32,076
Peat:				
Agricultural	180,000	--	--	180,000
Fuel use	60,000	--	--	60,000
Petroleum:				
Crude	[3]595,000	100,000	10,000	505,000
Refinery products	450,000	60,000	1,000	391,000

[1]Includes amount available for consumption and stockpiling based on 1985 production and trade, and excludes consumption from stockpiles from previous years.
[2]Less than 1/2 unit.
[3]Reported in Soviet sources.
[4]Includes concentrates and pellets.

Table 4.—U.S.S.R.: Apparent exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS				
Alkali and alkaline-earth metals:				
Unspecified	184	NA		
Aluminum:				
Oxides and hydroxides	3,950	3,021	--	Cuba 3,017; Japan 4.
Ash and residue containing aluminum	--	1,631	--	All to West Germany.
Metal including alloys:				
Scrap	11,552	4,012	--	Canada 2,016; Italy 1,392; West Germany 571.
Unwrought	491,140	490,008	5,937	Hungary 163,320; Czechoslovakia 72,000; Japan 54,447.
Semimanufactures	18,709	17,315	--	Yugoslavia 9,967; Austria 3,092; Poland 2,845.
Antimony:				
Oxides	433	451	--	Japan 241; West Germany 85; Austria 80.
Metal including alloys, all forms	18	17	17	
Arsenic: Oxides and acids	12	NA		
Chromium:[2]				
Ore and concentrate thousand tons	496	442	--	Poland 131; Czechoslovakia 130; Yugoslavia 71.
Oxides and hydroxides	5,365	5,722	--	Yugoslavia 500; Czechoslovakia 451; Bulgaria 350.
Copper:				
Sulfate[2]	22,444	23,013	--	Bulgaria 7,986; Hungary 3,500; Ireland 1,499.
Ash and residue containing copper	--	214	--	All to West Germany.
Metal including alloys:				
Scrap	14,178	18,116	--	Austria 11,109; Poland 5,525; Switzerland 432.
Unwrought	63,678	96,126	--	Czechoslovakia 38,000; West Germany 22,548; Hungary 13,430.
Semimanufactures	606	847	--	Pakistan 382; Yugoslavia 157; Japan 139.
Gold: Metal including alloys, unwrought and partly wrought thousand troy ounces	667	632	4	West Germany 445; Japan 183.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite[2] [3] thousand tons	42,805	45,922	--	Czechoslovakia 13,539; Poland 11,048; Romania 7,671.
Metal:				
Scrap[2] do.	3,370	3,407	--	Yugoslavia 676; Italy 656; Spain 523.
Pig iron, cast iron, related materials do.	1,777	2,872	([4])	Poland 1,262; Czechoslovakia 742; Bulgaria 404.
Ferroalloys:				
Ferrochromium	21,330	17,506	--	Hungary 5,957; Austria 4,053; Belgium-Luxembourg 3,333.
Ferromanganese	24,623	25,277	--	Hungary 24,584; Italy 693.
Ferrosilicochromium	387	882	--	All to Sweden.
Ferrosilicomanganese	15,882	20,157	--	Romania 20,120; Thailand 37.
Ferrosilicon	59,286	37,510	10,445	West Germany 7,375; Hungary 6,233; Japan 4,308.
Silicon metals	--	6	--	All to Japan.
Unspecified	11,704	23,548	148	Hungary 10,282; Sweden 3,763; Turkey 2,410.
Steel, primary forms thousand tons	1,007	697	--	Hungary 391; Yugoslavia 198; Italy 42.
Semimanufactures:				
Bars, rods, angles, shapes, sections do.	497	671	--	East Germany 446; Hungary 139; Bulgaria 48.
Universals, plates, sheets do.	1,331	1,391	--	Cuba 490; East Germany 473; Hungary 228.
Hoop and strip do.	18	10	--	Bulgaria 5; Yugoslavia 5.
Rails and accessories do.	3	3	--	Yugoslavia 2; Turkey 1.
Wire do.	9	8	--	West Germany 4; Hungary 4.
Tubes, pipes, fittings do.	92	75	--	Cuba 39; West Germany 12; Turkey 10.
Castings and forgings, rough do.	45	38	--	Cuba 37.
Unspecified do.	594	429	--	All to Poland.

See footnotes at end of table.

Table 4.—U.S.S.R.: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued				
Lead:				
Oxides	50	NA		
Metal including alloys:				
Unwrought	17,326	23,987	--	Czechoslovakia 9,000; Finland 8,061; Hungary 5,924.
Semimanufactures	10	15	--	All to Yugoslavia.
Lithium: Oxides and hydroxides	90	NA		
Manganese: Ore and concentrate, metallurgical-grade[2] thousand tons	1,079	1,081	--	Poland 549; Czechoslovakia 300; Bulgaria 74.
Nickel:				
Ore and concentrate	--	25	--	All to Switzerland.
Matte and speiss	734	215	--	Spain 155; Greece 60.
Metal including alloys:				
Scrap	107	369	--	Austria 291; Italy 54; France 24.
Unwrought	35,426	35,759	54	West Germany 17,104; Japan 5,540; Czechoslovakia 4,219.
Semimanufactures	480	290	--	Yugoslavia 232; Italy 30; Pakistan 28.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$303,481	$320,306	$85,731	Japan $158,888; West Germany $40,302; Switzerland $23,419.
Silver:				
Ore and concentrate[5] do	--	$528	$52	United Kingdom $476.
Waste and sweepings do	--	$1,135	$118	Switzerland $873; West Germany $144.
Metal including alloys, unwrought and partly wrought do	$225	NA		
Tellurium, elemental and arsenic	13	13	--	West Germany 11; Japan 2.
Thallium: Metal including alloys, all forms	13	NA		
Titanium: Metal including alloys, all forms	1,147	655	81	West Germany 486; Sweden 72; Italy 16.
Tungsten:				
Ore and concentrate	30	NA		
Oxides and hydroxides	5	NA		
Uranium and thorium: Oxides and other compounds	--	15	--	All to Japan.
Zinc:				
Oxides	300	100	--	All to Yugoslavia.
Metal including alloys:				
Unwrought	14,803	31,392	--	India 15,000; Czechoslovakia 7,000; Hungary 4,181.
Semimanufactures	1	NA		
Other:				
Oxides and hydroxides	290	213	40	Yugoslavia 145; Sweden 15; Belgium-Luxembourg 10.
Ashes and residues	118,974	96,639	4,243	Austria 82,439; Japan 4,306.
Base metals including alloys, all forms	12,194	11,953	NA	Czechoslovakia 10,000; Austria 1,877; United Kingdom 59.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	520	NA		
Artificial:				
Corundum	4,191	6,723	--	West Germany 4,732; France 923; Japan 731.
Silicon carbide	3,544	7,002	--	West Germany 4,357; Italy 1,533; France 816.
Dust and powder of precious and semiprecious stones including diamond value, thousands	$1,286	$1,616	$135	Yugoslavia $481; Canada $441; Italy $256.
Grinding and polishing wheels and stones	24	78	--	Yugoslavia 25; West Germany 15; Spain 13.
Asbestos, crude	275,875	256,839	--	Poland 61,122; Japan 42,885; Yugoslavia 33,607.
Boron materials:				
Crude natural borates	618	NA		
Oxides and acids[2]	11,403	14,418	--	Yugoslavia 5,934; Hungary 1,288.

See footnotes at end of table.

Table 4.—U.S.S.R.: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Destinations, 1984: United States	Destinations, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Bromine	146	132	--	All to Hungary.
Cement[2] thousand tons	2,279	2,543	--	China 508; Hungary 506; Malta 100.
Clays, crude:				
Kaolin	38,431	32,960	--	Poland 25,575; Austria 7,385.
Unspecified	21,271	10,949	--	Yugoslavia 9,415; Hungary 1,512.
Diamond:				
Gem, not set or strung value, thousands	$231,102	$374,393	$755	Belgium-Luxembourg $287,461; Switzerland $36,899; West Germany $35,558.
Industrial stones do.	$857	$602	$30	Belgium-Luxembourg $570.
Feldspar, fluorspar, related materials	714	1,053	--	Japan 600; Greece 453.
Fertilizer materials:				
Crude, n.e.s	359	950	--	West Germany 575; Yugoslavia 375.
Manufactured:				
Ammonia thousand tons	2,030	2,122	884	Turkey 349; Italy 208.
Nitrogenous[2] do.	4,226	4,657	383	Hungary 724; Vietnam 578; Cuba 570.
Phosphatic[2] do.	692	696	--	Bulgaria 206; Hungary 146; Mongolia 39.
Potassic[2] do.	4,513	5,435	142	Poland 1,865; Hungary 693; Romania 296.
Unspecified and mixed do.	46	45	--	Hungary 44.
Graphite, natural	37	NA		
Gypsum and plaster	[2]22,400	NA		
Iodine	29	32	--	All to Hungary.
Lime	22,071	5	5	
Magnesium compounds	17,464	8,615	--	Hungary 5,293; Netherlands 3,322.
Mica: Crude including splittings and waste	724	NA		
Nitrates, crude	52,486	NA		
Phosphates, crude thousand tons	3,364	3,112	--	Bulgaria 770; Poland 627; Hungary 472.
Phosphorus, elemental[2]	55,707	55,474	--	Poland 12,072; Japan 2,415; Romania 1,088.
Pigments, mineral:				
Natural, crude	--	210	--	All to France.
Iron oxides and hydroxides, processed	917	589	--	Yugoslavia 549; West Germany 40.
Potassium salts, crude	1,888	NA		
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$280	$296	$56	Singapore $94; Hong Kong $68; West Germany $46.
Synthetic do.	$708	$572	$1	Austria $238; Singapore $122; West Germany $80.
Pyrite, unroasted[2] thousand tons	362	273	--	Bulgaria 249; Vietnam 24.
Salt and brine[2]	338,931	375,181	--	Czechoslovakia 120,340; Hungary 90,137; Denmark 60,652.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	20,195	100	--	All to Italy.
Sulfate, manufactured[2]	43,901	37,595	--	Italy 10,546; Yugoslavia 6,351; Sweden 4,590.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	11,039	12,073	--	Italy 4,730; West Germany 3,623; Japan 3,023.
Worked	31	459	NA	Sweden 439.
Dolomite, chiefly refractory-grade	491	937	--	All to Japan.
Gravel and crushed rock	374	6,370	--	All to United Kingdom.
Limestone other than dimension	33,763	15,750	15,750	
Quartz and quartzite	1	NA		
Sulfur:				
Elemental, crude including native and byproduct	37,171	33,994	--	Hungary 31,036; West Germany 2,831.
Sulfuric acid[2]	206,136	230,140	--	Czechoslovakia 116,307; Mongolia 1,760.
Talc, steatite, soapstone, pyrophyllite	1,306	1,203	--	Poland 1,198; Yugoslavia 5.
Vermiculite	106,943	130,930	--	Belgium-Luxembourg 51,357; Spain 36,445; Italy 25,792.

See footnotes at end of table.

Table 4.—U.S.S.R.: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Destinations, 1984: United States	Destinations, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Other:				
Crude	35,428	36,108	--	West Germany 19,663; Italy 7,619; Norway 4,728.
Slag and dross, not metal-bearing	8,803	46	--	All to Japan.
MINERAL FUELS AND RELATED MATERIALS				
Carbon black[2]	103,769	92,542	--	Bulgaria 25,543; Hungary 21,439; East Germany 19,867.
Coal:				
Anthracite and bituminous thousand tons	19,067	19,526	--	Bulgaria 5,177; Czechoslovakia 3,115; Japan 2,477.
Briquets of anthracite and bituminous coal do	10	NA		
Lignite including briquets do	133	149	--	Yugoslavia 121; Japan 22; Turkey 5.
Coke and semicoke do	2,084	1,433	--	East Germany 1,153; Bulgaria 263; Hungary 17.
Gas, natural: Gaseous million cubic feet	1,420,550	1,652,084	--	Czechoslovakia 370,275; Italy 306,129; East Germany 217,786.
Peat including briquets and litter	166,414	146,578	--	West Germany 34,103; France 22,812; Italy 17,406.
Petroleum:				
Crude thousand 42-gallon barrels	554,713	495,886	--	East Germany 125,450; Poland 95,175; Italy 62,300.
Refinery products:				
Liquefied petroleum gas do	2,259	2,247	--	West Germany 1,060; France 513; Austria 345.
Gasoline do	43,797	35,241	98	West Germany 18,708; Netherlands 8,577; France 4,560.
Mineral jelly and wax do	11	9	--	All to Hungary.
Kerosene and jet fuel do	2,219	1,337	138	Hungary 936; Netherlands 147; Cyprus 66.
Distillate fuel oil do	122,045	98,706	5,278	Netherlands 18,525; West Germany 16,597; Switzerland 12,812.
Lubricants do	2,140	1,751	--	Denmark 717; Sweden 708; Netherlands 213.
Residual fuel oil do	84,683	76,214	493	Italy 20,498; Belgium-Luxembourg 18,474; West Germany 10,532.
Bitumen and other residues do	21	NA		
Petroleum coke do	1,326	1,430	--	Italy 723; Japan 548; Yugoslavia 77.
Unspecified do	17,439	18,446	--	All to Poland.

[p]Preliminary. NA Not available.

[1]Table prepared by Jozef Plachy. Owing to a lack of official trade data published by the U.S.S.R., this table should not be taken as a complete presentation of this country's mineral trade. Unless otherwise specified, these data have been compiled from United Nations information and data published by the partner trade countries.

[2]Official Trade Statistics of the U.S.S.R.

[3]In Minerals Yearbook 1982 and 1983, the total export of iron ore was incorrectly reported as 54,429,000 metric tons; the correct amount is 44,123,000 metric tons.

[4]Less than 1/2 unit.

[5]May include other precious metals.

Table 5.—U.S.S.R.: Net exports of selected minerals and metals as a percent of consumption in 1985[1]

Commodity	Percent of consumption
Aluminum	42
Asbestos	26
Chromium ore	19
Corundum	412
Diamond, gem	132
Gas, natural	13
Gold	480
Iron ore and concentrate	22
Manganese concentrate	12
Nickel, smelter	43
Nitrogen	30
Perlite	22
Petroleum, crude and refinery products	38
Phosphate rock	16
Platinum-group metals	73
Potash	29

[1]Selection made from commodities for which exports comprise 10% or more of consumption.

Table 6.—U.S.S.R.: Net import reliance of selected minerals and metals as a percent of consumption in 1985

Commodity	Percent of consumption	Principal sources
Barite	48	Bulgaria, North Korea, Yugoslavia.
Bauxite and alumina	49	Greece, Guinea, Hungary, India, Jamaica, Yugoslavia.
Bismuth	71	Peru.
Cobalt	44	Cuba.
Feldspar	11	Thailand.
Fluorspar	53	China, Mongolia, Thailand.
Iron and steel, high-quality products	5	Austria, Belgium-Luxembourg, France, West Germany, Italy, Japan, Spain.
Magnesite	13	North Korea.
Mica	12	India.
Molybdenum	38	Mongolia.
Silver	13	Switzerland, United Kingdom.
Sulfur	8	Poland.
Tin	45	Malaysia, Singapore, United Kingdom.
Tungsten	44	China, Mongolia.
Zinc	7	Bulgaria, Finland, Netherlands, Norway, Poland, Sweden.

Table 7.—U.S.S.R.: Apparent imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Sources, 1984	
			United States	Other (principal)
METALS				
Aluminum:				
Ore and concentrate thousand tons	990	1,733	--	Jamaica 756; Greece 577; Yugoslavia 333.
Oxides and hydroxides do.	880	756	(2)	Yugoslavia 379; Hungary 336; Jamaica 26.
Metal including alloys:				
Unwrought	18	25	--	All from Netherlands.
Semimanufactures	4,604	5,933	--	Austria 2,941; West Germany 1,005; France 652.
Bismuth: Metal including alloys, all forms	5	33	--	West Germany 30; Netherlands 3.
Cadmium: Metal including alloys, all forms	230	148	--	Italy 80; Japan 30; Austria 23.

See footnotes at end of table.

Table 7.—U.S.S.R.: Apparent imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Chromium: Oxides and hydroxides	--	330	--	All from United Kingdom.
Cobalt: Metal including alloys, all forms	6	3	--	All from Netherlands.
Columbium and tantalum:				
Ore and concentrate	--	71	--	Do.
Metal including alloys, all forms, tantalum	31	NA		
Copper:				
Ore and concentrate	--	450	--	All from Sweden.
Matte and speiss including cement copper	--	1,022	--	All from Cyprus.
Metal including alloys:				
Scrap	--	45	--	All from Belgium-Luxembourg.
Unwrought	3	1	--	All from West Germany.
Semimanufactures	19,943	21,426	9	Poland 14,271; West Germany 3,514; Japan 2,677.
Gold: Metal including alloys, unwrought and partly wrought troy ounces	2	32	--	All from Japan.
Iron and steel: Metal:				
Scrap	22,131	44,208	--	Mongolia 23,024; Norway 21,184.
Pig iron, cast iron, related materials	5,599	4,001	--	Sweden 3,665; West Germany 333.
Ferroalloys:				
Ferromolybdenum	--	50	--	All from France.
Ferrosilicon	3,100	NA		
Silicon metal	--	16,329	--	Norway 14,855; Italy 1,474.
Unspecified	498	1,786	--	Turkey 1,300; Sweden 486.
Steel, primary forms	27,325	56,825	--	West Germany 34,318; Bulgaria 12,386; Italy 9,179.
Semimanufactures:				
Bars, rods, angles, shapes, sections thousand tons	678	1,092	(2)	Spain 479; Czechoslovakia 154; Hungary 127.
Universals, plates, sheets do	2,589	2,864	--	West Germany 776; Austria 509; Japan 445.
Hoop and strip do	218	251	(2)	West Germany 171; France 21; Italy 21.
Rails and accessories do	1	(2)	--	Mainly from West Germany.
Wire do	29	15	--	West Germany 3; Italy 3; Hungary 2.
Tubes, pipes, fittings do	4,578	4,747	(2)	Japan 1,450; West Germany 1,078; Italy 835.
Castings and forgings, rough do	5	3	--	Mainly from West Germany.
Lead:				
Ore and concentrate	49,785	24,954	--	Greece 8,000; Peru 7,631; Spain 7,518.
Oxides	3,452	2,479	--	France 1,754; West Germany 350; Italy 350.
Metal including alloys:				
Unwrought	30,792	57,851	--	Spain 37,960; Sweden 10,856; West Germany 3,528.
Semimanufactures	70	554	--	Canada 500; Yugoslavia 37; Japan 14.
Magnesium: Metal including alloys:				
Unwrought	--	1,300	--	All from Japan.
Semimanufactures	1,886	NA		
Manganese: Oxides	3,274	5	--	All from Switzerland.
Molybdenum:				
Ore and concentrate	848	282	--	All from Netherlands.
Metal including alloys, all forms	19	1	1	
Nickel:				
Matte and speiss	--	338	--	All from Cuba.
Oxides and hydroxides	1,745	1,409	--	Do.
Metal including alloys:				
Unwrought	31	NA		
Semimanufactures	82	224	--	Japan 142; Sweden 65; West Germany 5.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$4,163	$2,429	$1,127	United Kingdom $1,294; France $7.
Silver: Ore and concentrate do	$12,778	$110,123	$2,249	United Kingdom $106,222; Belgium-Luxembourg $1,397.
Tin:				
Ore and concentrate	2,005	1,319	--	All from Singapore.
Metal including alloys:				
Unwrought	7,249	13,479	10	United Kingdom 8,908; Singapore 1,510; Malaysia 1,290.
Semimanufactures	102	1	--	All from France.

See footnotes at end of table.

Table 7.—U.S.S.R.: Apparent imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Titanium:				
Ore and concentrate	10,000	24,684	--	Norway 21,184; Netherlands 3,500.
Oxides	1,750	1,760	--	West Germany 1,750; France 10.
Tungsten:				
Ore and concentrate	475	NA		
Metal including alloys, all forms	37	132	6	Netherlands 85; Japan 41.
Uranium and thorium:				
Oxides and other compounds	--	224	--	All from France.
Metal including alloys, all forms	--	1,344	--	France 1,269; West Germany 75.
Vanadium: Oxides and hydroxides	354	NA		
Zinc:				
Ore and concentrate	45,006	75,565	5,783	Sweden 41,444; Peru 21,245; Spain 7,093.
Oxides	--	1	--	All from Yugoslavia.
Metal including alloys:				
Unwrought	20,499	27,403	--	Spain 13,502; Belgium-Luxembourg 5,151; Italy 3,000.
Semimanufactures	1,671	1,243	--	Poland 1,189; Yugoslavia 54.
Other:				
Ores and concentrates	38,536	105,638	--	Australia 105,573; Italy 65.
Oxides and hydroxides	272	3,595	--	Sweden 3,517; Netherlands 65; Switzerland 10.
Ashes and residues	400	NA		
Base metals including alloys, all forms	581	104	--	Australia 54; Sweden 28; United Kingdom 20.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	4	NA		
Artificial: Corundum	1,999	2,100	--	Hungary 2,054; France 24.
Dust and powder of precious and semiprecious stones including diamond kilograms	153	(2)	--	All from Canada.
Grinding and polishing wheels and stones	2,042	2,671	14	Italy 756; Austria 722; France 402.
Asbestos, crude	19	73	--	Italy 49; Japan 20.
Barite and witherite	34,720	75,318	--	Turkey 73,303; Yugoslavia 2,015.
Boron materials:				
Crude natural borates	--	20	--	All from Netherlands.
Oxides and acids	9	1	--	All from West Germany.
Cement[3]	262,000	563,000	--	North Korea 280,000; Poland 154,181; Hungary 24,266.
Chalk	20	24	--	All from United Kingdom.
Clays, crude	5,200	2,269	--	Turkey 2,250; Yugoslavia 13.
Diamond:				
Gem, not set or strung value, thousands	$410	$460	--	Switzerland $299; United Kingdom $121; Belgium-Luxembourg $40.
Industrial stones do	$2,005	$1,482	--	Belgium-Luxembourg $994; United Kingdom $487.
Diatomite and other infusorial earth	73	436	--	Iceland 241; Italy 150; West Germany 26.
Feldspar, fluorspar, related materials	32,000	4,530	--	All from Spain.
Fertilizer materials:				
Crude, n.e.s	--	10,000	--	All from Austria.
Manufactured:				
Ammonia	1	NA		
Nitrogenous	41,925	105	--	All from Switzerland.
Phosphatic[3]	112,849	88,500	--	Morocco 81,500.
Unspecified and mixed	294,242	39	--	France 17; Italy 16.
Graphite, natural	93	NA		
Gypsum and plaster	76	132	--	Yugoslavia 127; Austria 5.
Iodine	--	15	--	All from Japan.
Lime	576	246	--	Austria 117; Yugoslavia 114.
Magnesium compounds	574,471	48,929	--	Turkey 20,886; Japan 14,858; Austria 10,155.
Mica: Crude including splittings and waste	2	NA		
Nitrates, crude	2,720	1,950	--	All from Bulgaria.
Phosphates, crude	--	20	--	All from France.
Pigments, mineral: Iron oxides and hydroxides, processed	2,506	734	--	Japan 674; West Germany 60.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$135	NA		
Synthetic do	$38	$47	--	United Kingdom $39; Japan $5.

See footnotes at end of table.

Table 7.—U.S.S.R.: Apparent imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Salt and brine	4,120	NA		
Sodium compounds, n.e.s.: Carbonate, manufactured	524,728	553,898	--	Bulgaria 490,189; Poland 63,708.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	8,989	9,459	--	Hungary 9,326; Yugoslavia 108.
Worked	1,141	956	--	Yugoslavia 949.
Dolomite, chiefly refractory-grade	--	19	--	All from Sweden.
Gravel and crushed rock	4,849	13,013	--	All from Yugoslavia.
Limestone other than dimension	2,959	NA		
Quartz and quartzite	1,015	2	--	All from Japan.
Sand, other than metal-bearing	154	330	--	All from West Germany.
Sulfur:				
Elemental, crude including native and byproduct ----- thousand tons	1,112	1,052	--	Poland 872; Canada 180.
Sulfuric acid	105,640	824	--	West Germany 603; Japan 199.
Talc, steatite, soapstone, pyrophyllite	2,511	NA		
Other: Crude	23,692	33	--	Yugoslavia 26; United Kingdom 7.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	1,535	40	--	Yugoslavia 38; Austria 2.
Carbon black	401	[3]578	64	Japan 487.
Coal:				
Anthracite and bituminous thousand tons	11,564	12,834	--	All from Poland.
Lignite including briquets --do	23	16	--	All from Hungary.
Coke and semicoke --do	723	787	--	All from Poland.
Gas, natural ----- million cubic feet	383	368	--	All from Hungary.
Peat including briquets and litter	34	22	--	All from Sweden.
Petroleum refinery products:				
Liquefied petroleum gas thousand 42-gallon barrels	1	([2])	--	Mainly from France.
Gasoline --do	21	3	--	Belgium-Luxembourg 2.
Mineral jelly and wax --do	1	2	--	Hungary 1.
Kerosene and jet fuel --do	24	45	--	Argentina 22; Yugoslavia 19; Greece 2.
Distillate fuel oil --do	386	185	--	Italy 69; Spain 64; Argentina 19.
Lubricants --do	1,323	1,534	153	France 440; West Germany 343; Italy 220.
Residual fuel oil --do	141	208	--	Spain 150; Greece 31; Argentina 24.
Bitumen and other residues --do	12	27	--	Spain 17; Hungary 8.
Bituminous mixtures --do	92	([2])	--	Mainly from Austria.
Petroleum coke --do	174	NA		

[p]Preliminary. NA Not available.
[1]Table prepared by Jozef Plachy. Owing to a lack of official trade data published by the U.S.S.R., this table should not be taken as a complete presentation of this country's mineral trade. Unless otherwise specified, these data have been compiled from United Nations information and data published by the partner trade countries.
[2]Less than 1/2 unit.
[3]Official Trade Statistics of the U.S.S.R.

COMMODITY REVIEW

METALS

Aluminum.—The 12th 5-year plan for 1986-90 called for a significant increase in aluminum production. During 1985, work progressed on two priority projects, which should measurably increase production. These were the new Sayansk aluminum plant in Krasnoyarsk Kray in East Siberia, which was commissioned, and the Tadzhik aluminum plant in the city of Tursunzade in the Tadzhik S.S.R. (Tadzhikistan), where plans called for commissioning six new potlines in addition to renovating older potlines. The Sayansk plant, which was planned to be the country's third largest aluminum producer, had been under construction for 10 years and had been scheduled for commissioning in 1984. It obtained its power from the nearby Sayan hydroelectric powerplant and processed alumina from the Nikolayevsk alumina plant on the Black Sea, which was a main processor of imported bauxite. The first output was reported at the Tadzhik plant from newly renovated potline No. 4, at which the number of pots had been increased to 76; another 22 pots were planned to be added, raising the total to 98 pots. Following this renovation, there were plans to renovate, in order, potlines Nos. 3, 2, and 1.

The U.S.S.R. was dependent on imported bauxite and alumina for almost 50% of its aluminum raw material requirements. A 7-year barter agreement for bauxite was signed with Guyana, one of the U.S.S.R.'s traditional bauxite suppliers, in exchange for machinery and pharmaceuticals.

Antimony and Mercury.—A large percentage of the country's antimony and mercury was mined in the Soviet Central Asian Republics of Tadzhikistan and the Kirgiz S.S.R. (Kirgiziya). The Anzob antimony-mercury mining and beneficiation complex in Tadzhikistan reported fulfilling its plan for the 1981-85 plan period ahead of schedule, and during the 1986-90 plan period, plans called for expanding capacity at the Anzob plant. In Kirgiziya, during the 1986-90 plan period, antimony production was planned to increase 11%, and mercury production, 15%. Work was scheduled in Kirgiziya for renovating the Kadamzhay antimony complex and the Khaydarkan mercury complex.

Chromium.—Crude chrome ore production reportedly increased to 3.36 million tons.[13] A portion of the crude ore was beneficiated, resulting in the production of 500,000 tons of concentrate.[14] Approximately 95% of the country's chrome ore production came from the Donskoye complex in Kazakhstan where development of the Molodezhnaya Mine with a total design capacity of 2 million tons of ore per year was under way. In December, the U.S. Bureau of Mines published a detailed study of the Soviet chrome industry.[15]

Cobalt.—Cobalt was one of the few metals for which the U.S.S.R. had a significant import dependence, but the majority of Soviet cobalt imports were obtained in non-hard currency exchanges with Cuba, a member of the CMEA trading bloc. The Soviets were engaged in an effort to expand cobalt production domestically and in Cuba. Domestically, the major area for expansion was the Noril'sk mining and metallurgical complex in East Siberia. During the 1981-85 period, cobalt production at Noril'sk increased 50%.[16] During 1985, at Noril'sk, the second stage of the Taymyr Mine was put into operation. The mine was over 1,000 meters deep and was planned to reach a depth of 1,600 meters. The ninth and last stage of the Oktyabrsk Mine was also put into operation at Noril'sk. The Oktyabrsk Mine was scheduled to produce at design capacity in 1987, at which time it would be producing about one-half the total output from all five mines of the Noril'sk complex.[17]

Copper.—The U.S.S.R. had been attempting to increase copper production despite decreasing ore grades and reserves at a number of existing enterprises. Open pit mining accounted for 71.2% of the copper ore mined. The distribution of capital stock, the labor force, and losses among the stages of copper mining and processing was reported as follows, in percent:[18]

	Capital stock	Labor force	Metal loss
Mining	41	55	20
Beneficiation	20	24	60
Smelting	39	21	20
Total	100	100	100

Copper production was expanded at the Noril'sk complex in East Siberia, the site of a rich polymetallic deposit containing cobalt, copper, nickel, platinum-group metals, silver, and other byproducts. During the 1981-85 period, copper production at Noril'sk increased 50%.[19] Several deep underground mines were under development at Noril'sk. During 1985, the second stage of the Taymyr Mine was put into operation. The mine was over 1 kilometer deep, and development was planned to a depth of 1,600 meters. Also, during the year, the ninth and last stage of the Oktyabrsk Mine at Noril'sk was put into operation. When brought to full capacity in 1987, the Oktyabrsk Mine would produce almost one-half the total output from all five mines of the Noril'sk complex.[20] Slag processing was initiated at the Nadezhda complex at Noril'sk, increasing production of blister copper. The 1986 plan for Noril'sk called for a 2.3% increase in copper production.[21]

At Noril'sk, the first stage of a fluidized-bed, autogenous smelter was put into operation. The smelter, developed by the U.S.S.R., was supposed to double labor productivity, increase the output of sulfuric acid and byproduct metals, and control noxious emissions. During the 1986-90 period, plans called for increasing autogenous, fluidized-bed smelter production in the country by 150% to 200%, and 35% of the country's copper output was to be produced with autogenous smelters.

A large portion of copper production and of copper reserves is concentrated in Kazakhstan, where about 30% of the country's copper was mined. During the 1986-90 period, plans called for refined copper production in Kazakhstan to increase by 36.5%. The following developments were reported in Kazakhstan in 1985. At the Balkhash copper complex, an autogenous, fluidized-bed smelter was put into operation on an experimental basis. At the Dzhezkazgan copper mining and metallurgical complex, production began at underground mine No. 67 of the southern mining administration near the city of Nikol'skiy. Problems continued at Dzhezkazgan with the No. 3 smelter, which was officially commissioned in 1984. The smelter was reported to have so many operational defects that officials had to delete the commissioning of the smelter from their performance report.[22] Production of refined copper at Dzhezkazgan fell far short of the target for the 1981-85 period.[23] Elsewhere in Kazakhstan, the East Kazakhstan copper chemical complex began exploitation of the Shemonaikhinskoye polymetallic deposit, securing its reserve base until the end of the century.[24] During the 1986-90 period, it was also planned to begin development of the Boshchekul'skiy copper mining and beneficiation complex in Kazakhstan.

In the Uzbek S.S.R. (Uzbekistan), a new crushing-beneficiation plant was put into operation at the Almalyk copper complex in 1985. The new plant would enable Almalyk to increase copper production despite the low copper content of the ore.

In the Urals, where local copper mines supplied only about 50% of the required ore,[25] plans called for the renovation of a number of older copper enterprises. At the Kirovgrad complex, renovation of the copper smelter was under way to enable it to better process scrap and waste material. Production capacity increases at Kirovgrad were planned for the production of blister copper, zinc, and tin. Also, in the Urals, renovation was planned at the Karabash copper smelter, one of the copper industry's oldest and most antiquated enterprises with an almost depleted ore base. At the Mednogorsk copper-sulfur complex in the Urals, there were plans to introduce autogenous smelters in blister copper production.

At the Erdenet copper-molybdenum complex in Mongolia, jointly developed by the Soviet and Mongolian company Mongolsovtsvetmet in which the Soviet Union had a declared 92% interest, work was under way to expand the design capacity by 25%, enabling Erdenet to increase ore mining and processing capacity from 16 million tons per year containing from 118,000 to 125,000 tons of contained copper per year to 20 million tons of ore per year. Output from Erdenet, which achieved the 16-million-ton design capacity in 1983, was sent to the Soviet Union.

The issue was raised concerning the long delayed development of the Udokan copper deposit near Lake Baikal. Development of this deposit, which had been made more accessible with the completion of the Baikal-Amur Railroad (BAM), was urged. However, work was still progressing slowly on developing the necessary technology for mining and beneficiating ore from Udokan, and the Soviet Union in the past had solicited the aid of foreign firms, particularly from Japan, for developing Udokan. During the 1986-90 period, plans called for constructing an experimental mining and beneficiation facility at Udokan to try to resolve technological problems.

Ferroalloys.—During the 1981-85 period, the Soviet Union engaged in a rapid expansion of ferroalloy capacity, particularly of ferromanganese and ferrosilicon. Ferromanganese production was expanded with the addition of new electric furnaces from Japan, and the Soviet Union was able to increase ferromanganese exports to its CMEA trading partners. However, there had been no significant Soviet ferromanganese exports to market economy countries since the mid-1970's. During this period, the U.S.S.R. also rapidly expanded ferrosilicon production capacity at the Yermak ferroalloy plant in Kazakhstan, which produced one-sixth of the country's ferroalloys. During the 1981-85 period, output at Yermak grew 34%, and the Soviet Union increased exports of ferrosilicon to market economy countries.

Gold.—Soviet gold sales in 1985 were estimated to have increased to 225 tons as gold increased in importance as a hard currency earning export owing to lower world market prices for petroleum combined with decreasing Soviet petroleum production. During the 1986-90 period, the development of two new gold mining complexes in Soviet Central Asia was planned. In Kirgiziya in Soviet Central Asia, construction of the Kirgiz gold mining and beneficiation complex was to be completed by yearend 1986, and in Tadzhikistan in Soviet Central Asia, development of a gold mining and beneficiation complex was to begin.

Iron Ore.—Iron ore production was 248 million tons of commercial-grade ore from 537 million tons of crude ore.[26] Agglomerate production was reported at 148 million tons, and pellet production, at 65 million tons.[27]

During the 1981-85 period, over 50% of iron ore was mined from open pits with a capacity of more than 20 million tons per year. In 1985, the average open pit capacity was 16 million tons per year and the average open pit depth was 200 meters, which was an 11% increase in depth compared with that of 1980. More than one-third of all ore was extracted from open pits at a depth of more than 250 meters. Some open pits, such as the Sarbayskiy and Sokolovskiy, reached depths of 320 meters. The average shovel capacity in iron ore mining was 6.69 cubic meters. Within the pits, off-highway trucks accounted for 47% of ore transport, and rail, 43.4%. The average capacity of dump trucks in iron ore mining in 1984 was 57.7 tons, which represented a significant increase compared with that of 1981 when the average dump truck capacity was 41.4 tons.[28] During the 1981-85 plan period, the percentage of ore requiring beneficiation rose from 68% to 86% of total iron ore production. In 1986, the entire growth in steel production was to be achieved without any growth in iron ore extraction.

In 1985, the third and final stage of the Kostamush iron ore mining and beneficiation complex in Karelia was commissioned; an official inauguration ceremony was held by the Soviet Union and Finland, which jointly developed this complex. When operating at full capacity, Kostamush was designed to produce 24 million tons of ore per year for the production of 8 million tons of pellets per year. Finland, in exchange for its assistance, began receiving pellet shipments.

In 1985, the first stage of the Kachar mining and beneficiation complex in Kazakhstan with a capacity of 3 million tons of ore per year was put into operation; Kachar had been under development for 10 years. There were plans to put the second stage of Kachar into operation in 1986, with capacity of 2 million tons per year, and to raise total capacity during the 1986-90 period to 7 million tons of ore per year. The Kachar complex would be important in compensating for inadequate production at the nearby Sokolovskiy-Sarbayskiy mining and beneficiation complex.[29]

In 1985, construction began on a beneficiation plant for low-grade ores in the Krivoy Rog Basin in the Ukraine, which produced over 40% of the country's iron ore. The Soviet Union was being assisted by its CMEA partners in the construction of this plant, which was to have a design capacity to produce 13 million tons of pellets per year. The CMEA countries were to be compensated with pellet shipments.

Iron and Steel.—The steel industry faced severe challenges. The General Secretary of the Communist Party stated that during the past decade the steel industry had not been fulfilling its plan, and there was a need for fundamental change.[30] Despite the fact that the U.S.S.R. was the world's largest steel producer, the country in recent years experienced significant shortages of specialty steels, which it had to import mainly from Western Europe and Japan.

Criticism within the Soviet Union faulted the steel industry for not meeting its goals to produce the high-quality steel products needed to modernize industry. The iron and steel industry was criticized for, among other things, having channeled investment during the past 15 years into new construction rather than into re-equipping and modernizing existing enterprises. The new Minister of Ferrous Metallurgy, who replaced the former minister following criticism of the steel industry's performance, announced that during the 1986-90 plan period more than one-half of the capital investment in the steel industry would be devoted to modernizing existing enterprises rather than constructing new ones. Basic modernization was to include replacing openhearth furnaces, which still accounted for 57% of total steel production, with oxygen converter and electric arc furnaces, and increasing the amount of continuously cast steel, which currently accounted for about 12% of total production. The ministry also planned to increase production of cold-rolled steel and steel pipe to reduce imports.

In 1985, there were increases in the production of crude steel, rolled steel, and steel pipe. In 1986, plans called for increasing rolled steel production to 111.1 million tons and steel pipe production to 19.9 million tons. For the 1986-90 period, plans called for increasing rolled steel production to between 116 and 119 million tons by 1990. Production of oxygen converter steel was planned to increase 30% to 40%, and production of continuously cast steel was to double.

During 1985, the following developments were reported in the iron and steel industry. The Komsomol'sk na Amure minimill in the Soviet Far East, with a capacity of 700,000 tons per year, was officially commissioned as scheduled. However, the 500,000-ton-per-year rolling mill was not scheduled for completion until 1986. The first output of rolled steel was reported from the Rybnitsa minimill in Moldavia, which was officially commissioned in 1984. The Karaganda tinplate shop in Kazakhstan reported achieving its design capacity. The new tinplate shop, which began production in 1982, had increased the country's tinplate production by 150%. At the Oskol steel mill, the country's first direct-reduction steelworks, a third electric furnace with a capacity of 360,000 tons per year was put into operation. At the Donetsk steel mill, an electric-furnace shop was put into operation with two furnaces, each with a capacity to produce 230,000 tons of alloyed steel per year.

The U.S.S.R. concluded a number of foreign trade agreements to import steel pipes, rolled steel, and specialty steel products, and to purchase plant and equipment that would enable the U.S.S.R. to produce these products domestically.

Finanziaria Siderurgica S.p.A. (Finsider), the Italian state steel corporation, won a 5-year contract to supply the U.S.S.R. with 1.2 million tons of pipe per year from 1986 to 1990. This 6-million-ton contract was equal to the total amount of steel that Italy had exported to the Soviet Union since 1974. The contract was an important order for Italy as it would help reduce the country's large trade deficit with the Soviet Union.

The U.S.S.R. ordered from Union Sidérurgique du Nord et de l'Est de la France S.A. (Usinor) of France over 2 million tons of steel products including gas pipeline sections and sheet steel for the automotive industry. The deal was part of an arrangement by which the Soviet Union would substantially increase its purchases of French capital goods in return for France not substantially reducing its purchases of Soviet gas.

The Soviet Union signed a contract with Spain's Empresa Siderúrgica S.A. (Ensidesa) for the delivery of 800,000 tons of steel products, mainly cold-rolled sheet, over a 4-year period. Total Spanish exports of steel products to the U.S.S.R. in 1985 were estimated at 1 million tons. Spain had become one of the largest European suppliers of steel products to the U.S.S.R.

Austria's Voest-Alpine AG signed an agreement to deliver over 3 million tons of steel products to the U.S.S.R. over a 4-year period. Deliveries were to start in 1986 and continue until 1990 and were to include about 1 million tons of plate and 1.5 million tons of cold-rolled steel. In addition, deliveries of 800,000 tons of castings and tubing were to commence in 1987.

Japan, another traditional supplier of steel products to the U.S.S.R., agreed to deliver 500,000 tons of large-diameter steel pipe between October 1985 and March 1986. This order increased Soviet purchases of Japanese pipe to 1 million tons during 1985.

Regarding Soviet purchases of plant and equipment, Italy's Società Italiana Impianti S.p.A. (Italimpianti) contracted with the Soviet Union to build a turnkey plant in the city of Volzhskiy near Volgograd to produce seamless pipes for oil and gas transmission; the plant would have a capacity to produce 200,000 tons of continuously cast tube billets per year and 720,000 tons of pipe per year, and would include an electric smelting shop, a pipe-rolling shop, finishing shop, and control, repair, and auxiliary facilities. Italimpianti would act as general contractor for the plant, which it was expected, would take 3 years to construct.

Lead and Zinc.—In the lead-zinc industry, the distribution of capital stock, the labor force, and losses among mining and processing was reported as follows, in percent:[31]

	Capital stock	Labor force	Metal loss
Mining	38	54	30
Beneficiation	21	16	57
Smelting	41	30	13
Total	100	100	100

A slowdown in the growth of lead and zinc production occurred as ore grades declined and existing reserves were being depleted. New capacity was not being developed rapidly enough to compensate for the slowdown in production. The U.S.S.R. needed to increase imports of lead and zinc to provide for domestic consumption and to meet its export commitments to its CMEA partners.

Kazakhstan was the country's major lead-zinc producing region, producing about 70% of the country's lead and 50% of its zinc. Efforts were under way to expand lead-zinc production in Kazakhstan. During the 1986-

90 period, plans called for increasing lead production in Kazakhstan by 11.2% and zinc production by 3.8%. It was planned to begin development of the Shalkiya lead-zinc deposit in Kazakhstan situated on the southern slope of the Karatau Mountains near the Kentau zinc smelter. A significant effort to expand production was occurring at the Zhayremsk lead-zinc complex where plans called for doubling ore output by 1990. Shortly after yearend, an open pit was commissioned at the Dal'nezapadnyy mining directorate of the Zhayremsk complex. At the Leninogorsk polymetallic complex in Kazakhstan, where mining had been conducted for over 200 years with particularly intense development following World War II, the mining conditions were worsening, and the ore grade was decreasing. Nevertheless, Leninogorsk reported fulfilling its production plan for the 1981-85 period. The Leninogorsk complex planned to develop the Chekomar deposit by 1990 and the Novo-Leninogorsk deposit later to compensate for depleted reserves.

In Siberia, during the 1986-90 period, plans called for the start of development of the Goryevka lead-zinc deposit situated under the Angara River and the Ozernyy polymetallic complex in the Buryat A.S.S.R. To develop Angara, it was planned to create a series of dikes to divert the river 1,200 meters away from its present channel and to develop the main open pit in the reclaimed area. In 1987, at Goryevka, plans called for commissioning a pilot plant with the capacity to mine and process 1,000 tons of ore per year that would be used to develop suitable technology for extensive working of the deposit. At the Akhtala lead-zinc mining directorate in the Armenian S.S.R. (Armenia), it was planned, based on new assessments, to remine during the 1986-90 period depleted mines that were no longer in operation.

In 1985, the following developments were reported in the lead and zinc industry. In Tadzhikistan, the Adrasmanskiy lead-zinc complex fulfilled its 5-year plan ahead of schedule, and there was a 25% increase in extraction and processing capacity owing to renovation. In the Urals, the Uchaly lead-zinc mining and beneficiation complex, which included the Uchaly and Mezhozernyy mining directorates, reportedly, had increased ore processing 2.8% and production of zinc in concentrate 9.7% compared with that of 1980 and fulfilled its goals for the 1981-85 plan period.[32] During the 1986-90 period, the Uchaly complex planned to speed development of the Uzel'ginskiy underground mine to compensate for lost production from depleting open pits. Uzel'ginskiy was slated to begin production in 1990.

In 1985, Italy's Snamprogetti S.p.A., an Ente Nazionale Idrocarburi (ENI) subsidiary, agreed to supply the Soviet Union with a 200,000-ton-per-year electrolytic zinc refinery to be built near the city of Chelyabinsk in West Siberia. The zinc refining process was to be licensed from Società Azionaria Minero-Metallurgica (Samim), another ENI subsidiary. The plant, which was scheduled for completion in 1989, would use a computer-controlled, automated production process along with automated handling of jumbo cathodes. The refinery would be built on the site of a 150,000-ton-per-year refinery dating back to 1935, which would be replaced by the new refinery.

Magnesium.—Kazakhstan, one of the country's leading magnesium producing regions, contains the Ust'-Kamenogorsk titanium and magnesium complex. During the 1986-90 period plans call for increasing magnesium production in Kazakhstan by 45% and at Ust'-Kamenogorsk by more than 70%.

Manganese.—The U.S.S.R. was by far the world's largest manganese producer with triple the production of the world's next largest producer, the Republic of South Africa. Nevertheless, the state of the Soviet manganese industry was of growing concern because Soviet reserves of high-grade ore were being depleted, requiring the Soviet Union in recent years to import manganese ore. The Soviet supply situation was dependent on putting new capacity into operation at Nikopol as well as developing deposits in Kazakhstan and Siberia.

In 1985, manganese concentrate production decreased to 9.9 million tons, from nearly 10.1 million tons in 1984. Crude ore production was 21.9 million tons.[33] Over 95% of Soviet manganese was produced in two regions, the Nikopol Basin in the Ukranian S.S.R. (Ukraine), which produced over 70% of the total, and the Chiatura deposit in the Georgian S.S.R. (Georgia), which produced over 25%. Manganese production statistics for the Ukraine were not published,[34] unlike past years, but it appeared that there was a fall in production in 1985, which could be a harbinger of a manganese supply problem at the Nikopol Basin that could persist until production is brought on-stream at the Bol'shoy Tokmak carbonate ore deposit under development in the basin. The carbonate ore, however, was of lower grade than the usual oxide ore, and the Soviet Union had not mastered the necessary technology for processing it.

At the Chiatura deposit in Georgia, where reserves of high-grade ore were being depleted, production statistics were reported, showing that production fell 3% to 2.7 million tons of concentrate. Despite this decrease in production, the plan for manganese production for Georgia was reported fulfilled, indicating that the Soviets were taking the worsening conditions at Chiatura into account in their planning process. New capacity for ore extraction and concentrate production was commissioned at Chiatura, which should compensate to some degree for falling production. The Chiatura deposit was also the chief source of Soviet battery-grade ore. Decreasing production at Chiatura could be affecting the supply of ore to chemical enterprises as complaints were raised that chemical enterprises in Georgia fell thousands of tons behind in supplying the country with electrolytic manganese dioxide.[35]

Efforts were being made to expand manganese ore production in Kazakhstan, which produced less than 5% of the country's output for use locally in steel and ferroalloy plants. During the 1981-85 period, the Dzhezdinskiy mining administration in Kazakhstan, which exploited the Dzhezdy manganese deposit in Dzhezkazgan Oblast', reported a 40% increase in manganese concentrate production. At the Atasuyskiy mining administration in Kazakhstan, which exploited iron-manganese ore from the Karazhal deposit, plans called for completely renovating the complex by the end of the century in an attempt to double output.

Molybdenum.—The 12th 5-year plan for 1986-90 called for accelerated growth of molybdenum production. During this time, plans called for starting development of the Koktenkol'skiy molybdenum mining and beneficiation complex in Kazakhstan. The Boschekulskiy copper mining and beneficiation complex, planned for development in Kazakhstan during this period, would produce molybdenum as a coproduct. Also, plans called for commissioning the Zhireken molybdenum mining and beneficiation complex and the second stage of the Sorsk molybdenum complex, both in East Siberia. Work was under way to expand the Erdenet copper-molybdenum complex in Mongolia, which had been developed jointly by the Soviet-Mongolian company Mongolsovtsvetmet in which the Soviets had a declared 92% interest. Erdenet was to expand from its design capacity, achieved in 1983, to mine 16 million tons of ore per year for the production of 1,000 tons of molybdenum metal in concentrate, to mining and processing 20 million tons of ore per year. Output from Erdenet was sent to metallurgical plants in the Soviet Union.

It was reported in the Western press that the U.S.S.R. was seeking to purchase 10,000 tons of molybdenum concentrate in 1985. A purchase of this magnitude would far exceed the amount of molybdenum generally imported and could give the U.S.S.R. a quantity of molybdenum almost equal to its annual production for consumption or stockpiling.

Nickel.—During the 1981-85 period, the Soviet Union was engaged in an effort to expand nickel production at Noril'sk, the site of a rich copper-nickel deposit in East Siberia, and was also assisting in developing Cuban nickel resources in exchange for nickel. During the 1981-85 period, nickel production at Noril'sk increased 50%.[36] In 1985, the second stage of the Taymyr Mine at Noril'sk was put into operation; the mine was over 1,000 meters deep and development was under way to mine to a depth of 1,600 meters. Also at Noril'sk, the ninth and last stage of the Oktyabrsk Mine was put into operation. When operating as scheduled at design capacity in 1987, the Oktyabrsk Mine would produce almost one-half the total output of the five mines of the Noril'sk complex.[37] The 1986 plan for Noril'sk called for a 5.8% increase in nickel production.[38]

Platinum-Group Metals.—The U.S.S.R. was expanding platinum-group metals production at the Noril'sk complex in East Siberia, the site of a rich copper-nickel deposit with significant byproduct platinum-group metals production. During 1981-85, there was a 40% to 50% expansion of cobalt, copper, and nickel production at Noril'sk, and it may be assumed that there was a significant increase in platinum-group metals production. At Noril'sk, increased capacities were commissioned at two underground mines in 1985: the second stage of the 1,000-meter-deep Taymyr Mine and the ninth and last stage of the Oktyabrsk Mine. The Oktyabrsk Mine was scheduled to produce at design capacity in 1987, at which time it would be producing almost one-half of the total output of all five mines of the Noril'sk complex.

The U.S.S.R. was the world's largest exporter of palladium. Soviet ore contains a ratio of 2.7 to 1 of palladium to platinum, which was almost the opposite of the situation in the world's other major platinum-group metals exporting country, the Republic of South Africa. Soviet platinum exports decreased to an estimated 200,000 troy ounces in 1985, and palladium exports decreased to an estimated 1.37 million troy ounces. Soviet palladium sales exerted a major influence on the world palladium market. In 1983, the Soviet Union switched to a frame contract system for marketing palladium, and subsequently, there was a significant increase in palladium prices. It was reported in the Western press that in 1986 the Soviet Union was planning to abandon its frame contract method of palladium marketing. Following this reporting, there was a substantial increase in palladium prices and speculation in the Western press that the U.S.S.R. would reduce palladium exports to world markets.

Rare Earths and Other Metals.—The 1985 plan for rare metals production was reported fulfilled. At the Pavlodar alumina plant in Kazakhstan, a new shop was commissioned to produce gallium. The U.S.S.R., reportedly, expected a 150% increase in exports to the United States of rare-earth metals and compounds, including europium, yttrium oxide, and metallic calcium. According to the Soviet foreign trade organization Techsnabeksport, the sole Soviet exporter of rare and rare-earth metals, a series of contracts with U.S. firms had been signed for 1986. Regarding imports, it was reported in the Western press that the U.S.S.R. purchased 200 tons of high-purity columbium oxide from Brazil with delivery in March and April 1985.

Tin.—Tin was one of a few metals for which the Soviet Union was significantly dependent on imports. The distribution of capital stock, the labor force, and metal losses among the stages of tin mining and processing was reported as follows, in percent:[39]

	Capital stock[1]	Labor force	Metal loss
Mining	41	58	35
Beneficiation	26	29	52
Smelting	23	13	13
Total	100	100	100

[1]Reported figures; data do not add to total.

Tin mining was concentrated in remote eastern parts of the country, where expansion of tin mining was occurring. At the Deputatskiy tin mining and beneficiation complex in Yakutia, where development began in 1979, the first stage of a lode mine and concentrator was to be commissioned during the 1986-90 period; the start of concentrate production was planned for 1986. In Soviet Central Asia during the 1986-90 period, plans called for continuing development of the Sary Dzhaz tin mining complex in Kirgiziya, but operations would probably not begin until the mid-1990's. Besides tin, the Sary Dzhaz complex would also recover a range of byproducts including bismuth, copper, molybdenum, silver, and tungsten.

Titanium.—The Soviet Union had long been engaged in a program to expand titanium production. Large increases in titanium production were planned for both the 10th 5-year plan (1976-80) and the 11th 5-year plan (1981-85). One of the major enterprises engaged in expanding titanium production was the Ust'-Kamenogorsk titanium-magnesium complex in Kazakhstan where titanium production was planned to increase 27.1% during the 1981-85 period. During the 1986-90 period, plans called for titanium production in Kazakhstan to increase by 22.7% and at the Ust'-Kamenogorsk complex by 24%. During this period, plans called for constructing a shop for smelting titanium slag at Ust'-Kamenogorsk, for which feed material would be shipped for distances up to 5,000 kilometers. The director of Ust'-Kamenogorsk argued, to the contrary, that it would be less expensive to develop local titanium sources than to transport material such long distances to the new shop.[40]

Soviet titanium shipments to the West in past years had caused concern owing to uncertainty regarding the amount shipped and the fears of Western producers regarding dumping. During 1985, the Soviets reduced exports of titanium scrap and ferrotitanium to West European markets. However, indications were that exports would increase in 1986. A review of the U.S. antidumping duty of 83.96% levied against Soviet titanium in 1984 was requested by the ICD Group Inc., which had replaced Kolon Trading Co. as the U.S. and Canadian agent for the Soviet foreign trade organization handling titanium exports. No U.S. imports of titanium sponge from the U.S.S.R. had been reported since 1984. The ICD Group declared that it was impossible to market Soviet titanium to the United States with this duty, and the U.S. Department of Commerce agreed to review the duty.

Tungsten.—Tungsten was one of the few metals for which the U.S.S.R. was significantly dependent on imports, and there had been a major emphasis on increasing tungsten reserves and finding tungsten substitutes. The quality of tungsten ore had been declining for a long period; from 1968 to 1980, the tungsten trioxide content of ore had decreased 14%.[41] A research priority was to develop alloys to replace tungsten alloys owing to the country's dependence on foreign sources of supply.[42] The 1986-90 plan called for accelerated growth in tungsten production. During this period, plans called for developing the Kayraktinskiy tungsten mining and beneficiation complex in Kazakhstan, involving the renovation of an older mine and concentrator. Also, the Soviet Union announced a trade agreement with China for the 1986-90 period whereby China would supply the U.S.S.R. with tungsten ore. Although trade data had been lacking for many years, China had probably been the main supplier of tungsten ore to the Soviet Union.

INDUSTRIAL MINERALS

Amber.—The Baltic region of the Soviet Union was one of the world's leading amber producing areas, and Baltic amber was prized for its high quality. About 37 tons of amber per year was washed ashore on the Baltic coast. A percentage of this amber was gathered by individuals who sold it to state outlets. The Kaliningrad amber complex near the southern shore of the Baltic Sea reported that in 1984 it obtained 4.5 tons of amber from collectors, but in 1985, almost 8 tons was obtained. The vast majority of Soviet amber production, however, was mined rather than washed ashore, and Kaliningrad Oblast' and the Lithuanian S.S.R., reportedly, contain 95% of the world's amber reserves; these reserves are at a depth of from 12 to 60 meters. The Kaliningrad complex reported mining about 600 tons of amber per year, 90% of which was processed for industrial uses, including insulators and paints, while about 10% was used for jewelry.

Asbestos.—In 1985, the Kiyembay asbestos complex in Orenburg Oblast' in the southern Urals was reported to have attained its design production capacity of 500,000 tons per year of grades III and IV from 24 million tons of ore with an average grade of 4.4%. Production in 1985 at Kiyembay increased by 70,000 tons in comparison with that of 1984. Development of the Kiyembay complex had begun in 1968 with the help of participating CMEA countries, which provided one-third of the investment in return for one-third of the output.

Cement.—Reportedly, during the first 4-1/2 years of the 11th 5-year plan, 1981 to mid-1985, the country produced 7.3 million tons more cement, including 5.3 million tons more by dry processing, than during the comparable period of the 10th 5-year plan, 1976 to mid-1980. Despite these achievements, cement production fell 7 million tons short of meeting the planned goal for the 1981-85 period. Cement production in 1990 was planned to increase 8.3% over the 1985 amount. The percentage of cement produced by the dry processing method was planned to increase from 15% of total production in 1985 to 22% in 1990.

By 1985, the average hourly productivity of kilns had increased to 35.2 tons per hour compared with 33.1 tons per hour in 1980. During the 1981-85 period, eight new production lines were put into operation with a total cement production capacity of 6 million tons per year, of which 3.8 million tons per year of capacity was created by the opening of dry-process production lines. The downtime for kilns during the 1981-85 period ranged between 75 and 85 days per year; more than 26% of the downtime was attributed to overhauling, 37% to routine repairs, and 15% to replacing linings. The remaining 22% of the downtime was caused by lack of raw materials and power, malfunctioning of equipment, and accidents.[43] The Soviet cement industry used a large percentage of aging equipment. Of the industry's 370 rotary kilns, 20% had been operating more than 30 years; of the 1,019 grinding units, 62% were reported operating beyond their depreciation period.[44]

Diamond.—The U.S.S.R. was one of the world's largest diamond producers, and diamond sales were a significant source of hard currency earnings. According to an interview with the South African Labor Minister, the U.S.S.R. reportedly cooperated with the Republic of South Africa in marketing diamonds.[45] In 1985, Soviet diamond sales fell sharply, decreasing by about one-third on the Antwerp market. According to Western press reports, the decrease was attributed to the urging of De Beers Consolidated Mines Ltd., in an attempt to create a recovery in the slumping diamond market. Large Soviet sales at 10% or more below market prices in 1984 were considered a contributing factor to the depressed diamond market.

The Yakut diamond association, Yakutalmaz, was one of the country's major diamond producers. During the 1981-85 period, the Yakut diamond association reported achieving profits in excess of its plan. Especially good results were reported from the Udachnyy mining and beneficiation complex of the Mirnyy mining directorate, which was part of Yakutalmaz.

The Soviets reported problems at the Yakut diamond association in safeguarding diamonds from theft. The Minister of Nonferrous Metallurgy complained of unsatisfactory safekeeping of diamond-bearing raw material, and officials at the association and in the town of Mirnyy were punished. New security measures were introduced including limiting the number of people with access to raw materials, automated sorting of concentrates, and closed circuit television monitoring.

The U.S.S.R. also produced synthetic diamonds at a number of enterprises. The Yerevan diamond production association Almaz in the Armenian S.S.R. (Armenia), which produced a wide array of synthetic diamonds and diamond instruments for domestic consumption and export, reported exceeding its plan for the 1981-85 period. During the 1986-90 period, the Yerevan association planned to increase output by 43%. The Poltava synthetic diamond and diamond instrument plant reportedly produced a large percentage of the country's synthetic diamond instruments. It shipped its output to about 3,000 domestic consumers and 30 foreign countries, with the largest percentage of the plant's exports going to Japan.[46]

Graphite.—Plans were announced to begin construction of a graphite electrode plant in the city of Tashauz in the Turkmen S.S.R. (Turkmenistan) during the 1986-90 period.

Iodine.—The Nebit-Dag iodine plant in Turkmenistan, one of the country's major iodine producers, reportedly, fell far behind its delivery schedule for 1985.[47]

Perlite.—New data from the U.S.S.R. indicated that for 1985 the country was the world's largest perlite producer. One complex, the Aragatskiy enterprise in Armenia, with production of up to 600,000 tons of sized perlite per year, produced more perlite in the past 5 years than was produced during this period in the United States, the world's second largest perlite producing country. Perlite reserves in Armenia, the largest in the U.S.S.R., were described as "practically inexhaustible."[48] Numerous other perlite deposits, however, exist in the Caucasus, Soviet Central Asia, Kazakhstan, the Trans-Carpathians, East Siberia, and the Soviet Far East.

The Aragatskiy complex appeared to be the country's major supplier of perlite raw material for domestic consumption and for export. For the first 11 months of 1985, the complex produced 520,000 tons of sized perlite, and the plan for 1985 was to produce 600,000 tons. From 1981 through November 1985, Aragatskiy produced 2,951,000 tons of product. Aragatskiy also had the capacity to produce 30,000 cubic meters of expanded perlite per year, 1,800 tons of perlite for filtration per year, and 10,000 cubic meters of thermal insulation products per year. Perlite from Aragatskiy was sent to 120 different consumers within the country and was also exported to other countries including Belgium, France, Kuwait, and Spain. In 1984, Aragatskiy exported 124,000 tons of sized perlite, and over 100,000 tons for the first 11 months of 1985.[49]

The Aragatskiy complex consisted of an open pit, a crushing-sorting plant, an expanded perlite shop, and a shop for producing filtration and insulating products. The open pit was 5 kilometers from the plant. The ore was blasted and loaded on trucks. There were plans to increase perlite extraction and processing at Aragatskiy, which called for developing another open pit, constructing a new crushing, grinding, and sorting shop, and constructing a plant to produce sized perlite sands obtained by expanding crushed perlite. The first stage of the sized perlite sand shop, which was scheduled for commissioning in 1987, was to have a capacity of 520,000 cubic meters per year. The commissioning of the second stage was set for 1989 and would increase capacity to 1.1 million cubic meters per year. This new facility, reportedly, would be the world's largest producer of sized perlite sands.

Phosphate.—Explored phosphate reserves were adequate to secure the planned growth in fertilizer production only if exploitation of difficult to concentrate phosphate ore or lower grade apatite ore commenced.[50] The Khibiny apatite complex on the Kola Peninsula, which produced about 80% of all phosphate used in fertilizer production, was experiencing increasing difficulties owing to decreasing ore grades and worsening mining conditions. In 1985, Khibiny mined about 50 million tons of apatite ore to produce 19 million tons of concentrate. Plans called for increasing apatite concentrate production at Khibiny to 20 million tons by 1987. During the 1986-90 period, the Soviet Union announced plans to cooperate with Finland to develop apatite and other mineral resources on the Kola Peninsula.

The Karatau complex, which exploited the Karatau sedimentary rock deposits of the Karatau phosphate basin in Kazakhstan, was the country's other major phosphate producer. The Karatau Basin occupies approximately 2,500 square kilometers and contains more than 45 deposits averaging between 23% to 33% phosphorus pentoxide (P_2O_5). It has a reserve base of 2.5 billion tons P_2O_5, of which over 500 million tons was in reserve categories $A+B+C_1$, called explored reserves,[51] which within the context of the Soviet economy would be similar to economic reserves. The largest deposits, Dzhantas, Kokdzhan, Gimmelfarbskoye, Koksu, Chulaktau, Aksay, Uchbas, Akdzhan, and Geres, contained more than 80% of the basin's reserves. During the 1986-90 period, plans called for increasing phosphate production by 4.2 million tons P_2O_5, of which 62% of the increase was planned to come from the Karatau Basin.[52]

During 1985, renovation began at the Bryansk phosphorite complex in Moscow Oblast', which would enable Bryansk to achieve its design capacity for extracting 3 million tons of ore per year for the production of 900,000 tons of phosphate rock per year. Achieving design capacity would significantly increase output at Bryansk.

In 1985, exploration was conducted on a large phosphorite deposit in the Kyzylkum Desert in Uzbekistan. Although exploration of this deposit was far from complete, an experimental open pit was under development. Also, plans called for beginning development of the Seligdar apatite deposit in Yakutia, about 30 kilometers from the city of Aldan, during the 1986-90 period. The ore at Seligdar has an average P_2O_5 content of 6%, and Seligdar was projected to have a potential crude ore output of 40 million tons per year for the production of 4 to 5 million tons of concentrate per year. Development of Seligdar would provide the U.S.S.R. with its first phosphate raw material base in Siberia.

Potash.—Over 80% of the U.S.S.R.'s potash reserves are in the Verkhne-Kamsk, Starobinsk, and Pre-Carpathian deposits. The Uralkaliy and Byeloruskaliy potash association and the Kalush "Silvinit" and Stebnik potash enterprises mined these deposits. The quantity of potash ore extracted in the country had increased fourfold over the 1965 level, and equaled 72 million tons per year.[53] The two major potash producers were the Byeloruskaliy and Uralkaliy associations. Ore production at Byeloruskaliy in 1985 was reportedly 38.6 million tons,[54] but problems with potash production persisted for the sixth consecutive year, and Byeloruskaliy did not fulfill its plan for fertilizer production.[55] Production problems were particularly acute at the No. 4 mining directorate, put into operation in the late 1970's, which was producing at only one-half its design capacity. In addition, mining losses at Byeloruskaliy were high, with approximately 50% of the potassium chloride remaining in the deposit.[56] During the 1981-85 period, as a result of exploration at the Starobinsk and Verkhne-Kamsk deposits, an additional 1 billion tons of reserves was confirmed, which would provide Byeloruskaliy and Uralkaliy, which respectively work these deposits, an additional 10 to 15 years of operation.

In 1985, five officials from the Stebnik potash enterprise in the Ukraine were sentenced to between 2-1/2 and 5 years in jail for their responsibility in the collapse in 1983 of a tailings dam at Stebnik, which discharged brine into the nearby Dniester River, polluting the water supply and killing fish.

Salt.—The U.S.S.R. reported 99 explored salt deposits with explored reserves totaling 220 billion tons. Of these 99 deposits, 51 are rock salt, 30 solar salt, 14 solar and interstitial brine, and 4 underground brine. These deposits are grouped into large salt basins that comprise about 20% of the territory of the country.[57] Approximately two-thirds of the country's salt production occurred at two locations: the Artemsol' production association in Donetsk Oblast' in the Ukraine and the Bassol' complex in Astrakhan Oblast', which produced salt from Lake Baskunchak. Lake Baskunchak provided about one-third of the country's salt requirements, but the large amount of salt extraction had been causing environmental problems in the lake. Soviet researchers were recommending that extraction from Lake Baskunchak be reduced to protect the lake.

Soda Ash and Caustic Soda.—Plans were announced to increase production of soda ash and caustic soda by 60% in the year 2000 in comparison with that of 1985.

Sulfur.—The U.S.S.R. was engaged in a major expansion of sulfur production from sour gas, and plans called for increasing sulfur production from natural gas to 5.5 million tons per year by 1990. The Astrakhan sour gas deposit, which was under development, is one of the most saturated in hydrogen sulfide of all natural gas deposits in the country, and processing of sulfur from this deposit, it was stated, would end the country's "severe deficit" in sulfur production. The first stage of the Astrakhan complex was scheduled to go on-stream in 1986 with a capacity to produce over 2 million tons of sulfur per year. Problems in development, however, would probably considerably delay Astrakhan operating at design capacity. Other sour gas projects under development were the Tengiz oil and associated gasfield in Kazakhstan, which was planned to produce 500,000 tons of sulfur per year, and the second stage of the Mubarek sour gas processing plant in Uzbekistan, scheduled to begin production in 1986 with a capacity to produce 450,000 tons of sulfur per year, raising total sulfur production capacity at Mubarek to over 700,000 tons per year. In June, a fire occurred at the Tengiz Field, which by yearend had not been extinguished. The Astrakhan and Tengiz projects were being developed with the assistance of French and other European firms.

Although sulfur production from sour gas was planned to greatly increase, the Soviets were experiencing difficulty in maintaining native sulfur mining production. At the Gaurdak sulfur complex in Turkmenistan, which mined native sulfur, the goal for the 1986-90 period was to stabilize output in the face of decreasing ore grades and the increasing depth of open pits.[58] In 1985, at the Nemerovskiy deposit in the Ukraine, the third stage of a Frasch mining complex with a capacity of 150,000 tons per year was put into operation by the Yavorov native sulfur mining association, raising the total output at the Nemerovskiy deposit to 650,000 tons per year.

MINERAL FUELS

The Soviet energy program to the year 2000 called for large gains in natural gas production of 60% to 80%, and electricity generated by nuclear powerplants was planned to increase fivefold to sevenfold. Oil production, however, was planned to grow at a slower pace than overall economic growth. A large effort at conservation was planned as energy consumption per unit of national income was slated to decrease by at least 40% by the year 2000. The majority of the increase in energy production was to come from Siberia, which by the year 2000 was planned to produce 70% of the country's oil and natural gas and 50% of its coal.

Table 8.—U.S.S.R.: Estimated primary energy balance in 1985

(Million metric tons of standard coal equivalent)

	Production	Exports	Imports	Apparent consumption
Coal (lignite, anthracite, bituminous, coke)	486	29	12	469
Fuelwood	22	--	--	22
Hydropower	24	3	--	21
Natural and associated gas	760	88	5	677
Nuclear power	18	--	--	18
Oil, crude and petroleum products	875	234	20	661
Oil shale	10	--	--	10
Peat	9	--	--	9
Total	2,204	354	37	1,887

Coal.—Raw coal production in 1985 increased by 2% to 726 million tons, fulfilling the plan. This was only the second time coal production increased during the last 7 years. In 1985, open pit coal production reportedly accounted for 41.1% of total coal extraction.[59] The coal industry initially set ambitious plans to produce between 770 and 800 million tons in the 1981-85 plan period, but it was forced to scale these back.

A number of important administrative changes occurred in the coal industry in 1985. The Minister of the Coal Industry retired and was replaced by one of the First Deputy Ministers of the Coal Industry. In the Ukrainian S.S.R., the major coal producing region in the country, which includes the Donets Basin (Donbas), a new

Minister of the Coal Industry for the Ukrainian S.S.R. was appointed. The Donbas contains high-quality anthracite and bituminous coal, much of which is suitable for coking, and is situated close to the industrial center of the country. However, it was debated whether or not more resources should be devoted to developing underground mines in the Donbas, which would require mining deeper, thinner seams. The average depth of mines in the Donbas was more than 600 meters, and some mines were more than 1,000 meters deep. Furthermore, the quality of coal mined in the Donbas was worsening and the ash content was projected to increase significantly in the future.

Coal production in 1986 was planned to increase to 733.9 million tons, with the entire growth in output coming from open pit production. The 1986-90 plan called for coal production to increase to between 780 and 800 million tons per year in 1990, with almost the entire increase in production also coming from open pits, which were to account for 46% of total output by 1990. Plans called for increasing washed coal production from approximately 176 million tons in 1985 to 190 million tons in 1990 and briquet production from about 5.5 million tons to 7 million tons.[60] A large portion of the investment resources for the coal industry was to be directed toward developing large open pit lignite mines in the eastern part of the country.

The Ekibastuz subbituminous coal basin in Kazakhstan produced over 10% of the country's coal output with over 26% of the country's open pit production. It was the third largest coal producing region in the country, following the Donbas and the Kuznetsk Basin. Plans called for coal production at Ekibastuz to increase to 94 million tons per year by 1990. The coal from the Ekibastuz Basin has an ash content of nearly 50% and was used primarily by electric powerplants. In 1985, in the Ekibastuz Basin, the first stage of the Vostochnyy open pit with a capacity of 7.5 million tons of coal per year was commissioned. Total capacity at the Vostochnyy open pit was planned to be 30 million tons per year. Development of Vostochnyy was to be completed during the 1986-90 period; this would provide about one-half of the country's planned increase in coal output during this period. The Ekibastuz Basin also contained the Bogatyr' open pit with a capacity of over 50 million tons per year.

Plans to develop the large Kansk-Achinsk lignite basin in Siberia were considerably delayed, in part, owing to the environmental problems that would occur if the planned burning of lignite in large powerplants in the region were conducted. Initial plans had envisaged constructing a series of powerplants in the region, each with a 6.4-million-megawatt capacity; economic, technological, and environmental problems impeded the construction of these plants,[61] and only one, the Berezovskaya, was under construction. Other less polluting technologies including coal liquefaction and gasification were being studied as a means of utilizing Kansk-Achinsk lignite. The development of Kansk-Achinsk was thus considered a long-range project.

The U.S.S.R. was experiencing difficulties in increasing production of high-quality coking and steam coal, and the plan for 1986-90 called for increased exploration to increase reserves of these types. In 1985, the country experienced a shortage of coking coal, limiting a number of new 1-million-ton-per-year capacity coking batteries that were recently put into operation to working at only one-third of their design capacity.[62]

During the 1986-90 period, plans called for increasing coking coal production in the Kuznetsk Basin (Kuzbas) in Siberia. Approximately one-third of the country's coking coal came from the Kuzbas. Total coal output at the Kuzbas was targeted to increase from 141.4 million tons per year in 1985 to 160 million tons per year in 1990, of which 70 million tons per year was to be coking coal. Labor shortages, aggravated by the lack of housing, medical care, and other social amenities, was one of the factors hindering coal production in this area.[63]

Coking coal production was being increased at the Neryungri complex in Yakutia where production increased to its design capacity of 13 million tons per year in 1985, 9 million tons of which was to be coking coal. Japan, which assisted in the development of Neryungri in exchange for coal, began receiving shipments of Neryungri coking coal in March. The U.S.S.R., however, was experiencing difficulties in shipping the agreed upon amount to Japan owing to transport problems, and was seeking ways to improve rail and port loading capacity to increase shipments.

A major problem in utilizing the massive lignite reserves in the eastern part of the country was the inadequacy of the rail transport system for long-distance haulage of large quantities of lignite. The Soviet Union for some time had been considering the feasibility of constructing long-distance coal slurry pipelines to alleviate this problem. In 1985, Italy's Snamprogetti agreed to license its Reocarb process to the U.S.S.R. for use on a 260-mile coal slurry pipeline to be built from a coal slurry production plant in Byelovo in the Kuzbas to the city of Novosibirsk. The pipeline was expected to take 3 years to construct and will transport 3 million tons of coal per year. The Reocarb process allows for the preparation of a high-concentration, low-viscosity, coal-and-water slurry that can be transported at low temperatures and requires no additional treatment for burning.

Table 9.—U.S.S.R.: Ministry of the Coal Industry[1] planned and reported coal production in 1985, by basin

(Thousand metric tons)

Basin	Planned production: Original[2]	Planned production: Final[3]	Reported production[3]
Donets	210,000	194,800	197,096
Kuznetsk	154,000	145,000	141,406
Ekibastuz	84,000	78,000	80,457
Karaganda	50,000	49,000	49,820
Kanzk-Achinsk	48,000	40,800	40,765
Pechora	28,000	28,200	29,795
Moscow	25,000	19,000	19,251
Other	171,000-201,000	161,650	159,406
Total	770,000-800,000	716,450	717,996

[1]A small amount of coal is produced by enterprises not subordinate to the Ministry of the Coal Industry.
[2]Ekonomicheskaya gazeta (Economic Gazette), Moscow. No. 7, Feb. 1982, p. 1.
[3]Ugol' (Coal), Moscow. No. 3, Mar. 1986, p. 57.

Natural Gas.—In 1985, natural gas production continued to increase rapidly, increasing 10% to 22.7 trillion cubic feet, and it was estimated that natural gas overtook crude oil to become the country's leading source of primary energy consumption. The Soviets were able to maintain increases of 7% or more in natural gas production during the entire 1981-85 plan period. In 1986, however, natural gas production was planned to increase only 4% to 23.7 trillion cubic feet. Production at the massive Urengoi natural gasfield in West Siberia, which accounted for practically all of the increase in natural gas production during the 1981-85 period, was nearing peak production, and new major production increases were to come from the Yamburg Field, north of Urengoi, which was under development. First output from Yamburg, the development of which was behind schedule, was expected no sooner than yearend 1986.

The Soviet Union had been engaged in a massive pipeline construction program to transport gas from West Siberia to the European part of the country and for export to Eastern and Western Europe. During 1981-85, the Soviet Union planned the construction of six gas pipelines from the Urengoi Field, the sixth of which, the Urengoi-Tsentr II line to Yelets southeast of Moscow, was completed in 1985. During the 1986-90 period, the Soviet Union planned to construct six additional 56-inch pipelines from the Yamburg deposit. These six lines were Yamburg-Yelets-Kremenchug in the Ukraine (4,459 kilometers), Yamburg-Transcaucasus (4,530 kilometers), Yamburg-Gorkiy-Tula (3,155 kilometers), Yamburg-Tula-Kiev (3,405 kilometers), Yamburg-Volga River area (2,757 kilometers), and the Yamburg-Uzhgorod export pipeline, called the Progress pipeline. All six East European CMEA countries would assist in construction of the Progress pipeline in exchange for gas. Construction of the Progress pipeline had started and was scheduled for completion in 1989.

The 1986-90 plan called for total domestic natural gas production to increase to almost 30 trillion cubic feet by 1990. In addition to the Yamburg deposit, the plan called for commencing exploitation of the Astrakhan sour gas deposit north of the Caspian Sea and continuing development of the Karachaganak deposit in Kazakhstan. The Astrakhan sour gas and condensate deposit was scheduled to begin production in 1986, but considerable delays were being reported. Plans called for constructing a gas-chemical complex on the basis of the Astrakhan deposit, output from which was suitable for a wide variety of chemical uses. At the Karachaganak deposit in Kazakhstan, which began production in 1984, natural gas production in 1990 was planned to increase fivefold in comparison with that of 1985 and condensate production sixfold. There were 17 wells in operation at Karachaganak in 1985. In Turkmenistan, plans called for natural gas production to increase from 2.7 trillion cubic feet in 1985 to 3 trillion cubic feet in 1986. Development was proceeding on the Sovetabad gas condensate field in Turkmenistan, the Republic's leading natural gas producer.

Oil Shale.—In 1985, oil shale production in the Estonian S.S.R., which accounted for over 80% of the country's total oil shale production, fell by 4% in comparison with that of 1984 to 26.4 million tons. During the 1986-90 period, plans called for expanding oil shale production, including beginning construction of the Kuremyae oil shale mine, with a capacity of 5.8 million tons of commercial oil shale per year, and renovating the Kohtla-Jarve oil shale processing facilities. The Estonian oil shale production association planned in the near future to close the Kivioli Mine and the Vivikonna open pit, and plans were being prepared to develop the Permiskula Mine and a new Kivioli Mine. During the 1990-2000 period, plans called for developing the Tammiku, Sompa, and Kohtla Mines in the Estonian S.S.R.

Peat.—The country's total potential peat reserves were calculated to be 200 billion tons with 75% of these potential reserves in West Siberia and 20% to 25% in the northwestern part of the country. In 1990, peat production was planned to increase 43% in comparison with the 1985 level.[69] It was considered possible at some future time to increase the level of peat extraction to 1 billion tons per year, which was about five times the amount of peat being extracted and processed.

Petroleum.—Oil production fell for the second straight year as the Soviet Union continued to experience problems with production in Tyumen' Oblast', West Siberia, the country's major producing region. The problem was attributed to the inability to cope with the present, more complex phase of development in West Siberia now that the stage had been reached when oil "no longer flows naturally."[64] It was now necessary to use improved recovery techniques such as gas lifts, hydraulic pumps, and surfactants for which domestic production was inadequate or lacking.[65] As in 1984, production problems were attributed to causes such as power shortages, lack of well repair crews, failure to put new wells into operation, and poor management. In the first quarter of 1985, the Minister of the Petroleum Industry was replaced along with a large number of top level managers in Tyumen' Oblast'.

During the 1986-90 period, exploration drilling in Tyumen' Oblast' was planned to increase to 14 million meters in comparison with a total of 6.9 million meters drilled during the 1981-85 period. This drilling program would require acquisition of more sophisticated technology and equipment. Because the amount of explored reserves in West Siberia had dropped significantly, the possibility of further rapid increases in oil production in this region was being debated. Dwindling reserves were noticeable at the giant Samotlor Field in West Siberia where production peaked in 1980. The Soviets projected that in 1990 Samotlor would produce 25% less oil than in 1985.[66] There were conflicting claims concerning the wisdom of attempting rapid development of West Siberian oil resources, with the Ministry of Geology emphasizing the potential for rapid increases in production and the Ministry of the Petroleum Industry emphasizing that attempts to rapidly increase production could result in worsening prospects for long-term development. The General Secretary of the Communist Party of the Soviet Union, upon an inspection of the region, disclosed that the reserves-to-production ratio in the region had declined to the point that it was no higher than the national average, and dismissed the optimistic assessments of the Ministry of Geology.[67] Despite proposed huge investments during the next 5 years, West Siberia faced severe tests in meeting production targets. The success or failure of petroleum extraction here would significantly affect the entire economy.

In 1986, oil and gas condensate production was planned to increase 3.7% to 4.5 billion barrels, which was approximately the peak level of production achieved in 1983. In 1990, according to the draft plan of the 27th Communist Party Congress published in March 1985, oil and gas condensate production was to increase to between 4.6 and 4.7 billion barrels with the lower level revised slightly downward from the original draft program published in November 1984. The plans for the 1986-90 period called for practically all production increases to come from West Siberia, with some small increases to come from the Komi A.S.S.R., the Nenets Autonomous Okrug near the Barents Sea, and from the North Caspian Basin of Kazakhstan where deep oil deposits lie beneath salt domes. A small increase in offshore production was planned, but offshore production would still account for only about 3% of total Soviet oil production during the 1986-90 period. During the 1986-90 period, the program to upgrade refinery output to produce more light products was to continue with fuel oil production being reduced substantially and coal and natural gas being substituted for fuel oil in powerplants. In October, a new Minister of the Petroleum Refining and Petrochemical Industry was appointed, replacing the former minister who, reportedly, retired.

In developments in other regions in 1985, shipments of crude oil began from a group of six fields near the town of Varandey, 150 miles above the Arctic Circle near the coast of the far eastern sector of the Barents Sea. Exploratory drilling was continuing in the belief that these fields and others in this region could be substantial producers.

The Azerbaidzhan S.S.R., one of the oldest oil producing regions of the country, had about 13,700 functioning oil wells with about 60% of all oil extracted from offshore deposits in the Caspian Sea. Offshore oil production in the Caspian Sea increased during 1985 with the development of new wells in the 28th of April Field. Production, however, at the large Neftyannye Kamni Field northwest of the 28th of April Field had been declining, as had production in the Caspian's Baku Archipelago Field south of the city of Baku. Azerbaidzhan, which produced 96.7 million barrels, failed to fulfill its plan for oil extraction.[68] Oil production was targeted to reach 97.8 million barrels in 1986. The 12th 5-year plan called for oil extraction in Azerbaidzhan in 1990 to be between 103 and 110 million barrels. All offshore increases were planned to come from the 28th of April Field.

The Soviet Union was seeking to increase production of heavy oil and bitumen resources in view of the slowdown in oil production. Heavy oil and tar sands deposits are found in most of the oil-bearing regions of the U.S.S.R. The largest concentrations are in the Caspian Basin, Soviet Central Asia, East Siberia, Sakhalin Island, the Ukraine, and the Volga-Urals region. The only significant commercial production of bitumen occurred at the Yarega deposits near Ukhta in the Pechora Basin of the northern Komi A.S.S.R. Nevertheless, the necessary technologies for mining and processing heavy oil and bitumen had not been successfully introduced.

Soviet hard currency revenues from oil sales fell in 1985 as the decline in Soviet oil production coincided with lower world market prices for crude oil and a decrease in the supply of Middle East crude oil obtained in barter exchanges for reexport. This decline posed a serious challenge to the economy, as the Soviet Union had depended on oil sales for about 60% of its hard currency earnings. Soviet oil deliveries to CMEA remained at practically the same level.

During the 1986-90 period, the U.S.S.R. agreed to markedly increase oil exports to Romania, which was the only CMEA country that did not obtain a large percentage of its imported oil from the Soviet Union. It appeared that Romania, in exchange, would increase its exports of oil drilling equipment to the U.S.S.R. and participate in the development of some Soviet oilfields. Furthermore, the Soviet Union in 1985 agreed to supply Nicaragua with 80% to 90% of its oil needs. Nicaragua's chief suppliers had been Venezuela and Mexico, but these countries were halting shipments. Nicaragua's oil needs were estimated at about 4.4 million barrels per year.

[1]This publication is based on a review of sources published in the U.S.S.R.

[2]Foreign mineral specialist, Division of International Minerals.

[3]Voprosy ekonomiki (Problems in Economics) (Moscow). No. 11, Nov. 1985, pp. 50-61.

[4]Izvestiya (Moscow). July 4, 1985, pp. 1-2.

[5]Planovoye khozyaystvo (Planned Economy) (Moscow). No. 9, Sept. 1985, pp. 53-61.

[6]Pravda (Moscow). June 12, 1985, pp. 1-2.

[7]Foreign Broadcast Information Service (FBIS). Soviet Union, Daily Report. Washington, DC, July 16, 1985, p. CC9.

[8]Sovetskaya geologiya (Soviet Geology) (Moscow). No. 4, Apr. 1986, p. 11.

[9]———. No. 1, Jan. 1986, p. 3.

[10]Page 4 of work cited in footnote 9.

[11]Sotsialisticheskaya industriya (Socialist Industry) (Moscow). Sept. 10, 1985, p. 2.

[12]Council for Mutual Economic Assistance (CMEA) was founded in Jan. 1949. The founding members were Bulgaria, Czechoslovakia, Hungary, Poland, Romania, and the U.S.S.R. Albania joined in Feb. 1949 but ceased to take part in meetings in 1961. The German Democratic Republic was admitted in 1950, Mongolia in 1961, Cuba in 1972, and Vietnam in 1978. Yugoslavia obtained permanent observer status in 1965.

[13]Gornyy zhurnal (Mining Journal) (Moscow). No. 1, Jan. 1986, pp. 3-7.

[14]Work cited in footnote 13.

[15]Strishkov, V. V., and W. G. Steblez. The Chromium Industry of the U.S.S.R. BuMines Miner. Issues, Dec. 1985, 33 pp.

[16]Tsvetnye metally (Nonferrous Metals) (Moscow). No. 8, Aug. 1985, pp. 30-34.

[17]British Broadcasting Corp., Reading, England. Summary of World Broadcasts (SWB). The U.S.S.R., Weekly Econom. Rep. Jan. 24, 1986, p. A/6.

[18]Tsvetnye metally (Nonferrous Metals) (Moscow). No. 10, Oct. 1985, p. 112.

[19]Work cited in footnote 16.
[20]Work cited in footnote 17.
[21]Ekonomicheskaya gazeta (Economic gazette) (Moscow). No. 5, Jan. 1986, p. 4.
[22]Kazakhstanskaya pravda (Kazakhstan Truth) (Alma-Ata). Feb. 7, 1986, pp. 2-6.
[23]Work cited in footnote 22.
[24]Kazakhstanskaya pravda (Kazakhstan Truth) (Alma-Ata). Jan. 23, 1986, p. 1.
[25]Tsvetnye metally (Nonferrous Metals) (Moscow). No. 1, Jan. 1986, p. 6.
[26]Work cited in footnote 13.
[27]Work cited in footnote 13.
[28]Pages 3 through 7 of work cited in footnote 13.
[29]Stroitel'naya gazeta (Construction Gazette) (Moscow). Oct. 9, 1985, p. 1.
[30]Work cited in footnote 6.
[31]Work cited in footnote 18.
[32]Gornyy zhurnal (Mining Journal) (Moscow). No. 2, Feb. 1986, pp. 6-7.
[33]Work cited in footnote 13.
[34]Pravda Ukraini (Truth of the Ukraine) (Kiev). Jan. 29, 1986, pp. 1-2.
[35]Zarya vostoka (Dawn of the East) (Tbilisi). Jan 26, 1986, pp. 1-4.
[36]Work cited in footnote 14.
[37]Work cited in footnote 17.
[38]Work cited in footnote 21.
[39]Work cited in footnote 18.
[40]Kazakhstanskaya pravda (Kazakhstan Truth) (Alma-Ata). Feb. 8, 1986, p. 4.
[41]Tsvetnye metally (Nonferrous Metals) (Moscow). No. 10, Oct. 1985, p. 113.
[42]Sotsialisticheskaya industriya (Socialist Industry) (Moscow). July 31, 1985, p. 2.
[43]Tsement (Cement), Leningrad. No. 1, Jan. 1986, pp. 1-4.
[44]Work cited in footnote 43.
[45]Die Welt (The World) (Hamburg). Nov. 30, 1985, pp. 1, 6.
[46]Ekonomicheskaya gazeta (Economic Gazette) (Moscow). No. 20, May 1986, p. 5.
[47]Turkmenskaya iskra (Turkmenistan Spark) (Ashkhabad). Jan. 30, 1986, p. 2.
[48]Petrov, V. P. Perlit i vermikulit, Geologiya, metodika razvedki i tekhnologiya (Perlite and Vermiculite, Geology, Method of Exploration, and Technology) (Moscow). Nedr, 1962, p. 1.
[49]Kommunist (Communist) (Yerevan). Jan. 30, 1986, p. 2.
[50]Razvedka i okhrana nedr (Exploration and Conservation of Mineral Resources) (Moscow). No. 11, Nov. 1985, p. 19.
[51]Izvestiya Akadamii Nauk Kazakhskoy S.S.R., Seriya geologicheskaya (Reports of the Academy of Sciences of the Kazakh S.S.R., Geological Series) (Alma-Ata). No. 3, Mar. 1986, pp. 35-36.
[52]Work cited in footnote 51.
[53]Pages 19 and 20 of work cited in footnote 13.
[54]Work cited in footnote 53.
[55]Izvestiya (Moscow). Apr. 25, 1985, p. 2.
[56]Work cited in footnote 55.
[57]Shmidel, kh. Nauki o zemlye, vokrug soli (Earth Sciences, The Topic of Salt) (Moscow). 1985-86, pp. 6-7.
[58]Turkmenskaya iskra (Turkmenistan Spark) (Ashkhabad). Jan. 4, 1986, p. 2.
[59]Ugol' (Coal) (Moscow). No. 3, Mar. 1986, p. 3.
[60]Work cited in footnote 59.
[61]Znaniye-Sila (Knowledge is Power) (Moscow). No. 10, Oct. 1985, p. 2.
[62]Sotsialisticheskaya industriya (Socialist Industry) (Moscow). Sept. 18, 1985, p. 2.
[63]Sovetskeya Rossiya (The Soviet R.S.F.S.R.) (Moscow). Sept. 18, 1985, p. 2.
[64]Torfyanaya promyshlennost (The Peat Industry) (Moscow). No. 4, Apr. 1986, p. 3.
[65]Sotsialisticheskaya industriya (Socialist Industry) (Moscow). Aug. 7, 1985, p. 2.
[66]Sovetskaya Rossiya (The Soviet R.S.F.S.R.) (Moscow). Sept. 11, 1985, p. 3.
[67]Pravda (Moscow). Jan. 28, 1986, p. 1.
[68]Kommunist (Communist) (Moscow). No. 15, 1985, pp. 13-21.
[69]Bakinskiy rabochiy (Baku Worker) (Baku). Jan. 30, 1986, p. 2.

The Mineral Industry of the United Arab Emirates

By Michael D. Fenton[1]

The economy of the United Arab Emirates (UAE), based on oil and gas revenues, continued to be adversely affected by the worldwide slump in the price of oil. Gross domestic product (GDP) had fallen every year since 1981, except for a slight rise in 1984, and it again dropped in 1985 by 5%. Oil revenues were about 50% of GDP and about 85% of exports; sales were worth about \$12 billion,[2] down about 4% from those of 1984. The three major oil-producing Emirates, Abu Dhabi, Dubai, and Sharjah, had to reduce spending significantly for many projects beginning in late 1985. Abu Dhabi, which produced 65% of UAE's oil, had the most trouble recouping its investment in new field developments. The less affluent northern Emirates of Ajman, Fujairah, Ras al-Khaimah, and Umm al-Qaiwain experienced even greater difficulties in continuing infrastructure development. However, the current account surplus of the UAE, about \$7.1 billion at the end of 1985, remained substantial, and the surplus was expected to continue into 1986 unless oil prices fell much below \$15 per barrel.

PRODUCTION AND TRADE

The total crude oil reserves of the UAE were an estimated 33.4 billion barrels, about 80 years of production at current rates. The UAE would, therefore, continue to be a major oil exporter for some time. Abu Dhabi had 31 billion barrels or 93% of the total, but despite continued exploration and discovery, proven reserves tended to decline. The causes of this decline have been not only depletion, but also reevaluation and consequent downgrading of reserves. Dubai was second in reserves with 1.4 billion barrels, Sharjah had 1 billion barrels, and Ras al-Khaimah had 100 million barrels.

Crude oil and condensate production in Abu Dhabi declined by 3.5% to 744,000 barrels per day (bbl/d). Production in Abu Dhabi had been progressively declining between 1977 and 1985 as a result of oilfield management decisions and production strategy by the Organization of Petroleum Exporting Countries (OPEC). Exports of crude oil from Abu Dhabi also had been declining in recent years, partly owing to declining production and increased refining capacity. In 1985, crude oil exports declined by 4% to 581,000 bbl/d. About two-thirds of Abu Dhabi's sales were exported, with Japan as the leading buyer, followed by Western Europe and the United States. Dubai appeared to exceed its OPEC-assigned production quota of 300,000 bbl/d by 50,000 bbl/d, and at the prevailing rate of production, reserves would be exhausted in a decade. Trading and reexport business in Dubai were expected to remain more important than oil to the economy. Sharjah's oil production was 5,000 bbl/d. Oil exports from Ras al-Khaimah totaled less than 5 million barrels from September 1984 through December 1985.

The UAE had an estimated 32,800 billion cubic feet (Bcf) of natural gas reserves. Abu Dhabi had 21,200 Bcf of gas, which is most of UAE's total gas reserves. Gas production by Abu Dhabi National Oil Co. (ADNOC) was 1.112 Bcf per day, an increase of 5%.

Less than 10% of the gas produced from onshore and offshore wells was vented to the atmosphere. About one-quarter of the captured gas was used locally for the production of electricity, petroleum products, chlorine and associated products, fertilizers, and distilled water. Most of the gas was processed at two gas processing plants that recovered about 4 million barrels of condensate. Abu Dhabi Gas Liquefaction Co. (ADGAS) operated a liquefied natural gas (LNG) plant on Das Island where production rose 14.3% to 2.4 million tons, and Abu Dhabi Gas Industries Ltd. had three plants at the Bu Hasa, Bab, and Asab onshore oilfields that produced natural gas liquids (NGL). NGL was then pumped to the Ruwais fractionation plant where it was converted to propane, butane, and motor fuel for export. Abu Dhabi was the only exporter of LNG in the Gulf. The Dubai Natural Gas Co. (DUGAS) gas recovery plant at Jebel Ali was expected to reach a production record high of nearly 600,000 tons, 95% of which was to be exported to Japan under a 5-year contract. The rest of the products was to go to Dubai Aluminium Co. (DUBAL) and Dubai Electricity Co. (DEC) plants. Most of the 60,000 bbl/d of high-grade liquefied petroleum gas (LPG) condensate and 530 million cubic feet (MMcf) of natural gas per day from Sharjah's Sajaa Field were also exported to Japan. In Ras al-Khaimah, about 18 MMcf per day of gas was produced at the Saleh Oilfield. Output was used at a cement plant.

The UAE was expected to produce a total of about 348 million barrels of petroleum products by the end of 1985. About 61 million barrels of refined products was produced during 1985 at Abu Dhabi's refineries at Umm al-Nar and Ruwais, an increase of 2.7%, including LPG, gasoline, naphtha, jet fuel, gas oil, and fuel oil. Major markets for 62% of these refined products were Japan, the Middle East, and Western Europe.

Abu Dhabi's Ruwais Fertilizer Industries Co. Ltd. (FERTIL), producer of ammonia and urea, reported an increase in exports in 1985. Urea shipments of 343,000 tons and ammonia shipments of 129,000 tons were about 7% over those of 1984. The plant had been operating at close to capacity since its startup in late 1983, and the output of ammonia in 1985 increased 125% to 343,000 tons, or 281,300 tons of nitrogen; urea production was up 3% to 353,000 tons. India was the most important importer of Abu Dhabi ammonia and urea. Shipments of urea in 1985 amounted to 244,000 tons, over 70% of total urea exports; 71,000 tons of ammonia went to India, which was over one-half of the total ammonia exported. Exports to China of fertilizers decreased significantly to 26,000 tons in 1985. Indonesia was lost as an importer when it began its own domestic fertilizer production.

The National Chlorine Industries (NCL) of Abu Dhabi continued to link its production of salt, hydrochloric acid, chlorine, and caustic soda to the demand of other industries. Production was down 23% to 41,000 tons. NCL had 95% of the local market, which took 75% of its production. The 11,000 tons exported went to Bahrain, Iraq, Jordan, Oman, Qatar, and Saudi Arabia.

A serious oversupply problem in the cement industry continued as a result of the decreasing number of Government-supported construction projects. Current production of almost 3 million tons, nearly 40% of clinker capacity, was higher than the demand of only 1.6 to 1.8 million tons. Cement producers sought to coordinate prices and production and to pressure the Government for increased protection from foreign producers.

Table 1.—United Arab Emirates: Production of mineral commodities[1]

Emirate[2] and commodity[3]	1981	1982	1983[p]	1984[e]	1985[e]
ABU DHABI					
Cement, hydraulic thousand metric tons	[e]700	[e]780	800	800	800
Gas, natural:					
Gross million cubic feet	472,508	410,000	338,000	385,600	[4]405,880
Marketed do.	320,126	300,000	NA	355,000	373,000
Natural gas liquids thousand 42-gallon barrels	[e]35,000	38,000	NA	NA	[4]55,000
Petroleum:					
Crude do.	[r]400,200	[r]309,000	274,500	[r]281,000	257,300
Refinery products:					
Gasoline do.	2,990	[r]6,060	7,700	[r]8,500	8,700
Kerosene do.	2,480	[r]4,960	3,600	[r]9,000	9,300
Distillate fuel oil do.	6,460	[r]9,600	15,400	[r]17,700	18,200
Residual fuel oil do.	5,990	[r]8,940	11,100	[r]15,100	15,500
Naphtha do.	[r] [e]1,820	[e]1,930	6,000	[r]8,000	8,200
Refinery fuel and losses do.	[r] [e]260	[e]300	1,000	[r]1,000	1,100
Total do.	[r]20,000	[r]31,790	44,800	[r] [4]59,300	[4]61,000
Sulfur:					
Byproduct from petroleum refining metric tons	[e]5,000	10,000	15,000	15,000	[4]1,460
Byproduct from natural gas do.	--	--	--	35,000	[4]104,000
DUBAI					
Aluminum, primary ingot do.	106,000	148,739	151,170	[4]155,333	[4]156,000
Cement, hydraulic thousand metric tons	[e]500	[e]350	800	800	800
Gas, natural:[e]					
Gross million cubic feet	146,000	140,000	150,000	[4]107,000	107,000
Marketed do.	38,000	70,000	120,000	[4]43,400	44,000
Natural gas liquids:					
Propane thousand 42-gallon barrels	[e]2,500	5,000	10,000	10,000	[4]4,000
Butane do.	[e]1,100	3,000	8,000	8,000	[4]2,500
Natural gasoline do.	[e]1,700	4,000	9,000	9,000	9,000
Petroleum, crude do.	130,889	[4]133,850	121,830	120,000	127,000
FUJAIRAH					
Cement, hydraulic thousand metric tons	--	--	520	550	550
RAS AL-KHAIMAH					
Cement, hydraulic do.	[e]800	[e]750	1,200	1,200	1,200
Lime[e] do.	40	40	45	45	45
SHARJAH					
Cement, hydraulic[e] do.	220	[4]188	685	700	700
Gas, natural:					
Gross[e] million cubic feet	20,000	30,000	40,000	[4]193,500	183,000
Condensate thousand 42-gallon barrels	--	4,500	6,000	[4]21,900	21,900
Petroleum, crude do.	3,540	[4]2,555	2,000	[4]1,716	2,200

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through Aug. 22, 1986.
[2]In addition to the Emirates listed, Ajman and Umm al-Qaiwain record no mineral production but presumably produce small quantities of crude construction materials.
[3]In addition to the commodities listed, crude construction materials such as common clays, sand and gravel, and stone presumably are produced, but output is not recorded quantitatively, and general information is inadequate to make reliable estimates of output levels.
[4]Reported figure.

COMMODITY REVIEW

METALS

Aluminum.—DUBAL sold 150,677 tons of aluminum in 1985, a slight increase over 1984 sales, despite a depressed market, even though the value of aluminum exports fell by 24% during the first half of 1985 when compared with the same period in 1984. Japan bought 28% of sales, 150,677 tons, followed by 23% bought by the United States. Sales to China were 13% of sales, 24 times that of 1984. Other first-time buyers were Bulgaria, France, Greece, Italy, and Sweden. The plant was operating at 100% of its 158,000-ton-per-year capacity.

Umm al-Qaiwain and International Engineering Consultants (IEC) agreed to build a $650 million smelter in Umm al-Qaiwain that would be completed by 1989. The owner of the smelter would be Umm al-Qaiwain

Aluminium Co., a 50-50 joint venture including the government of Umm al-Qaiwain and IEC, which represented Hawker Siddeley Power Engineering Co. Ltd. and Balfour Beatly of the United Kingdom, Brown and Root Inc. of the United States, and Ferrostaal AG of the Federal Republic of Germany. Funds for the project were to be raised by forward sales of metal to substantial long-term consumers in China (65% to China National Metals & Minerals Import and Export Corp. and to China Everbright over a period of 12 years) and to the United States. Alumina supplies would come from Australia, which was shipping to Bahrain and Dubai smelters. The 120,000-ton-capacity smelter would be fueled by Emirate natural gas from a small offshore gasfield that tested at 35 MMcf per day of nonassociated dry gas. The capacity of the field may be 100 MMcf per day. The project would include a 250-megawatt power station, a gas platform, a gas pipeline, and perhaps a desalination plant. The Aluminum Co. of America of the United States would provide the smelter technology.

Copper.—Ras al-Khaimah signed an agreement with the Government of Oman that would allow Oman personnel to search for copper for 2 years in Ras al-Khaimah.

INDUSTRIAL MINERALS

Cement.—Total installed clinker capacity in the UAE in early 1985 was about 4.2 million tons per year, and total installed grinding capacity was about 8.7 million tons per year. The specific annual clinker capacities for the individual Emirates were Ajman Cement Co. and Al-Ain Cement Factory, 750,000 tons each; Dubai's National Cement Co., 1.8 million tons; Fujairah Cement Industries, 520,000 tons; Ras al-Khaimah's Gulf Cement Co. and Union Cement Co., 1 million tons each; Sharjah Cement and Industrial Development Co., 1.3 million tons; and Umm al-Qaiwain Cement Co., 500,000 tons. Ras al-Khaimah's white cement works had a capacity of 7.6 million tons per year.

Dubai's National Cement completed conversion of its kiln from the wet to the dry process, but it had not yet started regular production. Planned clinker capacity was to be 500 million tons per year.

Umm al-Qaiwain Cement was building a 500,000-ton-per-year clinker grinding plant, the first phase of a long-term program of increasing capacity.

The new 300,000-ton-per-year Ras al-Khaimah white cement plant was expected to go on-stream during the first half of 1986. White cement was expected to be exported to other Gulf countries. Union Cement added a new packing plant and new electroprecipitators for dust control.

Chlorine.—The NCL plant near Umm al-Nar reported a capacity of 52,700 tons per year of salt, hydrochloric acid, chlorine, caustic soda, and distilled water, and production for 1985 was expected to be about 46,800 tons. The plant is wholly owned by ADNOC.

MINERAL FUELS

Natural Gas.—Dubai and Sharjah settled a boundary dispute on the southern and eastern flanks of Dubai's Margham gas-condensate field that was producing 25,000 bbl/d of condensate. A result of this settlement was an agreement worth $25 million annually in which Amoco Sharjah Oil Co. would sell 70 MMcf per day (70 billion British thermal units (BTU) per day) of gas from its Sajaa gas-condensate field to the Dubai Supply Co., a joint venture between DUGAS, DEC, and DUBAL, at a price of about $1.25 per million BTU. A new 45-mile, 24-inch pipeline was to transport gas to DEC's Jebel Ali power and desalination complex. Although the associated gas output of the Sajaa Field was about 500 to 600 MMcf per day, along with 60,000 bbl/d of condensate, only about 100 MMcf per day was being supplied at $3.50 per million BTU to the Emirates General Petroleum Corp. (EGPC) for use in the northern Emirates; the rest was flared. However, deliveries to EGPC were expected to increase to 300 MMcf per day in 1987. EGPC was building a pipeline from the Sajaa Field to the Umm al-Qaiwain powerplant for deliveries in early 1986. Powerplants in Ajman, Fujairah, and Ras al-Khaimah were also using Sajaa gas.

C. Itoh & Co. Ltd. and Tomen Co. Ltd. of Japan renewed their 5-year agreement to purchase NGL from DUGAS. Future liftings were expected to be greater than the 400,000 tons per year of propane and butane and 2.5 million barrels per year of condensate in 1984.

DUGAS's gas recovery plant at Jebel Ali was supplied with gas from the Rashid, Fateh, and southwestern Fateh Fields. An additional 70 MMcf was planned to be piped in from Sharjah's Sajaa Field, beginning January 1986. The 45-mile pipeline was 70% complete in November 1985. Natural gas was to be dried and used in the DEC powerplant.

Throughout 1985, the Sharjah Liquefaction Co. continued to build the $300 million LPG plant at Al-Hamriyah to process Sajaa Field gas. It was to have a capacity of 240,000 tons per year of propane, 200,000 tons per year of butane, and 230,000 tons per year of light oil, all from 440 MMcf of gas daily. A storage field and shipping terminal were concurrently under construction in Al-Hamriyah. Annual revenues were expected to reach $50 million. These two gas projects were expected to compensate for revenue losses from the declining Sharjah Mubarak Field where production of 6,000 bbl/d was expected to continue for only 5 more years.

Amoco Sharjah Oil spudded a new exploratory well, Uwaid-1, 40 miles south of the main producing area of the Sajaa Field in Sharjah. The company announced that the capacity of the gas treatment plant at this field would be raised to 240 MMcf per day from 160 MMcf per day by adding a third treatment plant.

Two turbocompressor natural gas reinjection modules were to be installed on a Persian Gulf platform by ADNOC. Each unit, built by Nuovo Pignone S.p.A. of Italy, was 90 feet long, 24 feet wide, and 30 feet high, and was driven by a 30,000-horsepower gas turbine that could compress 138 MMcf per day to 6,500 pounds per square inch.

ADNOC selected Fluor Corp. of the United States as consultant for a $34 million gas reinjection phase of the Thamama C project. Fluor was to design the construction project, tender documents, and supervise construction that was expected to be completed by mid-1986. The Thamama C gas processing plant, commissioned in April 1984, had a design capacity of 450 MMcf per day of nonassociated gas from the Thamama C reservoir. Products were 375 MMcf per day of dry sweet gas, 4,500 bbl/d of NGL, 26,000 bbl/d of stabilized condensate, and 760 tons of sulfur per day.

ADNOC began an $80 million project to produce 250 MMcf per day of gas from the offshore Khuff Formation. The installation of five wellhead platforms, the jacket and topsides for a collector platform, and nearly 20 miles of subsea pipelines to Das Island was contracted by Bechtel Inc. of the United States.

ADGAS selected Costain Process Abu Dhabi, a part of Costain Process Construction Ltd. of the United Kingdom, to overhaul Train 1 of the LNG plant on Das Island.

Consolidated International Petroleum Corp. of Canada contracted to drill the one Al-Khair wildcat well in early 1986 in Umm al-Qaiwain. The well, on-trend and about 12 miles northeast of the Sajaa Field in Sharjah, was expected to test the potentially highly fractured Thamama carbonates from 9,500- to 14,000-foot depths.

Petroleum.—*Exploration.*—Abu Dhabi Co. for Onshore Oil Operations (ADCO) was drilling two exploration wells in the Thamama and Habshan Formations at a cost of about $14 million. Silmiya-1, situated halfway between Mafraq and Tarif and about 300 feet inland from the shoreline, was expected to reach a depth of 11,276 feet. The depth of Bu-Labyad-1 on Bu Labyad Island was to be 10,680 feet.

The Abu Dhabi Marine Operating Co. (ADMA-OPCO) discovered two new hydrocarbon-bearing fields: Bu-Jufair in the western part of its concession area, and Meem in the concession's central section. A discovery of gas in the Khuff Formation was confirmed in the CC structure, since renamed Bu Haseer, by a stepout well 1.3 miles north of the discovery well drilled in 1984. Exploratory drilling continued in the Umm Lulu, Nasr, and Ghasha structures. ADMA-OPCO's total drilling footage in 1985 was 545,600 feet, compared with 520,556 feet in 1984; 15% of this footage was for exploration, 38% was for production, and 47% was for water injection.

Amoco Sharjah Oil began to test three more horizons in its wildcat well, al-Wadi-1, after an earlier test failed to detect hydrocarbon reserves. The 11,000-foot well is 47 miles southeast of Sharjah and 17 miles southeast of Dubai.

Concessionares North South Resources of Canada and International Petroleum Ltd. planned to begin a 15,000-foot well in 500 feet of water in Fujairah that was expected to cost $12.7 million. Drilling of the first offshore well in the Emirate was to be with a semisubmersible rig or floater. A seismic survey showed the presence of structures favorable to the accumulation of hydrocarbon reserves.

The Dubai Petroleum Co. reported the testing and completion of two exploratory wells, the drilling of 26 new development wells, the reworking of 33 existing wells, the acquisition of 1,360 miles of seismic data, and the construction of 2 compression plants, a central production facility, water injection facilities, and a new production platform.

Production.—A joint venture composed of the Arab Engineering Co. (AREC) and Fluor Mideast Ltd. was awarded a $2 million contract by ADCO for the engineering procurement and construction management of the water injection facilities for enhanced recovery at the Sahil Field, but the work was later postponed until 1990. ADNOC was to act as manager of the $35 million project scheduled for completion in early 1987.

ADCO awarded Snamprogetti S.p.A. of Italy a contract for enhanced oil recovery facilities for a reservoir southwest of Abu Dhabi that would be in operation by early 1987. The contract covered services for a pilot gas-injection system, a study of the existing facilities, and for the planning, designing, procuring, construction supervision, and commissioning for the new facilities. ADCO had also awarded a $4.5 million contract to Fluor Mideast and AREC to upgrade a gathering system to handle production from the Thamama B reservoir at Bab Oilfield, about 60 miles southwest of Abu Dhabi. However, the project was later postponed until 1990. The contract covered engineering, procurement, and construction management.

Japan Gasoline Corp. of Japan and Global Engineering were awarded contracts to design production facilities for the Mubarraz Oil Co. of Japan at Abu Dhabi's West Mubarraz Oilfield. Secondary recovery production was expected to start at 8,000 bbl/d in 1987 and to rise to 12,000 bbl/d at a cost of $160 million to $176 million. An additional $132 million was to be spent for a pipeline from the field to a sea loading platform. In the Umm al-Anbar structure, six early wells were to be converted to production wells, and new production wells were to be drilled.

The Offshore Development Project in the Umm Shaif and Zakum Fields was nearly completed in 1985. All major manufacturing and installation work on jackets, decks, and pipelines was finished; minor associated work was expected to be completed by mid-1986.

The UAE Ministry of Petroleum and Mineral Resources completed a plan to establish a 45-day strategic reserve of oil products for emergency use. About 375 miles of new pipeline would link newly built storage facilities and refineries throughout the UAE. The plan was to be presented to the UAE Supreme Council for approval.

National Petroleum Construction Co. agreed to construct 18 wellhead towers and jackets and 56 miles of submarine pipeline for oil and for water injection, and to do hookup work for ADMA-OPCO for $72 million.

Abu Dhabi's offshore Umm Addalkh Oilfield started producing with an initial capacity of 15,000 bbl/d, which was expected to increase to 25,000 bbl/d by mid-1986. The developer of the field, Umm Addalkh Development Co., was also developing a second offshore field, Satah, which was scheduled to begin producing by the end of 1985 at an initial rate of 10,000 bbl/d.

The United Petroleum Development Co. of Japan announced that production from the offshore Bunduq Oilfield, shared 50-50 between Abu Dhabi and Qatar, reached 22,000 bbl/d. Production was expected to increase to 25,000 bbl/d from the Arab D area, and 7,000 bbl/d from the Arab C area.

Projects scheduled for completion in Abu Dhabi during the year were the Bu Hasa water injection project, the first phase of Bu Hasa's oil-gathering system, and the Asab oil-gathering program.

The National Drilling Co., a wholly owned subsidiary of ADNOC, drilled 111 onshore and offshore wells during the year, with 6 offshore, 6 onshore, and 7 water well rigs. The total consisted of 38 development, 13 exploration, 47 workover and rehabilitation, and 13 water wells. Total footage was 553,785 feet, up 155,000 feet from that of 1984.

INTOIL, the Bahrain-based private oil group, farmed out a drilling program of 11 wells in the offshore Mubarek Oilfield in Sharjah to Buttes Gas and Oil International and to Neste Oy of Finland. The first well, J-1, was to be dually completed in the Thamama reservoir and the Ilam-Mishrif reservoirs, and an option for dual completion in subsequent wells was secured. The total capital cost of the program was expected to be $110 million. Production from the Mubarek Field had decreased from an initial 60,000 bbl/d to 5,390 bbl/d in 1984.

Dubai announced that a new oil well named Albarq had been drilled by British Petroleum Ltd. on the coast of Dubai.

Gulf Offshore Ras Al Khaimah Ltd. completed the fourth development well, Saleh 4-X, in the Saleh Field off the northernmost point of the Emirates and was expected to complete by yearend the delineation well 5A Saleh. Saleh 4-X tested at 8,255 bbl/d of high-gravity crude and 43,000 MMcf per day of gas, and by yearend was producing over 5,000 bbl/d of condensates, about 55% of the field's total production of 9,000 bbl/d. Three prior wells produced an average of 10,000 bbl/d of condensate in December 1984. The fifth well, having a target depth of 15,000 feet, was spudded from Zapata Offshore Co.'s Bonito II jackup rig that had been serving as a temporary production and processing unit for the previous four wells until it was replaced by a permanent production facility. Saleh condensate was transferred by pipelines to the *Afran Zodiac* storage tanker 21 miles away. The new facility was to include an 18-inch pipeline to feed gas to an onshore plant that was to produce as much as 980 bbl/d of additional NGL that would then be moved to the *Afran Zodiac* through a new 18-inch pipeline. Total exports of condensate since the beginning of production in June 1984 had reached 4.9 million barrels.

The UAE became the largest exporter of crude oil to Japan at 679,000 bbl/d, thereby displacing Saudi Arabia. Imports by Japan from the UAE rose 30%, even though total Japanese imports from Arab countries declined sharply. Increased export activity may have been a result of price discounts and more favorable credit terms that were brought about by Japanese pressure on the UAE to adopt a spot market-related price that was lower than the official price.

ADNOC reported agreements to supply the Indian Oil Corp. with 3,855,000 barrels of crude oil as it did in 1984. Also, a countertrade deal was announced, with Dassault International S.A.R.L. of France providing 18 Mirage 2,000 war planes and related equipment for about 15.4 million barrels of crude oil valued at about $450 million. France's Compagnie Française de Pétroles-Total S.A., a major equity holder in Abu Dhabi, was to handle the oil.

Refining.—The total capacity of Abu Dhabi's two refineries was 225,000 bbl/d. ADNOC was planning to increase the capacity of the Ruwais refinery from 120,000 bbl/d to 300,000 bbl/d. Airports under construction at Al Ain and Fujairah were expected to require additional aviation fuel.

ADNOC's 120,000-bbl/d Ruwais refinery was shut down in January and reopened in October after a new hydrocracking plant was installed. Italy's Snamprogetti built the $400 million plant, which has a 27,000-bbl/d capacity. The refinery consists of a 27,000-bbl/d vacuum gas and oil hydrocracking unit, a 46,000-bbl/d vacuum distillation unit, a 53-million-cubic-foot hydrogen production unit, a 26.5-cubic-meter-per-hour sour water stripper, a 9,500-cubic-foot-per-hour acid removal unit, and a 49-ton-per-day sulfur recovery unit. The crude throughput at the refinery was about 100,000 bbl/d in January. Atmospheric residues were to be upgraded into naphtha, kerosene, high-octane gasoline, LPG, and diesel fuel.

In mid-1985, the 100,000-bbl/d Exxon Corp. refinery at Milford Haven in southern Wales was being dismantled for shipment to Ajman for reconstruction by 1988. The Ajman Refinery Co. Ltd., owned by the government of Ajman and other investors, contracted for project management and engineering services with Sir Alexander Gibb and Partners, Foster Wheeler (Energy) Ltd., and Hawker Siddeley Power Engineering. Agreements were signed with Mundogas (UK) Ltd. and with Treffoil and AVIA Mineralol-AG of the Federal Republic of Germany to handle sales. The project was expected to cost $530 million.

Construction of a $12 million lube-oil blending and packaging plant in Mina Jebel Ali, 22 miles southeast of Dubai, was to begin in late 1985. Ewbank Preece of the United Kingdom was to be the managing contractor, and British Petroleum Arabian Agencies Co. was to be the builder. The 20,000- to 30,000-ton-per-year plant would include an oil import pipeline from the dockside, a 353,150-cubic-foot tank farm for base oils and additives storage, blending and packaging equipment, and warehouses for lube-oil products. Base oils were to be imported from Jeddah, Saudi Arabia. Completion was expected to be by yearend 1986.

Shell Markets (Middle East) Co. opened a 28,000-ton base-lube storage depot in the Jebel Ali area near Dubai. Lube oils were to be supplied to blending plants in the Middle East with beginning deliveries being made to Saudi Arabia and Oman by truck.

Petrochemicals.—The new sulfur-handling terminal at Ruwais, Abu Dhabi, operated by FERTIL, shipped 14,000 tons of sulfur to Mitsui & Co. of Japan. The terminal was designed to receive, store, and export 800 tons of granulated byproduct sulfur per day from ADNOC's Thamama C gas project. Storage capacity was 40,000 tons of sulfur, and a single-berth loading terminal was able to handle 5,000- to 25,000-deadweight-ton ships. Sulfur was produced at the company's gas treatment plant at Habshan, which was designed to process 450 MMcf per day of gas.

Davy McKee Corp. and Wimpey Engineering Corp. of the United Kingdom and Tenneco Inc. of the United States were actively seeking $200 million financing for a proposed 5.5-million-barrel-per-year methanol plant at Hamriya on the Sajaa Gasfield in Sharjah. An alternative project is a 5.5-million-barrel-per-year ammonia and urea plant that would cost $300 million.

Transportation.—The Abu Dhabi National Tanker Co., a wholly owned subsidiary of ADNOC, sold two very large crude carrier tankers for scrap to Taiwan breakers. The *Delma*, a tanker displacing 265,053 deadweight tons, was being used as a storage and export terminal from the Ruwais and Umm al-Nas refineries, and the *al-Dhafrah*, displacing 273,504 deadweight tons, had been laid up since mid-1983. The tanker fleet was reduced to eight carriers, five between 28,000 and 57,000 deadweight tons for products, two about 57,000 deadweight tons for crude oil and products, and one for oil at about 136,000 deadweight tons.

ADNOC has let a contract to Bechtel to design a major 230-mile, 48-inch oil line from Habshan Fields to Fujairah on the Gulf of Oman, which would allow the Strait of Hormuz to be avoided.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from United Arab Emirate dirhams (UAED) to U.S. dollars at a rate of UAED3.67=US$1.00.

The Mineral Industry of the United Kingdom

By Richard H. Singleton[1]

In 1985, the United Kingdom enjoyed its fourth year of economic recovery. The growth in real gross domestic product (GDP) increased to 3.4% from 1.4% in 1984. Wages increased 9%, about 4% above the average of the Organization for Economic Cooperation and Development countries. Nonoil commodity prices decreased and costs of materials procured by industry decreased 7%. However, retail prices increased by an estimated 6%.

The world's first commercial casting center for the production of aluminum-silicon alloys was established in the United Kingdom. Lithium metal production capacity was increased. British Steel Corp. (BSC) began another rationalization program including closing of several mills and modernization of others, aimed at making BSC financially independent beginning in 1986. Disruption of steel production had been slight during a 12-month coal strike that ended in March.

Total coal production nearly doubled to 96 million tons in 1985 but remained well below the 1983 level. The National Coal Board continued its coal mine closure program that began prior to the strike. New coal mining capacity was under development. Lignite seams of sufficient quality and thickness for commercial development were discovered in Northern Ireland, and a modest development program was begun.

The Rio Tinto Zinc Corp. PLC (RTZ) gained control of about 80% of British tin mining capacity. Capital investments were halted by yearend in this industry because of the collapse of world tin prices. One beneficiation plant was closed. The United Kingdom's tin smelting annual capacity was increased by one-third to 20,000 tons.

Blue Circle Industries PLC acquired the Atlantic Cement Co. Inc. in the United States and closed two wet-process plants in the United Kingdom. British potash production increased for the third successive year.

North Sea natural gasfield development slowed significantly although demand remained high and production increased. A large commercial flow of gas, 300 million cubic feet per day, began from the G sector of the Leman Field in the North Sea. Smaller deliveries of gas began in October from the Anglo-Norwegian Statfjord Field. Statfjord was the most productive oilfield in the North Sea. The world's first natural gas undersea storage chamber in the United Kingdom went into operation. The stored gas was to be released to the domestic market during the winter months. The first British underground pressurized facility for liquid petroleum gas storage was inaugurated.

All 29 petroleum fields that had been developed in the United Kingdom's sector of the North Sea remained in operation, although the four largest were more than 50% depleted. Seven new North Sea fields were under development, all east and northeast of Scotland. Exploration for new deposits remained active, although little hope remained that new large fields would be discovered.

Sales from the Government stockpile of strategic materials began in August with the release of about 24,000 tons of high-carbon ferromanganese, 27,000 tons of manganese ore, and nearly 100 tons each of cobalt and ferrovanadium. Total estimated market value was $13 million.[2] Trade and Industry Department officials indicated that disposal of the stockpile should be completed in 4 or 5 years.

PRODUCTION

Estimated coal production increased 88% as a result of settlement of the yearlong coal strike in March and reached 81% of the 1983 level. Production of marketable natural gas increased 11% to 1.5 trillion cubic feet. Nickel production decreased because of the market-induced plant closure during the first quarter of 1985. Production of zinc metal decreased about 14%, and production of secondary aluminum decreased about 10%.

Table 1.—United Kingdom: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984[p]	1985[e]
METALS					
Aluminum:					
Alumina from imported bauxite ------- thousand tons	90	88	93	105	100
Metal:					
Primary	339,183	[r]240,806	252,525	287,874	[2]275,373
Secondary	148,009	[r]114,612	128,258	143,949	130,000
Cadmium: Metal including secondary	278	354	340	390	370
Copper:					
Ore and concentrate, metal content	[r]607	649	652	660	650
Metal, refined:					
Primary	59,834	[r]63,153	67,545	69,458	64,000
Secondary	76,329	[r]70,979	76,821	67,376	62,000
Total	136,163	[r]134,132	144,366	136,834	126,000
Iron and steel:					
Iron ore:					
Gross weight ------- thousand tons	731	470	384	403	350
Iron content ------- do.	161	103	81	82	73
Metal:					
Pig iron ------- do.	9,470	8,327	9,477	9,487	10,500
Ferroalloys, blast furnace: Ferromanganese ------- do.	84	61	83	75	80
Steel, crude ------- do.	15,573	13,704	14,986	15,121	[2]15,722
Rolled products ------- do.	13,041	11,664	12,442	12,638	12,800
Lead:					
Mine output, metal content	[r]6,965	3,993	3,797	2,431	3,000
Metal:					
Smelter:					
Bullion from imported concentrate	26,556	34,100	40,740	36,071	36,000
Secondary (refined)[3]	197,992	175,210	185,288	191,252	158,900
Total	224,548	209,310	226,028	227,323	194,900
Refined:					
Primary[4]	135,369	130,984	136,908	147,122	140,500
Secondary[3]	197,992	175,210	185,288	191,252	158,900
Total	333,361	306,194	322,196	338,374	299,400
Magnesium metal including alloys	1,900	1,758	[r e]1,700	[e]1,800	NA
Nickel metal, refined	25,400	6,900	23,200	22,300	14,000
Silver metal ------- thousand troy ounces	[r]107	105	85	82	87
Tin:					
Mine output, metal content	3,869	4,208	4,025	5,216	5,300
Metal:					
Primary	[r]6,863	[r]8,164	6,467	6,830	7,200
Secondary (refined)	6,071	[r]5,419	6,870	6,700	7,300
Zinc:					
Ore and concentrate, metal content	[r]10,855	10,186	8,906	7,478	5,400
Metal, smelter	81,650	[r]79,278	87,651	85,604	74,000
INDUSTRIAL MINERALS					
Barite and witherite ------- thousand tons	63	81	36	63	70
Bromine	27,600	29,800	25,800	28,500	28,000
Cement, hydraulic ------- thousand tons	12,729	12,962	13,396	13,481	[2]13,339
Clays:					
Fire clay ------- do.	992	850	689	757	700
Fuller's earth[5] ------- do.	[r]185	[r]187	192	286	300
Kaolin (china clay)[6] ------- do.	[r]2,629	[r]2,421	2,722	2,970	3,000
Ball clay and pottery clay[6] ------- do.	[r]689	[r]660	642	629	625
Other including clay shale ------- do.	18,776	20,280	22,385	17,804	18,000

See footnotes at end of table.

Table 1.—United Kingdom: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984[p]	1985[e]
INDUSTRIAL MINERALS —Continued					
Diatomite[e]	1,000	1,000	[r]300	[r]200	200
Feldspar (china stone)	49,000	5,000	5,300	5,900	6,000
Fluorspar, all grades[7] thousand tons	[r]256	[r]201	131	137	150
Gypsum and anhydrite[6] do	2,944	2,741	2,967	3,138	3,200
Lime: Quicklime and hydrated lime[e] do	[r]2,500	[r]2,500	[r]2,500	[r]2,500	2,500
Nitrogen: N content of ammonia do	1,780	1,716	1,720	1,836	1,800
Potash, K_2O equivalent do	285	[r]245	308	324	343
Salt:					
Rock do	1,350	2,209	1,316	1,569	1,600
From brine do	1,454	1,554	1,394	1,423	1,500
In brine, sold or used as such do	3,916	3,874	3,601	4,134	4,100
Sand and gravel:					
Common sand and gravel do	97,000	97,753	107,096	105,990	106,000
Industrial sand do	4,451	4,123	4,025	4,329	4,300
Sodium compounds: Sodium carbonate[e] do	1,300	1,300	1,300	[r]1,000	1,000
Stone:					
Calcite do	20	18	10	7	8
Chalk do	11,756	11616	12,430	12,022	12,000
Chert and flint do	10	[e]10	174	17	18
Dolomite do	13,936	13,727	14,983	14,228	14,500
Igneous rock do	30,772	36,138	36,873	36,825	14,500
Limestone do	65,131	71,723	79,002	79,239	79,500
Sandstone including ganister do	12,260	13,336	14,736	15,116	15,200
Slate:					
Roofing do	16	21	18	[e]200	20
Other, including fill do	334	764	476	[e]137	170
Crushed rock, not further described do	92,000	102,848	112,082	110,678	111,000
Strontium minerals	14,500	18,000	12,100	16,100	17,000
Sulfur, byproduct:					
Of metallurgy[e] thousand tons	[r]55	[r]61	[r]69	[r]71	70
Of spent oxides do	4	[r]3	3	1	1
Of petroleum refinery do	75	59	55	75	80
Total do	[r]134	[r]123	127	147	151
Talc, soapstone, pyrophyllite[e] do	18	19	16	[r]19	18
Titania[6] do	170	172	195	206	200
MINERAL FUELS AND RELATED MATERIALS					
Carbon black do	153	[e]150	[e]150	NA	NA
Coal:					
Anthracite do	2,123	2,884	2,016	1,217	1,700
Bituminous and other do	[r]125,346	[r]121,827	117,238	49,965	94,500
Total do	127,469	124,711	119,254	51,182	96,200
Coke:					
Metallurgical do	[r]6,677	[r]6,533	6,493	5,140	6,000
Breeze, all types do	[r]1,381	[r]1,095	1,182	988	1,000
Fuel briquets, all grades do	2,065	1,933	1,784	1,067	1,500
Gas, natural:					
Gross billion cubic feet	[r]1,470	[r]1,496	1,530	1,484	1,650
Marketed[8] do	1,321	1,352	1,396	1,363	1,510
Natural gas liquids[9] thousand 42-gallon barrels	[r]17,800	[r]33,700	47,400	55,200	60,000
Petroleum:					
Crude do	[r]640,200	[r]730,200	806,800	882,100	890,000
Refinery products:					
Naphtha do	30,600	34,900	35,500	32,100	25,900
Gasoline do	146,197	163,563	179,000	189,000	189,200
Jet fuel do	36,472	35,656	37,800	42,800	42,000
Kerosene do	14,756	14,345	13,700	16,000	17,900
Distillate fuel oil do	152,259	153,534	156,900	160,700	161,900
Residual fuel oil do	127,000	[r]104,300	89,800	86,300	85,100
Lubricants do	7,441	6,930	6,600	7,800	8,300
Bitumen do	10,500	11,300	10,900	10,900	10,700
Other do	[r]24,900	[r]24,000	24,700	26,800	123,700
Refinery fuel and losses do	[r]48,400	[r]56,800	52,900	52,800	49,200
Total do	[r]598,525	[r]605,328	607,800	625,200	713,900

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Includes data available through Apr. 30, 1986.
[2]Reported figure.
[3]Includes a small quantity of primary lead from domestic concentrate.
[4]Produced entirely from imported bullion and includes the lead content of alloys.
[5]Salable product.
[6]Sales.
[7]Proportions of grades not available; probably about two-thirds acid grade.
[8]Includes gas used on platforms.
[9]Includes ethane, propane, butane, and other condensates.

TRADE

Noteworthy increases occurred in 1984 in the trade of certain commodities. Imports of nickel matte from Canada, crude dimension stone from Sweden, and alumina and bauxite increased. Large imports of alumina began from Ireland as imports from Jamaica decreased. Brazil was responsible for most of the bauxite import increase. Export increases occurred in crude petroleum and tin. Crude oil exports increased 15% to 571 million barrels or 65% of production compared with 62% of production in 1983. Exports of crude oil to the United States decreased 21% in 1984 to 104 million barrels. Exports of tin metal increased almost sevenfold with 68% going to the U.S.S.R.

The oil trade surplus increased from $9.0 billion in 1984 to $10.7 billion in 1985. Deficits in the trade of nonoil commodities caused a net trade deficit of $2.7 billion compared with $5.7 billion in 1984. The total balance of payments increased from $1.4 billion to $4.5 billion in 1985 as the United Kingdom enjoyed its sixth year of surplus in its total balance of payments.

The United Kingdom had maintained a trade surplus with the United States since 1981, caused mainly by increased U.S. imports of British oil.

The United Kingdom had followed for a decade a policy of favoring British-based firms to provide engineering services and goods to its offshore oilfields. Subsidiaries of U.S. firms operating in the United Kingdom had 70% of this market in 1985. The British Government passed a law in 1985 tying procurement in oil lease awards to firms with majority British ownership.

Table 2.—United Kingdom: Exports and reexports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS				
Alkali and alkaline-earth metals:				
Alkali metals	207	427	18	France 105; Poland 68; Netherlands 57.
Alkaline-earth metals	1	60	--	All to Republic of South Africa.
Aluminum:				
Ore and concentrate	717	848	--	Sweden 693; West Germany 30.
Oxides and hydroxides	37,926	43,975	2,978	Finland 4,078; Sweden 3,595; Norway 3,335.
Ash and residue containing aluminum	3,105	3,127	562	West Germany 1,987; France 131.
Metal including alloys:				
Scrap	78,863	88,523	130	West Germany 47,038; Italy 14,274; France 8,147.
Unwrought	132,414	127,560	11,117	West Germany 53,863; Belgium-Luxembourg 12,219.
Semimanufactures	95,031	113,022	8,740	West Germany 18,520; Ireland 15,359; France 9,522.
Antimony: Metal including alloys, all forms	75	84	--	West Germany 20; Norway 15; France 9.
Arsenic: Oxides and acids	4,278	4,088	2,008	New Zealand 1,430; Netherlands 134.
Beryllium:				
Oxides and hydroxides	2	2	1	West Germany 1.
Metal including alloys, all forms	18	2	([2])	India 1.
Bismuth: Metal including alloys, all forms	353	419	123	West Germany 64; France 46.
Cadmium: Metal including alloys, all forms	194	120	4	France 37; Canada 29; Netherlands 13.
Cesium and rubidium: Metal including alloys, all forms	([2])	40	--	All to China.
Chromium:				
Ore and concentrate	112	--		
Oxides and hydroxides	12,614	15,689	2,391	France 2,638; Australia 1,[illegible]81.
Metal including alloys, all forms	3,037	3,888	1,619	West Germany 623; Italy 211.
Cobalt:				
Oxides and hydroxides	387	359	63	Belgium-Luxembourg 82; Netherlands 59.
Metal including alloys, all forms	743	918	136	Netherlands 225; Australia 84.
Columbium and tantalum:				
Ore and concentrate	--	27	4	Nigeria 18; Ireland 2.
Metal including alloys, all forms:				
Columbium (niobium)	([2])	22	--	Netherlands 20; Italy 2.
Tantalum	27	18	7	West Germany 6; Austria 1.

See footnotes at end of table.

Table 2.—United Kingdom: Exports and reexports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued				
Copper:				
Ore and concentrate	667	3,069	--	Sweden 3,000; Netherlands 23.
Matte and speiss including cement copper	150	8	--	All to Netherlands.
Oxides and hydroxides	446	583	--	Australia 139; Netherlands 104; Singapore 70.
Sulfate	899	2,120	129	Belgium-Luxembourg 210; Malaysia 206; West Germany 190.
Ash and residue containing copper	5,158	5,495	--	Belgium-Luxembourg 1,969; West Germany 1,061; Sweden 1,037.
Metal including alloys:				
Scrap	104,701	101,194	177	West Germany 44,497; Italy 28,219; Belgium-Luxembourg 13,983.
Unwrought	32,803	38,451	1,859	Italy 12,899; West Germany 9,640; France 4,981.
Semimanufactures	94,266	109,064	6,969	Ireland 11,721; France 10,380; West Germany 8,635.
Gallium: Metal including alloys, all forms	17	--		
Germanium: Metal including alloys, all forms	3	4	1	West Germany 2; Japan 1.
Gold:				
Waste and sweepings value, thousands	$7,042	$6,734	--	France $3,341; Spain $1,609; West Germany $865.
Metal including alloys, unwrought and partly wrought thousand troy ounces	177	202	10	Israel 26; Japan 26; Hong Kong 23.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite	965	343	2	West Germany 92; Cuba 85; Switzerland 64.
Metal:				
Scrap thousand tons	3,794	4,317	(2)	Spain 2,222; Sweden 404; East Germany 232.
Pig iron, cast iron, related materials	69,434	61,079	423	Belgium-Luxembourg 22,823; West Germany 6,496; Sweden 6,469.
Ferroalloys:				
Ferromanganese	14,040	687	--	Belgium-Luxembourg 284; Israel 78; Australia 55.
Ferrosilicon	1,699	1,222	--	Ireland 282; Portugal 180; India 123.
Silicon metal	1,166	3,259	60	Belgium-Luxembourg 1,004; West Germany 490; Japan 429.
Unspecified	14,649	15,014	88	West Germany 3,313; Netherlands 1,987.
Steel, primary forms	722,127	680,428	39,618	West Germany 143,545; Italy 54,901; France 54,101.
Semimanufactures:				
Bars, rods, angles, shapes, sections thousand tons	1,353	1,404	331	West Germany 106; Singapore 87.
Universals, plates, sheets do	1,128	1,177	70	West Germany 123; U.S.S.R. 73; Denmark 72.
Hoop and strip do	110	133	9	Ireland 13; France 12; West Germany 12.
Rails and accessories do	161	107	3	India 26; New Zealand 15; France 14.
Wire do	98	113	26	Ireland 9; Saudi Arabia 6.
Tubes, pipes, fittings do	559	578	52	Netherlands 61; Sweden 47.
Castings and forgings, rough do	40	44	9	Sweden 7; France 4.
Lead:				
Ore and concentrate	10,095	2,644	4	Belgium-Luxembourg 1,725; France 806.
Oxides	5,267	6,897	1	West Germany 2,378; Ireland 2,174; France 455.
Ash and residue containing lead	1,401	3,487	144	West Germany 2,149; Denmark 623; Belgium-Luxembourg 303.
Metal including alloys:				
Scrap	22,314	34,385	52	West Germany 20,607; Netherlands 5,099; Ireland 4,375.
Unwrought	113,049	143,080	1,398	West Germany 57,827; Belgium-Luxembourg 16,752; Netherlands 15,315.
Semimanufactures	3,116	4,244	145	Saudi Arabia 556; France 457; West Germany 441.

See footnotes at end of table.

Table 2.—United Kingdom: Exports and reexports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued				
Lithium:				
Ore and concentrate	117	--		
Oxides and hydroxides	94	147	--	Italy 40; France 34; Belgium-Luxembourg 27.
Metal including alloys, all forms	97	163	19	West Germany 50; Switzerland 27; Italy 22.
Magnesium: Metal including alloys:				
Scrap	353	469	--	Italy 237; Netherlands 87; Belgium-Luxembourg 77.
Unwrought	921	965	458	West Germany 148; Canada 145.
Semimanufactures	767	743	83	France 153; Ireland 98.
Manganese:				
Ore and concentrate, metallurgical-grade	1,414	1,934	--	Belgium-Luxembourg 1,450; Italy 104; Ireland 103.
Oxides	2,697	2,007	71	Nigeria 1,404; Singapore 100; Israel 98.
Metal including alloys, all forms	1,232	1,001	13	Venezuela 125; Egypt 101; France 89.
Mercury 76-pound flasks	3,597	1,247	NA	Belgium-Luxembourg 232; France 232; West Germany 203.
Molybdenum:				
Ore and concentrate	6,120	4,906	--	Netherlands 3,231; Spain 563; Belgium-Luxembourg 323.
Oxides and hydroxides	1,035	1,614	20	Netherlands 509; Austria 487; West Germany 179.
Metal including alloys, all forms	460	409	56	Netherlands 67; West Germany 63.
Nickel:				
Ore and concentrate	10	12	--	Ireland 10.
Matte and speiss	573	184	--	Belgium-Luxembourg 78; West Germany 42; East Germany 38.
Oxides and hydroxides	150	88	--	Netherlands 60; Yugoslavia 9; Sweden 5.
Ash and residue containing nickel	4,504	7,467	343	Canada 5,818; West Germany 404.
Metal including alloys:				
Scrap	5,637	5,842	602	Sweden 2,343; West Germany 843; Netherlands 817.
Unwrought	13,737	12,376	285	Belgium-Luxembourg 3,288; West Germany 3,192; France 1,265.
Semimanufactures	7,718	10,768	866	Belgium-Luxembourg 1,777; Japan 1,491; France 1,361.
Platinum-group metals: Metals including alloys, unwrought and partly wrought thousand troy ounces	1,511	1,736	643	Switzerland 418; France 96.
Selenium, elemental	153	174	2	Sweden 43; Netherlands 39; Spain 22.
Silicon, high-purity	r14	19	--	West Germany 13; Japan 5.
Silver:				
Ore and concentrate[3] value, thousands	$182	$2	--	West Germany $1; Israel $1.
Waste and sweepings[3] do	$33,743	$18,343	$285	France $8,892; West Germany $5,328; Belgium-Luxembourg $2,006.
Metal including alloys, unwrought and partly wrought thousand troy ounces	81,309	54,174	NA	Switzerland 18,519; China 12,732; U.S.S.R. 12,217.
Tellurium and arsenic, elemental	44	57	27	Japan 9; Ireland 7.
Tin:				
Ore and concentrate	1,601	3,092	1	Netherlands 3,026; West Germany 39.
Oxides	501	606	193	Spain 155; Netherlands 105.
Ash and residue containing tin	453	547	--	West Germany 261; Denmark 213.
Metal including alloys:				
Scrap	373	932	17	West Germany 274; Bangladesh 92; Netherlands 87.
Unwrought	1,897	13,065	135	U.S.S.R. 8,908; Netherlands 1,421; West Germany 640.
Semimanufactures	558	631	13	Ireland 88; West Germany 67; Italy 51.
Titanium:				
Ore and concentrate	513	27	--	All to West Germany.
Oxides	14,018	15,411	5,689	Poland 1,027; Hungary 960.
Metal including alloys, all forms value, thousands	$22,315	$3,998	NA	NA.

See footnotes at end of table.

Table 2.—United Kingdom: Exports and reexports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued				
Tungsten:				
Ore and concentrate	218	275	--	Netherlands 106; Japan 104; Switzerland 36.
Oxides and hydroxides	8	59	--	Romania 30; Austria 16; Yugoslavia 10.
Ash and residue containing tungsten	25	54	15	West Germany 36.
Metal including alloys, all forms	543	575	92	West Germany 167; Belgium-Luxembourg 90; Austria 76.
Uranium and/or thorium: Metals including alloys, all forms	5	11	8	Australia 1; Netherlands 1.
Vanadium:				
Oxides and hydroxides	182	483	1	Belgium-Luxembourg 445; Netherlands 19.
Ash and residue containing vanadium	--	129	--	All to Netherlands.
Metal including alloys, all forms	73	62	--	West Germany 33; Netherlands 19; Ireland 8.
Zinc:				
Ore and concentrate	7,538	955	--	West Germany 884; Denmark 23.
Oxides	7,728	7,901	281	Belgium-Luxembourg 1,173; Ireland 1,026; West Germany 844.
Blue powder	2,702	3,371	1,693	NA.
Matte	868	577	--	West Germany 298; Spain 261.
Ash and residue containing zinc	8,764	5,504	3	Sweden 2,433; West Germany 1,867; France 446.
Metal including alloys:				
Scrap	14,495	15,246	--	West Germany 7,649; Italy 2,355; France 1,426.
Unwrought	25,561	14,660	1,779	France 4,882; Netherlands 1,873.
Semimanufactures	3,928	2,337	39	Nigeria 576.
Zirconium: Ore and concentrate	596	434	9	West Germany 113; Belgium-Luxembourg 92; Colombia 50.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	1,968	2,988	78	West Germany 1,102.
Artificial:				
Corundum	2,839	3,990	167	Sweden 1,302; West Germany 1,148; Italy 464.
Silicon carbide	269	168	1	Belgium-Luxembourg 74; New Zealand 33; West Germany 24.
Dust and powder of precious and semiprecious stones including diamond value, thousands	$2,502	$3,159	$816	India $546; Italy $367.
Grinding and polishing wheels and stones	3,611	3,565	151	France 589; Sweden 333; Iran 324.
Asbestos, crude	1,283	964	--	Belgium-Luxembourg 735; Italy 46.
Barite and witherite	10,464	14,997	20	West Germany 7,329; Norway 2,463; Denmark 2,158.
Boron materials:				
Crude natural borates	447	330	--	Republic of South Africa 263; France 43; Finland 20.
Elemental	272	19	--	Spain 16.
Oxides and acids	985	1,151	([2])	Netherlands 888; Japan 85; West Germany 77.
Bromine	1,918	2,018	--	West Germany 627; France 569; Belgium-Luxembourg 389.
Cement	393,128	126,953	35	Ireland 54,557; Nigeria 31,708.
Chalk	40,265	34,009	778	Nigeria 3,193; Lebanon 2,765; Ireland 2,010.
Clays, crude:				
Bentonite thousand tons	19	22	([2])	Sweden 7; Belgium-Luxembourg 2; West Germany 2.
Kaolin do	2,131	2,560	13	Finland 474; West Germany 441; Sweden 343.
Unspecified do	r356	372	1	Italy 91; Spain 67; Greece 33.
Cryolite and chiolite	29	47	--	Ireland 39; Singapore 3.
Diamond:				
Gem, not set or strung value, thousands	$1,905,570	$1,964,197	$256,452	Belgium-Luxembourg $722,904; Switzerland $413,937; India $308,162.
Industrial stones do	$15,932	$12,378	$2,660	Romania $2,768; Belgium-Luxembourg $1,590.
Diatomite and other infusorial earth	309	611	14	Saudi Arabia 242; Jamaica 53; Ireland 43.

See footnotes at end of table.

Table 2.—United Kingdom: Exports and reexports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Feldspar, fluorspar, related materials:				
Feldspar	452	456	7	Indonesia 150; Ireland 140; Greece 55.
Fluorspar	12,034	8,199	--	West Germany 2,741; Norway 1,479; Netherlands 842.
Unspecified	908	818	--	Ireland 660; Australia 60; Norway 58.
Fertilizer materials:				
Crude, n.e.s	3,054	2,750	89	Ireland 2,005; Tanzania 225.
Manufactured:				
Ammonia	232,568	241,369	1	Spain 52,626; Belgium-Luxembourg 40,100; India 34,644.
Nitrogenous	118,330	186,128	27	Netherlands 60,147; Belgium-Luxembourg 50,852; Portugal 23,817.
Phosphatic	1,706	753	--	Ivory Coast 386; Ireland 123; Ghana 120.
Potassic	145,994	98,938	392	Norway 35,325; Finland 28,628; Netherlands 14,098.
Unspecified and mixed	330,071	319,468	68	Ireland 205,415; West Germany 44,588; Denmark 15,021.
Graphite, natural	3,126	3,862	235	West Germany 1,240; France 692; Austria 361.
Gypsum and plaster	21,715	16,647	60	Ireland 3,376; Saudi Arabia 2,865; Republic of South Africa 1,079.
Iodine	96	97	--	France 23; Japan 20; Nigeria 19.
Kyanite and related materials	2,502	5,334	915	West Germany 2,542; France 504.
Lime	21,737	19,427	--	France 6,478; Ivory Coast 4,050; Nigeria 2,490.
Magnesium compounds:				
Magnesite	42	50	NA	NA.
Oxides and hydroxides	89,168	79,750	NA	NA.
Other	--	1	NA	NA.
Mica:				
Crude including splittings and waste	3,676	3,406	1	West Germany 866; Netherlands 441; Belgium-Luxembourg 253.
Worked including agglomerated splittings	113	90	NA	NA.
Nitrates, crude	196	219	--	Ireland 82; France 80; West Germany 26.
Phosphates, crude	10,395	20,253	--	West Germany 20,080.
Pigments, mineral: Natural, crude	800	880	--	Saudi Arabia 269; Philippines 160; Canada 71.
Precious and semiprecious stones other than diamond:				
Natural ---- value, thousands	$105,676	$119,962	$24,697	Switzerland $69,337; France $7,700.
Synthetic ---- do	$265	$439	$4	Ireland $226; Spain $78; U.S.S.R. $39.
Pyrite, unroasted	52	29	--	France 22; Portugal 5.
Salt and brine	378,864	484,510	57	Nigeria 135,324; Sweden 108,262; Ireland 50,206.
Sodium compounds, n.e.s.: Carbonate, manufactured	91,525	99,280	([2])	Republic of South Africa 48,583; Ireland 11,811; Sweden 4,627.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	8,820	10,382	59	West Germany 8,455; Denmark 748; Ireland 404.
Worked	5,602	5,585	1,613	Netherlands 513; France 415.
Dolomite, chiefly refractory-grade	24,012	32,858	--	Norway 7,705; Sweden 6,512; Poland 3,676.
Gravel and crushed rock	2,413,311	2,040,506	12,723	Belgium-Luxembourg 622,655; France 621,595; Netherlands 370,384.
Limestone other than dimension	668,629	617,803	--	Norway 170,184; Belgium-Luxembourg 169,947; Denmark 82,650.
Quartz and quartzite	1,081	244	6	Romania 46; United Arab Emirates 37; Ireland 31.
Sand other than metal-bearing	58,981	65,950	9	Ireland 26,494; Sweden 18,664; Iran 8,954.

See footnotes at end of table.

Table 2.—United Kingdom: Exports and reexports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Sulfur:				
Elemental:				
Crude including native and by-product	1,688	3,025	--	Nigeria 1,615; Netherlands 509; Ireland 174.
Colloidal, precipitated, sublimed	176	247	--	India 65; Iran 49; Republic of South Africa 45.
Dioxide	57	127	--	Ireland 120; Kenya 3.
Sulfuric acid	59,779	44,831	33	Ireland 18,719; Belgium-Luxembourg 11,193; France 7,645.
Talc, steatite, soapstone, pyrophyllite	4,272	3,583	--	Nigeria 1,533; Ireland 960; West Germany 182.
Vermiculite	1,353	1,648	35	West Germany 559; Israel 212; Netherlands 158.
Other:				
Crude	31,469	34,257	NA	NA.
Slag and dross, not metal-bearing	46,706	40,740	612	West Germany 29,926; Sweden 1,629; Netherlands 1,562.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	4,128	5,893	6	Ireland 3,035; Pakistan 813; France 438.
Carbon: Carbon black	32,004	32,115	175	Ireland 4,075; West Germany 3,479; France 3,181.
Coal:				
Anthracite thousand tons	517	203	--	France 61; Morocco 58; Belgium-Luxembourg 26.
Bituminous do.	5,827	2,237	(2)	France 716; Denmark 612; Ireland 298.
Briquets of anthracite and bituminous coal do.	125	73	--	Norway 62; Venezuela 7.
Lignite including briquets do.	1	1	--	Mainly to Yugoslavia.
Coke and semicoke do.	878	249	(2)	Norway 108; Sweden 34; Belgium-Luxembourg 29.
Peat including briquets and litter	8,265	10,127	--	Egypt 1,730; Spain 1,614; Australia 436.
Petroleum:				
Crude thousand 42-gallon barrels	497,964	570,867	103,652	Netherlands 116,753; France 108,143.
Refinery products:				
Liquefied petroleum gas do.	23,188	24,700	1,803	Netherlands 5,904; France 3,824; Sweden 3,515.
Gasoline do.	34,579	38,543	7,025	Netherlands 8,824; France 5,915; Ireland 5,425.
Mineral jelly and wax do.	267	364	30	Netherlands 77; West Germany 73; Nigeria 38.
Kerosene and jet fuel do.	4,074	6,745	911	Ireland 2,227; Iran 1,394.
Distillate fuel oil do.	37,236	42,869	822	France 13,577; Netherlands 6,082; Ireland 5,732.
Lubricants do.	3,668	5,649	238	Netherlands 1,838; Belgium-Luxembourg 501; West Germany 489.
Residual fuel oil do.	21,897	10,953	1,203	Ireland 3,909; Belgium-Luxembourg 1,435.
Bitumen and other residues do.	673	643	NA	Ireland 469; Iceland 76.
Bituminous mixtures do.	174	180	NA	India 29; Ireland 24; Singapore 21.
Petroleum coke do.	2,077	2,622	NA	NA.

[r]Revised. NA Not available.
[1]Table prepared by Jozef Plachy.
[2]Less than 1/2 unit.
[3]May include other precious metals.

Table 3.—United Kingdom: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS				
Alkali and alkaline-earth metals:				
Alkali metals	1,903	3,886	--	West Germany 2,794; France 1,072.
Alkaline-earth metals	28	36	--	Canada 19; France 11.
Aluminum:				
Ore and concentrate	256,068	316,909	64	Brazil 234,046; Ghana 40,372; Greece 23,856.
Oxides and hydroxides	488,882	661,954	3,073	Ireland 397,412; Jamaica 191,725; Suriname 26,217.
Ash and residue containing aluminum	1,626	225	11	Bahrain 82; France 44.
Metal including alloys:				
Scrap	10,897	6,746	230	Ireland 3,381; Nigeria 732; Netherlands 392.
Unwrought	163,637	172,141	60	Norway 115,583; Ireland 12,491; West Germany 8,973.
Semimanufactures	237,742	248,045	12,894	West Germany 76,384; France 33,786; Belgium-Luxembourg 33,140.
Antimony:				
Oxides	737	976	6	France 660; West Germany 106; Belgium-Luxembourg 95.
Metal including alloys, all forms	617	231	8	China 123; Belgium-Luxembourg 36; Netherlands 33.
Arsenic: Oxides and acids	4,395	5,746	--	NA.
Beryllium:				
Oxides and hydroxides	8	9	9	
Metal including alloys, all forms	1	1	1	NA.
Bismuth: Metal including alloys, all forms	337	503	66	West Germany 67; Bulgaria 64.
Cadmium: Metal including alloys, all forms .... value, thousands	$1,773	$2,043	NA	NA.
Chromium:				
Ore and concentrate	100,475	129,786	NA	NA.
Oxides and hydroxides	1,206	658	22	Netherlands 234; West Germany 116; Italy 107.
Metal including alloys, all forms	161	185	9	Japan 121; West Germany 17.
Cobalt:				
Ore and concentrate	7	1	--	All from Finland.
Oxides and hydroxides	344	502	2	Canada 404; Belgium-Luxembourg 64; Netherlands 21.
Metal including alloys, all forms	1,918	1,824	158	Zambia 413; Zaire 231; Belgium-Luxembourg 171.
Columbium and tantalum: Metal including alloys, all forms:				
Columbium (niobium)	17	16	11	West Germany 4.
Tantalum	51	52	26	West Germany 19; Austria 4.
Copper:				
Ore and concentrate	1,000	1,045	--	Czechoslovakia 1,040.
Oxides and hydroxides	2,063	2,743	108	Norway 1,317; Australia 795; West Germany 362.
Sulfate	--	2,020	206	Italy 349; Netherlands 346; Australia 301.
Ash and residue containing copper	45,466	73,217	624	Sweden 20,323; Republic of South Africa 20,106; Saudi Arabia 16,686.
Metal including alloys:				
Scrap	10,008	8,117	364	Republic of South Africa 2,236; Ireland 1,451; West Germany 568.
Unwrought	284,908	314,330	5,121	Peru 51,954; Canada 49,857; Chile 48,952.
Semimanufactures	92,091	97,396	1,457	West Germany 34,821; France 14,775; Finland 10,127.
Gallium: Metal including alloys, all forms	21	25	1	Belgium-Luxembourg 9; France 6; Netherlands 3.
Germanium: Metal including alloys, all forms	11	7	--	France 3; West Germany 2.
Gold:				
Waste and sweepings value, thousands	$127,555	$112,361	$72,605	Belgium-Luxembourg $15,684; Sweden $11,404.
Metal including alloys, unwrought and partly wrought thousand troy ounces	1,438	1,437	35	Hong Kong 569; Singapore 402; Brazil 116.

See footnotes at end of table.

Table 3.—United Kingdom: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite thousand tons	13,170	14,138	73	Canada 3,533; Australia 3,098; Brazil 2,326.
Pyrite, roasted do	231	296	--	Sweden 288; Norway 7.
Metal:				
Scrap	11,193	33,710	623	Ireland 24,359; Canada 2,741; Spain 1,457.
Pig iron, cast iron, related materials	106,685	102,687	99	Norway 21,197; Brazil 20,002; Netherlands 17,844.
Ferroalloys:				
Ferromanganese	98,949	37,625	(2)	Norway 22,034; France 7,355; Portugal 2,753.
Ferrosilicon	69,725	81,754	NA	NA.
Silicon metal	25,606	27,215	3	France 9,946; Norway 7,603; Republic of South Africa 5,777.
Unspecified	139,003	126,243	90	Republic of South Africa 26,806; Norway 25,516; Sweden 16,870.
Steel, primary forms	847,207	869,520	1,235	West Germany 447,499; Netherlands 142,535.
Semimanufactures:				
Bars, rods, angles, shapes, sections thousand tons	766	808	2	West Germany 108; Belgium-Luxembourg 99; Spain 93.
Universals, plates, sheets do	1,316	1,331	4	West Germany 294; Belgium-Luxembourg 256; Netherlands 213.
Hoop and strip do	151	157	1	West Germany 68; Belgium-Luxembourg 27; France 21.
Rails and accessories do	2	2	(2)	Belgium-Luxembourg 1.
Wire do	53	57	(2)	France 17; Belgium-Luxembourg 16; West Germany 10.
Tubes, pipes, fittings do	299	425	3	West Germany 78; Netherlands 60; Italy 59.
Castings and forgings, rough do	21	29	(2)	West Germany 9; Denmark 4; France 4.
Lead:				
Ore and concentrate	34,571	24,151	--	Spain 12,242; Australia 8,099; Ireland 1,900.
Oxides	979	1,452	44	Netherlands 846; West Germany 500.
Ash and residue containing lead	7,526	7,862	2,010	Sweden 2,426; West Germany 1,043.
Metal including alloys:				
Scrap	1,246	1,482	66	Ghana 296; Australia 261; Republic of South Africa 118.
Unwrought	139,931	175,673	12	Australia 108,548; Netherlands 34,230; Canada 27,187.
Semimanufactures	6,713	9,087	164	Belgium-Luxembourg 4,248; Ireland 3,361; West Germany 603.
Lithium:				
Oxides and hydroxides	1,522	1,109	246	Switzerland 672; West Germany 144.
Metal including alloys, all forms	7	15	8	West Germany 3.
Magnesium: Metal including alloys:				
Scrap	168	471	--	Netherlands 152; Republic of South Africa 121; Belgium-Luxembourg 58.
Unwrought	4,332	5,363	124	Norway 2,227; Netherlands 1,918; Canada 731.
Semimanufactures	1,115	1,121	53	Canada 434; Netherlands 385; Norway 87.
Manganese:				
Ore and concentrate, metallurgical-grade	368,494	269,865	--	Brazil 129,169; Republic of South Africa 116,683.
Oxides	2,645	3,582	111	Ireland 2,231; Belgium-Luxembourg 904.
Metal including alloys, all forms	3,421	3,043	74	Republic of South Africa 2,307; France 240; Saudi Arabia 100.
Mercury 76-pound flasks	5,367	8,352	29	Netherlands 3,364; Spain 2,533; France 1,044.
Molybdenum:				
Ore and concentrate	14,419	18,042	10,618	Canada 1,628; Peru 1,544.
Oxides and hydroxides	191	102	--	Netherlands 66; Belgium-Luxembourg 25.
Metal including alloys, all forms	308	487	52	Austria 246; West Germany 92; France 57.

See footnotes at end of table.

Table 3.—United Kingdom: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Nickel:				
Ore and concentrate	--	671	--	All from Netherlands.
Matte and speiss	25,937	39,892	61	Canada 36,835; Indonesia 1,789.
Oxides and hydroxides	511	552	4	Australia 321; Canada 131; Netherlands 39.
Ash and residue containing nickel	689	1,034	292	Netherlands 479; West Germany 93.
Metal including alloys:				
Scrap	2,299	2,810	413	Netherlands 403; West Germany 340; France 328.
Unwrought	10,890	15,395	335	Australia 4,520; Netherlands 4,199; Finland 1,968.
Semimanufactures	3,056	5,543	2,841	West Germany 1,472; Sweden 256; France 254.
Platinum-group metals: Metals including alloys, unwrought and partly wrought troy ounces	333,425	546,567	64,302	Switzerland 96,453; Netherlands 32,151.
Selenium, elemental	396	458	68	Canada 129; Belgium-Luxembourg 100.
Silicon, high-purity	16	25	3	West Germany 14; Japan 3.
Silver:				
Ore and concentrate[3] value, thousands	$285,543	$274,424	$876	Republic of South Africa $183,857; Canada $79,222.
Waste and sweepings[3] do	$212,210	$114,022	$35,134	Hong Kong $13,748; Republic of South Africa $11,167.
Metal including alloys, unwrought and partly wrought thousand troy ounces	79,627	53,435	322	West Germany 10,128; Hong Kong 6,302; Australia 5,208.
Tellurium and arsenic, elemental	120	160	1	Sweden 103; Belgium-Luxembourg 34.
Tin:				
Ore and concentrate	22,407	21,055	([2])	Bolivia 10,341; Chile 4,173; Peru 2,618.
Oxides	20	19	--	All from Italy.
Ash and residue containing tin	19,497	11,081	2,704	West Germany 2,394; Belgium-Luxembourg 2,113.
Metal including alloys:				
Scrap	2,902	1,664	485	Chile 505; Netherlands 308.
Unwrought	7,350	6,998	866	Netherlands 1,902; Indonesia 1,619.
Semimanufactures	135	591	16	Malaysia 427; West Germany 55; France 23.
Titanium:				
Ore and concentrate	281,399	248,110	18	Australia 143,627; Norway 75,473; India 24,990.
Oxides	11,024	9,818	3,141	West Germany 2,137; France 1,614.
Metal including alloys, all forms	[r]1,336	1,439	479	Japan 595; West Germany 153.
Tungsten:				
Ore and concentrate	693	896	--	Portugal 324; Bolivia 303; Belgium-Luxembourg 93.
Oxides and hydroxides	18	104	--	South Korea 54; West Germany 39.
Ash and residue containing tungsten	23	98	9	Bolivia 54; Italy 14; Netherlands 11.
Metal including alloys, all forms	213	418	31	West Germany 95; Austria 86; South Korea 74.
Uranium and/or thorium:				
Ore and concentrate	--	13	--	NA.
Metals including alloys, all forms	21	9	7	West Germany 2.
Vanadium:				
Oxides and hydroxides	1,929	660	--	Finland 522; China 100.
Metal including alloys, all forms	142	347	--	France 225; West Germany 96; Netherlands 20.
Zinc:				
Ore and concentrate	167,171	196,100	18	Australia 53,078; Peru 52,667; Canada 43,431.
Oxides	3,378	3,923	5	West Germany 1,210; France 879; Netherlands 619.
Blue powder	495	1,902	NA	NA.
Matte	47	54	18	Canada 36.
Ash and residue containing zinc	14,361	29,528	1,939	West Germany 13,249; Belgium-Luxembourg 3,100; Morocco 2,000.
Metal including alloys:				
Scrap	1,817	2,237	236	Canada 738; France 396; West Germany 288.
Unwrought	122,880	120,993	289	Canada 40,062; Netherlands 30,140; Finland 23,868.
Semimanufactures	5,024	3,756	6	West Germany 1,029; France 731; Yugoslavia 638.

See footnotes at end of table.

Table 3.—United Kingdom: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Zirconium:				
Ore and concentrate	38,000	43,077	60	Australia 21,683; Republic of South Africa 20,430.
Metal including alloys, all forms	142	111	60	Sweden 32; West Germany 16.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	221,318	191,170	NA	NA.
Artificial:				
Corundum	10,690	9,866	94	Canada 5,870; France 1,601; West Germany 1,496.
Silicon carbide	16,216	16,960	--	Norway 11,224; West Germany 1,943; Netherlands 1,611.
Dust and powder of precious and semiprecious stones including diamond value, thousands	$11,676	--		
Grinding and polishing wheels and stones	4,925	6,001	140	Netherlands 1,048; West Germany 998; France 916.
Asbestos, crude	45,145	41,556	161	Italy 2,351; Zimbabwe 1,526; undetermined 36,901.
Barite and witherite	138,226	158,473	(2)	Ireland 77,740; Morocco 38,397; Netherlands 15,890.
Boron materials:				
Crude natural borates value, thousands	$20,648	$15,584	NA	NA.
Elemental	3	9	3	West Germany 6.
Oxides and acids	3,835	5,949	4	France 3,508; Belgium-Luxembourg 1,903; Norway 514.
Bromine	5,170	6,169	1,275	Israel 4,894.
Cement	429,958	499,621	153	Netherlands 169,054; West Germany 86,504; Ireland 73,595.
Chalk	5,538	4,303	3	Denmark 3,355; West Germany 449; France 356.
Clays, crude:				
Bentonite	45,751	81,051	3,135	Greece 31,065; Cyprus 15,950; Netherlands 3,203.
Chamotte earth	31,744	40,911	--	France 30,986; Republic of South Africa 8,460; Spain 1,450.
Kaolin	4,287	4,187	988	Belgium-Luxembourg 1,203; Netherlands 1,173.
Unspecified	56,020	49,440	16,192	France 15,490; Senegal 7,454.
Cryolite and chiolite	412	807	4	Denmark 802.
Diamond:				
Gem, not set or strung value, thousands	$2,094,121	$1,903,190	NA	NA.
Industrial stones do	$27,719	$26,386	NA	NA.
Diatomite and other infusorial earth	17,601	20,880	2,695	Denmark 13,508; France 2,924.
Feldspar, fluorspar, related materials:				
Feldspar	55,737	54,335	--	Finland 23,233; Norway 13,938; Sweden 11,064.
Fluorspar	10,759	1,432	--	Republic of South Africa 1,008; France 404.
Unspecified	43,340	77,230	--	NA.
Fertilizer materials:				
Crude, n.e.s	2,389	2,235	3	Ireland 1,140; France 958.
Manufactured:				
Nitrogenous thousand tons	609	1,012	(2)	Netherlands 279; Belgium-Luxembourg 223; Ireland 122.
Phosphatic do	181	189	1	Netherlands 66; Tunisia 21; Belgium-Luxembourg 20.
Potassic do	484	522	(2)	East Germany 260; West Germany 142; Belgium-Luxembourg 32.
Unspecified and mixed do	568	627	2	Netherlands 132; Belgium-Luxembourg 116; Sweden 88.
Graphite, natural	28,352	19,540	206	Madagascar 5,256; China 5,138; Norway 5,077.
Gypsum and plaster	85,582	87,087	423	Ireland 45,746; France 31,645; Morocco 6,170.
Iodine	2,043	2,070	2	Chile 1,008; Japan 946.
Kyanite and related materials	35,618	52,707	9,557	Republic of South Africa 25,492; France 13,839.
Lime	2,166	3,848	--	Ireland 3,244; France 401.

See footnotes at end of table.

Table 3.—United Kingdom: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Magnesium compounds:				
Magnesite	15,282	12,420	--	Greece 10,591; Turkey 970; Ireland 810.
Oxides and hydroxides	100,687	122,058	252	Spain 32,212; Greece 29,492; Netherlands 21,587.
Other	24,677	21,753	--	West Germany 12,326; East Germany 8,690.
Mica:				
Crude including splittings and waste	16,408	18,894	62	China 10,316; France 3,874; Brazil 1,801.
Worked including agglomerated splittings	492	601	110	Belgium-Luxembourg 149; France 105.
Nitrates, crude	7,701	7,473	--	Chile 6,717; Belgium-Luxembourg 725.
Phosphates, crude ___ thousand tons	1,489	1,340	48	Morocco 816; Senegal 323.
Pigments, mineral:				
Natural, crude	5,231	2,536	--	India 1,214; Cyprus 1,034.
Iron oxides and hydroxides, processed	30,494	34,659	685	West Germany 28,053; Belgium-Luxembourg 1,629.
Potassium salts, crude	25,720	36,038	--	West Germany 21,190; East Germany 14,848.
Precious and semiprecious stones other than diamond:				
Natural ___ value, thousands	$103,852	$121,441	$22,579	Switzerland $64,920; Thailand $7,640.
Synthetic ___ do	$454	$713	$417	West Germany $88; Ireland $69.
Pyrite, unroasted	24,346	19,638	NA	NA.
Salt and brine	93,957	115,152	291	Italy 45,952; West Germany 26,516; Tunisia 16,220.
Sodium compounds, n.e.s.: Carbonate, manufactured	66,164	64,166	43,208	Poland 16,342; Norway 2,026.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	60,642	134,717	836	Sweden 103,575; Republic of South Africa 8,916; France 8,907.
Worked	56,661	62,196	109	Italy 25,571; Spain 13,309; Portugal 12,401.
Dolomite, chiefly refractory-grade	123,808	120,823	190	Spain 89,081; Norway 24,832.
Gravel and crushed rock	573,437	548,376	18	Ireland 194,978; Netherlands 100,945; France 94,957.
Limestone other than dimension	3,002	30,705	1	France 30,350; Ireland 203.
Quartz and quartzite	7,643	6,307	363	Netherlands 1,297; West Germany 1,019; France 620.
Sand other than metal-bearing	59,558	64,019	1,643	Belgium-Luxembourg 50,775; Ireland 3,564; West Germany 3,372.
Sulfur:				
Elemental:				
Crude including native and byproduct	840,416	810,963	NA	NA.
Colloidal, precipitated, sublimed	457	418	3	France 333; West Germany 54; Netherlands 18.
Dioxide	632	2,710	--	Sweden 2,691; Netherlands 19.
Talc, steatite, soapstone, pyrophyllite	59,846	67,615	NA	NA.
Vermiculite, perlite, chlorite	109,265	120,276	47	Italy 47,800; Republic of South Africa 31,988; Greece 26,326.
Other:				
Crude	r2,756	631	NA	NA.
Slag and dross, not metal-bearing	204,713	397,312	297	France 168,334; Belgium-Luxembourg 145,560; Netherlands 46,644.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	12,053	14,610	4,402	Trinidad and Tobago 4,837; France 3,150.
Carbon: Carbon black	84,620	90,240	--	France 20,092; Norway 7,963; undetermined 39,876.
Coal:				
Anthracite ___ thousand tons	672	1,269	10	West Germany 684; Belgium-Luxembourg 234; Netherlands 174.
Bituminous ___ do	3,687	7,627	2,620	Netherlands 2,167; Poland 1,325.
Briquets of anthracite and bituminous coal ___ do	94	171	--	West Germany 92; Netherlands 31; France 29.
Lignite including briquets ___ do	6	73	(2)	West Germany 35; Netherlands 18; East Germany 17.
Coke and semicoke ___ do	702	1,999	--	West Germany 857; Japan 603; France 168.

See footnotes at end of table.

Table 3.—United Kingdom: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Gas, natural: Gaseous million cubic feet	396,609	496,257	(2)	Norway 496,171.
Peat including briquets and litter	159,544	182,011	1,668	Iceland 163,411; U.S.S.R. 11,355.
Petroleum:				
Crude thousand 42-gallon barrels	165,828	184,852	--	Norway 72,025; Saudi Arabia 15,384; Iran 15,268.
Refinery products:				
Liquefied petroleum gas do	4,187	7,552	1	Saudi Arabia 3,517; Netherlands 1,166; Algeria 1,050.
Gasoline do	21,874	18,164	438	Netherlands 3,201; Algeria 2,352; Norway 1,784.
Mineral jelly and wax do	107	107	3	West Germany 30; Netherlands 27.
Kerosene and jet fuel do	4,812	2,161	26	Netherlands 1,129; France 449; Belgium-Luxembourg 275.
Distillate fuel oil do	13,037	16,003	68	U.S.S.R. 10,065; Netherlands 2,841; Sweden 1,392.
Lubricants do	12,817	11,246	98	Belgium-Luxembourg 6,772; Sweden 1,036; Netherlands 859.
Residual fuel oil do	64,434	140,674	3	Netherlands 23,708; Netherlands Antilles 9,664; France 9,524.
Bitumen and other residues do	1,571	1,033	1	Netherlands 574; Belgium-Luxembourg 334.
Bituminous mixtures do	42	39	2	France 20; West Germany 7; Netherlands 4.
Petroleum coke do	1,751	2,084	658	Netherlands 716; Belgium-Luxembourg 442.

[r]Revised. NA Not available.
[1]Table prepared by Jozef Plachy.
[2]Less than 1/2 unit.
[3]May include other precious metals.

COMMODITY REVIEW

METALS

Aluminum.—The world's first commercial casting center for the production of aluminum-lithium alloys was established at Kitt's Green near Birmingham by British Alcan Aluminium Ltd. The alloys produced at the $13 million installation were to be marketed under the trade name Lital for use primarily in aircraft construction. The Canadian parent company, Alcan Aluminium Ltd., entrusted corporate aluminum-lithium alloy development and commercialization to British Alcan.

Deeside Aluminium Ltd., a private British firm, opened at midyear a 30,000-ton-per-year $7 million plant in North Wales for producing aluminum extrusion billets from scrap aluminum. The scrap, supplied primarily by aluminum extruders, was to be melted on a custom basis with an equal amount of aluminum metal to supply extrusion billets to industry with a short turnaround time. None of the participants in the funding of the company were part of the aluminum industry. An apparent novelty was that prior to filtration and casting the molten metal was injected with small gas bubbles to remove hydrogen and nonmetallic particles. In competition with Deeside, British Alcan was offering the industry a similar scrap-to-extrusion-billet tolling service that also was to come on-stream near midyear. This new venture, called Banbury Aluminium Ltd. and situated at the Alcan extrusion site in Banbury, was reported to have a capacity similar to that of the Deeside operation. Banbury announced a planned 20,000-ton-per-year increase in extrusion billet capacity scheduled to be fully operational by 1987. In the meantime, total production of secondary aluminum in the United Kingdom in 1985 decreased about 10% to approximately 130,000 tons.

Iron and Steel.—BSC embarked on another rationalization program aimed at making it financially independent beginning in 1986. The company had a good year, showing its first profit since 1974. Disruption of the United Kingdom's steel output was slight during the 1984-85 coal strike. BSC continued selling nonmainstream assets as part of its privatization program. However, all five of its integrated steelmaking works were fully retained and operational. Demand for construction steel, including seamless tubing, grew mainly because of increased offshore exploration.

BSC announced its decision, pending Parliamentary approval, to close the Gartcosh wide-strip, cold-rolling mill in Scotland; approval appeared imminent according to Government sources. The company also indicated that Ravenscraig, in Scotland, one of the company's five integrated works, would not be cut back for at least 3 years. BSC's cold-strip mills at Shotton, Port Talbot, and Llanwern operated at 60% of capacity.

BSC purchased Alphasteel Ltd.'s hot-strip rolling mill and closed it down at yearend. Its slab casters were to be transferred to BSC's Llanwern works in South Wales, and its strip mill was reportedly to be sent overseas. This cut British capacity by 1 million tons, satisfying European Economic Community (EEC) rationalization requirements. However, overcapacity remained in the industry, and prices were weakening at yearend. Other BSC modifications included closure of its Hartlepool plate mill and the planned merger of its engineering rod-bar interests in a 50-50 venture with Guest Keen and Nettlefolds (GKN), known commonly as the Phoenix II project. This venture included taking control of Manchester Steel Ltd., owned by Elkem A/S of Norway, and closure of Manchester's two bar minimills and associated electric furnaces. Much of this had already been accomplished by yearend when Allied Steel & Wire Ltd., an existing company owned jointly by BSC and GKN, purchased Manchester Steel. The BSC-GKN planned venture also included a merger of most of the rolled special steel manufacturing capability of 1.9 million tons per year.

As part of a $250 million modernization program by BSC of its Port Talbot works, the hot-strip mill was modified to handle slabs up to 33 feet long. At its Teesside works, BSC moved to 100% continuous casting for its production of heavy beams up to 36 by 16 inches in cross section. The company acquired an interest in Tuscaloosa Steel Corp.'s new plate rolling mill in Alabama, thereby securing an outlet for up to 250,000 tons per year of continuously cast slabs from its Teesside works.

Following an EEC refusal after months of negotiation to include steel semimanufactures in formal U.S. import quota restraints, the United States imposed unilaterally a total annual limit of 600,000 tons on these semimanufactures, including 300,000 tons of BSC slabs for BSC's partly owned Tuscaloosa rolling mill, to be supplied in fulfillment of a contract. No other British semimanufactures were to be imported into the United States.

Total exports of ferrous materials rose 5% in 1985 to a record high 4.5 million tons, 85% of which went to non-EEC countries.

Lead.—Billiton (UK) Ltd. began the installation of a new secondary lead smelting complex at Darby Dale near Matlock in Derbyshire at a total cost of about $12 million. Much of the equipment in the old complex was obsolete, and the major goal was to lower production costs. The initial phase, replacing the blast furnace and reverberatory furnace with two new rotary furnaces, was completed. Completion of the second phase, refurbishment of the refinery, was expected by yearend 1987. The works modifications were planned so as not to require production stoppages. Plant capacity was to remain at 50,000 tons per year. A main energy and cost saving was to be the transfer of metal from the smelting furnaces to the refinery in molten form. Production from a strip mill commissioned in 1983 in anticipation of a strong overseas market for battery-grid strip remained sporadic because of a reluctance of lead battery manufacturers to abandon cast lead grids.

Lithium.—Lithium Corp. of Europe, a subsidiary of Lithium Corp. of America, expanded its lithium chloride and lithium metal capacity significantly at its plant at Bromborough near Liverpool, making it self-sufficient in lithium chloride. The company had been established in 1979 for the manufacture of lithium compounds and began producing metal in 1982. The company had enjoyed a steady growth in existing markets for lithium metal and organolithium compounds. New demand for the metal was anticipated in aluminum-lithium alloys for aircraft structural components. (See also "Aluminum.")

Nickel.—Nickel production decreased significantly because the sole producer, Inco Europe Ltd., kept shut its Clydach refinery, near Swansea in Wales, during the first quarter. The plant produced nickel pellet and powder and nickel salts from imported ore. The shutdown was to reduce stocks to a level consistent with market conditions. Production of nickel chloride and sulfate continued throughout the year. Production of metal resumed after the first quarter at about 50% of capacity.

Tin.—RTZ purchased in late 1984 Charter Consolidated Ltd.'s 40% share in Wheal Crofty Holdings Ltd., giving it control of the South Crofty Mine. RTZ then controlled 80% of the United Kingdom's tin mining capacity through its subsidiary Carnon Consolidated Tin Mines Ltd. The two other large mines in Cornwall were Carnon's Wheal Jane Mine, annual capacity 2,000 tons of contained tin, and the Geevor Mine, annual capacity about 1,200 tons of contained tin. RTZ also owned 20% of the Geevor Mine and owned or controlled two other small tin mines in Cornwall, Wheal Pendarves, capacity about 200 tons of contained tin, and Wheal Maid, capacity about 300 tons of contained tin. A few smaller independent tin-mining operations in Cornwall either existed or were being planned or developed. One of these, owned by Medway Tin Ltd., closed temporarily in November.

Carnon had planned to make significant capital improvements in its tin mining and ore processing operations in 1985 to reduce production costs and improve productivity. However, the collapse of world tin prices caused by the cessation of tin trading on the London Metal Exchange (LME) in October curtailed these activities. Despite numerous meetings throughout the balance of the year between the International Tin Council, LME, the Bank of England, the British Government, and the major producing members of LME, the largest being the Malaysia Mining Corp., no agreement had been reached by yearend, and the price of tin had fallen from about $5.50 per pound in October to $3.50 per pound by yearend. The British tin producers sought Government financial support for capital improvements in the mines to make their product more cost competitive. The Geevor Mine was the most vulnerable because operating costs were highest among the Cornwall operators. In general, the underground lode mining methods used in Cornwall were costly and generally vulnerable to world market price reductions. Wheal Jane was considered by RTZ to be one of the world's wettest mines. However, it had often been described as having the best tin deposit in Cornwall.

Carnon had begun to invest in 1985 in its South Crofty Mine with the aim of lowering production costs and expanding about 25% to an annual capacity of 2,000 tons of contained tin. It had intended to modernize the shaft and install a new flotation plant. However, the old flotation unit was closed in December, and RTZ suggested that the South Crofty Mine might be able to survive using Wheal Jane's ore processing facilities.

Carnon sought permission in 1985 to drill six 150-meter holes to locate the famous Great Flat lode near Carnkie in Cornwall.

Capper Pass, the British smelting complex at North Ferriby, North Humberside near Hull, owned and operated by Capper Pass Ltd., a subsidiary of RTZ, increased its annual smelting capacity by 5,000 to 20,000 tons. The new electric furnace was to smelt concentrates containing 55% tin supplied by Rio Algom Ltd.'s new mine at East Keptville, Nova Scotia, Canada. The mine reported its first full month of production in November, and smelting at the new Capper Pass addition was scheduled to begin in early 1986. All of the mine's first 10 years of production was contracted to go to Capper Pass. The older 15,000-ton-per-year smelting unit at Capper Pass was expected to continue to operate using low-grade and complex ores blended with recycled material to an average tin content for feed material of 20%.

Tungsten.—Billiton announced in December 1984 that it would not be extending its option to purchase a 50% stake in the development of the Hemerdon tungsten and tin mine near Plymouth in Devonshire. In 1985, Amax Hemerdon Ltd., owner of the venture, applied for the second time for permission to develop the mine with changes in the provisions for waste disposal. The United Kingdom Department of the Environment granted development permission in September. The large low-grade deposit had been worked toward the end of both World Wars by underground methods. If developed, the mine would be open pit, and projected annual output was concentrate containing about 2,000 tons of tungsten oxide and 400 tons of tin.

INDUSTRIAL MINERALS

Cement.—Of the three major cement producers, Blue Circle Industries PLC was the largest, with over one-half of the United Kingdom's total capacity. The other two producers, each with an equal share of most of the remainder of the country's capacity, were Rugby Portland Cement PLC and RTZ. Modernization of the cement industry continued in order to achieve improved energy efficiency and lower production costs. Blue Circle's $200 million 4-year plant modernization program was nearly completed. Two wet-process plants, one at Holborough in Kent and one at Norman in Cambridge, were closed in 1984. Improvements at its Cauldron works in Staffordshire consisted of converting the 3-kiln semidry-process plant into a single precalciner kiln operation, increasing annual production capacity by 10% to about 800,000 tons. A similar conversion was completed at the Dunbar plant in Scotland. RTZ was adding a new 1-million-ton-per-year dry-process kiln to its Ketton plant in Lincolnshire to replace the existing facility. The new kiln was expected to start up in 1986.

Blue Circle acquired a U.S. firm, Atlantic Cement Co. Inc., in 1985. The purchase included Atlantic's plants at Ravena in New York State, annual capacity 1.35 million tons, and the Sparrows Point, Maryland, steel slag cement plant, annual capacity 0.7 million tons. Blue Circle planned to improve the efficiency of the Ravena plant, which was based on wet process technology. Other Blue Circle cement plants in the United States had a combined annual capacity of about 2 million tons.

Fluorspar.—Laporte Industries Ltd., the largest fluorspar producer in the United Kingdom, applied for planning permission to construct a new fluorspar drift mine in the Peak National Park near the village of Great Hucklow in Derbyshire. The company's existing mines, also in Derbyshire, were approaching exhaustion. The Cavendish mill operated at about 50% capacity, a production rate of about 75,000 tons per year, all acid grade.

Nitrogen.—Imperial Chemical Industries PLC (ICI) announced plans to build two new ammonia plants at Severnside near Bristol at a cost of $80 million. The combined annual capacity of 300,000 tons was to replace existing plants at Severnside. New ICI technology was to be used in the plants resulting in an expected one-third saving in energy and a nearly doubling of productivity. Construction was expected to begin in 1986.

Norsk Hydro Fertilizers Ltd., a subsidiary of Norsk Hydro A/S, the Norwegian oil, chemicals, and metals firm, announced plans to construct a 1-million-ton-per-year ammonium nitrate solution plant at its Immingham complex near Hull. Commissioning of the new facility was expected near yearend 1987.

Potash.—Production of potash by the sole producer, Cleveland Potash Ltd., increased for the third successive year as the company continued to supply approximately 50% of the country's consumption of this fertilizer material. Three main development projects were under way at the Boulby Mine to increase output and lower production costs. These were an increase in grinding capacity, a doubling of annual product compaction capacity to 240,000 tons, and recovery of potash from waste brine by refrigeration. The potash compaction plant addition was completed by yearend. A pilot plant for potash recovery from waste brine was operational by late 1985.

Sand.—Fife Silica Sand Ltd., a new company, commissioned its new washing and classification plant at its new silica sand quarry at Burrowmine Moor near Alloa in Scotland. The first 1,000 tons of high-quality flint glass sand was shipped to a domestic manufacturer of container glass. The company expects to deliver to glass manufacturers in Yorkshire, Lancashire, and Scandinavia.

Another new company, Blubberhouses Silica Sand Co. Ltd., began preparation of a mining site near Harrogate in North Yorkshire for extraction of flint glass sand. A new crushing and processing plant was scheduled to be commissioned in early 1986 and expected annual production was at least 210,000 tons.

Slate.—Penrhyn Quarries Ltd., the largest producer of roofing slate in the United Kingdom, further strengthened its position by the acquisition of the Buttermere Westmoreland Greenslate Co. of Borrowdale, Cumbria. The quarry was to continue to produce green slate for roofing, flooring, window sills, cladding, and other uses. Penrhyn's Bethesda quarry in North Wales already had produced more than one-half of the United Kingdom's dimension slate. A significant quantity of roofing slate was also imported from Spain. Redland Roof Tiles Ltd. released a new lightweight synthetic slate roofing tile into the British market under the trade name of Cambrian. The material is manufactured from a blend of 65% comminuted natural slate powder with glass fiber reinforcement and a resin binder. The tiles are produced by molding and with an interlocking fixing mechanism. The product has a bluish-gray appearance similar to that of the parent slate material and is a viable alternative to clay and concrete tiles as well as natural slate tiles.

Stone (Crushed).—Foster Yeoman Ltd. disclosed plans to develop a large new granite quarry at a cost of about $80 million at Glensada in the Morvern District on the west coast of Scotland. An early production rate of 7.5 million tons per year was expected during the first stage of development beginning in late 1986. Reserves were at least 2,000 million tons of good-quality granite aggregate. The material was to be shipped by sea in especially developed self-unloading bulk-carrier ships to points in western and southern England. Overseas markets in Northern Europe, the United States, and the Middle East were being sought. Foster Yeoman already operated the largest single limestone quarry in the United Kingdom near Shepton Mallett, Somerset, in the west of England. Development of the new quarry would approximately double the company's crushed stone capacity.

Strontium Minerals.—The sole producer, Bristol Mineral Co. Ltd., continued to mine celestite by open pit at Yate, north of Bristol. It was also similarly working a deposit at Tytherington-Summerbridge on a temporary basis. A third deposit at Wickmar, also north of Bristol, was made ready for mining. The company applied for planning permission to work a number of other pits.

Titania.—Two companies produced titania in the United Kingdom. The largest, BTP Tioxide Ltd., continued to produce titania from imported ilmenite by the sulfate process at its 100,000-ton-per-year Grimsby plant on the River Humber. The company also continued to produce titania by the chloride method at its 50,000-ton-per-year Teesside plant in Greatham on the River Tees. The other producer, SCM Corp., formerly Laporte Industries, produced titania in a 50,000-ton-per-year chloride plant and a 27,000-ton-per-year sulfate plant, both at Stallingborough near Grimsby.

MINERAL FUELS

After 6 years of net energy exports, an energy surplus continued. The Government owned all energy production industries except oil and gas and all of the energy distribution agencies except oil. The Government sold its 48.8% share in Britoil PLC, the largest independent British oil company in December and established its Oil and Pipelines Agency as successor to its share. The new agency was to wind down some of Britoil's business activities, market North Sea royalty oil, and manage the Government-owned pipeline and storage system. Domestic energy consumption per unit of GDP was 40% higher than that of the Federal Republic of Germany and Japan, and electricity sold at higher prices than its competition in continental Europe. Broad Government energy and mineral fuel policy was to allow consumer demand to control supply, that is, to let the free market prevail. However, a degree of control was exerted through taxation.

Development of 5 additional nuclear reactors for electricity generation was nearing fruition, and after 20 years, 5 advanced gas-cooled reactors (AGR) with a total capacity of about 3,500 megawatts were scheduled to go on-stream during 1985-88, 4 in England and 1 in Scotland; this would mean a total of 42 nuclear plants with a capacity of about 13,000 megawatts. A link across the channel also was to supply 2,000 megawatts of low-priced French electrical energy beginning in 1986.

Research and development of geothermal energy from subterranean dry hot rock continued in Cornwall at a modest pace. Development of feasible heat extraction techniques could release vast quantities of energy that could be transformed to electrical power through steam turbines, similar to the U.S. Los Alamos project. However, the engineering problems were formidable. The ultimate aim of the program was to develop a 5-megawatt power station using pressurized water heated to 340° F by passing it through a permeable rock bed at a depth of 20,000 feet. Two holes had been drilled into the Cornish granite to a 7,000-foot depth. Detonations at depth had to be made to effect a reasonable degree of circulation. A third hole was subsequently drilled to 10,000 feet. The immediate aim of the project was to achieve a 25-liter-per-second circulation with a sustained outlet temperature of 175° F. This very difficult development program, which had become a problem of remote rock fracture mechanics and fluid flow, was to continue.

Coal.—The 12-month coal strike ended in March with the National Union of Mineworkers unable to win its argument that pits should not be closed on economic grounds alone. Production increased 88% to about 96 million tons, but this was 19% less than total output in 1983. The National Coal Board continued its mine closure program begun prior to the strike. Coal exports decreased while imports increased. It also continued to invest in the development of large economical new mines in an effort to become profitable by 1987-88 and to become financially independent by 1990 through increased productivity, economies of scale, and advanced mining techniques with improved control.

A total of 32 mines were closed during the 2-year period 1984-85, causing a reduction in coal mining capacity of 12 million tons. It was planned to close another 56 mines with a total annual capacity of 19 million tons by yearend 1987. Of the total 30-million-ton reduction in annual capacity, nearly one-half would be closed because of reserves exhaustion and the remainder for economic reasons.

New coal mining capacity totaling about 20 million tons per year was under development including the Selby complex in Yorkshire with five mines using a common loading system representing a total annual capacity of 10 million tons, and a new colliery in the Vale of Belvoir in Leicester. It was announced in June that a mine would be developed in south Warwickshire at a cost of about $600 million. Total projected annual capacity by yearend 1987 after completion of most of the closures and new mine development was projected to be approximately 105 million tons, of which 90 million tons would be underground mining. This represented a 10% decrease under the prestrike capacity.

Industrial demand for coal in electrical power generation increased in 1985 as the Government supported a modest program to develop coal combustion technology for fluidized bed boilers. British coal is especially suitable for this type of application because of its high volatile content, low sulfur content, and free burning characteristic. Demand for coal in the steel industry decreased. The coking-coal-producing Polkemmet colliery in Scotland was closed because of the uncertain future of pig iron production at the Ravenscraig steel mill. Domestic demand for house coal and anthracite decreased as many households converted to central gas heating. The Central Electricity Generating Board announced that it would rebuild its coal stockpile requiring 10 million tons per year through 1987. The National Coal Board indicated that future demand for British coal would be dependent on production costs and would require a productivity of 4 tons per worker shift, about 50% above the 1985 average. Average productivity rose significantly during 1985 to above 3 tons per worker shift in December. The Board also stated that demand after 1986 was expected to decrease significantly when five AGR's came onstream in the United Kingdom and electrical power began to be imported through the 2,000-megawatt linkage with France. These two combined would replace up to 13 million tons of coal per year. Further domestic markets for coal were being sought.

Although thin seams of lignite had been known in Northern Ireland since the eighteenth century, seams thick enough for possible commercial development were not discovered until the late 1970's near Crumlin on the eastern shores of Lough Neagh in County Antrim. An estimated 50% of the reserve lies beneath the lake, and a portion lies beneath the town of Ballymoney. The Northern Strip Mining Ltd. was licensed in 1985 by the local council to extract up to 1 million tons of lignite per year from the deposit over a 10-year period. Initial batches were to be produced on an experimental basis, and the technical aspects of mining and marketing the lignite were to be studied. The British Government authorized the Northern Ireland Electricity Service to undertake initial planning, to be completed in early 1986, of a 450-megawatt electrical power station at the minesite. This equaled about one-quarter of Northern Ireland's electrical power generating capability for which the country is heavily dependent on foreign oil. The British Government decided to lower this oil dependency by converting the Kilroot powerplant north of Belfast from an oil to an oil-coal capability using Scottish coal. The British National Coal Board sought permission from the Clydesdale District Council in Scotland to develop a 500,000-ton-per-year mine in a 40-million-ton coalfield in south Lanarkshire to supply coal to the Kilroot plant.

Natural Gas.—The British House of Commons energy committee recommended that gas production, nearly all from the North Sea, be controlled by the free world market price; early integration into the Western European market was also recommended. The Government sought to encourage exploration by appropriate licensing and taxation policies and encouraged its British Gas Corp. (BGC) to seek bids from a wider range of competing suppliers. In support of the Government's new "hands off" policy, a bill to transfer BGC, including its duties for gas supply and safety, to private ownership received its second reading in Parliament in December, and the favorable vote appeared to assure its passage by mid-1986. The proposed sale of BGC would add an estimated $12 billion to the United Kingdom's treasury. Oil companies indicated skepticism regarding the new system's ability to effect a freer market, and questions remained regarding its effect on the competitive environment with the industry. All gas destined for utilities would have to be sold through BGC. Nevertheless, BGC would be allowed to explore for and develop new gas, creating a possible conflict of interest. The bill contained a complicated formula for gas price adjustments but did not address the issue of foreign trade. A Government requirement was to land all North Sea gas in the United Kingdom. An Office of Gas Supply was to be created with limited regulatory powers including the setting of maximum prices for domestic consumers.

The British Government rejected in February BGC's agreement to purchase large quantities of Norwegian gas from the Sleipner Field. It was expected that this would stimulate gas exploration and development in the United Kingdom's part of the North Sea and other undersea areas adjacent to the British Isles.

An expected steady stream of gasfield development projects slowed to a trickle because BGC's firmer price stance caused delays in negotiating prices of southern basin gas and because of uncertainty about oil price trends. Nevertheless, demand for gas remained high, particularly in the domestic home-heating market, and 1985 production increased by an estimated 11%. Potential new producers were set back by new resource estimates that indicated that the United Kingdom would not be forced to rely on gas imports until after the turn of the century instead of the mid-1990's as previously indicated. Proven gas reserves were estimated to be 47 trillion cubic feet with perhaps one-third more in the possible category. One supply and demand analysis, by a respected stockbroker, Wood, Mackenzie & Co., indicated production from fields on-stream or under development, together with that from fields already subject to negotiations with BSC, could satisfy likely requirements until about 1991. Of the many North Sea gas development projects planned by industry, eight were considered as probable. These were Britoil's Amethyst; Audrey, operated jointly by Phillips Petroleum Co. (UK) Ltd. and Conoco (UK) Ltd.; Barque and Clipper, each operated by Shell UK Exploration and Production (Shell Expro) for Shell (UK) Ltd.; Bruce operated jointly by Hamilton Oil Great Britain PLC, The British Petroleum Co. Ltd. (BP), and Total Oil Marine Ltd.; BP's Cleaton and Ravenspurn; Shell Expro's Gannett and Kittiwoke; BP's Miller; and Conoco's Valiant area.

In October, BGC received its first deliveries of gas from the Anglo-Norwegian Statfjord Field in the northern North Sea. Statfjord remained the most highly productive oilfield in the North Sea. Its associated gas had previously been reinjected into the reservoir pending completion of pipeline links to Europe and the United Kingdom. The British portion of Statfjord gas, delivered to St. Fergus on the east coast of Scotland by Statfjord's operator, Conoco, equaled about 1% of the British supply. Amoco (UK) Exploration Co. began production from the G sector of the Leman Gasfield, thereby adding 300 million cubic feet per day of production capacity, or about 7% of 1985 average total British production.

Two gasline links were being completed in the southern basin of the North Sea leading to BGC's Bacton Terminal. These were a 118-mile, 24-inch line from the Esmond Field and a 67-mile, 30-inch line from the Sean North and South Fields.

Chevron Petroleum (UK) Ltd. discovered a large gasfield 50 miles northwest of the Shetland Islands with reserves estimated to be between 1 and 8 trillion cubic feet. The deposit is not likely to be developed in the near future because it is at a total depth of about 3,500 feet including 2,000 feet of water.

Gas production began in January from the large Morecambe Field in Morecambe Bay, off the west coast of England, near Blackpool at a rate of 130 million cubic feet per day. Projected ultimate production capacity was 1,200 million cubic feet per day, perhaps 25% of total British demand. It is situated near an area of high demand.

BGC began high-pressure injection of gas for storage into the United Kingdom's North Sea Rough Field, 18 miles from the Easington terminal off the east coast of England. This world's first offshore gas storage facility was being developed at a total cost of approximately $1 billion. With a capacity of 1 billion cubic feet per day, it was to be used to boost the supply of British domestic gas during the 40 to 80 coldest days of winter. Production of gas from the

Rough Field was to continue coincidentally and would contribute, along with other North Sea wells, to the storage buildup. The gas pressure had to be boosted nearly four times to the 3,000 pounds per square inch needed to push it into the porous sandstone storage chamber. The clean gas from the grid became contaminated during storage and had to be recleaned and reodorized after removal from storage.

The United Kingdom's first underground storage facilities for liquefied petroleum gas (LPG) were inaugurated in September. The two companies involved in the project were Calor Gas Ltd., the largest distributor of LPG in the United Kingdom and the Republic of Ireland, and Conoco. The site, at South Killingholme on the east coast of England, had facilities for seagoing vessels. Two storage caverns are in solid rock 600 feet below the surface, a 700,000-barrel cavern for propane and a 450,000-barrel cavern for butane. The depth is twice that required to maintain the head pressure needed to keep the hydrocarbons in the liquid state. Other surface LPG storage facilities in England, Scotland, and Wales require refrigeration.

Petroleum.—The average production rate of crude petroleum continued at 1984 record-high levels except for a slackening during the summer months to allow for North Sea platform inspection and maintenance programs. Shell Expro, with an interest in six North Sea oilfields, was the largest operator. All 29 fields that had been developed in the North Sea continued to produce in 1985. The four largest, Brent, Forties, Ninian, and Piper, although more than 50% depleted, continued to produce over 50% of British crude. Seven oilfields were being developed. These, all situated east or northeast of Scotland, were Alwyn, Balmoral, Clyde, Eider, North Brae, Scapa, and Tern. The total expected annual production rate from these fields was about 150 million barrels. This added production was expected to replace lost production from older fields resulting in no net gain in production rate. Government permission to develop the Eider, Scapa, and Tern Fields was granted in 1985. Both the Eider and Tern Fields were to be developed by the combine of Shell Expro and Esso Petroleum Co. Ltd. at a projected cost of $1.3 billion and $800 million, respectively. Startup for both was expected in 1989 at respective peak production rates of 55,000 and 45,000 barrels per day. Estimated reserves were 175 million and 85 million barrels, respectively. Tern Field had previously been economically marginal because it required water injection and gas lifting because of its low pressure. The tax improvements effected in 1983 by the Government provided the incentive for the combine to proceed. The Eider platform was the first to be developed in the North Sea for unmanned operation. The Scapa Field was to be developed jointly by Occidental International Oil Inc. and Texaco North Sea (UK) Co. at a projected cost of $130 million. Startup from one well began in 1984, and peak production, from up to 6 wells, was scheduled for 1985 at a rate of 24,000 barrels per day. Estimated reserves were 42 million barrels. BP announced construction of a 33-mile pipeline from its Buchan Field to the Forties pipeline scheduled for completion in 1987. This would replace its offshore loading system. The Department of Energy also gave permission to BP to develop the Nettleham onshore oilfield near Lincoln. Expected production was 300 barrels per day for 18 years.

Proven reserves of petroleum were approximately 11 billion barrels. Reserves increased to about 15 billion barrels when probable figures were included. Costs to develop new fields were rising and estimates of reserves in new fields were an inverse function of the world price of crude. Future prices also affected estimates of how long the United Kingdom would remain self-sufficient in petroleum. The prevailing opinion was that this self-sufficiency would continue for at least one decade and perhaps into the next century.

Although chances of finding new major oilfields in the North Sea were poor, exploration and drilling in search of smaller reservoirs continued at near the peak 1984 level. Nearly one-half of the 110 drilling rigs available in northwestern Europe were active in British waters. Awards from the 193 applications received in the ninth round of offshore exploration licensing included new areas in the deepwater Rockall and Faroes troughs west of Scotland, the central and extreme southern North Sea, and the Celtic Sea. Also licensed were blocks in areas with intermediate prospects including the English Channel and the West Shetlands Basin. In the mature areas, particularly strong interest centered in the southern North Sea gas province. A total of 75 exploratory wells and 47 appraisal wells were drilled during the first 10 months of 1985. Britoil made a discovery in block 3/4A about 100 miles east of the Shetland Islands and another in block 16/13a-3 near Brae Field. BP Petroleum Development identified a "substantial" oil discovery in block 16/7b east of the North and South Brae developments. Esso struck a wildcat in block 214/28 west of the Shetland Islands. Occidental struck a "significant" wildcat in block 16/12-A-8 and a gas and condensate wildcat in block 22/19. Marathon Petroleum Co. discovered gas in block 16/3B-7 near East Brae.

Onshore exploration increased as small private operators took advantage of the lower costs, compared with offshore drilling, and smaller sizes of the possible operations. However, local residents were often less than cooperative. Of 67 onshore wells drilled in 1985, 36 were wildcats, and 7 of these became petroleum discoveries. Hope continued that a significant discovery would be made similar to the large Wytch Farm Field. The Government began in 1985 its first onshore licensing round. Onshore licenses had previously been allocated when appropriate applications were received.

A privately financed study began to develop enhanced oil recovery techniques using both polymer flooding and nitrogen injection methods.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from pounds sterling (£) to U.S. dollars at the rate of £1.00=US$1.30, the average rate during 1985.

The Mineral Industry of Venezuela

By Harold R. Newman[1]

Venezuelan economic growth continued to decline in 1985 with a 0.4% fall in gross domestic product (GDP) from that of 1984, following a decline of 1.1% in 1984 from 1983 levels. Weak demand and the collapse of prices in the international oil market continued to impede recovery of the Venezuelan economy, which has been in a recession for 7 years despite efforts by the Government to initiate a recovery. However, oil export revenues remained relatively high at $12.8 billion.[2] Some sectors such as mining, electricity, and agriculture experienced some growth, but most sectors, including construction, suffered losses. Iron ore sales and gold production increased, partly offset by decreased aluminum production. Petroleum continued to account for over 90% of export earnings and over 50% of Government revenues. With the drop in world oil prices, all major projects are being reevaluated.

The Government announced a 3-year investment program, or Plan Trienal, to generate economic recovery. The Plan Trienal provides for expenditure in the public sector of 2% of GDP per year from 1986 to 1988. The high level of unemployment continued to be a problem faced by the Government. Import substitution, i.e., use of domestically produced goods, continued to be Government policy. Multitier devaluation and administrative decisions, including import controls, have been used to encourage use of these domestic goods.

Oil production has declined from 2.1 million barrels per day (bbl/d) in 1981 to 1.7 million bbl/d in 1985. The corresponding fall in oil export revenues continued to significantly impact the possibility of economic growth. Offsetting the austerity implied by the condition of the world oil market, the Government approved spending and borrowing commitments by several state enterprises. Major projects continuing or expected to start up in 1986 are Corpoven S.A.'s east-west pipeline, Pequiven S.A.'s polypropylene plant, Maraven S.A.'s Cardon refinery upgrade, Meneven S.A.'s Guárico Gasfield development, and C.V.G. Siderúrgica del Orinoco C.A.'s (SIDOR) seamless pipe plant. Also the International Development Bank (IDB) granted loans of $350 million to Electrificacion del Caroni for the Guri Dam hydroelectric complex, and $108 million to C.V.G. Bauxita de Venezolana C.A. (BAUXIVEN) for the Los Pijiguaos bauxite mine development.

In May 1985, the Government of Venezuela and representatives of over 450 international creditor banks agreed to reschedule $21.2 billion of public sector liabilities maturing between 1983 and 1988 for a period of 12 years until the second quarter of 1997. The term included no years of grace at a rate of 1-1/8% above the London Inter-Bank Offered Rate.

Even though the economy has been in a recession since the end of 1979 and unemployment was about 12% at the end of 1985, the country's external accounts are in excellent shape. With foreign currency reserves of $13.7 billion, Venezuela continues to enjoy an enviable position in comparison with the rest of the developing world.

PRODUCTION

Petroleum production, including condensates and natural gas liquids (NGL), averaged 1.7 million bbl/d in 1985. This reflected the late-1984 reduction in Venezuela's Organization of Petroleum Exporting Countries (OPEC) crude production quota and is equivalent to only two-thirds of production capacity. With over 90% of export earnings and over 50% of the state's revenues derived from petroleum, weakness in price and demand on international markets has significantly impacted the Venezuelan economy. Each $1 per barrel drop in realized prices, if continued for a 12-month period, means a revenue decrease of about $500 million for Venezuela.

Venezuela has production capacity of nearly 2.6 million bbl/d, based on proven and probable crude petroleum reserves of 109 million barrels. This figure includes only a small portion of the huge deposits of extra heavy oil in the Orinoco Heavy Oil Belt, of which about 250 million barrels may eventually be recoverable. Exploration and production drilling activity was moderate in 1985 with about 340 wells drilled. Light crude reserves continued to increase owing to exploration emphasis on onshore exploration.

The aluminum industry's production continued to represent the second largest source of foreign currency revenue after petroleum. Interamericana de Alúmina C.A. (INTERALUMINA) produced almost 1.1 millon tons of alumina, exceeding design capacity by 8.5%. Industria Venezolana de Aluminio C.A. (VENALUM) produced a record high output of 274,723 tons of aluminum, 16% more than in 1984. Aluminio del Caroní S.A. (ALCASA) exceeded its 120,000-ton installed capacity with production of 121,171 tons. Total aluminum production rose marginally over that of 1984.

Iron ore production of C.V.G. Ferrominera del Orinoco C.A. (FERROMINERA) was up by 19%. Sales by the company also increased from 12.9 million tons in 1984 to 13.8 million tons in 1985. Opening of the Cerro San Isidro Mine gave FERROMINERA access to about 800 million tons of high-grade iron ore. In the first phase of the operation, from 1985 to 1994, output was expected to average 4 million tons per year for the first year and 8 million tons per year in the subsequent period.

Raw steel output at SIDOR, the state steel company, rose 8% in 1985 over that of 1984 to 3.2 million tons. Output of finished products, mainly tinplate and seamless tubes, rose almost 12% over that of 1984 to 2.2 million tons. Despite producing more than one-quarter of the world's total direct-reduced iron (DRI), Venezuela was still importing scrap to meet a deficit of iron units for its steel industry. SIDOR was studying expansion projects which would give an additional 2.1 million tons per year of DRI capacity. The company feels that the 400,000-ton-per-year deficit caused by growth in the steel industry, operating limitations on existing plants, and shortage of scrap justifies an expansion in DRI output.

Gold production was reported to be almost 73,000 troy ounces and diamond production 215,000 carats, with most of the diamonds being industrial grade. Results of a Government study suggested that over 20,000 troy ounces of gold and several hundred thousand carats of diamonds per year are smuggled out of the Guayana region. Because of the size and inaccessibility of Guayana, the Government has problems exercising control over mining activities. There was a proposal for the creation of a gold and precious metals ministry to legalize activities, supervise mining operators, and provide technical assistance and support.

Table 1.—Venezuela: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984[p]	1985[e]
METALS					
Aluminum:					
Alumina	--	--	560,000	1,139,000	1,085,000
Metal, unalloyed ingot	313,523	273,633	335,200	386,150	395,894
Gold, mine output, metal content troy ounces	27,810	27,993	33,200	50,885	72,919
Iron and steel:					
Iron ore and concentrate thousand tons	15,531	[r]11,701	9,449	13,371	15,481
Metal:					
Pig iron do	[r]418	202	348	326	441

See footnotes at end of table.

Table 1.—Venezuela: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984[p]	1985[e]
METALS —Continued					
Iron and steel —Continued					
Metal —Continued					
Sponge iron thousand tons	1,608	2,155	2,418	2,486	2,635
Ferroalloys:					
Ferromanganese do.	[e]2	2	2	2	2
Ferrosilicomanganese do.	10	9	9	9	7
Ferrosilicon[2] do.	44	42	46	44	42
Total do.	56	53	57	55	51
Steel, crude do.	2,030	2,296	2,558	2,940	3,200
Semimanufactures, hot-rolled do.	1,619	1,738	1,919	2,460	2,600
Lead, secondary, smelter[e]	[r]12,000	[r]15,000	[r]15,000	[r]17,000	18,000
INDUSTRIAL MINERALS					
Cement, hydraulic	4,876,253	5,431,860	4,444,104	4,783,000	4,680,000
Clays:					
Kaolin	[r]34,000	[r]15,000	15,000	21,938	23,501
Other thousand tons	[r]2,891	[r]2,385	1,839	1,868	1,928
Diamond:					
Gem carats	97,000	83,000	45,367	40,739	47,400
Industrial do.	403,000	357,000	233,553	232,183	167,600
Total do.	500,000	440,000	278,920	272,922	215,000
Feldspar	[r]41,684	[r]37,000	37,400	38,800	31,167
Gypsum	218,234	[r]237,000	204,600	142,386	133,585
Lime, hydrated	1,888	[e]1,900	[e]2,000	--	--
Nitrogen: N content of ammonia	414,689	440,433	379,652	463,000	465,000
Phosphate rock	6,000	6,000	8,000	3,000	5,000
Salt, all types	394,660	455,000	310,650	325,000	350,000
Stone, sand and gravel:					
Stone:					
Dolomite	254,540	[r]251,000	239,000	87,450	239,643
Granite	1,256	[r]1,431,000	770,970	549,239	470,000
Limestone thousand tons	31,690	5,760	27,302	10,847	12,000
Marble cubic meters	292	189	169	73	154
Sand and gravel thousand tons	[r]12,957	[r]13,311	9,040	8,189	7,743
Sand, glass do.	440	280	107	331	449
Sulfur, byproduct of petroleum and natural gas[e]	85,000	84,000	85,000	86,000	88,000
MINERAL FUELS AND RELATED MATERIALS					
Carbon black[e] thousand tons	19	18	18	51	55
Coal, bituminous	45,735	[r]46,700	39,100	50,870	40,379
Gas, natural:					
Gross million cubic feet	1,224,586	1,163,973	1,222,100	1,150,364	1,158,510
Marketable do.	584,349	527,000	508,460	517,664	498,159
Natural gas liquids:[3]					
Natural gasoline thousand 42-gallon barrels	5,177	5,642	4,483	4,708	6,885
Liquefied petroleum gas do.	14,889	15,720	13,949	13,945	15,849
Total do.	20,066	21,362	18,432	18,653	22,734
Petroleum:					
Crude[4] do.	767,552	691,689	657,365	658,279	613,581
Refinery products:					
Gasoline:					
Aviation do.	284	328	430	539	373
Motor do.	59,578	62,694	67,500	46,100	59,994
Jet fuel do.	11,369	14,362	14,500	14,486	18,263
Kerosene do.	5,266	3,675	4,440	4,277	21,648
Distillate fuel oil do.	61,890	62,745	67,510	69,744	92,870
Residual fuel oil do.	147,117	140,052	108,740	117,466	107,987
Lubricants do.	2,741	2,481	[e]2,400	2,340	2,343
Liquefied petroleum gas do.	1,765	1,955	[e]2,000	1,868	15,848
Asphalt and bitumen do.	10,082	9,313	8,660	8,930	10,215
Naphtha do.	8,534	10,140	[e]10,000	19,800	21,249
Refinery gas[5] do.	8,518	8,578	9,200	12,020	7,844
Unspecified do.	1,870	1,479	27,260	27,813	20,754
Total do.	319,014	317,802	322,640	325,383	379,388

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Table includes data available through June 30, 1986.
[2]Figure represents combined 45% silicon content and 75% silicon content production.
[3]From nonassociated natural gas only.
[4]Includes associated natural gas lease condensate and natural gasoline. Lease condensate is included as follows, in thousand 42-gallon barrels: 1981—1,661; 1982—1,771; 1983—3,127; 1984—3,156; and 1985—not available. Natural gasoline is included as follows, in thousand 42-gallon barrels: 1981—307; 1982—293; 1983—229; 1984—249; and 1985—not available.
[5]Liquid equivalent.

TRADE

Venezuela's trade balance was reflected in the drop in revenues from a deteriorating world petroleum market. Petroleum exports, including refined products, averaged 1.4 billion bbl/d in 1985, resulting in foreign exchange earnings of almost $13 billion, which was 12% lower than in 1984. Light and medium crudes are hard to sell at official OPEC-controlled prices; consequently, Venezuelan exports for the past 2 years have emphasized heavy crudes and petroleum products, both of which are outside the OPEC pricing system.

The Government of Venezuela, through Petróleos de Venezuela S.A. (PDVSA), was intending to purchase one-half of the shares of Champlin Petroleum Co., a subsidiary of Union Pacific Corp., for $30 million. The deal would give PDVSA rights to a refinery in Corpus Christi, Texas, and control over the company's internal marketing operations. This is the fifth joint venture negotiation with various foreign companies. Venezuela is seeking markets for about 700,000 bbl/d of crudes and products. The internationalization of the oil industry by the Government is a strategy to guarantee the placement of important volumes of petroleum exports and to generate the foreign exchange revenues the country requires. PDVSA's joint ventures overseas would grant Venezuela direct access to final consumers of oil and refined products.

Aluminum is Venezuela's second largest export after petroleum. Exports of primary aluminum rose to 156,683 tons in the January to June 1985 period, which was almost 50% higher than in the corresponding 1984 period. This was the result of a new agreement with Japanese customers. The Government also increased exports to China, Western Europe, and the United States.

FERROMINERA exported 5.4 million tons of iron ore in the period January-August 1985, a 7% increase over the same period in 1984. The United States, which is the principal market, received 1.2 million tons, a 54% increase over that of 1984. The company was negotiating with Japan, Taiwan, the Republic of Korea, and China as part of a plan to boost exports to 20 million tons per year. SIDOR's steel exports were slightly over 1 million tons, up 75% over those of 1984. Faced with restrictions in the U.S. market, SIDOR broadened its export base. China became the largest steel market, accounting for 44% of the 500,000 tons exported in the first half of 1985. Venezuela agreed to a voluntary trade restraint with the United States in June 1985, limiting Venezuela to approximately 17% of the U.S. market for finished steel products. Venezuela approached the European Economic Community (EEC) Commission regarding the possibility of a steel trade pact. The Government was interested in an arrangement with the EEC to export about 150,000 tons per year of rolled steel products. This would be the first time for Venezuela to agree to a steel trade pact with the EEC.

Table 2.—Venezuela: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides	NA	349,113	125,982	Norway 197,079; Canada 26,052.
Metal including alloys:				
Scrap	784	175	120	Netherlands 44; Colombia 11.
Unwrought	298,256	224,800	51,589	Japan 142,265; Netherlands 17,688.
Semimanufactures	21,059	62,359	48,524	Colombia 8,654; Netherlands 5,089.
Copper: Metal including alloys:				
Scrap	975	1	1	
Unwrought	--	41	41	
Semimanufactures	602	412	12	Colombia 400.

See footnotes at end of table.

Table 2.—Venezuela: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued				
Iron and steel: Metal:				
Scrap	1,742	1	--	All to Panama.
Pig iron, cast iron, related materials	381,088	373,931	245,999	Italy 76,838; Spain 32,250.
Ferroalloys:				
Ferrosilicomanganese	--	42	--	All to Dominican Republic.
Ferrosilicon	67,130	32,264	25,476	Japan 6,703; Dominican Republic 85.
Steel, primary forms	103,733	150,968	32,171	Thailand 26,317; Dominican Republic 18,285.
Semimanufactures:				
Bars, rods, angles, shapes, sections	302,270	295,370	145,769	Kuwait 23,564; Singapore 18,807.
Universals, plates, sheets	363,799	230,431	140,256	Thailand 30,354; Colombia 19,460.
Rails and accessories	22	(2)	--	All to Netherlands Antilles.
Wire	1,361	4,659	2,617	Colombia 797; Trinidad and Tobago 588.
Tubes, pipes, fittings	43,013	181,824	180,090	Colombia 704; Canada 397.
Castings and forgings, rough	146	27	18	Netherlands Antilles 9.
Unspecified	55,723	135	132	Netherlands Antilles 3.
Magnesium: Metal including alloys, unwrought	100	--		
Zinc:				
Oxides	NA	145	--	Mainly to Costa Rica.
Metal including alloys, semimanufactures ______ kilograms	19	24,805	--	Colombia 21,200; Nicaragua 2,769; Netherlands Antilles 836.
Other:				
Ashes and residues	--	764	120	West Germany 379; Japan 185.
Base metals including alloys, all forms	8	53	2	Japan 51.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.: Natural: Corundum, emery, pumice, etc	(2)	1	(2)	Mainly to Netherlands Antilles.
Asbestos, crude	3	3	--	All to Netherlands Antilles.
Cement	259,429	1,317,142	844,194	Netherlands Antilles 64,106; Martinique 56,145.
Clays, crude:				
Bentonite	--	11	11	
Unspecified	--	5	--	Mainly to Netherlands Antilles.
Graphite, natural ______ kilograms	350	--		
Gypsum and plaster	--	17,918	--	Trinidad and Tobago 13,860; Barbados 2,957; Netherland Antilles 1,101.
Lime	6	18	--	All to Netherlands Antilles.
Stone, sand and gravel:				
Dimension stone, crude and partly worked	334	1,266	--	Colombia 960; Netherlands Antilles 306.
Dolomite, chiefly refractory-grade	NA	3	--	All to Netherlands Antilles.
Gravel and crushed rock	5,774	3,536	--	Colombia 3,502; Netherlands Antilles 34.
Quartz and quartzite	34	1	--	All to West Germany.
Sand other than metal-bearing	1,023	3,185	--	Costa Rica 3,097; Trinidad and Tobago 76; Colombia 12.
Sulfur: Elemental: Crude including native and byproduct	--	15,191	15,191	
Other:				
Crude	--	207	--	Jamaica 203; Netherlands Antilles 4.
Slag and dross, not metal-bearing	3	450	450	
MINERAL FUELS AND RELATED MATERIALS				
Carbon black	NA	5,437	18	Chile 2,145; Guatemala 1,754; Trinidad and Tobago 885.
Petroleum:				
Crude_ thousand 42-gallon barrels	r356,485	365,604	102,223	Netherlands Antilles 96,845; West Germany 21,092.
Refinery products:				
Liquefied petroleum gas _do	NA	1,178	NA	NA.
Gasoline _do	51,830	33,907	NA	NA.
Kerosene and jet fuel _do	NA	16,721	NA	NA.
Distillate fuel oil _do	31,578	42,856	NA	NA.
Lubricants _do	847	494	NA	NA.
Residual fuel oil _do	r96,174	86,096	NA	NA.
Asphalt _do	5,044	6,286	NA	NA.
Unspecified _do	r8	2	NA	NA.

rRevised. NA Not available.
[1]Table prepared by H. D. Willis.
[2]Less than 1/2 unit.

Table 3.—Venezuela: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984	
			United States	Other (principal)
METALS				
Aluminum:				
Ore and concentrate thousand tons	1,719	2,522	48	Brazil 1,365; Suriname 669; Sierra Leone 289.
Oxides and hydroxides	NA	7,606	3,696	Canada 1,265; United Kingdom 666.
Metal including alloys:				
Scrap	1	--		
Unwrought	342	149	54	Netherlands 50; West Germany 25.
Semimanufactures	14,455	24,401	11,089	West Germany 3,266; Belgium-Luxembourg 2,766.
Antimony:				
Oxides	NA	39	28	Italy 10; West Germany 1.
Metal including alloys, all forms	38	118	55	Taiwan 27; Spain 26.
Bismuth: Metal including alloys, all forms kilograms	--	269	268	West Germany 1.
Cadmium:				
Oxides and hydroxides	NA	15	--	West Germany 10; Netherlands 4; Italy 1.
Metal including alloys, all forms	1	1	1	
Chromium:				
Ore and concentrate	3,914	11,914	(2)	Cuba 5,848; Philippines 4,000; France 67.
Oxides and hydroxides	NA	364	190	Austria 85; West Germany 54.
Metal including alloys, all forms	1	4	1	Belgium-Luxembourg 1; West Germany 1.
Cobalt: Oxides and hydroxides	NA	34	29	West Germany 2; Italy 2.
Columbium and tantalum: Metal including alloys, tantalum kilograms	10	1	--	All from Netherlands.
Copper:				
Oxides and hydroxides	NA	142	46	West Germany 38; Belgium-Luxembourg 25.
Metal including alloys:				
Unwrought	2,249	5,281	271	Peru 4,545; Chile 451.
Semimanufactures	12,738	15,193	5,791	Belgium-Luxembourg 2,814; Canada 1,676.
Indium: Metal including alloys, all forms kilograms	141	9	9	
Iron and steel:				
Iron ore and concentrate including roasted pyrite	11	31	31	
Metal:				
Scrap	18,581	362,944	355,274	Suriname 7,631; Brazil 31.
Pig iron, cast iron, related materials	1,779	25,280	830	Trinidad and Tobago 20,185; Canada 2,211; Brazil 1,403.
Ferroalloys:				
Ferrochromium	36	86	45	West Germany 18; Italy 16.
Ferromanganese	20,430	38,818	2,994	France 34,500; West Germany 1,235.
Ferromolybdenum	2	10	5	West Germany 3; Belgium-Luxembourg 1.
Ferronickel	2	--		
Ferrosilicomanganese	3	3	--	All from West Germany.
Ferrosilicon	26	68	--	Mainly from France.
Ferrovanadium	442	86	86	
Unspecified	423	748	400	Brazil 255; United Kingdom 74.
Steel, primary forms	3,462	3,058	1	Italy 2,015; Japan 746; Brazil 293.
Semimanufactures:				
Bars, rods, angles, shapes, sections	23,969	17,971	1,279	Belgium-Luxembourg 4,534; Japan 4,460; West Germany 2,394.
Universals, plates, sheets	83,547	130,669	1,637	Brazil 48,822; Japan 47,946; Belgium-Luxembourg 12,493.
Hoop and strip	1,428	3,235	577	West Germany 990; Brazil 704.
Rails and accessories	7,120	8,819	970	France 6,662; Japan 776.
Wire	864	678	157	Brazil 500; France 10.
Tubes, pipes, fittings	108,289	12,204	2,393	Belgium-Luxembourg 1,751; France 1,731.
Castings and forgings, rough	229	23	5	Italy 13; China 1.
Unspecified	27,815	38,417	2,781	Japan 16,795; Brazil 4,917; West Germany 4,390.

See footnotes at end of table.

Table 3.—Venezuela: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984	
			United States	Other (principal)
METALS —Continued				
Lead:				
Ore and concentrate kilograms	--	57	57	
Oxides	NA	2,308	183	Mexico 1,222; Canada 584; Peru 257.
Metal including alloys:				
Scrap	--	1,243	1,243	
Unwrought	5,233	7,394	--	Peru 7,368; United Kingdom 26.
Semimanufactures	1,910	670	89	Peru 500; Belgium-Luxembourg 58.
Lithium: Oxides and hydroxides	NA	37	37	
Magnesium: Metal including alloys:				
Unwrought	228	564	178	Norway 347; West Germany 39.
Semimanufactures	5	113	56	Norway 50; United Kingdom 5.
Manganese:				
Ore and concentrate, metallurgical-grade	5,150	28,956	--	Brazil 20,956; Mexico 8,000.
Oxides	NA	2,509	801	Mexico 1,277; Brazil 214.
Mercury 76-pound flasks	NA	3,537	789	West Germany 2,234; Spain 373.
Molybdenum:				
Oxides and hydroxides	NA	144	6	Chile 123; West Germany 15.
Metal including alloys, all forms kilograms	296	1,191	590	Japan 447; Spain 111.
Nickel:				
Ore and concentrate	2,663	2	--	France 1; West Germany 1.
Oxides and hydroxides	NA	42	--	Italy 32; United Kingdom 5.
Metal including alloys:				
Scrap	6	1	1	
Unwrought	109	171	124	Brazil 17; France 13.
Semimanufactures	107	196	108	West Germany 42; United Kingdom 21.
Tin:				
Ore and concentrate kilograms	--	3	3	
Metal including alloys:				
Unwrought	257	612	530	Bolivia 31; Taiwan 20.
Semimanufactures	209	213	17	Bolivia 99; Belgium-Luxembourg 61; United Kingdom 24.
Titanium: Oxides	NA	14,131	2,498	West Germany 3,033; Belgium-Luxembourg 2,249.
Tungsten:				
Oxides and hydroxides	NA	16	8	West Germany 6; Italy 1.
Metal including alloys, all forms	13	13	3	Italy 9; France 1.
Vanadium: Oxides and hydroxides	NA	7	7	
Zinc:				
Ore and concentrate kilograms	--	35	35	
Oxides	NA	77	16	West Germany 47; Belgium-Luxembourg 5.
Metal including alloys:				
Scrap	--	2	--	All from Belgium-Luxembourg.
Unwrought	9,672	23,376	1,587	Peru 15,170; Canada 3,794.
Semimanufactures	217	1,273	794	West Germany 256; Spain 112.
Other:				
Ores and concentrates	26,863	2,425	1,582	Italy 196; unspecified 590.
Ashes and residues	([2])	9	([2])	Mainly from West Germany.
Base metals including alloys, all forms	131	463	317	United Kingdom 127; Belgium-Luxembourg 3.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	157	304	74	Ecuador 72; West Germany 54.
Artificial:				
Corundum	NA	1,794	98	Brazil 1,033; West Germany 291; Austria 224.
Silicon carbide	NA	784	25	Switzerland 329; Brazil 238; Italy 106.
Asbestos, crude	4,734	8,013	1,761	Canada 6,201; Italy 51.
Barite and witherite	62,266	69,362	2,375	Peru 26,526; Chile 13,000; Brazil 12,700.
Boron materials:				
Crude natural borates	241	952	708	Netherlands 165; Italy 38.
Oxides and acids	NA	1,119	832	Italy 57; West Germany 55.
Cement	34,016	4,547	1,398	France 1,085; Netherlands 835.
Chalk	353	29	--	All from West Germany.
Clays, crude:				
Bentonite	20,662	16,332	16,264	Colombia 50; West Germany 7.
Kaolin	6,612	21,938	20,205	United Kingdom 1,630; Italy 45.
Unspecified	1,551	1,880	1,531	France 256; Mexico 45.
Cryolite and chiolite	5,156	2,482	([2])	Mainly from Denmark.

See footnotes at end of table.

Table 3.—Venezuela: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Diatomite and other infusorial earth	7,150	4,837	3,756	Mexico 1,023; Netherlands 26.
Feldspar, fluorspar, related materials:				
Feldspar	545	1,267	674	Italy 219; Finland 209.
Fluorspar	155	329	66	Mexico 153; France 70.
Unspecified	(2)	32	14	Netherlands 16; Brazil 2.
Graphite, natural	594	701	394	China 254; West Germany 42.
Gypsum and plaster	35,140	25,565	262	Spain 24,868; West Germany 302.
Lime	68	33	33	
Magnesium compounds:				
Magnesite	27	64	7	West Germany 50; Italy 3.
Oxides and hydroxides	11,914	20,849	1,100	Netherlands 6,026; Austria 4,000; Greece 3,550.
Mica: Crude including splittings and waste	656	1,061	968	West Germany 62; France 21.
Phosphates, crude	34,463	54,909	905	Unspecified 54,004.
Pigments, mineral:				
Natural, crude	15	58	1	Spain 47; United Kingdom 9.
Iron oxides and hydroxides, processed	NA	3,912	548	Argentina 1,343; West Germany 1,009.
Pyrite, unroasted	17	37	33	Italy 4.
Salt and brine	49	64	7	West Germany 57.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	NA	132,692	126,165	Belgium-Luxembourg 5,000; Poland 753.
Sulfate, manufactured	NA	73,295	65,262	Mexico 7,807; West Germany 140.
Stone, sand and gravel:				
Dimension stone, crude and partly worked	3,323	6,678	--	Italy 5,915; Brazil 343; Portugal 319.
Dolomite, chiefly refractory-grade	35,723	73,509	73,509	
Gravel and crushed rock	113	324	(2)	West Germany 204; Yugoslavia 120.
Limestone other than dimension	--	11	11	
Quartz and quartzite	96	185	3	Brazil 95; Finland 47; West Germany 27.
Sand other than metal-bearing	486	1,071	1,067	Belgium-Luxembourg 3; Italy 1.
Sulfur:				
Elemental:				
Crude including native and by-product	126	247	247	
Colloidal, precipitated, sublimed	NA	32	32	
Sulfuric acid	NA	6,044	6,033	Belgium-Luxembourg 5; West Germany 4.
Talc, steatite, soapstone, pyrophyllite	5,156	12,594	8,680	Brazil 2,210; Finland 306.
Vermiculite, perlite, chlorite	61	57	21	Mexico 20; Spain 15.
Other:				
Crude	338	2,008	1,317	Australia 441; Netherlands Antilles 149.
Slag and dross, not metal-bearing	24	4	4	
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	NA	122	69	Netherlands 53.
Carbon black	NA	791	365	West Germany 294; Canada 126.
Coal:				
Anthracite	NA	10,370	10,199	Belgium-Luxembourg 161; Colombia 10.
Bituminous	NA	23,231	385	Colombia 22,846.
Lignite including briquets	NA	706	671	United Kingdom 35.
Coke and semicoke	NA	184,277	127,650	Colombia 23,837; United Kingdom 13,146.
Petroleum:				
Crude thousand 42-gallon barrels	NA	4,246	(2)	Netherlands Antilles 3,952; Netherlands 294.
Refinery products:				
Liquefied petroleum gas do.	NA	1,354	773	Saudi Arabia 243; Netherlands 149.
Gasoline do.	NA	29	27	France 2.
Mineral jelly and wax do.	NA	25,142	9,851	West Germany 6,209; Spain 3,432.
Nonlubricating oils do.	NA	28,556	21,275	Netherlands 4,543; France 2,311.
Bitumen and other residues do.	NA	3,138	3,071	Netherlands 38; United Kingdom 16.
Petroleum coke do.	NA	239,034	174,826	Argentina 64,208.

NA Not available.
[1]Table prepared by H. D. Willis.
[2]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Aluminum.—Aluminum is Venezuela's second largest source of foreign exchange after petroleum. Cabinet approval has been announced to expand aluminum capacity from 400,000 tons per year to 800,000 tons per year by 1990. Aluminum industry investments are as follows: ALCASA—construction of an 84,000-ton-per-year aluminum reduction line, construction of a 60,000-ton-per-year aluminum rolling mill, and construction of a 140,000-ton-per-year coke calcination plant; VENALUM—construction of a 110,000-ton-per-year aluminum reduction plant, modification of the existing reduction plant to increase production by 30,000 tons per year, and modification of the existing carbon plant and cast house. These projects were scheduled for construction from 1986 to 1990. Total investment was estimated at $1.1 billion. In 1985, ALCASA's foil plant in Guácura, Carabobo State, was expanded from 6,000 tons per year to 9,000 tons per year, enabling the company to meet its export targets for Latin America. VENALUM's exports increased in 1985 following settlement of a price dispute with Japanese customers. Domestic sales of both VENALUM and ALCASA increased.

Alumina.—INTERALUMINA, Venezuela's only alumina refinery, continued to exceed its design capacity of 1 million tons per year with an output of 1.09 million tons in 1985. INTERALUMINA has revised its plans to add a third 500,000-ton-per-year alumina production line to its two existing units. Instead, the company intends to upgrade its present facilities, raising their capacity to 1.5 million tons per year in the next 4 years.

Bauxite.—BAUXIVEN continued development of the Los Pijiguaos bauxite mining project. The International Development Bank approved a $108 million loan for construction of the 3-million-ton-per-year open pit mine in late 1984. The loan would cover 30% of the total cost of the project. The remainder of the project cost would be covered by the Government of Venezuela and other local sources. Much of the work has been completed at the mine area including access roads and a 31-mile railroad. Other contracts for a 4-mile conveyor belt to carry ore, the Port of El Jobal, river barges, and navigational aids on the Orinoco River are still in the engineering stages. The first shipment of ore is scheduled for delivery in early 1987. The material will be shipped by barge 390 miles downriver to INTERALUMINA's plant at Ciudad Guayana. Venezuela's probable bauxite reserves were estimated at 5 billion tons.

Iron Ore.—Opening of the Cerro San Isidro Mine by FERROMINERA in September 1985 gave the state-owned mining company access to about 500 million tons of iron ore. The ore assays at 66.4% iron, 1.6% silica, 0.8% aluminum, 0.04% manganese, and 0.06% phosphorus. By reducing output of lower grade ore at FERROMINERA's other mines at Cerro Bolivar and El Pao and increasing volume of higher grade ore at San Isidro, the company is striving to maintain competitiveness in the international market.

FERROMINERA acquired ownership of the Minerales Ordaz C.A. briquet plant at Puerto Ordaz in 1985. The plant formerly belonged to United States Steel Corp. and has been shut down since 1982 owing to technical problems. The company was considering initiating an $80 million redesign of the plant, which would include installation of a DRI unit. The plant would produce 800,000 tons per year of briquets and provide an outlet for increased iron ore production.

FERROMINERA also plans to build a floating 100,000-ton-capacity mobile ore transshipment station to be anchored at the mouth of the Orinoco River to top off ore carriers of up to 170,000 deadweight tons (dwt). The station was estimated to cost $30 million.

Iron and Steel.—In an effort to eliminate shortfalls in the supply of seamless tube, SIDOR was planning to increase its seamless tube capacity of 112,000 tons per year to 335,000 tons per year by the year 2000. The first phase, scheduled to be completed by 1988, will raise capacity to 150,000 tons per year. The second phase will add another 30,000 tons per year by 1995, and the final phase will expand capacity by an additional 155,000 tons per year.

Siderúrgica Venezolana S.A. (SIVENSA), a private sector steel company, is continuing the modernization programs initiated at its Siderúrgica del Turbio S.A. (SIDETUR) plant at Barquisimeto. SIVENSA ordered a 40-ton electric arc furnace, to be supplied on a turnkey basis, from Voest-Alpine AG.

SIDETUR currently has steelmaking capacity of 160,000 tons per year and operates a 200,000-ton-per-year continuous billet caster. SIVENSA was ordered by the Government to relocate its operations in Caracas in order to comply with antipollution regulations. The company acquired a site in the Tuy Valley near Caracas, and design work was in progress for construction of a new plant. Siderúrgica Zuliana C.A.'s plans for a new 1.0-million-ton-per-year steelmaking project near Maracaibo were considered unprofitable, and the project was canceled.

Other Metals.—C.V.G. Ferrosilicio de Venezuela C.A. (FESILVEN) production rose almost 41% in 1985 from 36,047 tons in 1984 to 50,655 tons, nearly reaching the plant's rated capacity of 55,000 tons per year. Output was the highest since the plant started operating in 1977. FESILVEN was upgrading the fume clearing plant and investigating installing a third furnace. Ninety percent of FESILVEN sales were made to the United States and Japan.

Alluvial production of gold rose with new discoveries in the Amazonas region near the Brazilian and Colombian borders. Initial recovery rates from some of the new deposits were reportedly high. The state-owned gold mining company of Mineria de Venezuela C.A. (MINERVEN) operated at less than 50% capacity in 1985. Lack of known reserves and technical problems at the plant caused this poor performance. As a result, the Government has invited bids from private companies for the evaluation, exploitation, and processing of gold ores in the El Callao concessions, currently being worked by MINERVEN. The Government hoped to define reserves capable of output of 1,200 to 1,800 kilograms per year.

There are no lead, silver, or zinc mines operating in Venezuela. The Government was intensifying its nonferrous metal exploration efforts to delineate possible deposits for development. Most of the exploration efforts for lead and zinc and associated silver were in the States of Mérida and Guárico.

INDUSTRIAL MINERALS

Phosphate.—The Riecito Mine, owned and operated by Pequiven, a petrochemical affiliate of PDVSA, commenced operations in late 1985 after being closed for 8 years. The open pit mine is being developed for production of up to 750,000 tons per year of phosphate rock containing 28.7% phosphorus pentoxide. Reserves were estimated at 20 million tons. The material will be used by Pequiven at the Morón petrochemical complex to make phosphoric acid. Pequiven was also planning to develop the 1-million-ton Lizardo deposit near the Riecito Mine.

Venezuela has additional phosphate deposits in Mérida and Táchira States, although only the Lobatera Mine in Táchira was being exploited in 1985. The mine produces about 50,000 tons per year.

Other Industrial Minerals.—The Cabumba area and the western region of the state of Yaracuy are being investigated by the Ministry of Energy and Mines. Significant deposits of white and gray dolomitic marble and industrial-grade talc along with extensive resources of gypsum, quartz, and feldspar have been discovered. Development by private investors was being encouraged by the Government.

MINERAL FUELS

Coal.—Vencemos Cavosa S.A.'s $62 million open pit Fila Maestra Mine, in the State of Anzoátegui, was expected to begin production in early 1986. The entire output of Venezuela's only major non-Government coal project is slated for export to Europe. Initial production was planned at 150,000 tons per year, to be expanded to 300,000 tons per year as soon as possible. Output was expected to reach 700,000 tons per year by 1990. The company has a 22-year concession to mine an area of 20 square kilometers estimated to contain 300 million tons of coal. Under terms of the concession, Vencemos will be obligated to build a new port at Puerto Unare when production reaches 700,000 tons per year. Until then, Vencemos will use the Port of Guanta, which had to be dredged to handle the 60,000-dwt coal carriers.

At the end of 1985, PDVSA was finalizing negotiations to take over majority ownership of the Guasare coal project from Carbones del Zulia C.A., and was seeking a foreign partner for the venture. Declining oil prices and Government revenue have caused PDVSA to reevaluate the economics of the project. Construction is unlikely to begin before 1988. The project has about 360 million tons of proven reserves and 960 million tons of probable reserves. The Guasare Coalfield is approximately 150 kilometers northwest of Maracaibo just below the Guajira Peninsula and close to the Colombian border. The cost of developing the project has been estimated to be $800 million. The project is divided into four subprojects: the open pit mine, a railroad linking the mine to port facilities, a deep water port on the Gulf of Venezuela, and support infrastructure. Production costs were estimated at $30 per ton. Initially all the output of the mine will be exported.

Petroleum and Natural Gas.—Venezuela's proven crude oil and condensate reserve rose to 29.3 billion barrels at yearend. Petroleum production averaged 1.73 million bbl/d, down 3.9% from that of 1984. Meneven's $1 billion Oriente Cryogenic complex was inaugurated in November 1985. This complex will process 800 million cubic feet per day of natural gas and recover about 57,000 bbl/d of NGL. The plant doubles the country's NGL production capacity. About one-half of the NGL output will be exported.

PDVSA was giving priority to increasing natural gas production, which was 3.2 billion cubic feet per day in 1985. Gas deposits are large, and greater output can increase oil exports by substituting for liquid fuels and yielding more NGL, which does not count on OPEC production quotas.

Construction of Corpoven's $1.1 billion Nurgas pipeline was to begin in early 1986. This line will carry 950 million cubic feet per day of treated gas from eastern gasfields to central and western Venezuela. Development of Orinoco was continuing slowly because increased production there will not be needed until the early 1990's.

Exploration and production drilling were at a moderate level in 1985. About 340 wells were drilled, mostly for production rather than exploration. Corpoven discovered a new light crude oilfield in Apure State near the Colombian border that has estimated proven reserves of 300 million barrels. Light crude has also been discovered by Lagoven S.A. in Monagas State. The oil and gas field was estimated to contain possible reserves of 1 billion barrels of light crude and 2.7 billion cubic feet of natural gas. The discovery could be the largest since the nationalization of the industry in 1975.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, unless otherwise specified, values have been converted from Venezuelan bolivars (Bs) to U.S. dollars at the rate of Bs7.5=US$1.00.

The Mineral Industry of Yugoslavia

By Roman V. Sondermayer[1]

During 1985, the Yugoslav mining industry operated below the performance level attained before the economic slowdown. Shortages of hard currency for imports of fuels and spare parts adversely affected the mineral industry. Operators were forced to shut down because of shortages of electric power or petroleum refinery products. Furthermore, lack of spare parts prolonged downtime for equipment repairs. The country produced many minerals, but none dominated the industry.

By world standards, Yugoslavia was a modest producer of minerals. Output of alumina, antimony, bauxite, mine lead, and magnesite contributed between 3% and 5% of the world totals. Nevertheless, the mineral industry was important in the country's economy. Employment was close to 6.3% of the total labor force. Share of the mineral industry in the gross social product was 8.4%. Details of production value and employment are shown in the following tabulation for 1984, the latest year for which complete data were available:

Branch	Production value (million dinars)[1]	Employment (thousands)
Coal:		
Production	79,477	63.8
Processing	11,009	4.0
Crude oil:		
Production	48,116	4.1
Processing	46,168	12.1
Iron and steel:		
Iron ore production	6,576	5.9
Steel production	100,999	61.0
Nonferrous metals:		
Production of ores	40,042	32.6
Metal production	46,943	19.9
Metal processing	28,312	15.3
Nonmetallics:		
Production	10,891	12.9
Processing	42,632	56.7
Sand and gravel	14,390	22.6
Construction materials	55,997	76.7
Total	531,522	387.6

[1]The dinar (Din) is not convertible currency. A meaningful conversion to U.S. currency is impractical. At yearend 1985, the official exchange rate was 320Din=US$1.00.

Major events related to the mineral industry were as follows: A decision to expand the aluminum smelter at Kidricevo, Slovenia; completion of a new aluminum semis-plant at Sibenik, Croatia; awarding of a contract for supplying and installing a new conveyor belt system at the Majdanpek copper mine in Serbia; development of a copper mine near Prijepolje in Serbia; commissioning of the first natural oxide plant in Yugoslavia, situated at Tomasic in Bosnia and Hercegovina (BiH); beginning of production in a large iron ore mine in Omarska, BiH; discovery of large low-grade iron ore deposits in Serbia; discovery of a deposit of natural sodium carbonate near Gazin Han in Serbia; and confirmation of crude oil discovery in Stig, Serbia.

Government Policies and Programs.— During July 1985, the assembly of the Socialist Federal Republic of Yugoslavia enacted the Long-Range Social Plan of Yugoslavia, covering the period from 1986 to 2000. The plan sets forth the general orientation for development of the economy and society, determining the long-term goals and changes in the structure of the productive forces. The document also serves to assist in the formulation of medium-term plans.

The plan calls for the nonferrous mining and processing sector to produce annually by the year 2000 the following products: aluminum metal, 414,000 tons; copper, 207,000 tons; lead, 226,000 tons; zinc, 190,000 tons; as well as other minor commodities.

PRODUCTION

The mineral industry was entirely Government owned. Majority private ownership was not permitted, but joint ventures with foreign capital were possible. A law regulated investment of foreign capital in the country. The largest enterprises of the mineral industry included, among others, Rudarsko Topionicarski Bazen Bor (RTB Bor), copper; Rudarsko Metalurski Kombinat Zajaca, antimony; Energoinvest, bauxite, alumina, and aluminum; Dalmacija Cement, cement; Jugohrom, Hemijsko-Metalurski Kombinat, ferroalloys; Rudarsko-Metalurski Kombinat Zenica (RMK Zenica), iron ore, pig iron, and steel; Rudarsko-Metalursko-Hemijski Kombinat za Olovo I Cink Trepca, lead and zinc ore, concentrates of lead, zinc, and pyrites, and lead and zinc metals; Industrija Nafte (INA), crude oil, natural gas, and refined petroleum products.

Table 1.—Yugoslavia: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984[p]	1985[e]
METALS					
Aluminum:					
Bauxite ---- thousand tons	3,249	3,668	3,500	3,347	[3]3,250
Alumina ---- do	1,037	1,017	1,010	[e]1,000	1,000
Metal ingot:					
Primary	172,683	220,100	258,174	[e]270,000	280,000
Remelted[4]	24,084	26,263	25,385	[e]31,567	36,092
Total	196,767	246,363	283,559	301,567	[3]316,092
Antimony:					
Mine and concentrator output:					
Ore, gross weight	66,517	62,996	50,961	51,000	[3]71,000
Metal content of ore	1,455	1,517	950	[r] [e]950	1,300
Concentrate, gross weight	3,413	3,690	2,072	[r] [e]2,100	3,000
Metal (regulus)	2,198	1,872	895	1,263	[3]1,502
Bismuth, smelter output	102	49	45	30	[3]68
Cadmium, smelter output	208	174	48	270	250
Chromium: Chromite concentrate (produced largely from imported ores)	105,135	81,648	76,935	[r] [e]80,000	75,000
Copper:					
Mine and concentrator output:					
Ore, gross weight ---- thousand tons	18,337	19,733	23,443	25,279	[3]26,166
Cu content of ores	110,961	119,299	129,824	137,600	150,000
Concentrate, gross weight ---- thousand tons	478	514	543	[r] [e]580	600
Metal:					
Blister and anodes:					
Primary	92,505	94,013	86,833	[r] [e]90,000	100,000
Remelted[4]	86,175	86,865	80,903	[r] [e]80,000	90,000

See footnotes at end of table.

Table 1.—Yugoslavia: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984[p]	1985[e]
METALS —Continued					
Copper —Continued					
Metal —Continued					
Refined:					
Primary	90,660	82,456	82,925	[e]94,000	100,000
Remelted[4]	41,943	44,414	40,783	33,611	35,442
Total	132,603	126,870	123,708	127,611	[3]135,442
Gold, refined troy ounces	115,164	135,387	136,062	[e]140,000	145,000
Iron and steel:					
Iron ore:					
Gross weight thousand tons	4,794	5,106	5,018	5,321	[3]5,478
Fe content do.	1,510	1,680	1,529	[e]1,700	1,800
Iron concentrate, gross weight do.	2,451	2,669	2,224	[e]2,700	2,800
Metal:					
Pig iron do.	2,817	2,703	2,845	2,855	[3]3,120
Ferroalloys:					
Ferrochromium	69,194	50,591	63,807	[e]67,000	NA
Ferromanganese	51,126	38,895	39,677	[e]50,000	NA
Ferrosilicon	80,201	70,888	78,014	[e]95,000	NA
Silicon metal	28,358	29,818	26,256	[e]37,000	NA
Ferrosilicomanganese	28,600	20,286	26,254	[e]38,000	NA
Ferrosilicochromium	5,873	6,129	5,998	[e]6,000	NA
Other	1,072	3,997	10,889	[e]11,000	NA
Total	264,424	220,604	250,895	304,000	[3]299,000
Steel, crude:					
From oxygen converters thousand tons	1,424	1,349	1,598	1,644	[3]1,801
From Siemens-Martin furnaces do.	1,504	1,464	1,432	1,440	[3]1,524
From electric furnaces do.	1,048	1,037	1,105	1,152	[3]1,155
Total do.	3,976	3,850	4,135	4,236	[3]4,480
Semimanufactures do.	4,780	4,513	4,649	5,667	[3]5,694
Lead:					
Mine and concentrator output:					
Ore, gross weight (lead-zinc ore) do.	4,365	4,252	4,063	4,634	[3]4,590
Pb content of ores	118,556	113,119	114,000	113,600	110,000
Concentrate, gross weight	155,791	148,210	144,010	[e]150,000	145,000
Metal:					
Smelter:					
Primary	74,000	74,008	93,112	[r][e]95,000	110,000
Secondary[5]	46,456	35,000	34,000	35,000	40,000
Total	120,456	109,008	127,112	[r][e]130,000	150,000
Refined:					
Primary[6]	73,901	72,000	54,831	45,415	61,954
Secondary	12,500	10,248	42,700	37,400	38,000
Total	86,401	82,248	97,531	82,815	[3]99,954
Magnesium metal	3,859	4,216	4,763	[e]4,300	4,500
Manganese ore:					
Gross weight	31,149	27,494	31,643	[e]27,000	25,000
Mn content	10,872	9,819	11,074	[e]10,000	9,500
Mercury 76-pound flasks	--	--	[e]1,500	[e]1,700	1,800
Nickel:					
Mine output:					
Ore, gross weight thousand tons	--	452	[e]500	[e]600	800
Metal content of ore[e]	2,000	4,000	3,000	4,000	5,000
Nickel content of ferronickel[e]	--	1,500	1,500	2,000	3,000
Platinum-group metals:					
Palladium troy ounces	3,119	2,893	2,926	[e]3,100	3,300
Platinum do.	482	418	193	[r][e]200	250
Selenium metal, refined kilograms	35,600	42,323	43,782	[e]45,000	46,000
Silver, metal refined including secondary thousand troy ounces	4,437	3,343	3,987	4,051	[3]5,015
Zinc:					
Zn content of lead and zinc ore	88,640	83,813	86,767	[e]87,000	84,000
Concentrator output, gross weight	150,366	149,411	143,809	[r][e]150,000	130,000
Smelter including secondary	96,370	86,767	88,049	92,649	[3]83,398

See footnotes at end of table.

Table 1.—Yugoslavia: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984[p]	1985[e]
INDUSTRIAL MINERALS					
Asbestos, all kinds	13,591	11,657	10,502	8,556	[3]6,916
Barite	44,179	32,114	35,025	[e]35,000	35,000
Cement, hydraulic ... thousand tons	9,780	9,718	9,592	9,315	[3]9,028
Clays:					
Ceramic clay, crude	113,714	121,709	98,903	[e]125,000	130,000
Fire clay:					
Crude	374,671	337,073	303,965	[r,e]310,000	320,000
Calcined	72,804	60,009	54,551	[r,e]60,000	65,000
Kaolin	224,797	236,485	208,254	[r,e]210,000	220,000
Feldspar, crude	53,240	42,265	41,372	[r,e]42,000	45,000
Gypsum:					
Crude ... thousand tons	669	640	623	[r,e]650	680
Calcined	123,194	108,498	93,997	[r,e]95,000	100,000
Lime:					
Quicklime ... thousand tons	1,614	1,550	1,696	[r,e]1,700	1,650
Hydrated ... do	950	860	853	[r,e]900	850
Magnesite:					
Crude	299,676	328,456	303,965	326,000	417,000
Sintered	154,339	152,676	137,680	[r,e]140,000	150,000
Caustic calcined	14,841	11,712	11,527	[r,e]12,000	15,000
Mica, all grades	265	1,403	946	[r,e]950	1,000
Nitrogen: N content of ammonia ... thousand tons	421	422	410	[e]400	420
Pumice and related volcanic materials: Volcanic tuff	533,679	516,514	504,814	[r,e]500,000	510,000
Quartz, quartzite, glass sand:					
Quartz and quartzite ... thousand tons	212	205	201	[r,e]210	220
Glass sand ... do	2,424	2,418	2,391	[r,e]2,500	2,600
Total ... do	2,636	2,623	2,592	[r,e]2,710	2,820
Salt:					
Marine	36,185	37,980	28,874	NA	NA
From brines	189,976	191,746	194,709	NA	NA
Rock	192,579	198,500	191,885	NA	NA
Total	418,740	428,226	415,468	380,000	[3]410,000
Sand and gravel excluding glass sand ... thousand cubic meters	26,589	24,912	24,205	21,464	[3]22,136
Sodium compounds: Sodium carbonate	147,156	181,880	183,374	188,291	[3]199,629
Stone excluding quartz and quartzite:					
Dimension:					
Crude:					
Ornamental ... thousand cubic meters	78	72	74	NA	NA
Other ... do	1	12	13	NA	NA
Partly worked facing ... thousand square meters	2,058	2,134	2,139	2,273	[3]2,544
Cobblestones, curbstones, other ... thousand cubic meters	38	29	63	NA	NA
Dolomite ... thousand tons	928	930	954	NA	NA
Limestone ... do	4,081	4,872	NA	NA	NA
Shale ... do	8,759	8,324	7,936	NA	NA
Crushed and broken, n.e.s. ... thousand cubic meters	4,562	4,872	3,156	NA	NA
Milled marble and other ... do	18,420	NA	8,800	NA	NA
Sulfur, pyrite, pyrrhotite:					
Pyrite, gross weight ... thousand tons	652	810	694	[r,e]700	750
Pyrrhotite, gross weight ... do	29	32	17	[r,e]18	20
Sulfur:					
Sulfur content of pyrite[7] ... do	274	340	291	[r,e]294	315
Sulfur content of pyrrhotite[7] ... do	12	13	7	[r,e]7	8
Byproduct:					
Of metallurgy[e] ... do	200	200	180	160	170
Of petroleum[e] ... do	4	4	3	3	3
Total[e] ... do	490	557	481	[r]464	496
MINERAL FUELS AND RELATED MATERIALS					
Carbon black	23,945	24,670	24,690	[e]24,000	25,000

See footnotes at end of table.

Table 1.—Yugoslavia: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1981	1982	1983	1984[p]	1985[e]
MINERAL FUELS AND RELATED MATERIALS —Continued					
Coal:					
Bituminous thousand tons	384	389	392	389	[3]400
Brown do	10,581	10,744	11,303	11,391	[3]12,465
Lignite do	41,279	43,545	46,889	53,651	[3]56,635
Total do	52,244	54,678	58,584	65,431	69,500
Coke:					
Metallurgical do	2,349	2,427	3,028	NA	NA
Breeze do	171	183	249	NA	NA
Foundry do	174	170	163	NA	NA
Total do	2,694	2,780	3,440	3,516	[3]3,545
Gas:					
Manufactured (excluding petroleum refinery gas):					
From coke plants million cubic feet	29,633	30,904	39,658	NA	NA
From lignite gasification plants do	4,112	3,621	3,672	NA	NA
Natural, gross production do	77,585	80,728	73,816	70,523	[3]84,755
Natural gas plant liquids: Propane and butane thousand 42-gallon barrels	746	1,012	1,079	NA	NA
Petroleum:					
Crude:					
As reported thousand tons	4,375	4,340	4,125	4,044	[3]4,149
Converted thousand 42-gallon barrels	32,405	32,146	30,554	29,954	30,731
Refinery products:					
Gasoline do	20,119	23,042	22,283	33,175	[3]31,221
Liquefied petroleum gas do	2,818	2,939	2,660	NA	NA
Jet fuel do	2,480	2,433	2,430	NA	NA
Kerosene do	109	110	182	NA	NA
Middle distillate fuel oil do	11,259	9,041	9,373	NA	NA
Distillate fuel oil: Diesel do	22,924	24,546	25,856	27,273	[3]25,341
Residual fuel oil do	27,672	35,990	36,203	32,560	[3]30,156
Lubricants do	3,352	3,045	3,227	3,171	[3]4,228
Paraffin do	133	235	181	NA	NA
White spirit do	247	254	289	NA	NA
Asphalt and bitumen do	3,527	3,254	4,123	NA	NA
Petroleum coke do	370	326	240	NA	NA
Other do	11,257	2,278	249	NA	NA
Total do	[r]106,267	[r]107,493	107,296	NA	NA

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through July 30, 1986.
[2]In addition to the commodities listed, bentonite, common clay, and diatomite are also produced, and tellurium may be recovered as a copper refinery byproduct, but available information is inadequate to make reliable estimates of output levels.
[3]Reported figure.
[4]Includes undetermined quantity of secondary raw material.
[5]Calculated as the difference between reported total and reported primary figure.
[6]Calculated as the difference between reported total and reported secondary figure.
[7]Calculated from pyrite and pyrrhotite concentrate using 42% as average sulfur content.

TRADE

A large trade deficit resulted in 1985, mostly from imports of large quantities of high-rank coals, crude petroleum, natural gas, iron ore, crude steel and steel semimanufactured products, and phosphates. Approximately one-third of the total value of the country's imports was in mineral commodities, and one-tenth of the value of exports was in minerals. Most prominent export items were bauxite, alumina and metal in crude form and in the form of semimanufactures; roasted pyrite; cement; and steel semimanufactures.

Table 2.—Yugoslavia: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS				
Aluminum:				
Ore and concentrate	555,412	651,893	--	U.S.S.R. 333,320; Romania 201,109; West Germany 68,953.
Oxides and hydroxides	515,606	419,636	--	U.S.S.R. 379,413; Italy 15,719; Romania 12,713.
Metal including alloys:				
Scrap	1,674	295	--	Italy 126; West Germany 113; France 56.
Unwrought	143,636	142,040	200	East Germany 37,619; France 32,626; Italy 16,750.
Semimanufactures	69,365	61,866	10,191	Czechoslovakia 14,585; West Germany 7,791.
Chromium:				
Ore and concentrate	12,450	25,848	--	Switzerland 12,741; Czechoslovakia 11,902.
Oxides and hydroxides	88	25	--	All to Italy.
Columbium and tantalum: Metal including alloys, all forms, tantalum value, thousands	$8	$6	--	All to West Germany.
Copper:				
Ore and concentrate	2,095	8	--	NA.
Matte and speiss including cement copper	347	672	--	All to Bulgaria.
Metal including alloys:				
Scrap	6,062	3,473	--	West Germany 2,110; Italy 863; Switzerland 500.
Unwrought	4,101	2,394	--	East Germany 1,320; Belgium-Luxembourg 901.
Semimanufactures	25,252	33,701	4,706	Italy 6,300; West Germany 5,297; Algeria 3,774.
Iron and steel:				
Iron ore and concentrate, pyrite, roasted	61,195	45,740	--	Hungary 27,977; West Germany 11,506; Austria 6,257.
Metal:				
Scrap	70,383	141,732	--	Italy 96,119; Austria 39,966.
Pig iron, cast iron, related materials	7,469	5,297	--	West Germany 2,463; East Germany 830; Sweden 506.
Ferroalloys:				
Ferromanganese	10,946	12,110	4,103	Italy 3,145; Turkey 2,200.
Unspecified value, thousands	$57,081	$93,032	$18,384	Japan $16,381; Austria $12,934.
Steel, primary forms	20,847	92,864	--	Italy 44,801; West Germany 21,567; Poland 17,745.
Semimanufactures:				
Bars, rods, angles, shapes, sections	309,306	493,767	976	Egypt 175,299; West Germany 72,764; China 31,491.
Universals, plates, sheets	73,843	106,846	--	China 25,103; Austria 22,467; Italy 19,413.
Hoop and strip	10,533	9,409	1,925	Poland 2,997; Italy 2,028.
Rails and accessories	10,528	11,380	--	Romania 9,584; Albania 941; Greece 692.
Wire	31,058	28,404	--	Italy 19,053; Poland 2,061; Hungary 1,133.
Tubes, pipes, fittings	130,055	163,278	14,880	Turkey 20,048; East Germany 15,629.
Castings and forgings, rough	4,256	5,988	--	Italy 2,298; West Germany 1,699; Austria 1,488.
Lead:				
Ore and concentrate	4,274	5,925	--	Romania 4,068; Bulgaria 1,857.
Oxides	4	13	--	Iraq 10; U.S.S.R. 2.
Metal including alloys:				
Unwrought	18,105	16,296	--	Czechoslovakia 7,249; Greece 2,733; Albania 1,599.
Semimanufactures	3,203	2,218	--	Italy 1,449; France 402; West Germany 276.
Magnesium: Metal including alloys:				
Scrap	35	13	--	All to West Germany.
Unwrought	3,361	3,162	489	West Germany 1,652; Belgium-Luxembourg 495.
Semimanufactures	122	20	--	All to Austria.
Manganese: Ore and concentrate, metallurgical-grade	5,175	7,157	--	Switzerland 3,619; Italy 3,538.
Mercury 76-pound flasks	58	638	--	Italy 377; Switzerland 261.
Molybdenum: Metal including alloys, all forms	1	--		

See footnotes at end of table.

Table 2.—Yugoslavia: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984 United States	Destinations, 1984 Other (principal)
METALS —Continued				
Nickel:				
Matte and speiss	--	47	--	All to Italy.
Metal including alloys:				
Scrap	93	153	--	West Germany 61; Austria 35; Italy 35.
Unwrought	46	466	--	Austria 266; Czechoslovakia 120; East Germany 61.
Semimanufactures	128	266	--	Italy 141; Austria 125.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$189	$164	--	Austria $162.
Silver:				
Waste and sweepings[2] do	$156	$254	--	West Germany $237; Italy $15.
Metal including alloys, unwrought and partly wrought do	$33,151	$18,408	$543	Czechoslovakia $6,206; United Kingdom $5,657; West Germany $2,509.
Tin: Metal including alloys:				
Unwrought	7	(3)	--	Mainly to Kenya.
Semimanufactures	2	(3)	--	Mainly to Iraq.
Titanium: Oxides	13,866	15,979	1,046	East Germany 12,704; Romania 1,595.
Tungsten: Metal including alloys, all forms	27	--		
Zinc:				
Ore and concentrate	3,404	5,484	--	Belgium-Luxembourg 4,396; Bulgaria 609; Romania 479.
Oxides	1,879	1,988	--	Romania 1,056; Hungary 765; Italy 162.
Metal including alloys:				
Scrap	363	612	--	Austria 529; Portugal 44; Italy 39.
Unwrought	25,024	24,038	--	Czechoslovakia 12,209; East Germany 6,378; Hungary 3,225.
Semimanufactures	8,105	8,137	--	Czechoslovakia 5,052; West Germany 1,433; United Kingdom 537.
Other:				
Oxides and hydroxides	319	407	--	Sweden 324; West Germany 42; Switzerland 36.
Ashes and residues	2,141	2,507	--	Italy 1,634; Austria 470; Switzerland 227.
Base metals including alloys, all forms	135	37	--	Czechoslovakia 27; Switzerland 10.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Artificial: Corundum	10,873	17,145	--	Italy 4,562; Romania 4,436; West Germany 3,864.
Grinding and polishing wheels and stones	2,809	3,520	328	West Germany 648; Poland 486; Bulgaria 356.
Asbestos, crude	2,152	2,220	--	Albania 1,643; France 563.
Barite and witherite	17,680	20,256	--	Hungary 13,700; West Germany 3,001; U.S.S.R. 2,015.
Boron materials: Oxides and acids	736	1,219	--	Italy 781; Romania 400.
Cement thousand tons	1,052	1,091	--	Egypt 666; Italy 231; Algeria 60.
Clays, crude	4,109	253	--	West Germany 80; Kenya 62; Albania 48.
Cryolite and chiolite	5	9	--	All to Malta.
Diatomite and other infusorial earth	(3)	394	--	Austria 342; Spain 30; Switzerland 22.
Feldspar, fluorspar, related materials	3,311	3,793	--	East Germany 1,722; Italy 1,449; Hungary 338.
Fertilizer materials: Manufactured:				
Ammonia	193	--		
Nitrogenous	113,406	156,423	--	West Germany 31,513; Turkey 23,904; Kenya 16,000.
Phosphatic	220,086	111,937	--	Hungary 64,885; Czechoslovakia 31,643; Austria 7,788.
Unspecified and mixed	270,152	316,643	--	West Germany 90,105; Hungary 81,061; Italy 58,133.
Graphite, natural	13	(3)	--	All to Iraq.
Gypsum and plaster	119	2,270	--	Iraq 2,058; U.S.S.R. 127.
Lime	37,120	25,996	--	Hungary 23,844; Austria 1,477.
Magnesium compounds	5,050	6,859	1,022	Italy 2,945; Romania 1,331.
Mica: Worked including agglomerated splittings	3	4	--	Austria 3; West Germany 1.
Pigments, mineral: Iron oxides and hydroxides, processed	2	--		
Pyrite, unroasted	95,764	359,202	--	West Germany 258,956; Turkey 51,357; Romania 48,867.

See footnotes at end of table.

Table 2.—Yugoslavia: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Salt and brine	59	450	--	Italy 275; Iraq 63; Angola 25.
Sodium compounds, n.e.s.: Carbonate, manufactured	15,128	10,718	--	Italy 8,917; France 1,801.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	34,514	46,398	--	Italy 25,440; Czechoslovakia 14,418.
Worked	15,051	19,322	320	West Germany 3,761; Austria 3,352; Czechoslovakia 2,663.
Dolomite, chiefly refractory-grade	32	106	--	Austria 94; Malta 12.
Gravel and crushed rock	12,408	75,273	--	Italy 54,397; U.S.S.R. 13,013; Czechoslovakia 3,238.
Quartz and quartzite	12,523	13,130	--	West Germany 7,337; Spain 3,728; Italy 1,623.
Sand other than metal-bearing	13,206	18,031	--	Greece 7,815; Italy 6,457; Albania 2,940.
Sulfur:				
Elemental:				
Crude including native and byproduct	(3)	--		
Colloidal, precipitated, sublimed	110	--		
Sulfuric acid	12,327	18,634	--	Bulgaria 11,471; Italy 7,090.
Talc, steatite, soapstone, pyrophyllite	944	2	--	All to Austria.
Other:				
Crude	1,309	1,481	--	Austria 406; Greece 280; Romania 279.
Slag and dross, not metal-bearing	33,608	19,148	--	Greece 18,233; Austria 405; Italy 261.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	160	591	--	Libya 543; U.S.S.R. 38.
Carbon: Carbon black	306	122	--	West Germany 120.
Coal: Lignite including briquets	395,775	219,122	--	Austria 168,186; Italy 42,092.
Coke and semicoke	216,226	101,042	--	Romania 56,040; Hungary 25,232; Bulgaria 13,030.
Peat including briquets and litter	1,934	5,281	--	Italy 5,261.
Petroleum:				
Crude thousand 42-gallon barrels	8	--		
Refinery products:				
Liquefied petroleum gas do	396	442	--	Italy 260; West Germany 130; Austria 38.
Gasoline do	3,080	5,652	--	Netherlands 1,804; Italy 1,334; West Germany 1,061.
Mineral jelly and wax do	61	43	--	West Germany 20; Italy 17.
Kerosene and jet fuel do	136	151	5	United Kingdom 28; France 25; U.S.S.R. 19.
Distillate fuel oil do	629	1,182	(3)	Netherlands 809; Austria 186; United Kingdom 172.
Lubricants do	579	1,062	--	Austria 572; West Germany 218; Italy 172.
Residual fuel oil do	8	--		
Bitumen and other residues do	969	1,557	--	Austria 742; Italy 572; Greece 218.
Bituminous mixtures do	(3)	4	--	Libya 3.
Petroleum coke do	19	17	--	West Germany 12; Italy 5.

NA Not available.
[1]Table prepared by Jozef Plachy.
[2]May include other precious metals.
[3]Less than 1/2 unit.

Table 3.—Yugoslavia: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS				
Aluminum:				
Ore and concentrate	158,761	185,800	--	Guinea 139,936; Greece 17,913; Australia 15,893.
Oxides and hydroxides	101,374	113,241	1	Guinea 81,091; Greece 28,062; Hungary 2,459.
Metal including alloys:				
Unwrought	37,537	34,057	--	U.S.S.R. 30,400; Romania 2,592.
Semimanufactures	12,018	14,805	25	U.S.S.R. 9,967; West Germany 1,187; Austria 1,019.
Beryllium: Metal including alloys, all forms ... value, thousands	$14	--		
Chromium:				
Ore and concentrate	202,819	273,679	--	Albania 131,174; U.S.S.R. 75,643; Turkey 66,684.
Oxides and hydroxides	575	824	--	U.S.S.R. 450; East Germany 136; West Germany 129.
Cobalt: Oxides and hydroxides	27	34	10	Netherlands 13; France 8.
Columbium and tantalum: Metal including alloys, all forms, tantalum ... value, thousands	$325	$257	$26	West Germany $197; Switzerland $22.
Copper:				
Matte and speiss including cement copper	--	(2)	--	All from Switzerland.
Metal including alloys:				
Scrap	400	441	--	U.S.S.R. 213; Switzerland 200; Greece 20.
Unwrought	26,844	31,824	--	Zambia 14,412; Zaire 7,609; Poland 2,392.
Semimanufactures	8,734	18,870	8	Poland 12,155; West Germany 1,720; Italy 1,587.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite ... thousand tons	1,568	1,566	--	Canada 528; U.S.S.R. 333; Brazil 302.
Metal:				
Scrap	738,094	781,452	--	U.S.S.R. 715,904; Czechoslovakia 25,119; Bulgaria 22,968.
Pig iron, cast iron, related materials	63,704	66,295	102	Algeria 24,246; U.S.S.R. 15,804; Bulgaria 15,147.
Ferroalloys:				
Ferromanganese	2,483	1,754	--	West Germany 609; Italy 500; France 290.
Unspecified ... value, thousands	$15,385	$17,036	$10	Austria $8,894; West Germany $3,989; United Kingdom $1,108.
Steel, primary forms	695,163	689,127	--	Czechoslovakia 291,287; U.S.S.R. 198,397; Poland 49,443.
Semimanufactures:				
Bars, rods, angles, shapes, sections	212,136	173,552	11	Czechoslovakia 34,364; U.S.S.R. 29,092; Romania 29,027.
Universals, plates, sheets	429,549	438,952	20	Czechoslovakia 110,710; Italy 74,743; Austria 62,167.
Hoop and strip	113,224	130,064	12	Poland 46,975; West Germany 28,484; Czechoslovakia 15,327.
Rails and accessories	3,973	10,705	--	Austria 5,030; U.S.S.R. 2,365; Poland 1,566.
Wire	21,734	32,303	3	Czechoslovakia 13,450; Italy 3,527; Belgium-Luxembourg 2,625.
Tubes, pipes, fittings	55,176	58,249	80	West Germany 15,312; East Germany 12,599; Austria 7,366.
Castings and forgings, rough	3,431	11,998	3	West Germany 9,606; Czechoslovakia 1,161.
Lead:				
Ore and concentrate	6,537	574	--	Sweden 474; Greece 100.
Oxides	2,653	4,310	10	Austria 3,206; Bulgaria 573; Netherlands 240.
Metal including alloys:				
Unwrought	10,740	11,614	--	Peru 3,733; Spain 3,000; France 2,182.
Semimanufactures	47	68	1	Italy 20; West Germany 18; U.S.S.R. 15.
Magnesium: Metal including alloys:				
Unwrought	2	12	--	West Germany 5; Switzerland 4.
Semimanufactures	17	(2)	--	All from West Germany.

See footnotes at end of table.

Table 3.—Yugoslavia: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Manganese:				
Ore and concentrate, metallurgical-grade	130,169	148,032	--	Republic of South Africa 64,533; Ghana 48,288; U.S.S.R. 33,432.
Oxides	1,166	977	--	West Germany 344; Belgium-Luxembourg 289; France 176.
Mercury 76-pound flasks	1,914	812	87	Spain 290; Austria 232; West Germany 196.
Molybdenum: Metal including alloys, all forms	26	32	(2)	Hungary 15; Austria 11; Netherlands 2.
Nickel:				
Matte and speiss	53	7	1	Australia 3; Austria 2.
Metal including alloys:				
Scrap	(2)	1	--	All from Austria.
Unwrought	1,395	2,659	1	U.S.S.R. 2,526; Bulgaria 64; United Kingdom 25.
Semimanufactures	1,192	844	3	West Germany 240; U.S.S.R. 232; Italy 112.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$2,001	$1,916	$1	France $869; U.S.S.R. $641; West Germany $145.
Silver: Metal including alloys, unwrought and partly wrought do	$2,212	$3,117	$2	Spain $1,181; West Germany $760; Austria $402.
Tin:				
Oxides	(2)	(2)	--	All from Japan.
Metal including alloys:				
Unwrought	1,125	1,122	1	Malaysia 554; Bolivia 304; Indonesia 66.
Semimanufactures	164	70	(2)	West Germany 32; Thailand 24; Italy 6.
Titanium: Oxides	775	763	1	West Germany 531; Italy 80; Belgium-Luxembourg 57.
Tungsten: Metal including alloys, all forms	29	36	(2)	Hungary 15; France 5; Austria 4.
Uranium: Metal including alloys, all forms	$2	--		
Zinc:				
Ore and concentrate	29,382	26,913	--	Czechoslovakia 12,044; Peru 2,851; Italy 2,686.
Oxides	3,125	3,163	--	Austria 1,323; Czechoslovakia 1,160; West Germany 459.
Metal including alloys:				
Unwrought	27,893	24,683	51	Algeria 5,621; United Kingdom 4,127; Austria 2,985.
Semimanufactures	844	3,031	--	Czechoslovakia 2,830; Poland 131; Italy 22.
Other:				
Ores and concentrates	56,444	50,517	--	Australia 47,407; West Germany 1,196; China 589.
Oxides and hydroxides	1,074	1,090	5	West Germany 552; U.S.S.R. 145; Austria 103.
Ashes and residues	--	1,268	--	All from Switzerland.
Base metals including alloys, all forms	707	643	13	Netherlands 234; United Kingdom 95; France 62.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	618	373	--	Poland 170; France 102; Italy 39.
Artificial: Corundum	1,538	2,125	6	Poland 1,289; Austria 664; West Germany 77.
Dust and powder of precious and semiprecious stones including diamond value, thousands	$1,134	$1,215	$177	U.S.S.R. $481; Belgium-Luxembourg $307.
Grinding and polishing wheels and stones	1,387	1,101	7	Austria 364; Italy 130; West Germany 110.
Asbestos, crude	45,656	45,490	--	U.S.S.R. 33,607; Republic of South Africa 6,785; Canada 4,101.
Barite and witherite	151	380	--	Spain 336; Italy 24; West Germany 20.
Boron materials:				
Crude natural borates	35,209	40,487	8,800	Turkey 30,622; West Germany 700.
Oxides and acids	2,650	115	--	France 79; West Germany 20; Belgium-Luxembourg 16.

See footnotes at end of table.

Table 3.—Yugoslavia: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Cement	343,451	261,800	--	Hungary 169,645; Czechoslovakia 46,296; U.S.S.R. 38,386.
Chalk	3,073	4,028	--	Austria 1,475; Italy 1,237; France 816.
Clays, crude	122,159	135,829	3,388	Czechoslovakia 72,037; Greece 18,631; East Germany 11,714.
Cryolite and chiolite	900	1,253	--	Denmark 1,252.
Diamond:				
Gem, not set or strung value, thousands	$263	$389	--	Switzerland $144; Belgium-Luxembourg $87; Italy $82.
Industrial stones do	$697	$1,265	--	Belgium-Luxembourg $743; United Kingdom $271; Ghana $122.
Diatomite and other infusorial earth	616	551	90	Italy 266; Austria 156.
Feldspar, fluorspar, related materials	8,958	7,519	--	China 2,833; France 1,907; East Germany 1,208.
Fertilizer materials:				
Crude, n.e.s	100	516	--	U.S.S.R. 379; Italy 72; France 65.
Manufactured:				
Ammonia	130,681	127,840	--	Hungary 58,332; Austria 33,043; U.S.S.R. 23,524.
Nitrogenous	373,873	460,355	--	U.S.S.R. 142,384; Hungary 122,172; Romania 60,614.
Phosphatic	31,494	29,086	--	Tunisia 16,776; Romania 12,310.
Potassic	543,376	525,792	--	East Germany 279,684; U.S.S.R. 234,846.
Unspecified and mixed	100,440	113,348	79,722	Romania 21,148; Tunisia 9,612.
Graphite, natural	3,003	2,220	3	Czechoslovakia 1,245; West Germany 474; Austria 455.
Gypsum and plaster	16	18	1	West Germany 16.
Lime	--	5	--	All from United Kingdom.
Magnesium compounds	45,549	51,256	--	Greece 23,199; West Germany 11,640; Italy 3,291.
Mica:				
Crude including splittings and waste	983	140	--	West Germany 70; France 40; India 15.
Worked including agglomerated splittings	115	99	--	Czechoslovakia 24; Austria 21; Switzerland 14.
Phosphates, crude thousand tons	1,802	1,438	--	Togo 509; Morocco 298; Jordan 283.
Pigments, mineral: Iron oxides and hydroxides, processed	2,799	2,618	10	West Germany 670; U.S.S.R. 549; East Germany 318.
Potassium salts, crude	--	121	--	All from East Germany.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$91	$29	--	France $15; Austria $6.
Synthetic do	$264	$266	$37	Austria $72; Czechoslovakia $58; United Kingdom $38.
Pyrite, unroasted	--	157	--	All from Austria.
Salt and brine	241,125	284,038	--	Romania 171,452; East Germany 45,652; U.S.S.R. 35,315.
Sodium compounds, n.e.s.: Carbonate, manufactured	68,237	82,342	--	Romania 49,355; Bulgaria 16,145; Poland 7,452.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	2,137	1,001	--	Austria 442; East Germany 440; France 72.
Worked	94	49	--	Italy 44.
Dolomite, chiefly refractory-grade	1,011	1,309	--	Italy 1,159; West Germany 150.
Gravel and crushed rock	201	6,819	--	Hungary 6,726; France 40.
Limestone other than dimension	--	189	--	All from Italy.
Quartz and quartzite	2,716	928	17	West Germany 836; United Kingdom 27.
Sand other than metal-bearing	50,829	55,598	--	Hungary 17,776; Czechoslovakia 13,471; West Germany 12,072.
Sulfur:				
Elemental:				
Crude including native and byproduct	121,581	115,905	15,827	Poland 94,002; West Germany 2,284.
Colloidal, precipitated, sublimed	1,869	407	--	West Germany 197; Italy 134; Albania 60.
Dioxide	272	(2)	(2)	Mainly from Netherlands.
Sulfuric acid	93,097	37,368	--	Hungary 23,824; East Germany 5,575; West Germany 4,698.

See footnotes at end of table.

Table 3.—Yugoslavia: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984 United States	Sources, 1984 Other (principal)
INDUSTRIAL MINERALS —Continued				
Talc, steatite, soapstone, pyrophyllite	4,037	6,129	--	Austria 2,104; West Germany 1,440; Italy 983.
Other:				
Crude	20,350	12,924	--	Hungary 8,171; U.S.S.R. 2,628; Austria 1,304.
Slag and dross, not metal-bearing	17,879	31,080	--	Italy 17,982; Canada 13,078.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	757	678	130	Albania 500; East Germany 31.
Carbon: Carbon black	30,866	23,246	72	Italy 17,332; U.S.S.R. 4,306.
Coal:				
Anthracite and bituminous thousand tons	4,005	3,613	535	U.S.S.R. 2,283; Poland 294; Czechoslovakia 270.
Briquets of anthracite and bituminous coal do	9	(2)	--	All from Poland.
Lignite including briquets do	140	147	--	U.S.S.R. 121; East Germany 15; Hungary 11.
Coke and semicoke do	27	37	--	Italy 25; West Germany 12.
Gas, natural million cubic feet	99,630	119,373	--	All from U.S.S.R.
Peat including briquets and litter	8,351	9,432	--	U.S.S.R. 6,342; Hungary 2,926.
Petroleum:				
Crude thousand 42-gallon barrels	69,835	72,553	--	Iraq 39,299; Libya 14,298; Algeria 6,269.
Refinery products:				
Liquefied petroleum gas do	1,216	1,091	--	Bulgaria 400; West Germany 307.
Gasoline do	381	422	(2)	Romania 197; West Germany 133.
Mineral jelly and wax do	18	17	--	West Germany 8; East Germany 3.
Kerosene and jet fuel do	428	1,161	--	Italy 640; Austria 176; Czechoslovakia 96.
Distillate fuel oil do	1,904	234	5	U.S.S.R. 136; West Germany 42; Hungary 37.
Lubricants do	561	481	1	Bulgaria 237; Italy 78; Hungary 72.
Residual fuel oil do	4,214	6,989	--	U.S.S.R. 4,209; Italy 551; Hungary 517.
Bitumen and other residues do	3	(2)	--	All from Netherlands.
Bituminous mixtures do	2	(2)	(2)	Mainly from Italy.
Petroleum coke do	511	629	435	U.S.S.R. 77; Norway 76; West Germany 30.

[1]Table prepared by Jozef Plachy.
[2]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Aluminum.—In general, bauxite producers had an uneventful year except for problems created by the general economic conditions in the country. In Hercegovina, bauxite mines near Mostar had a successful year. Bauxite production was 473,120 tons, 4% higher than planned. The largest mine in the Mostar mining district was Posusje, which produced 247,473 tons, followed by the Listica Mine, with an output of 91,100 tons, Stolac with 72,280 tons, and Citluk with 62,267 tons. At the Posusje Mine, 5 million tons of new bauxite reserves was discovered, and two mines, Baturinka and Okrugli Breg, were developed. The alumina plant near Mostar received most of the bauxite from the Mostar Mines. Both the plant and the mines were operated by the Energoinvest enterprise of Sarajevo. BiH remained the largest producing areas of bauxite and alumina in the country. Energoinvest remained the enterprise with the largest output of bauxite and alumina through its control of the Vlasenica Mines and Zvornik alumina plant. Sibenik aluminum smelter was the largest aluminum metal producer in the country.

After several years of preparatory work, the management of the Unial enterprise, which operated alumina and aluminum plants in Kidricevo, Slovenia, announced that its primary aluminum facilities would be expanded and modernized. When the project is completed, production capacity of aluminum should reach 70,000 tons, an increase of 24,000 tons over the present capacity. Total costs were reported at 24,500 million dinars.[2] Many Yugoslav enterprises financed this project. The expansion and modernization will be in two phases. From 1986 to 1990, a new electrolytic plant, Elektroliza C, will be built with an annual capacity of 35,000 tons of aluminum. The existing electrolytic plant, Elektroliza B, will be reconstructed, and its capacity will be increased to 35,000 tons of metal per year. Apparently, Elektroliza A will be closed.

The second phase should start during 1990 and end in 1996, when Elektroliza B will be closed, and the capacity of Elektroliza C will increase to 70,000 tons of metal per year. At Industrija Aluminija Boris Kidric in Sibenik, Croatia, a plant for production of semis came on-stream in 1985. Annual capacity was 9,000 tons of thin strip, 6,000 tons of foil, and 2,000 tons of structural sheet. Davy McKee Corp. was the prime contractor for this project. An international loan financed construction, equipment, and other needs. British credit provided an equivalent of $40 million for British equipment. Swiss banks provided about $10 million, and the United States share was $26 million in a Eurocurrency loan.

Copper.—The management of the Majdanpek open pit copper mine, near Majdanpek in Serbia, awarded a contract to the Continental Conveyor and Equipment Co. Inc. of Winfield, Alabama, a subsidiary of B. F. Goodrich Inc. Continental will design, supply major components, and supervise construction of a high angle conveyor (HAC) in the pit, which will elevate crushed ore from the pit to a horizontal conveyor for moving it to the flotation plant. The HAC will be 2 meters wide and will have a lift of 93.5 meters. In addition, the system will carry minus 25-centimeter ore up a 35.5-degree incline at the rate of 4,000 tons per hour. An upper belt at Majdanpek will be powered at 450 kilowatts and the lower at 2 by 450 kilowatts. The conveyor is designed to permit future installation of a second conveyor to permit elevation of ores from deeper parts of the pit.

Reconstruction and modernization of the copper powder producing plant at Bor, Serbia, started in the fall. After completion, annual capacity of the plant will increase from 100 to 500 tons. Costs for this endeavor were reported at 150 million dinars.

At Prijepolje, Serbia, development of a mine and construction of a flotation plant, started during 1985, are to be completed in 1987. The content of gold in the copper ore from the Prijepolje deposit was between 1.6 and 1.8 grams per ton of ore.

Gold.—Exploration was conducted in various parts of the country. In Bosnia, near Fojnica, an old gold mine abandoned during 1939 was reexamined. Positive results of tests to recover gold from the Fojnica mine dump indicated reopening was a possibility. In Serbia, state geologists discovered gold in primary deposits in the Jastrebac and Zeljin Mountains. In the same region, alluvial areas in the Zagroze, Krivaca, and Rasina streams contained gold. Preliminary results indicated that the primary ore contains about 5 grams of gold per ton of ore and the alluvial deposits about 1 gram of gold per cubic meter of sand. In some places, the alluvial deposits contained platinum. In addition, in the general area of Homolje Mountain and in the region of Miroc, Deli Jovan, Stara Planina Mountains, a region was found with significant quantities of gold. Geologists from the Geological Institute (Geoloski Zavod) believe that the areas around Blagojev Kamen and Kladovo are the most promising.

Iron Oxide.—The first plant for production of ferrous oxide started production at yearend 1985. The new facility, in Tomasic, near Prijedor, BiH, had a capacity to produce 10,000 tons yearly of natural ferrous oxide pigments. Authorities expect to export 3,000 tons per year. Total costs were reported at 800 million dinars.

Iron and Steel.—Development of the Omarska opencast iron ore mine, part of the Ljubija mining complex near Prijedor operated by RMK Zenica, was completed and Omarska entered regular production in the fall of 1985 with a capacity of 1.7 million tons of concentrates per year, averaging 52% iron. Ore reserves at Omarska were reported at 100 million tons with an average metal content ranging between 30% and 49%. The Federal Republic of Germany, the U.S.S.R., and other European countries supplied mining and concentrating equipment. The mine and concentrator employed about 700 persons. Investments totaled 26,000 million dinars, provided by steel producers from Bosnia, Croatia, Serbia, and Slovenia. When Omarska reaches its full capacity, imports of iron ore into Yugoslavia should end.

The Institute for Exploration of Mineral Resources (Geozavod) of Belgrade announced discoveries of several iron ore deposits on slopes of the Jastrebac, Kukavica, and Pasjaca Mountains in Serbia. Reserves of deposits on Pasjaca and Jastrebac were reported to be 200 million tons, with an iron content between 5% and 40%, and averaging 15%. On Pasjaca Mountain, two ore bodies, Statovci and Zitni Potok, appeared most promising. On Jastrebac Mountain, the Lukin Potok and Mala Planina deposits were most attractive. Although the officials were optimistic about the discoveries, the low grade of the ore may be an impediment to a successful economic operation.

Work on expansion of the Zenica Iron and Steel Works, the largest iron and steel works in Yugoslavia, in Zenica, BiH, continued. When completed, Zenica's steel capacity will be increased from 2 to 2.6 million tons of steel per year. The expansion includes construction of a 340,000-ton-per-year special steel plant.

At the Jesenice Iron and Steel Works, in Jesenice, Slovenia, construction of a new steel plant, Celicana 2, followed the new schedule. All preliminary works, designing, and construction of buildings were completed; the plant should start production in 1987. Two years of delays in beginning of construction resulted in increasing total costs from 18,700 to 51,000 million dinars.

Lead and Zinc.—Exploration for lead and zinc has been carried out in various parts of the country, mostly near existing mines. Near the Lece Mine, near Medvedja in Serbia, new reserves of about 2.5 million tons of lead-zinc-gold ore were measured. In Podvirovci, also in Serbia, a large deposit of lead-zinc ore was discovered. At Trepca Mines, near Titova Mitrovica, Serbia, no major increases of production were reported during 1985; the apparent slowdown was caused by delays in developing new mining sites at Didome, Meljanice, Rasane, and Zijace. During the year, Trepca produced about 700,000 tons of lead-zinc ore with an average content of 3.9% lead, 2.6% zinc, and about 62 grams of silver per ton. Trepca's installations were closed by a 1-day strike during August over a wage dispute.

INDUSTRIAL MINERALS

Ammonia.—The Pancevo Chemical Enterprise of Pancevo, Vojvodina Province, in Serbia, announced completion of construction of its new 300,000-ton-per-year plant, doubling ammonia capacity.

Fluorspar.—Development of the first fluorspar mine in Yugoslavia, Ravanja, near Krupanj, in western Serbia, continued. Financing was assured by the Republic of Slovenia, Enterprise Zorka of Sabac, and the operator, 26 September, of Krupanj. Ore sampling at Ravanja had indicated 28% fluorspar and 3.5% lead. Yugoslav authorities believe that when Ravanja reaches its full production capacity, imports of fluorspar should end.

Phosphate Rock.—Geologists concluded exploration of the Lisina phosphate deposit situated near Bosilegrad in eastern Serbia. Reportedly, Lisina, with 300 million tons of low-grade phosphate, is among the largest phosphate deposits in Europe. Authorities had not secured capital for development of Lisina at yearend, but apparently, the fertilizer producers would share in the total investment of the mine and flotation plant.

Quartz.—The Ruse enterprise announced discovery of a quartz deposit near Ruse, Slovenia. Reports indicated reserves of 6 million tons of quartz sand. Plans called for development of a 120,000-ton-per-year mine.

Sodium Carbonate.—Development of the first natural sodium carbonate mine in Yugoslavia started near Gadzin Han in Zaplanje, an underdeveloped part of eastern Serbia. Reportedly, purity of reserves was 99.8% of sodium carbonate, and the quantity was defined as huge. According to plans, a fine grinding plant will be part of the project. When the plant becomes fully operational, this facility should eliminate imports and have about 70% of its output free for export.

Sulfur.—A unit came on-stream for recovery of sulfur from refinery gases of the petroleum refinery at Bosanski Brod operated by the Energoinvest of Sarajevo. During 1985, production was about 6,000 tons of sulfur. In 1986, the new facility should start producing at a rate of 11,000 tons of sulfur per year. The unit, constructed by Technip of France, was part of the Bosanski Brod refinery expansion started in 1978. Commissioning of the sulfur recovery installation was 4 years behind schedule.

MINERAL FUELS

Coal.—Exploration for coal was successful in various parts of the country. In Serbia, in the new lignite deposits, State geologists reported reserves of 300 million tons of low calorific value lignite. In the Zapadna Morava coal basin, Bajevac Mine reserves reportedly reached 100 million tons of lignite, and modernization of the mine started. At the closed Babusnica Mine in eastern Serbia, an additional 15 million tons of bituminous coal reserves were discovered. Because some infrastructure is still usable, authorities were contemplating reopening the mine.

In Montenegro, drilling confirmed existence of a large lignite deposit between Plevlja and Bijelo Polje near Maoca, Mataruga, and Borove. Coal seams, 10 to 20 meters thick, contained lignite with calorific value of about 3,000 kilocalories.

In Bosnia near Tuzla, on the slopes of the Majevica Mountain, preliminary results indicated existence of an anthracite deposit. Reportedly, this anthracite has good coking properties. RMK Zenica and the Boris Kidric enterprise of Lukavac agreed to finance further exploration.

Development of the opencast Moscanica Mine situated near Zenica in BiH, continued during 1985. When completed in 1993, the Moscanica Mine should produce 1.3 million tons of coal annually. Moscanica coal has a calorific value of 5,000 kilocalories, and reserves were reported at 60 million tons.

The management slowed development of the 9-million-ton-per-year open pit mine Tamnava Zapad in Serbia because of financing difficulties resulting from the overall Government austerity program.

Phase one of the development of the Ugljevik opencast project, near Tuzla in BiH, was completed. Phase one consisted of a 1.7-million-ton-per-year opencast mine, Bogutovo Selo, and a nearby 300-megawatt power station. The deposit is irregular and has a number of faults. The coal seams at Bogutovo Selo lie between 30 and 200 meters below surface with a thickness ranging between 10 and 30 meters and an average dip of less than 20 degrees. The principal seam is not uniform and has intercalations of sterile materials that are sometimes 0.7 meter thick. The overburden to coal ratio was about 7:1 in 1985. Overburden consists mostly of clay and clayey marls, which are soft. Nevertheless, there is also some chalky and hard limestone that has to be blasted. Mining equipment was mostly made in the Federal Republic of Germany; some equipment was made in the United States (trucks, unit rigs of 85 and 120 tons) and in the U.S.S.R. (draglines). A road connects Bogutovo Selo Mine with a crushing plant 1.2 kilometers away.

Petroleum and Natural Gas.—Difficulties in providing foreign currency for purchases of spare parts and equipment both slowed down developments in the oil and gas sector and limited imports of crude oil. Petroleum refineries operated between 50% and 60% of their installed capacities, resulting in lesser exports of petroleum refinery products. However, despite these difficulties, the petroleum industry managed to reverse the drop in domestic production recorded in past years.

Exploration by the Naftagas of Novi Sad, Serbia, the second largest producer and processor of crude oil in the country, discovered oil in the Stig area near Pozarevac. A total of four positive wells were drilled. The discovery well was Babusnica 1. The Babusnica 2, Brodarac, and Sirakovo 1 wells followed. The Brodarac well encountered oil-bearing formations at depths about 2,300 meters. In the others, the depth of oil-bearing formations was at about 1,600 meters. The crude oil from formations in Stig is similar in composition and age to the oil from formations in Banat, north of Stig. With these four wells, Stig may become the first commercial crude oil producing region in Serbia proper. Efforts were made to secure funds for further exploration and development of oil production in the Stig region to bring the region into production by 1988. In Banat, the largest producing area in the Vojvodina part of Serbia, one oilfield and one gasfield were discovered in 1985. The oilfield was near the city of Zrenjanin, and the gasfield was near the villages of Melenci and Jankov Most. After discovery of hydrocarbons in several exploratory wells, work continued in the localities of Begejci, Hetin, Kumano, Nova Crnja, Tordi, Velike Livade, and Vojvoda Stepa to determine commercial possibilities.

INA-Naftaplin, largest producer and processor of crude oil in Yugoslavia, continued preparations for offshore drilling south of Pula in the Adriatic, off the coast of Istria. Domestic imported natural gas increased its share in the total energy supply of the country. In recent years, all imported gas has been from the U.S.S.R. To diversify future supplies of natural gas, the Government of Yugoslavia concluded an agreement with Algeria for deliveries of 700 billion cubic feet of natural gas over a period of 20 years. The existing pipeline system in Italy will be used to transport natural gas to Trieste. A spur from Trieste to the border of Yugoslavia and to the pipeline system in Yugoslavia will be built. Preliminary work on this spur reportedly started at yearend.

The Macedonian Chamber of Economy has made preliminary arrangements to bring natural gas from the Soviet Union to Macedonia via Bulgaria. Plans call for building a pipeline system in Macedonia and connecting it with the pipeline system in Bulgaria. Quantities to be imported yearly were not reported.

The management of INA sold the new equipment for expansion of the Lendava Petroleum Refinery in Lendava, Slovenia, to China. The equipment was not needed since adequate petroleum capacity existed without expanding at Lendava. The equipment purchased for about $34 million brought $21 million or a loss of about $13 million.

Uranium.—Preliminary results of exploration for uranium indicated existence of a large uranium deposit at Slatka Reka near Leskovac in eastern Serbia. Production of uranium from imported phosphates was part of the research conducted in the laboratories of INA-Zagreb and in the Industrija Hemijskih Proizvoda (IHPP), Prahovo, part of the RTB Bor in Serbia. INA and IHPP produced fertilizers from imported phosphates. Reports indicated that both INA and IHPP developed their own systems for recovery of uranium from imported phosphate. Providing that financing is assured, the Institut za Tehnologiju Nuklearnih Sirovina (Institute for the Technology of Nuclear Raw Materials) believes that Yugoslavia can successfully produce uranium concentrates from the imported phosphate.

During 1985, Yugoslavia decided to build four nuclear powerplants, and a debate ensued to determine which type of nuclear plant would be standard. Not all energy experts favored construction of nuclear plants in Yugoslavia for environmental, economic, and technical reasons.

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[1]Physical scientist, Division of International Minerals.

[2]The dinar (Din) is not convertible currency. A meaningful conversion to U.S. currency is impractical. At yearend 1985, the official exchange rate was 320Din=US$1.00.

The Mineral Industry of Zaire

By George A. Morgan[1]

Output of major mineral commodities either increased or remained near full production capacity in 1985. Output increased for cobalt, silver, and zinc metal, all byproducts of copper production. Diamond output was up by 1.7 million carats to a world record 20.2 million carats, or nearly 4 tons.

Mining accounted for 20% of the gross domestic product (GDP) estimated at $5 billion and about 86% of foreign exchange earnings. The GDP was up 2.5% and export revenues were $2.1 billion.[2] Zaire continued to seek new destinations for its mineral exports beyond its traditional customers Belgium and France. The reform of exchange rates allowed companies with foreign participation to transfer dividends abroad for the first time in a decade.

La Générale des Carriéres et des Mines du Zaire (Gécamines), the country's largest state-controlled mining company, planned a 5-year investment program, which was designed to improve the company's efficiency and the quality of copper, its main product. Gécamines had a positive cash flow and expected to provide most of the cost of over $700 million for the program. Other contributors to the plan, mainly for covering foreign currency requirements, included the European Economic Community, the European Investment Bank, and the International Bank for Reconstruction and Development (World Bank). Included in the program were spare parts and equipment purchases, a trolley assist system in the large open pits, and additional copper refining capacity at Luilu to refine blister copper currently being exported from the Lubumbashi smelter.

PRODUCTION AND TRADE

Production facilities, which have not had refurbishing for many years, were either undergoing modernization or were being studied for upgrading. Among these were the sulfuric acid plant and the workshops of Gécamines at Shituru. Tin mining in the Kivu Region was being consolidated and efficiencies were realized in transportation.

The World Bank was participating in a number of areas involving support infrastructure for Zaire. Among them was construction of the Ruzzi II hydroelectric complex by the Great Lakes International Electricity Co., valued at $56 million, of which $45 million was supplied by the World Bank.

Renovation of transport infrastructure was planned, including construction of a 600-kilometer-long railroad linking Ilebo with Kinshasa and parallel to the Kasai River. Its completion would allow continuous rail transport from the heart of mining in the Shaba Region to Zaire's only seaports on the west coast via the Voie National, effectively bypassing the Kasai River route. A deepwater port at Banana has also been planned to relieve congestion at the Port of Matadi.

Total exports in 1984 were 2.7 million tons valued at $1.6 billion. In terms of export value, the principal commodities exported were copper, $544.4 million; crude petroleum, $330.7 million; cobalt, $207.3 million; diamonds, $190.5 million; and coffee, $136.6 million.

Table 1.—Zaire: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984[p]	1985[e]
METALS					
Cadmium, smelter	230	230	308	318	296
Cobalt:					
Mine output, metal content[e]	15,400	11,300	11,300	18,000	20,000
Refined	11,124	[r]5,475	5,360	9,075	10,791
Columbium-tantalum concentrate:					
Gross weight ... kilograms	[r]80,000	[r]60,000	51,000	100,000	184,970
Columbium content[e] ... do.	[r]21,800	[r]16,200	[r]13,800	[r]27,000	49,500
Tantalum content[e] ... do.	[r]22,400	[r]16,800	[r]14,300	[r]28,000	51,800
Copper:					
Mine output, metal content[2]	555,100	519,000	536,500	562,000	562,700
Blister and leach cathodes	480,400	473,500	479,100	480,600	480,000
Refined	151,300	175,000	227,231	224,774	226,800
Gold[3] ... troy ounces	[r]65,169	[r]60,733	192,930	117,115	63,022
Manganese ore and concentrate	18,214	--	--	15,518	--
Monazite concentrate, gross weight	35	32	15	2	--
Silver ... thousand troy ounces	2,580	1,751	1,288	1,225	1,516
Tin:					
Mine output, metal content	[r]2,452	[r]2,320	2,163	2,708	3,100
Smelter, primary	450	353	201	170	85
Tungsten, mine output, metal content	46	38	44	30	18
Zinc:					
Mine output, metal content	63,300	82,100	76,215	74,836	74,000
Metal, primary, electrolytic	57,600	64,400	62,500	66,100	67,925
INDUSTRIAL MINERALS					
Cement, hydraulic ... thousand tons	494	541	513	529	480
Diamond:					
Gem[e] ... thousand carats	[r]360	[r]308	[r]3,355	[r]5,169	4,032
Industrial[e] ... do.	[r]6,801	[r]5,856	[r]8,627	[r]13,290	16,127
Total ... do.	[r]7,161	6,164	11,982	18,459	20,159
Lime	[r]123,509	[r]103,825	106,993	109,856	110,000
Stone, crushed ... thousand tons	335	317	387	348	350
Sulfur:					
Byproduct of metallurgy, S content of sulfuric acid from sphalerite[e]	25,000	25,000	36,000	[r]37,000	36,000
Sulfuric acid, gross weight	142,900	146,400	159,864	152,800	150,000
MINERAL FUELS AND RELATED MATERIALS					
Coal, bituminous ... thousand tons	130	123	111	121	100
Petroleum:					
Crude ... thousand 42-gallon barrels	7,668	8,385	9,234	11,698	12,225
Refinery products:					
Gasoline ... do.	375	173	62	258	NA
Kerosene and jet fuel ... do.	289	132	42	240	NA
Distillate fuel oil ... do.	498	82	105	422	NA
Residual fuel oil ... do.	798	316	101	364	NA
Refinery fuel and losses ... do.	130	47	34	67	NA
Total ... do.	2,090	750	344	1,351	NA

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through July 25, 1986.
[2]Content of concentrate produced.
[3]Excludes gold recovered from blister copper.

Table 2.—Zaire: Apparent exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS				
Aluminum: Ore and concentrate	--	35	--	All to West Germany.
Beryllium: Ore and concentrate	8	--		
Bismuth: Metal including alloys, all forms	6	--		
Cadmium: Metal including alloys, all forms	205	171	--	Belgium-Luxembourg 151; West Germany 20.
Cobalt:				
Oxides and hydroxides	--	21	21	
Metal including alloys, all forms	4,933	7,776	5,221	Japan 1,408; West Germany 1,036.
Columbium and tantalum:				
Ore and concentrate	19	44	5	Japan 39.
Ash and residue containing tantalum	199	87	--	All to West Germany.
Copper:				
Ore and concentrate	91,882	69,640	--	All to Japan.
Matte and speiss including cement copper	150	--		
Ash and residue containing copper	256	107	--	All to West Germany.
Metal including alloys:				
Scrap	626	1,569	--	Belgium-Luxembourg 928; West Germany 319.
Unwrought	320,720	376,921	28,039	Belgium-Luxembourg 213,363; West Germany 79,065.
Semimanufactures	403	353	--	Belgium-Luxembourg 350.
Gold:				
Ore and concentrate value, thousands	--	$138	$138	
Waste and sweepings do.	$205	--		
Metal including alloys, unwrought and partly wrought troy ounces	2,218	1,046	--	Netherlands 660; West Germany 322.
Bullion value, thousands	$83	$40	$40	
Manganese: Ore and concentrate, metallurgical-grade	629	19,704	--	All to Belgium-Luxembourg.
Nickel: Matte and speiss	27,011	--		
Platinum-group metals: Metal including alloys, unwrought and partly wrought:				
Platinum value, thousands	--	$1,900	$1,900	
Unspecified do.	$51	--		
Silver:				
Ore and concentrate[2] do.	$60	--		
Waste and sweepings do.	--	$76	--	All to Switzerland.
Metal including alloys, unwrought and partly wrought do.	$633	$166	--	Yugoslavia $164.
Tin:				
Ore and concentrate	1,884	2,398	--	Malaysia 2,374.
Metal including alloys, unwrought	196	275	81	Switzerland 75; West Germany 60.
Tungsten: Ore and concentrate	53	41	--	United Kingdom 21; Japan 20.
Zinc: Metal including alloys:				
Unwrought	32,672	35,164	32,329	Republic of Korea 1,298; Japan 1,181.
Semimanufactures	154	--		
INDUSTRIAL MINERALS				
Diamond:				
Gem, not set or strung value, thousands	$77,262	$125,399	$730	Belgium-Luxembourg $124,656.
Industrial stones do.	$15,107	$26,535	$54	Belgium-Luxembourg $24,654.
Dust and powder thousand carats	749	1,095	218	Japan 877.
Sodium compounds, n.e.s.: Carbonate, manufactured	1,256	--		
MINERAL FUELS AND RELATED MATERIALS				
Petroleum: Crude thousand 42-gallon barrels	9,289	11,496	11,496	

[1]Table prepared by Virgina A. Woodson. Owing to the lack of available official trade data published by Zaire, this table should not be taken as a complete presentation of this country's mineral exports. These data are compiled from trade statistics of individual trading partners.

[2]May include waste and sweepings and platinum-group metals.

Table 3.—Zaire: Apparent imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS				
Aluminum: Metal including alloys:				
Unwrought	--	63	--	All from Canada.
Semimanufactures	1,130	749	--	Belgium-Luxembourg 315; Netherlands 210; Hong Kong 170.
Iron and steel: Metal:				
Semimanufactures:				
Bars, rods, angles, shapes, sections	2,542	16,192	102	Belgium-Luxembourg 12,618; West Germany 1,681.
Universals, plates, sheets	19,225	24,397	--	Belgium-Luxembourg 14,594; Japan 8,655.
Hoop and strip	1,193	2,613	--	West Germany 1,307; Belgium-Luxembourg 1,125.
Rails and accessories	13,605	2,665	--	Belgium-Luxembourg 2,274; Netherlands 386.
Wire	605	872	--	Belgium-Luxembourg 636; Netherlands 115.
Tubes, pipes, fittings	6,496	16,084	390	West Germany 7,064; Italy 4,290; Belgium-Luxembourg 3,483.
Castings and forgings, rough	1,459	3,485	10	Italy 3,246; Belgium-Luxembourg 105.
Lead: Metal including alloys:				
Unwrought	337	346	--	Belgium-Luxembourg 344.
Semimanufactures	16	16	--	All from Belgium-Luxembourg.
Silver: Metal including alloys, unwrought and partly wrought value, thousands	$272	$2,589	--	Japan $2,118; Switzerland $162.
Titanium: Oxides	68	349	--	Belgium-Luxembourg 271; West Germany 74.
INDUSTRIAL MINERALS				
Asbestos, crude	325	531	--	All from Canada.
Barite and witherite	--	1,859	--	All from Netherlands.
Cement	1,260	3,026	--	Belgium-Luxembourg 2,922.
Chalk	18	79	--	Italy 37; Belgium-Luxembourg 24; United Kingdom 18.
Diatomite and other infusorial earth	249	25	13	West Germany 12.
Fertilizer materials:				
Crude	10	300	--	All from Belgium-Luxembourg.
Manufactured:				
Ammonia	22	80	--	Belgium-Luxembourg 68; West Germany 7.
Nitrogenous	13,853	7,394	--	West Germany 3,365; Netherlands 1,652; Japan 861.
Phosphatic	16	413	--	All from Belgium-Luxembourg.
Potassic	2,558	914	--	Belgium-Luxembourg 869; West Germany 40.
Unspecified and mixed	6,553	9,826	--	Belgium-Luxembourg 4,880; Japan 3,817.
Gypsum and plaster	22	29	--	All from Belgium-Luxembourg.
Lime	1,183	3,142	--	Belgium-Luxembourg 3,137.
Phosphates, crude	758	40	--	All from Belgium-Luxembourg.
Salt and brine	337	135	--	Belgium-Luxembourg 131; West Germany 4.
Sodium compounds, n.e.s.: Carbonate, manufactured	751	1,530	--	West Germany 1,505; United Kingdom 25.
Sulfur:				
Elemental:				
Crude including native and byproduct	78	150	--	Belgium-Luxembourg 87; West Germany 57.
Colloidal, precipitated, sublimed	1	1	--	All from Italy.
Sulfuric acid	179	556	--	Belgium-Luxembourg 269; Netherlands 231.
Talc, steatite, soapstone, pyrophyllite	30	62	--	Belgium-Luxembourg 46; West Germany 8; Italy 8.

See footnotes at end of table.

Table 3.—Zaire: Apparent imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984 United States	Sources, 1984 Other (principal)
MINERAL FUELS AND RELATED MATERIALS				
Carbon black	764	202	--	Netherlands 136; West Germany 36.
Coke and semicoke	703	1,018	--	Belgium-Luxembourg 1,012; Portugal 6.
Petroleum:				
Crude thousand 42-gallon barrels	730	1,460	--	NA.
Refinery products:				
Gasoline, motor do.	1,293	48	--	Netherlands 40; Belgium-Luxembourg 8.
Mineral jelly and wax do.	9	6	(2)	West Germany 4; Belgium-Luxembourg 1.
Kerosene and jet fuel do.	1,894	98	--	Netherlands 97; Argentina 1.
Distillate fuel oil do.	2,242	74	73	Belgium-Luxembourg 1.
Lubricants do.	167	22	1	Belgium-Luxembourg 18; Netherlands 1.
Residual fuel oil do.	607	(2)	--	All from Japan.
Bitumen and other residues do.	1	3	--	West Germany 1; Italy 1.
Bituminous mixtures do.	1	3	--	Belgium-Luxembourg 2.
Petroleum coke do.	3	44	--	All from Belgium-Luxembourg.

NA Not available.
[1]Table prepared by Virginia A. Woodson. Owing to the lack of available official trade data published by Zaire, this table should not be taken as a complete presentation of mineral imports of this country. These data are compiled from the trade statistics of individual trading partners.
[2]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Aluminum.—Aluzaire, formed in November 1981 by the Government and a consortium of nine European and Japanese companies including Swiss Aluminium Ltd., to build a 200,000-ton-per-year aluminum smelter near Banana was dissolved early in 1985. In September, the International Finance Corp. approved credits valued at $400 million for the Government of Zaire to help finance the smelter, which was still to be built near Banana, about 300 kilometers west of Kinshasa on the Zaire River. Power was to be drawn from the Inga hydroelectric facilities, which have excess electricity generating capacity.

Cobalt.—Output of refined metal increased as Gécamines reactivated some existing electrolytic capacity. Stockpiled cobalt hydroxide was rotated into production facilities at Kolwezi and Luilu for dissolution and electrodeposition as cathode.

Cobalt sales were under the control of Gécamines Trading, which marketed metals and ores through Afrimet Indussa Inc. in the United States. Afrimet Indussa was controlled by Sogem Corp., a subsidiary of Société Générale de Belgique SA. Sales of cobalt to Métallurgie Hoboken-Overpelt SA of Belgium, formerly on a toll basis, were sold outright under a 3-year agreement, thus helping to improve Gécamines' cash flow.

Columbium and Tantalum.—The Société Minière du Kivu (Somikivu), responsible for exploration, research, and development of columbite, tantalite, and pyrochlore mineralization in Kivu Region, completed milling and metallurgical tests on the Lueshe carbonatite deposit at yearend 1985. Somikivu, which required an electric power source to proceed with commercial production of pyrochlore, rejected a plan for construction of an independent hydroelectric plant at Rwindi, and instead opted for connection with the existing Bukavu-Goma high-tension powerline.

Copper.—Gécamines, the main copper producer with capacity of about 470,000 tons of copper per year, had stabilized output for 1984-85 at nearly full capacity. Programs to expand the production base were replaced by projects aimed at improving the efficiency of Gécamines' copper recovery and mining processes as well as improving the quality of the final product for export. The company's new Kov Mine, an open pit operation in the eastern group of mines, produced 736,000 tons of ore in 1985. About a 55% increase in output was planned for 1986. Production was shipped mainly to the Kolwezi concentrator for processing.

As part of its 5-year investment program, Gécamines expected to purchase a mobile crusher and conveyor system valued at about $87 million for use at the Kov Mine. Other projects to be affected by the program include changes in materials processing to improve recovery at the mills, upgrading the Kolwezi concentrator and the maintenance and repair shops at Shituru, and installation of a trolley assist for heavy trucks in the open pit mines. Modernization of the smelter at Lubumbashi, including installation of dust collectors, was under way.

The Société de Développement Industriel et Minière du Zaire (Sodimiza) continued to improve housing facilities for its personnel, as well as to dewater and develop the Kinsenda Mine. Sodimiza produced over 1 million tons of ore in 1985, about 620,000 tons from the Musoshi Mine and 380,000 tons from the Kinsenda Mine. Ore grades were 2.3% and 5.8% copper, respectively, and averaged 3.6% copper overall. Concentrate production was over 63,000 tons, grading 51.6% copper, with copper recovery at about 90%. Concentrates were shipped to Zambia for smelting and refining.

Gold.—A memorandum of understanding signed between the Government-owned Office des Mines d'Or Kilo-Moto (Okimo) and Andrade-Guteriez S.A. of Brazil provided for development of the D7-Kanga deposit near Mongbualu in northeastern Zaire. Investment costs were put at $110 million for mine development and ore treatment. In conjunction with the D7-Kanga development project, the World Bank was considering a rehabilitation plan for Okimo's existing facilities, as well as supporting road infrastructure, a drilling program, and topographic surveys for the project. Other gold deposits were to be studied further to support long-range plans for Okimo. Full-scale production for D7-Kanga was proposed at about 240,000 troy ounces per year. Reserves based on incomplete deposit studies were 1.9 million troy ounces.

Manganese.—Entreprise Minière de Kisenge Manganese reportedly signed an agreement with Geomin of Romania for the production of electrolytic manganese dioxide, and capacity was planned at 1,220 tons per year of manganese dioxide.

Tin.—Mine production of tin increased for the second consecutive year owing mainly to efforts by the principal producer, Société Minière et Industrielle de Kivu (Sominki) to restructure and consolidate its production facilities and to assure a reserve of minable material through an ongoing exploration program. Sominki reduced transport delays by months by renting C-130 aircraft to fly nearly 90% of its production from Kindu to Kinshasa, and to fly in provisions and replacement parts on the backhaul flights. Railroad transport was used from Kinshasa to Matadi. The remaining 10% of production was shipped through Bukavu, Kalundu, Kigoma, and Dars Es Salaam in Tanzania by way of rail, road, and water transport.

Société Zairetain (Zairetain) experienced a rapid loss of detrital reserves and declining output. The company was faced with large capital outlays to exploit unaltered pegmatite. The Government criticized the protocol signed in 1967 with Compagnie Geologique et Minière des Ingenieurs et Industriels Belges (Geomines) of Belgium, which owned 50% of Zairetain, owing to noncompliance of agreement provisions. Geomines reportedly declared bankruptcy in October 1985.

INDUSTRIAL MINERALS

Cement.—Six companies produced cement or clinker in Zaire and had a total capacity of 895,000 tons per year. Actual production has been at about 55% of capacity, and exports were 168,403 tons in 1984. The Congo was the main export destination at 128,258 tons, followed by the Central African Republic, 24,741 tons, and Burundi, 15,404 tons. Most of the cement for export was produced by the Société des Ciments du Zaire, the largest company with a capacity of 450,000 tons per year from two furnaces. As of July 1985, the price at Kinshasa for delivered bagged cement was $76 per 1-ton lot, or $3.18 per bag, and the official price for individual bags was $4.45.

Diamond.—Diamond output, as indicated by sales, increased again and exceeded 20 million carats for the first time. Actual output by the Société Minière de Bakwanga (MIBA), the only licensed producer, increased to 7.0 million carats compared with 6.9 million carats in 1984. Sales by MIBA in these same time periods were 7.2 million carats and 6.9 million carats, respectively. Production by artisanal miners made up the largest portion of Zaire's total diamond output, and amounted to 12.4 million carats as reported by the Centre National d'Expertise (CNE). CNE data was based on sales of diamond by artisanal miners to 15 licensed buyers-counters, and to Gécamines Trading.

MIBA's exclusive marketing agreement with Zaire-British Diamond Distributors Ltd. (Britmond) terminated at yearend 1984. MIBA marketed its own production through the CNE for a 2% commission from January 1 until August 1985, when a new 2-year agreement was reached with Britmond, the latter agreeing to purchase production at an average price of $7.90 per carat. An amendment to this agreement in September replaced the average diamond price with a minimum guaranteed floor price of $7.90 per carat. The average price for diamond in 1985 was $8.17 per carat compared with $8.63 per carat in 1984.

MIBA'S production gains were attributed to increased operational time of the treatment facilities from 55% in 1984 to 70% in 1985; the inauguration of new scrapers in June; and the increased availability of a dredge from 43% in early 1984 to 63% at yearend. Total volume extracted was 6.5 million cubic meters, of which 5 million cubic meters was waste. Average run-of-mine grade declined, owing to the working of lower grade deposits, to 4.19 carats per cubic meter from 5.14 carats per cubic meter. The principal deposits worked were Kanshi II and III, and massive kimberlite III. Since March, the washery at Dibindi has treated old plant tailings exclusively, recovering over 540,000 carats.

Liberalization of diamond mining by the Government led to the opening of MIBA's exclusive zone to artisanal miners, with the exception of about 5,000 square kilometers surrounding installations and containing reserves vital to MIBA's future. MIBA retained the right to explore, research, and develop commercially any discovery in the open zone in Kasai Region. Despite the availablity of additional areas opened to artisanal miners and the presence of a 500-member security force, illegal miners were scraping the high-grade areas in MIBA's remaining exclusive zone.

Lime.—Calcaire, Chaux, Ciments, de Kakontwe, a division of Gécamines, was the sole producer of lime. The company had a capacity of 200,000 tons per year consisting of a 60,000-ton-per-year furnace and two 70,000-ton-per-year furnaces. Only about 50% of installed capacity has been utilized for a number of years. Output includes mainly quicklime and about 8,000 tons per year of hydrated lime.

Phosphate.—The U.S.S.R. proposed development of a phosphate deposit in the vicinity of Kisantu in Bas-Zaire Region.

MINERAL FUELS

Coal.—Gécamines exploited an opencast coal mine at Luena, Central Shaba. The coal was high in ash content and was used mainly by Gécamines, with some shipments made to nearby cement plants and to the Société Nationale des Chemins de Fer Zairois. Coal from the Lukuga Mine at Kabimba, in the northern Shaba Region, was shipped to the cement plant of Ciments-Lacs S.A.R.L. at Kalemie. The mine was on the concession given to Zairetain.

Natural Gas.—Testing of the compressability of gas recovered from beneath Lake Kivu commenced in November to determine its effectiveness as a motor vehicle fuel.

Petroleum.—*Production.*—Annual output of crude petroleum continued to rise despite a brief reduction in offshore production during February and March 1985. Since 1982, all production has been exported, and imported crude oil was used for feedstock to the country's sole refinery at Muanda.

An accord reached at the end of March 1985 and retroactive to January 1, changed the ownership of the Zaire Gulf Oil Co., the country's major producer. Union Oil Co. of California (Unocal), of the United States, purchased the shares of the Belgium company Cometra Oil Co. in the Muanda Oil Co. and Soliza S.A.R.L., the latter controlling 17.72% of Zaire Gulf Oil. Sale price was $30 million plus an additional maximum of $10 million based on future revenues generated by Muanda Oil. The new arrangement consisted of 40% Zaire Gulf Oil, 25.82% Teikaku Oil Co. of Japan, 20% Government of Zaire, and 14.10% Unocal. Oilfields in production offshore by Zaire Gulf Oil and their output, in barrels per day, were GCO, 641; Lukami, 3,031; Mobale, 23,190; Motaba, 3; and Mwambe, 117. Investment in exploration and development in 1984, the latest year available, was $22.1 million.

The Société de Recherche et d'Exploitation du Pétrole du Zaire S.A.R.L. (Zairep), holding a 426-square-kilometer concession along the coast, has increased its production from 2,292 barrels per day in 1983 to 8,350 barrels per day in the first quarter of 1985. Output for 1985 was about 3 million barrels compared with about 1.5 million for 1984. Zairep was owned by Petrofina (46.4%), Shell Oil Co. (38.6%), and the Government of Zaire (15%).

Zairep had a $3.6 million seismic study under way in 1985 and commenced drilling 4 evaluation wells at a cost of $10 million and 32 development wells at a cost of $46.4 million. The high number of wells, 56 in production by April 1985, was necessitated by the structure of the oil reservoir. The company was also constructing a gas compression unit for a gas reinjection system, a pipeline network to facilitate oil transport, and a topping unit.

Amoco Oil Co. concluded a contract with Zaire to begin preliminary oil exploration in Lake Tanganyika and the Ruzizi Plain. The company was to combine its program in Zaire with a similar one with Burundi in order to reduce costs.

Entreprise Pétrolière du Zaire (PZ) was the exclusive importer of crude petroleum. PZ initiated an exploration program in the central basin with the aid of a Swiss company and the Japan National Oil Corp.

Refining.—Refined product consumption fell to 4.6 million barrels in 1984, the latest year for which such data were available, and was estimated to have declined further in 1985. The decline was attributed to price increases effected in September 1983, as well as to a shortage of currency and imbalances in supply to various parts of the country. The Government abandoned a uniform price system because of this imbalance and adopted a reference price based on ports of importation. Consumption by product was as follows, in thousand barrels:

Diesel fuel	2,691
Jet fuel	869
Gasoline	668
Residual fuel	484

Refined product imports by product were as follows, in thousand barrels:

Diesel fuel	2,747
Jet fuel	1,273
Gasoline	708
Lubricants	156
Aviation gas	41

Crude petroleum imports for processing at the Muanda refinery were about 1.3 million barrels. Refining was by Société Zaire-Italienne de Raffinage S.A.R.L. Output was about 25% of the plant's capacity of 5.5 million barrels per year. The refinery reportedly was technically capable of supplying 60% of the country's needs using domestically produced crude oil.

The World Bank granted $25 million for the purchase of equipment to modernize the Muanda plant. A study valued at $900,000 was under way to determine the possibility of economically refining Zarian crude through the installation of secondary conversion units and the addition of a bitumen unit.

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[1]Physical scientist, Division of International Minerals.
[2]Where necessary, values have been converted from zaires (Z) to U.S. dollars at the rate of Z50.793=US$1.00 for 1985.

The Mineral Industry of Zambia

By Thomas O. Glover[1]

Copper and byproduct cobalt production continued to dominate the Zambian mining industry in 1985. Their combined valuation amounted to $426.5 million,[2] which represented 92% of the total value of mineral production during the year. Other minerals of importance to the Zambian economy produced were cement, $7.6 million; coal, $6.9 million; lime, $5.5 million; and zinc, $9.6 million. The combined value of these four commodities was $29.6 million or 6% of the total mineral production value.

Zambia was the world's seventh largest producer of copper and the second largest producer of cobalt. Serious economic and financial difficulties remained, owing to the long-term depressed prices of copper. To avoid further financial problems, the Government decided to devalue the local currency (kwacha) in terms of foreign exchange. Two reasons were given for devaluation of the kwacha: to reduce in-country cost of copper production and to meet International Monetary Fund (IMF) demands, as a condition for special drawing rights. By decreasing the cost of copper production, sales of copper could be increased owing to lower copper prices. The devaluation was accomplished by auctioning off $6.5 million in foreign exchange on October 8, 1985. The value of the kwacha decreased 50% after the auction. Auctions were to be held each week to determine further exchange rates. IMF and Zambian officials had negotiated strong measures that were required to halt Zambia's economic decline for over a year. The fall had been accelerated by falling production and prices of copper since 1982. The production of refined copper metal fell 18% during a 3-year period and over 8% during 1985.

Forty percent of Zambia's export receipts were absorbed by repayments of previous loans made by the IMF. The country's debt to the IMF totaled more than $700 million. This dollar figure alone represented one-third of the amount that the fund had committed to all of east Africa. Owing to a severe oil shortage during mid-1985 caused by a shortage of foreign exchange, a $100 million loan was granted to Zambia by a consortium of foreign banks. The loan covered the purchase of 600,000 tons of crude oil and petroleum products. The 600,000 tons of fuel were scheduled to be received over a 12-month period into 1986.

PRODUCTION AND TRADE

Zambia's production of refined copper metal decreased by more than 8% in 1985, while the production of refined cobalt metal increased by over 25%. Copper ore milled in fiscal year (FY) 1985[3] decreased about 12% from that of FY 1984,[4] although the grade of ore remained about the same. Zambia Consolidated Copper Mines Ltd.'s (ZCCM) production came from eight underground and two open pit mines at the company's six operating divisions.

A $9.5 million purchase of 70 load-haul-dump mining vehicles was made in 1985. The vehicles were scheduled for use in four

Table 1.—Zambia: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984[p]	1985[p]
METALS					
Cobalt:					
Mine output, metal content of concentrate[e]	4,000	3,251	3,199	4,620	5,800
Metal	2,570	2,446	2,407	3,472	4,359
Copper:					
Mine output:					
Total content of ore	697,943	720,290	868,251	668,688	608,092
Recoverable content of concentrate	588,000	567,800	[2]574,507	[2]540,961	[2]542,643
Leaching (electrowon including that in recoverable content)	122,171	130,875	118,975	[2]134,377	[2]125,949
Metal:					
Blister and anodes, Cu content[3]	560,565	584,680	[e]581,200	[e]525,000	[e]482,300
Refined	560,446	584,613	575,423	521,871	479,446
Gold[4] troy ounces	10,545	13,439	10,160	12,185	7,909
Iron ore: Magnetite	1,434	797	715	595	984
Lead:					
Mine output, metal content of ore	17,152	21,240	25,865	18,124	15,021
Metal, smelter and refined[5]	9,866	14,645	14,572	8,825	8,873
Selenium, recoverable content of:					
Refinery muds kilograms	[6]48,703	[6]42,668	[6]42,752	[e]33,650	[e]37,790
Elemental, refined locally do.	23,929	22,453	22,051	[2]17,355	[2]19,490
Silver[7] thousand troy ounces	714	887	933	795	607
Tin concentrate, gross weight	([8])	10	22	4	22
Zinc:					
Mine output, metal content of ore	40,557	51,967	55,163	41,128	31,956
Metal, smelter plus electrolytic	33,298	39,186	37,882	29,177	22,766
INDUSTRIAL MINERALS					
Cement, hydraulic thousand tons	144	154	155	241	316
Clays, building, unspecified do.	28	27	9	([8])	2
Feldspar	452	362	226	184	185
Gem stones:					
Amethyst kilograms	45,222	23,476	38,799	24,827	19,612
Emerald do.	--	--	17	23	115
Lime, hydraulic and quicklime thousand tons	201	185	193	232	256
Nitrogen: N content of ammonia	18,100	27,200	28,100	28,386	14,500
Sand, construction	276,522	365,437	182,752	52,513	38,978
Stone:					
Limestone thousand tons	499	427	511	916	702
Phyllite do.	4	9	10	17	13
Miscellaneous (building)	302,401	4,338,653	193,625	72,471	108,251
Sulfur, elemental basis (produced as sulfuric acid):					
From pyrite	5	1,239	25,513	18,172	28,288
From copper ores	90,154	83,870	[e]79,525	[e]79,000	[e]79,008
Total	90,159	85,109	[e]105,038	[e]97,172	[e]107,296
Talc	921	271	1,313	367	9,529
MINERAL FUELS AND RELATED MATERIALS					
Coal, bituminous thousand tons	527	604	453	510	471
Petroleum refinery products:[e]					
Gasoline thousand 42-gallon barrels				[2]1,016	[2]870
Jet fuel do.				[2]350	[2]294
Kerosene do.				[2]217	[2]198
Distillate fuel oil do.	NA	NA	NA	[2]1,706	[2]1,604
Residual fuel oil do.				[2]768	[2]677
Other do.				[2]60	[2]51
Refinery fuel and losses do.				[2]240	[2]258
Total do.	NA	NA	NA	[2]4,357	[2]3,952

[e]Estimated. [p]Preliminary. NA Not available.

[1]Table includes data available through July 22, 1986.

[2]Data are for fiscal year ending Mar. 31 of that stated.

[3]Includes leach cathodes.

[4]Primarily contained in blister copper and refinery muds.

[5]For all practical purposes, Zambian output of crude lead and refined lead are regarded as equal; the latter is reported, and inasmuch as no impure lead is marketable, no attempt had been made to estimate the trivial difference between the two stages of processing.

[6]Selenium output for fiscal year ending Mar. 31, includes elemental selenium recovered from exported refinery muds by overseas refiners amounting to 24,774 kilograms in 1981, 20,215 kilograms in 1982, and 20,701 kilograms in 1983.

[7]Refined silver and silver contained in blister copper and refinery muds.

[8]Less than 1/2 unit.

underground copper mines on the Zambian copper belt. In addition to these vehicles, large dump trucks for the Nchanga open pit mine totaling $17.5 million were purchased. In addition to new truck procurement, the first stage of the Nchanga open pit trolley assist program was extended to include 33 additional trucks. The equipment purchases were a part of the rehabilitation program scheduled to end in 1987. ZCCM's new copper leaching plant at Nchanga was nearing the completion stage in 1985. When completed, the plant was expected by ZCCM to recover 520,000 tons of copper over a 15-year period. As part of the rehabilitation at the Nchanga open pit operation, two large blast-hole drill rigs were purchased for $3 million.

India's Minerals and Metals Trading Corp. contracted to buy 27,000 tons of Zambia's copper in 1985, which represented approximately 50% of India's domestic requirements. Other countries receiving Zambian copper were France, the Federal Republic of Germany, Italy, Japan, the United Kingdom, and the United States.

COMMODITY REVIEW

METALS

Copper, Cobalt, Byproduct Gold, Selenium, and Silver.—ZCCM treated approximately 25.7 million tons of ore in 1985 yielding about 542,643 tons of copper metal. Ore reserves, as published in the ZCCM Annual Report for FY 1985, were estimated at 13.53 million tons of contained copper and about 0.96 million tons of contained cobalt. Production of cobalt in 1985 exceeded the 1984 output by over 25%.

ZCCM's largest copper producer continued to be the Nchanga Div. The Nchanga open pit mine was the largest open pit copper mine in Zambia. In addition to the open pit, the division operated an underground mine at Nchanga and an open pit at Kansanshi. It also operated a metallurgical plant that included a conventional sulfide ore concentrator, a high-grade oxide concentrator, a leach plant, and a tailings leach plant that was undergoing expansion. The operation at the Kansanshi open pit mine, 176 kilometers northwest of Nchanga, was put under the Nchanga Div.'s control during 1985. Over 100,000 linear feet of exploration drilling was carried out at the Nchanga open pit to acquire information on the Chingola dolomite and also to evaluate the cobalt mineralization in the upper ore body. The production of primary copper from the Nchanga high-grade leach plant was approximately 19% lower in FY 1985 from that produced in FY 1984 owing to the low grade of concentrate input. Cathode copper production at Nchanga decreased slightly owing to the shortage of essential mechanical spare parts, which caused production constraints.

Kansanshi Mine, formerly a subsidiary of the Konkola Div., was transferred to the Nchanga Div. The mine produced a total of 162,260 tons of ore at a grade of 5.62% copper. A total of 76,960 tons of the ore was transported to the Nchanga Mine for processing. Nchanga Div.'s labor force numbered 10,470 at yearend.

The Mufulira Div. included the Mufulira Mine, one of the world's largest underground copper mines, plus concentrating, smelting, and refining operations. Also a part of the division was the Ndola copper refinery, which included a precious metals recovery plant. This plant recovered gold, silver, and selenium from anode slimes produced at all ZCCM copper refineries. Ore production at the Mufulira Mine was less than the scheduled rate owing to insufficient developed and drilled reserves. The shortage of available ore for mining resulted from a combination of poor ground conditions related to increased rock stress and poor equipment availability. Mufulira Div.'s labor force numbered 8,902 at yearend.

The Nkana Div. had the deepest underground copper mining operation in Zambia at 4,265 feet below the surface. Processing facilities included two concentrators, a cobalt plant, copper smelter and refinery, and a major sulfuric acid-producing facility. Ore deliveries were constrained by breakdowns in hoisting and in the crushing plant, plus poor availability of both diesel and air-powered loaders, locomotives, and raise borers owing to shortages of spare parts and consumables. The cobalt plant showed an improved performance by producing more cobalt at a time when the grade of concentrates was less than had been expected. Nkana Div.'s labor force numbered 11,658 at yearend.

The Luanshya Div. operated both the

Luanshya and Baluba underground mines. The Baluba Mine produced cobalt and copper, whereas the Luanshya Mine produced only copper. Production of ore at the Luanshya Mine decreased during 1985 as high-grade reserves were being worked out. The metallurgical plant consisted of the Baluba and Luanshya concentrators, which shared a common smelter, producing anodes for refining at the Ndola copper refinery. Surface exploration drilling at both mines ceased in 1985; however, underground exploration drilling continued at both mines. Development advances and stope drilling results were less than planned owing to shortages of essential spare parts and consumables. The projected rate of expansion at the Baluba Mine was not achieved in 1985. The Luanshya smelter treated Zairean concentrates along with ZCCM concentrates, producing 9,964 tons of cathodes from the Zairean concentrates. Luanshya Div.'s labor force numbered 8,854 at yearend.

The Kalulushi Div. operated both the Chibuluma and Chambishi underground mines. Both mines operated concentrators. The Chibuluma concentrator used differential flotation for the recovery of copper and cobalt minerals. Development and stope drilling goals were not met at the Chibuluma Mine owing to shortages of spare parts and consumables. Both production and development performances at the Chambishi Mine were adversely affected by inoperable underground loaders and rock drilling equipment. The condition of the equipment reflected the spare parts problem that existed throughout most of ZCCM's operations. Work on the Chambishi sulfuric acid plant was approximately 45% completed; however, construction on the project moved slowly owing to late deliveries of certain construction materials. Kalulushi Div.'s labor force numbered 5,384 at yearend.

The Konkola Div.'s only mine was an underground operation and was also probably one of the wettest mines in the world, pumping water at a rate of 65,700 gallons per minute. The division had a concentrator that produced copper concentrates from Konkola ore and cobalt concentrates from Nchanga cobalt ore. Development, stoping, and concentrator operations were also adversely affected by the shortage of spare parts and consumables. Konkola Div.'s labor force numbered 5,395 at yearend.

During 1985, there was major restructuring of ZCCM's operating divisions. As of April 1, the Chibuluma Mine was managed by the Nkana Div., and the Chambishi Mine, by the Nchanga Div. The Kalulushi Div.'s cobalt and acid plants were transferred to the Nkana Div., and the Ndola copper refinery was assigned to the Luanshya Div. from the Mufulura Div. Only six divisions remained.

Table 2.—Zambia: Copper production and ore reserves of Zambia Consolidated Copper Mines Ltd., by mine[1]

Mine	Ore milled and treated: Gross weight (thousand metric tons)	Ore milled and treated: Copper grade (percent)	Ore milled and treated: Copper recoverable in copper concentrate (percent)	Ore reserves: Gross weight (thousand metric tons)	Ore reserves: Copper grade (percent)	Ore reserves: Cobalt (percent)
Baluba[2]	2,398	1.69	93.33	50,337	2.56	0.16
Chambishi[2]	2,190	1.25	95.81	23,550	2.79	--
Chibuluma[2]	635	2.34	89.49	8,755	3.35	.23
Kansanshi[3]	--	--	--	4,017	2.84	--
Konkola[2]	1,549	2.81	86.17	51,827	3.82	.07
Luanshya[2]	2,873	1.29	95.88	41,909	2.42	--
Mufulira[2]	4,264	2.10	93.71	86,844	3.05	--
Nchanga[2 3]	10,263	3.03	70.04	91,648	3.92	.77
Nkana[2]	3,794	1.55	90.00	81,682	2.38	.14
Total or average	27,966	2.23	81.12	440,569	3.07	.34

[1]Data shown are for fiscal year Apr. 1, 1984, through Mar. 31, 1985.
[2]Underground.
[3]Open pit.

Source: Zambia Consolidated Copper Mines Ltd. 1985 Annual Report (Apr. 1, 1984 to Mar. 31, 1985).

Lead, Zinc, and Byproduct Silver.—The Kabwe Div. of ZCCM operated the Kabwe lead-zinc mine, the Nampundwe copper-pyrite mine, and a concentrator, all northeast of the capital city, Lusaka. The Kabwe Mine first produced zinc in 1906 and was ZCCM's oldest operating mine. In addition to zinc, the Kabwe Mine produced lead and byproduct silver in 1985. The metallurgical plants consisted of a concentrator, a leaching and electrolytic zinc plant, a Waelz kiln complex, a sinter plant, an Imperial smelting furnace, and a lead refinery. The concentrator produced copper and pyrite concentrates from the Nampundwe Mine. The Kabwe Mine produced 158,621 tons of lead-zinc ore at grades of 10.2% and 22.8%, respectively. The average volume of water pumped from the Kabwe Mine was 8,400 gallons per minute.

INDUSTRIAL MINERALS

Fertilizer Materials.—A team of technicians from Japan investigating phosphate deposits in Zambia discovered deposits of that mineral, and a feasibility study was made on the usage of the phosphate in the manufacture of fertilizers. A multimillion-dollar fertilizer plant at Kafue, owned by Nitrogen Chemicals of Zambia, was to undergo changes in design to make the plant financially viable. The plant was designed and erected by Kobe Steel Ltd. of Japan. Teams from the International Bank for Reconstruction and Development (World Bank) and the Federal Republic of Germany were studying ways to revamp the plant.

Gem Stones (Amethyst, Emerald, and Tourmaline).—Amethyst, emerald, and tourmaline were produced in Zambia. Amethyst production decreased by 21% from that of 1984, while the production of emerald increased 400% during the same period. The production of tourmaline decreased from 460.43 kilograms in 1984 to 12.00 kilograms in 1985. Value of all gem stones produced in Zambia during 1985 was $1.57 million, compared with $7.05 million in 1984. The value of gem stones in terms of local currency (kwacha) increased over 60%; however, the devaluation of the kwacha was so drastic in 1985 that in terms of dollars, the value decreased.

Sulfur.—The Nampundwe Mine produced 199,490 tons of copper-pyrite ore at grades of 0.8% copper and 13.2% sulfur. Production was below forecast levels owing to major mechanical problems with the surface compressors.

MINERAL FUELS

Coal.—Production of coal at the Maamba Collieries decreased approximately 8% from that of 1984 to 471,114 tons. Owing to the devaluation of the kwacha and the production shortfall, the total value of coal sales decreased by over $6 million. In mid-1985, a 3-year expansion program was started at the Maamba open pit coal mine in southern Zambia as the result of a $27 million loan from the African Development Bank and the African Development Fund. The money was to be used by Zambia Engineering Services to buy quality control equipment and spare parts for the coal preparation plant, dump trucks, earth moving machinery, electrical equipment, and lubricants. The expansion program plan was to increase production to 800,000 tons of washed coal per year by mid-1988. If the expansion program succeeds, Maamba would be able to resume exports to Malawi and Zaire.

Petroleum.—Zambia was scheduled to begin a $4.1 million project to repair the 1,054-mile Tazama crude oil pipeline from Dar es Salaam, Tanzania, to the Ndola refinery in Zambia. A World Bank affiliate provided over 75% of the funding for the project. Tazama Pipeline Ltd. and the European Investment Bank provided the balance of the project funds.

The Government of Zambia was scheduled to embark on a second phase of another multimillion-dollar search for petroleum. During the first phase, oil and natural gas have been prospected for in western Zambia, Kafue Basin, Luangwa Valley, Luano-Lukusahi Valley, and the Mweruwa-Ntipa area. The second phase would commence only when Zambia enacted a law enabling the Government legally to back its agreements with respect to oil. During the latter part of 1985, a bill was introduced in the Zambian parliament that would provide an equitable return to both Zambian and foreign investors. If the proposed bill becomes law, it would establish a petroleum committee to review applications from foreign firms before inviting them to participate in oil exploration and production.

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[1]Physical scientist, Division of International Minerals.
[2]Where necessary, Zambian kwachas (K) have been converted to U.S. dollars at the rate of K1=US$0.17632.
[3]Fiscal year 1985, Apr. 1, 1984, to Mar. 31, 1985.
[4]Fiscal year 1984, Apr. 1, 1983, to Mar. 31, 1984.

The Mineral Industry of Zimbabwe

By Thomas O. Glover[1]

In terms of basic production volume, Zimbabwe's mineral industry declined in 1985. Total output was valued at $391 million,[2] down approximately 26% from the 1984 level. Although production decreased as a general rule in 1985, the value decrease was mostly caused by the devaluation of the Zimbabwean dollar against the U.S. dollar.

Zimbabwe ended 1985 with a strong economic recovery. There was a 5.8% growth in gross domestic product (GDP), inflation was reduced to 10%, and the balance of payments surplus was increased. The GDP growth rate for 1986 was expected to attain a 2% to 3% growth, with the inflation rate returning to 20% as it had been in 1984.

Zimbabwe, with a debt service ratio of 25%, continued to experience foreign exchange difficulties. Owing to the strong economic growth rate in 1985, the Government moved to increase foreign exchange allocations by 30% during the second half of the year. The $620.4 million deficit created further economic problems. Despite high taxes and the Government's attempt to control subsidies, budget expenditures exceeded revenues.

Because a majority of Zimbabwe's mining firms were controlled by foreign interests, the Government was publicly committed to enlarging the stake of Zimbabweans in the country's production activities. Nationalization of private interests had been publicly rejected. The Government purchased a 40% equity interest in the coal mining operation of the Wankie Colliery Co. Ltd., which enabled the firm to finance a $5.6 million mine expansion program. International sales of Zimbabwe's minerals were controlled through the parastatal Mineral Marketing Corp. Despite Government participation in various mining enterprises, the private sector remained the prime overseer of the Zimbabwe Iron and Steel Co. Ltd.'s (ZISCO) steel mill, which was the largest such operation in southern Africa.

PRODUCTION AND TRADE

Production of Zimbabwe's major mineral commodities was generally down in 1985 compared with that of 1984. In the metal commodities, beryl, chromite, cobalt, and iron ore production increased, while production of aluminum, antimony, columbium, copper, nickel, palladium, platinum, silver, tantalum, and tungsten decreased. Among the industrial mineral commodities, asbestos, feldspar, fire clay, limestone, lithium, quartz, and talc production increased, while output of barite, graphite, kaolin, magnesite, and mica decreased. Significant gains were made in production of beryl, feldspar, quartz, and talc, while significant losses were reported for barite, columbium, mica, palladium, platinum, tantalum, and tungsten. Of all the mineral commodities produced in Zimbabwe, six accounted for 86% of the total value of all minerals produced and sold—asbestos, coal, copper, chromite, gold, and nickel—and were valued at $337 million. Gold production decreased slightly from that of 1984, yet it still remained the highest valued mineral, with total output at $150 million. The remaining five high value minerals were asbestos, $52 million; chromite, $21 million; coal, $41 million; copper, $27 million; and nickel, $46 million.

Between 1982 and 1985, Zimbabwe

achieved a significant turnaround in its trade account, moving from a deficit of $125 million to a surplus of $186 million in 1985. In descending order of importance, Zimbabwe's top three trading partners were the Republic of South Africa, the United Kingdom, and the Federal Republic of Germany. The United States was Zimbabwe's fourth most important trading partner in 1984, importing $75.1 million from Zimbabwe while exporting $63.6 million into the country. Ferrochrome and nickel were the major mineral exports to the United States.

A $5.5 million contract was signed by Austria Metall AG (Austria) and Aluminium Industries (Zimbabwe) to design, supply, erect, and commission a new 3,000-ton-per-year copper alloy plant and associated equipment. In addition to the plant, Austria Metall would guarantee Zimbabwe an overseas export market for copper worth about $1.2 million in foreign exchange. The plant would also save Zimbabwe approximately $900,000 through import substitution. Together with projected export sales of $520,000 to nearby African countries, the total benefits would net Zimbabwe $2.65 million per year.

Lancashire Steel Co., a subsidiary of ZISCO, suspended wire rod exports to the Republic of South Africa after the Republic of South Africa decided to replace quantitative controls on imports of products with a system of tariffs.

Table 1.—Zimbabwe: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984[p]	1985[p]
METALS					
Aluminum: Bauxite, gross weight	5,139	7,533	23,145	22,726	20,877
Antimony, mine output, metal content[2]	145	206	143	256	194
Arsenic, white	21	--	--	--	--
Beryllium: Beryl concentrate, gross weight	42	52	47	19	38
Cesium minerals: Pollucite[e]	100	80	--	--	--
Chromium: Chromite, gross weight thousand tons	536	432	431	477	536
Cobalt:					
Mine output, recoverable metal content[e]	100	100	73	[r]78	100
Metal (including content of refinery sludges)	94	98	73	78	92
Columbium and tantalum: Tantalite concentrate:					
Gross weight kilograms	45,000	36,000	2,480	59,000	40,000
Columbium content[e] do.	6,800	5,400	[r]370	[r]8,850	6,000
Tantalum content[e] do.	15,900	12,600	[r]870	[r]20,650	14,000
Copper:					
Mine output, metal content	24,583	24,693	21,600	24,000	21,570
Metal:[3]					
Smelter, primary[e]	23,000	23,200	21,600	[r]23,000	20,670
Refinery, primary	[e]8,000	[e]23,000	21,560	22,687	20,389
Gold, mine output, metal content thousand troy ounces	371	426	453	478	472
Iron and steel:					
Iron ore:					
Gross weight thousand tons	1,096	837	926	927	1,100
Metal content[e] do.	660	500	555	[r]555	660
Metal:					
Pig iron[e] do.	400	250	[r]21	[r]10	--
Ferroalloys:					
Ferromanganese	2,000	2,123	2,085	1,845	2,044
Ferrochromium	209,072	179,838	157,914	177,800	156,000
Ferrosilicon chrome	NA	12,815	27,542	42,482	53,527
Total	211,072	194,776	187,541	222,127	211,571
Steel, crude thousand tons	600	528	672	391	--
Nickel:					
Mine output, metal content	13,018	13,309	10,146	10,251	9,381
Metal, smelter[e] [4]	12,000	12,200	9,150	9,100	8,328
Platinum-group metals:					
Platinum troy ounces	2,300	1,704	1,693	772	611
Palladium do.	5,200	2,765	2,395	1,222	965
Total do.	7,500	4,469	4,088	1,994	1,576
Silver, mine output, metal content thousand troy ounces	857	918	935	893	799
Tin:					
Mine output, metal content[e]	1,600	1,660	1,700	[r]1,670	1,670
Metal, smelter	1,157	1,197	1,234	1,210	1,207

See footnotes at end of table.

Table 1.—Zimbabwe: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1981	1982	1983	1984[p]	1985[p]
METALS —Continued					
Tungsten, concentrate output:					
Gross weight	119	67	22	55	14
Metal content[e]	55	52	[r]15	[r]29	10
INDUSTRIAL MINERALS					
Abrasives: Natural corundum	12,202	8,714	5,120	--	--
Asbestos thousand tons	[r]251	198	153	165	173
Barite	--	800	980	700	400
Cement, hydraulic thousand tons	588	576	580	NA	--
Clays:					
Bentonite (montmorillonite)	78,403	85,490	63,097	NA	--
Fire clay	14,658	11,746	9,255	8,900	9,747
Kaolin	4,657	2,442	470	1,350	1,104
Feldspar	2,393	666	1,645	1,399	2,300
Gem stones, precious and semiprecious:[5]					
Emerald kilograms	NA	NA	NA	8	13
Graphite	11,218	8,225	8,000	12,334	10,450
Kyanite	870	2,207	--	--	--
Lithium minerals, gross weight	16,444	9,787	19,193	22,548	27,910
Magnesite	60,194	60,660	24,071	21,642	19,385
Mica	1,406	861	544	911	582
Nitrogen: N content of ammonia thousand tons	52	84	75	70	
Phosphate rock, marketable concentrates do	122	122	[e]120	134	135
Pigments, iron oxide[e]	1,200	1,000	1,000	1,000	--
Pyrite, gross weight thousand tons	65	58	57	57	57
Quartz[6] do	142	669	47	32	103
Stone: Limestone do	1,409	1,270	1,222	1,152	1,323
Sulfur:[e]					
S content of pyrite do	25	25	24	25	25
Byproduct of coal and metallurgy do	5	5	5	5	5
Total do	30	30	29	30	30
Talc	386	270	551	285	437
MINERAL FUELS AND RELATED MATERIALS					
Coal, bituminous thousand tons	2,867	2,769	3,437	3,110	3,120
Coke, metallurgical[7] do	200	166	203	[e]200	[e]200

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through July 8, 1986.
[2]Content of concentrates.
[3]Smelter copper includes impure cathodes produced by electrowinning in nickel processing.
[4]Includes Ni content of nickel oxide and nickel fonte.
[5]Other gem stones produced are as follows, in kilograms: 1981—beryl, 327, and chrysoberyl, 2; 1982—beryl, 1,080, and aquamarine, 36.
[6]Includes rough and ground quartz as well as silica sand.
[7]Data represent output by the Wankie Colliery Co. Ltd. for years ending Aug. 31 of that stated; additional output by the Redcliff plant of Zisco Ltd. may total 250,000 metric tons per year of metallurgical coke and coke breeze.

Table 2.—Zimbabwe: Apparent exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984	
			United States	Other (principal)
METALS				
Beryllium: Ore and concentrate	17	78	78	
Cobalt: Metal including alloys, all forms	[r]732	195	--	All to Norway.
Columbium and tantalum: Metal including alloys, all forms, tantalum[2] value, thousands	$115	$97	--	NA.
Copper:				
Matte and speiss including cement copper	--	579	--	Norway 500; West Germany 79.
Metal including alloys, unwrought[2]	24,898	21,539	--	Italy 15,656; West Germany 1,844.
Gold: Metal including alloys, unwrought and partly wrought[2] value, thousands	$1,240	--		

See footnotes at end of table.

Table 2.—Zimbabwe: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued				
Iron and steel: Metal:				
Scrap	NA	3,264	--	All to Republic of Korea.
Pig iron, cast iron, related materials[2]	144	250	--	NA.
Ferroalloys:				
Ferrochromium	r167,783	144,993	41,828	Japan 47,611; West Germany 29,481.
Ferrosilicochromium	r8,526	20,089	7,204	West Germany 9,161; Japan 3,724.
Unspecified[2]	r70,402	44,487	--	Italy 20,931; United Kingdom 14,664; Belgium-Luxembourg 3,728.
Steel, primary forms	286,263	[2]184,134	--	Taiwan 26,751; Republic of Korea 21,771.
Semimanufactures:				
Bars, rods, angles, shapes, sections	[2]131,405	[2]77,526	1,690	Sri Lanka 55,442; United Kingdom 4,884.
Universals, plates, sheets	7,667	--		
Rails and accessories[2]	1,436	3,842	--	NA.
Wire[2]	18,240	16,070	--	NA.
Tubes, pipes, fittings	393	--		
Lithium: Ore and concentrate[2]	16,172	23,805	--	NA.
Nickel:				
Matte and speiss	NA	3	--	All to Austria.
Metal including alloys:				
Scrap	--	202	--	Canada 144; Japan 48.
Unwrought	--	7,743	2,855	Japan 2,269; West Germany 1,762.
Semimanufactures	--	12	--	Austria 9; Portugal 2.
Unspecified[2]	16,237	--		
Silver:				
Waste and sweepings value, thousands	NA	$23	--	United Kingdom $17; Italy $6.
Metal including alloys, unwrought and partly wrought do.	$2,907	--		
Tin: Metal including alloys:				
Unwrought	--	628	296	Japan 221; West Germany 106.
Unspecified[2]	427	--		
Tungsten: Ore and concentrate	[2]24	[2]72	10	NA.
Zinc: Metal including alloys:				
Unwrought	--	2	--	All to Thailand.
Semimanufactures	--	100	--	All to Jordan.
Other:				
Precious metal scrap[2] value, thousands	$339	$2,820	--	NA.
Ores and concentrates	--	238	--	Belgium-Luxembourg 237.
Ashes and residues	--	39	--	All to United Kingdom.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.: Grinding and polishing wheels and stones	NA	4	--	All to Switzerland.
Asbestos, crude	[2]161,177	[2]155,385	287	Japan 27,563; West Germany 5,492; Italy 5,222.
Cement[2]	96,959	164,415	--	NA.
Diamond: Gem, not set or strung value, thousands	[2]$4,198	[2]$3,750	$10	NA.
Graphite, natural	r [2]9,720	72,848	72,315	Japan 530.
Magnesite, crude[2] value, thousands	$544	$431	--	NA.
Precious and semiprecious stones other than diamond: Natural do.	[2]$33	$3,021	$765	Switzerland $2,005; West Germany $248.
Stone, sand and gravel:				
Dimension stone, worked	NA	255	--	Belgium-Luxembourg 218; Switzerland 37.
Gravel and crushed rock	--	28,829	--	All to United Kingdom.
Quartz and quartzite	NA	177	--	Netherlands 143; United Kingdom 34.
Talc, steatite, soapstone, pyrophyllite value, thousands	$8	--		
Other: Crude	NA	1,655	--	All to West Germany.
MINERAL FUELS AND RELATED MATERIALS				
Coal: All grades including briquets[2]	113,761	174,776	--	NA.
Coke and semicoke[2]	135,272	102,286	--	NA.

rRevised. NA Not available.

[1]Table prepared by Virginia A. Woodson. Owing to a lack of official trade data published by Zimbabwe, this table should not be taken as a complete presentation of this country's mineral exports. These data have been compiled from various sources, which include United Nations information, data published by partner trade countries, and partial official trade data of Zimbabwe. Unless otherwise specified, data are compiled from trade statistics of individual trading partners.

[2]Central Statistical Office, Harare, Zimbabwe. Quarterly Digest of Statistics. Dec. 1985.

Table 3.—Zimbabwe: Apparent imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides	--	20	--	All from West Germany.
Metal including alloys:				
Unwrought	--	98	--	All from Netherlands.
Semimanufactures value, thousands	[r] [2]$6,349	[2]$5,349	$531	NA.
Cobalt: Oxides and hydroxides	--	3	3	
Copper: Metal including alloys, semimanufactures	--	65	15	United Kingdom 43.
Iron and steel: Metal:				
Pig iron, cast iron, related materials	--	35	--	Italy 18; Sweden 17.
Ferroalloys[2] value, thousands	$1,338	--		
Semimanufactures:				
Bars, rods, angles, shapes, sections[2] do.	$4,056	$4,741	--	NA.
Universals, plates, sheets do.	[2]$21,282	[2]$25,488	$491	NA.
Hoop and strip	--	71	--	Belgium-Luxembourg 42; United Kingdom 15.
Rails and accessories[2] value, thousands	$111	--		
Wire	--	743	--	United Kingdom 623; Italy 18.
Tubes, pipes, fittings value, thousands	[2]$6,934	[2]$10,702	$31	NA.
Manganese: Oxides	85	85	85	
Titanium: Oxides	102	3	--	Denmark 2; United Kingdom 1.
Zinc:				
Oxides	--	92	--	United Kingdom 77; Italy 15.
Metal including alloys, all forms[2] value, thousands	$2,026	$3,911	--	NA.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	--	3	--	All from Italy.
Artificial: Corundum	--	23	--	West Germany 19; Switzerland 4.
Grinding and polishing wheels and stones	(3)	19	NA	West Germany 5; Norway 5; Netherlands 3.
Boron materials: Crude natural borates	--	398	--	All from Belgium-Luxembourg.
Cement	--	55	--	West Germany 34; Italy 18.
Diamond: Gem, not set or strung thousand carats	NA	65	--	Mainly from Taiwan.
Fertilizer materials: Manufactured:				
Ammonia[2] value, thousands	$6,029	$6,666	--	NA.
Nitrogenous	(4)	5,770	--	All from Japan.
Potassic	NA	5,575	--	All from West Germany.
Unspecified and mixed[2] value, thousands	$4,121	--		
Graphite, natural	4	5	--	Do.
Pigments, mineral: Iron oxides and hydroxides, processed	--	25	--	Do.
Salt and brine	[2](5)	6,071	--	Do.
Sodium compounds, n.e.s.: Sulfate, manufactured	(6)	198	198	
Sulfur:				
Elemental: Crude including native and byproduct value, thousands	$1,243	$3,742	--	NA.
Sulfuric acid	--	12	--	All from United Kingdom.
Talc, steatite, soapstone, pyrophyllite	--	18	--	All from Italy.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	--	54	--	All from United Kingdom.
Carbon black	--	257	68	West Germany 109; United Kingdom 80.
Coal: All grades including briquets[2] value, thousands	$3,164	$4,684	--	NA.

See footnotes at end of table.

Table 3.—Zimbabwe: Apparent imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum:				
Crude ------- value, thousands--	$61,798	NA		
Refinery products:				
Gasoline thousand 42-gallon barrels--	--	44	(7)	Italy 42.
Mineral jelly and wax --do----	9	11	3	West Germany 5; United Kingdom 1.
Lubricants ---------do----	[r]102	[r]93	(7)	NA.
Unspecified value, thousands--	$11,109	--		

[r]Revised. NA Not available.

[1]Table prepared by Virginia A. Woodson. Owing to a lack of official trade data published by Zimbabwe, this table should not be taken as a complete presentation of this country's mineral imports. These data have been compiled from various sources, which include United Nations information, data published by partner trade countries, and partial official trade data of Zimbabwe. Unless otherwise specified, data are compiled from trade statistics of individual trading partners.

[2]Central Statistical Office, Harare, Zimbabwe. Quarterly Digest of Statistics. Dec. 1985.

[3]Unreported quantity valued at $3,984.

[4]Unreported quantity valued at $5,253,000.

[5]Unreported quantity valued at $1,793,000.

[6]Unreported quantity valued at $1,701,000.

[7]Less than 1/2 unit.

COMMODITY REVIEW

METALS

Chromite.—Total production from Zimbabwe's two major chromite producers increased nearly 12.6% in 1985 over that of 1984. Zimbabwe Alloys Ltd. (Zimalloys), a subsidiary of Anglo American Corp. (Zimbabwe) Ltd. (AMZIM) and Zimbabwe Mining and Smelting Co. (ZIMASCO), a subsidiary of Union Carbide Corp. of the United States, produced the bulk of the chromite from mines along the Great Dyke. ZIMASCO, a Zimbabwe registered company, was owned 40% by Union Carbide and 60% by Union Carbide Zimbabwe.

Zimalloys operated five chrome ore mines, a quartz quarry, and a ferroalloy refinery during 1985. Four of the chrome ore mines—Caesar, Netherburn, Sutton, and Vanad—operated during 1984. The fifth, the Inyala Mine, commenced operations in June 1985 after its rehabilitation costing $3.2 million was completed by Zimalloys. Production levels for the Inyala were achieved on schedule during August. Work on the Netherburn Mine concentrator was completed during the latter part of 1985. Approximately 38% of Zimbabwean ferroalloy production was produced by Zimalloys.

ZIMASCO was the major producer of ferrochrome in Zimbabwe, with annual sales of approximately $135 million, all of which was exported. The company drew 95% of its ore requirements from its own mines at Mutorashanga, Lalapanzi, and Shurugwe, and purchased approximately 5% of its requirements from small cooperative societies producing chrome ore on the Great Dyke.

The chrome ore mines at Mutorashanga were determined to be uneconomical. Various actions were considered to put mining operations on an economic basis. One possibility considered was the placing of the operations in the hands of smaller mining cooperative societies. Approximately 1,600 people were employed by the Mutorashanga Mine and the smaller operations supporting the larger mines.

The Cambrai Mine at Lalapanzi employed 570 people. A $5 million expansion program was under way at this mine with a planned doubling of production by yearend 1987. The expenditure included $1 million in housing for the employees.

In Shurugwe, 2,000 people were employed at the Peak, Railway Block, and Valley Mines. Approximately 70% of the Kwekwe smelter's ore requirements came from the Shurugwe complex.

The ZIMASCO smelter at Kwekwe employed approximately 1,000 people. The only other chrome smelter in Zimbabwe was the Gwelo smelter owned by AMZIM. The smelter was a six-furnace operation in 1985; however, only five were operative, as one was being repaired.

ZIMASCO conducted a $500,000 annual exploration program in 1985. Exploration activities were focused on locating the downdip extensions of the known ore bodies at Shurugwe and seeking an unmined ore occurrence in the Shurugwe communal area approximately 30 kilometers east of Shurugwe.

Cobalt.—Utilizing the Bindura Smelting and Refining Ltd. plant at Bindura, the Bindura Nickel Corp. Ltd. was Zimbabwe's sole producer of byproduct cobalt between late 1983 and September 1985. In late 1983, the Rio Tinto (Zimbabwe) Ltd. (RTZ) base metals refinery at Eiffel Flats was closed following the shutdown of the Empress Mine. The refinery reopened on November 17, 1985, after a new contract was signed to toll refine 10,500 tons per year of nickel-cobalt-copper pellets from the Selebi Phikwe Mine in Botswana. The new contract was scheduled to be in effect for a minimum of 10 years. The reopening of the Eiffel Flats refinery was responsible for a 17.9% increase in 1985 output, which was expected to increase further in 1986.

Copper.—Mangula Copper Mines changed its corporate name in 1985 to Mhangura Copper Mines, and changed the brand name of its standard copper cathode to Mhangura from Mangula. Mangula standard cathodes were not to be accepted for London Metals Exchange warranting after March 18, 1986.

Mhangura Copper Mines continued to be the major copper producer in Zimbabwe. The company had its own smelter and refinery to produce copper cathodes. The refinery also produced a precious metals byproduct slime that contained gold, paladium, platinum, and silver. The slime accounted for 75% of Zimbabwe's silver production.

Even though the Eiffel Flats refinery reopened in 1985, refined copper production decreased about 10% in Zimbabwe. Production of copper was expected to increase in Zimbabwe during 1986 if world market prices stabilized. The targeted operating level of the new operation at Eiffel Flats was scheduled to produce 4,800 tons of copper per year.

Messina Ltd., which held controlling interests in both Mhangura Copper Mines and Lomangundi Smelting and Mining Co., agreed in September 1984 to sell all its mining assets to Zimbabwe Mining Development Corp. (ZMDC). Messina's assets were taken over by ZMDC in November 1984.

Gold.—The three largest producers of gold in Zimbabwe during 1985 were Falcon Mines PLC, Falconbridge Investments (Zimbabwe) (Pvt.) Ltd., and Coronation Syndicate Ltd. (Corsyn). The three major producers had eight gold mining operations: the Dalney Group of Mines, the Venice Group of Mines, and Olympus Consolidated Mines Ltd., operated by Falcon; the Blanket Mine and the Golden Kopje Mine, operated by Falconbridge; and the Arcturus Mine, the Mazowe Mine, and the Muriel Mine, operated by Corsyn.

Falcon Mines showed a profit after taxes for the year ending March 31, 1985, of $5.535 million, of which $3.3 million was used for expenditures on mining assets. Two factors gave rise to the higher net profit—an increase in the average price for gold and the appreciation of the U.S. dollar over the Zimbabwean dollar. Production at the Dalny Group of Mines was interrupted by plant breakdowns, and milling rates were not met. Capital expenditures at the Dalny Group for shaft sinking and for the purchase of a ball mill were $1.755 million. Dalny's recovery rate was expected to be 6.55 grams per ton of ore in 1985. Capital expenditures at the Venice Group of Mines included plant improvements, and the acquisition of land surrounding the mining areas. Venice's recovery rate was expected to be 4.39 grams per ton. Operations at Olympus Consolidated Mines Ltd.'s Dawn and Commoner Mines ceased, owing to financial losses.

Falconbridge Investments produced gold through a wholly owned subsidiary at the Blanket and Golden Kopje Mines in Zimbabwe. Production from both mines was 24,689 troy ounces. At the Blanket Mine, gold production totaled 17,418 troy ounces from milling 149,032 tons of ore, while the Golden Kopje produced 7,271 troy ounces of gold from milling 75,563 tons of ore.

Corsyn produced gold from three operating mines: Arcturus, Mazowe, and Muriel. The Arcturus Mine increased throughput of ore from 94,000 to 105,000 tons. Gold production from Arcturus increased from 15,465 troy ounces in 1984 to 18,519 troy ounces in 1985. About 900 troy ounces of gold production came from the startup of new facilities in order to treat a deposit of weathered ore that was mined by opencast mining methods. Treatment of the surface ore was to be completed in 1986, after which the facility was scheduled to treat small tonnages of underground ore. The Mazowe Mine produced 11,831 troy ounces of gold in 1985. The life of the Mazowe Mine was to be extended as a result of payability found on the bottom levels of footwall ore bodies. The Muriel Mine produced 19,065 troy ounces of gold, slightly less than that produced in 1984. The life of the Muriel Mine was regarded as limited, although underground exploration continued and small blocks of ore that were developed in 1985 offset depletion.

Iron and Steel.—Production of iron ore in Zimbabwe in 1985 was 1.1 million tons, an 18.7% increase over that produced in 1984. The increased output was due to an expansion of the Ripple Creek Mine, owned by ZISCO. Approximately 78% of ZISCO's iron ore needs was produced at the Buchwa Mine, but open pit mining at Buchwa was reduced to one ore body, the West deposit. The steel mill at Redcliff was located 200 kilometers north of the Buchwa Mine. The second source of iron ore for the Redcliff steel mill was the open pit Ripple Creek Mine, only 15 kilometers from the steel mill. The development of Ripple Creek to produce the major portion of feed for a new sinter plant was still being planned. Deliveries of iron to the ZISCO mill from Buchwa contained 61.4% iron and 0.4% manganese, while deliveries from Ripple Creek contained 48.7% iron and 7.8% manganese. The total mill feed averaged 58.6% iron and 2.0% manganese.

The ZISCO steel mill was scheduled for a rehabilitation program lasting from 1985 to 1990 to streamline and upgrade many of its facilities at a projected cost of approximately $194 million. The project envisaged the installation of a sinter plant, a four- or six-strand billet caster, and the development of iron ore reserves. It was also planned to upgrade the medium and light section mills and the bar rod mill. Studies were also made to examine the possibility of constructing a 100,000- to 200,000-ton-per-year plate mill. Unless new iron ore resources were developed in Zimbabwe by 1993, the current supplies were projected to be depleted. The ZISCO mill was estimated to produce approximately 850,000 tons of raw steel in 1985, with 85% destined for export. Major markets included China and Hong Kong.

Nickel.—The official reopening of Empress Nickel Mining Co.'s (ENMC) Eiffel Flats nickel smelter and refinery, which was closed in December 1982, took place on November 17, 1985. ENMC was owned by RTZ. ENMC's refinery had been, prior to the 1982 closure, producing one of the three highest grade nickel products in the world. The refinery was forced to close owing to a depletion of copper-nickel ore reserves at the Empress Mine. The Empress Mine also suddenly and simultaneously experienced severe mining difficulties, including underground rock movement caused by a minor earth tremor. In August 1984, Bamangwato Concessions Ltd. (BCL), operators of the Selebi Phikwe Mine in Botswana, offered to sell its nickel-copper matte to ENMC for use in its Eiffel Flats nickel operation in Zimbabwe. Negotiations were held between BCL, ENMC, and Centametall AG, under which an agreement was made that ENMC would toll refine 10,500 tons of matte annually for Centametall. The agreement was scheduled to run 10 years. The refinery's targeted operating level was set at 4,800 tons of copper per year and 4,300 tons of nickel per year.

Refined nickel metal production decreased by 8.5% in 1985 to 9,381 tons, compared with 1984 production, with the Eiffel Flats nickel smelter and refinery, and Bindura Nickel's smelting and refining plant at Bindura both in operation.

Tin.—Tin production from the Kamativi Tin Mines Ltd. smelter in northwest Zimbabwe remained constant through 1984 and 1985 at approximately 1,200 tons of metal. The mine, smelter, and refinery was 91% owned by the Industrial Development Corp. (IDC) of Zimbabwe and was largely Government controlled. Ownership of the tin complex was scheduled to be transferred from IDC to ZMDC.

The Kamativi Mine produced approximately 1 million tons of cassiterite ore per year. Ore was crushed and gravity separated before smelting. Zimbabwe did not belong to the International Tin Council because the country's production was considered too small to justify membership.

INDUSTRIAL MINERALS

Asbestos.—Zimbabwe produced 5% more asbestos in 1985 than in 1984; however, the income from sales decreased by $12.6 million owing to foreign exchange rates and other marketing conditions. Value of the output was $52.5 million. Asbestos, in terms of value, ranked second only to gold in the country.

Zimbabwe exported its asbestos to over 52 countries, with the main customers being in the Middle East and Asia. Most exports were in the form of fibers; however, Zimbabwe hoped eventually to establish a spinning plant. By yearend 1985, approximately 84,000 tons of material was stockpiled. Although the asbestos market and prices remained in a state of depression, both new mills at Zvishavane and Mashava were running at full capacity and sales of fiber were slightly above those of 1984.

Lithium.—Bikita Minerals (Pvt.) Ltd. was Zimbabwe's only producer and exporter of lithium-related minerals, which were used primarily as feedstock for the ceramics industry. During 1985, lithium mineral exports of approximately 27,000 tons earned almost $6.2 million in foreign exchange, compared with 22,000 tons and $5.56 million in 1984. Regional markets included Western Europe, the Far East, and the United States. The company was planning to install a heavy-media separation plant along with a new grinding mill that was expected to improve recovery, lower the production cost, extend the life of the mine, and increase output. In 1986, Bikita expected to export approximately 6,000 tons of lithium minerals to the United States, an amount equal to that exported to the United States in 1985.

At Bikita, the ore was quarried either from the Bikita quarry or from the adjoining Al Hayat quarry. Although there were other known lithium deposits in Zimbabwe, the Bikita deposit was the highest quality mine of its type in the world. The only other comparable mine was the Bernic Lake Mine in Manitoba, Canada, owned by the Tantalum Mining Corp. of Canada.

MINERAL FUELS

Coal.—Wankie Colliery, a subsidiary of AMZIM, was the only coal producer in Zimbabwe in 1985. Coal production was fourth in value of all mining operations. The total value of the 3.1 million tons mined was $41.5 million or $13.39 per ton at the mine. In 1984, production was 3.1 million tons with a total value of $47 million, which amounted to $15.16 per ton at the mine, an 11.7% decrease in 1 year in the price per ton. Wankie Colliery, therefore, had reduced profits during the first 6 months of 1985. The Government of Zimbabwe approved an increase in domestic coal and coke prices, effective October 1, 1985, to counteract the reduced profits.

Zimbabwe's coal reserves were estimated to be 30 billion tons. The reserves were situated in the Zambezi Basin and in the Sabi-Limpopo Basin. Only one area was being mined in the Zambezi Basin. Roughly 50% of the coal produced in Zimbabwe was steam coal, and 40% was metallurgical coal. Approximately 10% was lost in the coal cleaning process. Roughly one-third of the coal produced in Zimbabwe was from underground mines, with the balance from open pit mines.

Petroleum.—The country was totally reliant on refined product imports. Most were pipelined from the Port of Biera in Mozambique to Umtali in Zimbabwe. Smaller amounts of refined products were transported by tank truck from the Republic of South Africa. Zimbabwe was seeking to increase ethanol production from farm products and increase the proportion of ethanol in gasoline in order to reduce its petroleum imports. The new project would include the construction of a $240 million facility in southeast Zimbabwe.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Zimbabwean dollars (Z$) to U.S. dollars at the rate of Z$1.61=US$1.00.

The Mineral Industry of Other Central African Countries

By Thomas O. Glover[1]

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CAMEROON

Cameroon's mineral industry continued to be dominated by crude petroleum. The economic development of the country depended on the production and export of crude oil. Output was estimated to be 49 million barrels in 1985 compared with 56 million barrels in 1984 and 47 million barrels in 1983. The country's only refinery consumed approximately 12% of the daily production of crude oil while operating at slightly over 50% capacity. The refinery output, however, supplied the domestic need for motor fuel and heating oils.

Cameroon's economic prospects were heavily dependent on the oil sector, which had been responsible for the recent strong growth in the economy. The country consistently sought to avoid the problems associated with an overdependence on oil and followed a relatively broad-based development strategy, using oil revenues to sustain and encourage growth in other sectors. Approximately 75% of the gross domestic product (GDP) was attributed to the mineral industry in some form. GDP growth was approximately 6.5% during 1985.

Government policies toward industry featured extensive tax and financing incentives, minor state participation, decentralization away from Yaoundé and Douala, and the encouragement of smaller ventures.

An estimated 1 billion tons of bauxite was located in northern Cameroon, but development was expected to be impeded by the remoteness of the deposit and an inadequate infrastructure. A joint venture company, composed of the Cameroon Government and aluminum concerns in free market economy countries, set up an operation to promote the exploitation. The aluminum smelter at Edéa used alumina imported from Guinea. Despite the expansion of the smelter and plant, other problems were encountered that retarded aluminum production.

Cameroon had a variety of other mineral resources including notably iron ore, but very little exploitation had taken place. Other mineral investigations have also indicated the presence of copper, diamond, gold, kyanite, nickel, rutile, and uranium. The study of the Kribi iron ore deposit by Société d'Études de Fer Du Cameroun confirmed that exploitation of the Kribi deposit would be feasible only if untapped natural gas was used as an energy source to produce iron and steel products and then, only if the demand for iron and steel products increased.

The Cameroon Government had permitted France's parastatal Bureau de Recherches Géologiques et Minières (BRGM) and the La Source Group to evaluate mineral potential in the Wum Banyo region. La Source was to study the overall mineral potential in a 21,500-square-kilometer area that includes occurrences of gold, tin, titanium, and tungsten. BRGM was scheduled to explore only the tin potential around Mayo Darle where a tin ore deposit was being worked by artisans.

U.S. trade with Cameroon fell in 1985 as the United States cut its imports of Cameroonian oil in half. U.S. exports to Cameroon grew modestly to $68.4 million,[2] while imports from Cameroon dropped by 55% to $338 million. The Government of Cameroon and the United States have been active in facilitating trade between the two countries. In November 1985, Cameroon held a trade and investment meeting with the United States.

Table 1.—Other countries of Central Africa: Production of mineral commodities[1]

Country[2] and commodity[3]	1981	1982	1983	1984[p]	1985[p]
CAMEROON					
Aluminum metal, primary ______ metric tons__	[r]65,400	[r]78,900	77,400	73,100	86,296
Cement, hydraulic[4] ______ do____	[e]516,000	530,000	610,000	NA	NA
Gold, mine output, metal content__ troy ounces__	316	136	261	[e]250	215
Petroleum, crude _ thousand 42-gallon barrels__	32,000	[r, e]35,000	47,000	[e]56,000	[e]49,000
Pozzolana ______ metric tons__	53,025	81,028	NA	NA	95,700
Stone:					
Limestone ______ do____	66,625	83,379	50,675	NA	78,800
Marble ______ do____	NA	NA	NA	251,600	504
Tin ore and concentrate:					
Gross weight ______ do____	[r]21	[e]15	NA	14	13
Metal content ______ do____	[r]14	[e]10	NA	[e]10	[e]10
CENTRAL AFRICAN REPUBLIC					
Diamond:					
Gem ______ carats__	[e]208,903	[r]185,573	229,681	235,589	189,545
Industrial stones ______ do____	[e]103,000	[r]91,000	65,677	101,562	87,452
Total ______ do____	[e]311,903	276,573	295,358	337,151	276,997
Gold ______ troy ounces__	1,386	1,000	2,492	6,953	6,033
CHAD					
Sodium carbonate, natural (natron), slabs (plaques), broken ______ metric tons__	5,000	[e]5,000	NA	NA	NA
CONGO					
Cement, hydraulic ______ do____	49,298	39,242	15,034	NA	NA
Copper, mine output, metal content ____do____	245	149	35	NA	NA
Gas, natural:					
Gross[e] ______ million cubic feet__	13,000	13,000	13,000	NA	NA
Marketed ______ do____	350	350	350	NA	NA
Gold, mine output, metal content[e] _ troy ounces__	48	83	267	101	150
Lead, mine output, metal content__ metric tons__	7,682	4,095	4,000	1,740	NA
Lime ______ do____	--	--	--	7,061	NA
Petroleum, crude _ thousand 42-gallon barrels__	30,860	33,000	40,271	44,911	43,564
Zinc, mine output, metal content[e] _ metric tons__	3,000	3,000	3,000	[r]2,780	NA

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.

[1]Includes data available through July 7, 1986.

[2]In addition to the countries listed, Equatorial Guinea and São Tomé e Principe, covered textually in this chapter, presumably produce modest quantities of a variety of crude construction materials (clays, sand and gravel, and stone) and may produce minor amounts of other mineral commodities (most notably gypsum, lime, and salt), but output is not reported quantitatively, and available information is inadequate to make reliable estimates of output levels.

[3]In addition to the commodities listed, modest quantities of unlisted varieties of crude construction materials (clays, sand and gravel, and stone) presumably are produced, but output is not reported quantitatively, and available information is inadequate to make reliable estimates of output levels.

[4]Includes imported clinker.

Table 2.—Cameroon: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983	Destinations, 1983	
			United States	Other (principal)
Aluminum: Metal including alloys, all forms	67,733	62,000	--	Mainly to Japan.
Cement	633	1,846	NA	NA.
Gas, natural: Gaseous thousand cubic feet	42	2,217	NA	NA.
Petroleum:				
Crude thousand 42-gallon barrels	13,477	14,372	7,526	France 4,405; Netherlands 2,441.
Refinery products:				
Gasoline 42-gallon barrels	1,619	6,188		
Mineral jelly and wax do	325	220		
Kerosene and jet fuel do	262	8,046		
Distillate fuel oil do	175	2,663		
			NA	
Lubricants do	6,357	8,064		
Nonlubricating oils do	291	385		
Residual fuel oil do	374	--		
Bituminous mixtures do	2,726	--		

NA Not available.
[1]Table prepared by Virginia A. Woodson.

Table 3.—Cameroon: Imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983
Aluminum: Oxides and hydroxides	73,717	154,207
Cement	186,714	632,323
Coke and semicoke	7,853	10,929
Gas, natural: Gaseous thousand cubic feet	31,432	53
Gypsum and plaster	7,724	35,892
Petroleum refinery products:		
Gasoline 42-gallon barrels	80,593	11,994
White spirit do	5,455	4,437
Mineral jelly and wax do	5,775	6,374
Kerosene and jet fuel do	33,456	5,005
Distillate fuel oil do	50,310	3,371
Lubricants do	113,302	115,906
Residual fuel oil do	48,998	655,131
Bitumen and other residues do	297,692	392,482
Bituminous mixtures do	44,544	46,159

[1]Table prepared by Virginia A Woodson. Sources for 1983 not available.

CENTRAL AFRICAN REPUBLIC

Reported mineral production of diamonds and gold in 1985 was valued at $29.9 million. Production of these precious minerals decreased by 18% and 13%, respectively, although the value of their production increased 5.3%, owing to a better exchange rate. In 1984, the exchange rate was CFAF437.0 per US$1.00; whereas in 1985, the exchange rate was CFAF351.50 per US$1.00.

The Central African Republic's economy moved ahead in 1985 after registering more than a 5% per capita real growth in GDP in 1984. Inflation fell to about 4% from double-digit figures prior to 1984. The Central African Republic completed a third standby agreement in July 1985 with the International Monetary Fund for financial assistance that was to last for a period of 1 year.

Mineral activity centered almost entirely in diamonds, which accounted for nearly 94% of the Central African Republic's mineral export earnings and 33% of its total export earnings. Production of diamond for legal exporting markets decreased from 342,000 carats in 1980 to 276,573 carats in 1982 owing to a high export tax of 20%. Informal estimates were that as much as 50% of the country's diamond production during those years was exported illegally. In 1983, the export tax was lowered to 18%; in 1984, to 12%; and in 1985, to 10%. The quantity and per carat value of the legal exports increased sufficiently each year since 1983 to offset the loss in revenue from the lower tax levels. All diamond and gold production in 1985 was by individual prospectors using manual means of extraction. A Bermuda company, Edlow Resources Ltd., began prospecting for gold in 1985 with the possibility of beginning semi-industrialized exploitation in 1986.

Known uranium and petroleum deposits prior to 1985 were never exploited in the Central African Republic because of the startup cost and transportation logistics involved in the exploitation. A petroleum consortium, headed by Esso Exploration and Production Central Africa, drilled an exploration well in the northeast Central African Republic during late 1985. Esso held 37.5% of the lease; Royal Dutch/Shell Group, 37.5%; and Chevron Oil Co., 25%.

CHAD

Significant production of any mineral product does not exist in Chad. For many years, small amounts of natron (hydrous sodium carbonate) were produced, but no production had been reported in recent years. Natron was obtained in approximately 20 saliferous basins northwest of Bol, near Lake Chad. The natron was all used within Chadian borders.

U.S. economic interests in Chad remain minimal. A consortium of oil companies (Esso Exploration and Production Central Africa, Royal Dutch/Shell, and Chevron) suspended exploration activities in southern Chad owing to the low world oil prices.

At the second United Nations sponsored Round Table on Chad held in December 1985, the Chadian Government solicited donor assistance totaling $425 million for long-term development projects in Chad. Direct investment by the United States remained negligible. Government revenues in 1985 totaled about $39 million, while Government spending totaled approximately $67 million.

CONGO

Petroleum and mining production accounted for about 95% of the country's exports, 75% of Government revenues, and 60% of the GDP in 1985. Petroleum revenues completely dominated the Congolese economy. Petroleum production for 1985 was 43.6 million barrels compared with 44.9 million barrels in 1984. Société Nationale Elf Aquitaine (Elf) of France and Azienda Generali Italiana Petroli S.p.A. of Italy operated all of Congo's eight producing oilfields. The state oil company, Hydro-Congolaise de Raffinage (Hydro-Congo), held a 15% interest in two of the smaller fields.

Owing to the depletion of old petroleum reservoirs, annual production was down 3% in 1985 from 1984 levels. The extension of the Loango Field and the development of the newly discovered Tchibouela Field were expected to boost the annual production rate by mid-1987.

The U.S. based American Oil Co. (Amoco) completed two dry holes in 1985. Amoco was planning to seismograph 1,200 more kilometers and drill one additional well in 1986. Continental Oil Co. (Conoco), another U.S. based company, formed a joint venture with Hydro-Congo in 1985 and planned a major offshore seismic program and one exploration well in 1986. Conoco's concession was situated off Pointe Noire; adjacent to the producing fields of Emeraude, Sendji, and Yanga.

The nonfuel minerals sectors remained largely unexploited, while potential for discovery remained excellent. The production of metals remained limited to one Government-owned and operated lead-zinc-copper mine at M'Fouati, and scattered artisanal production of gold. A new cement plant, started in 1985 by the Congolese Government and a Spanish trading company, was to satisfy internal demand for cement in 1986. One billion tons of iron ore resources in the High Ivingo area was being considered for exploitation in a joint venture between the Governments of Congo and Gabon. Poor market conditions and scarcity of capital made the venture uneconomical.

EQUATORIAL GUINEA

Equatorial Guinea continued to be beset with economic problems. The country was predominantly under the Franco-African sphere of influence in 1985, even though Spain contributed $7.06 million dollars to the economy. Equatorial Guinea became a member of the Bank of Central African States, backed by the Bank of France, in January 1985. The country had already been a member of the Central African Customs Union prior to 1985. Debt rescheduling for Equatorial Guinea took place on July 1, 1985. The rescheduling was concerned with overdue payments at the end of 1984, as well as the principal and interest from January 1985 to June 1986.

Preliminary surveys have found encouraging indications of alluvial gold, iron ore, manganese, silica, titanium, and uranium. Oil exploration had been ongoing since the mid-1960's, with more recent exploration activities funded by Spain, the United Nations, and the International Bank for Reconstruction and Development (World Bank). Indications of oil were discovered in sea areas off Rio Muni; however, there was no hydrocarbon production in 1985. Equatorial Guinea's offshore potential oil areas totaled about 13,450 square kilometers. The area included parts of three distinct sedimentary basins, the Neger Delta Basin, the seaward extension of the Douala Basin of Cameroon, and the northward extension of the Gabon Basin. Onshore geological work in Rio Muni indicated little petroleum potential in the area.

SÃO TOMÉ E PRINCIPE

São Tomé and Principe are two small islands located 82 miles apart in the Gulf of Guinea. The only mineral industries on the islands were quarrying of stone and mining of clay for local use. Foreign investments in any enterprise must take into account that 51% of the enterprise must be owned by São Toméans.

The Organization of Petroleum Exporting Countries (OPEC) Fund for International Development had loaned $500,000 for balance-of-payments support to São Tomé and Principe. The loan has financed imports of needed foreign goods. This was the fifth loan to the country from the OPEC fund. One of the earlier loans was for a petroleum products storage and distribution project. The fifth loan was interest free, with a small service charge, and had an 8 year maturity including 3 years grace. São Tomé's economy was based on tropical agricultural products.

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[1]Physical scientist, Division of International Minerals.
[2]Where necessary, values have been converted from Communauté Financiére Africaine francs (CFAF) to U.S. dollars at the rate of CFAF351.5=US$1.00 in 1985.

The Mineral Industry of Other East African Countries

By Kevin Connor[1]

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BURUNDI

The Government's ban on all commercial mining operations, except for small-scale artisan exploitation of alluvial gold deposits, continued throughout 1985. Minerals produced were kaolin and lime for agricultural uses, and experimental peat harvesting for energy applications. The total value of the minerals produced during the year was estimated at $1.1 million.[2]

In early 1985, an agreement between the Government and Amoco International Oil Co. was ratified for a petroleum exploration concession covering 243,000 hectares of Lake Tanganyika. Onshore exploration in the Ruzizi Plain was already under way the last half of 1985. By yearend, enough seismic information was available that Amoco hoped to complete data analyses, determine onshore drilling sites, and begin drilling operations before the end of 1986. Also to begin in the latter part of 1986 were seismic studies of Lake Tanganyika. Throughout 1985, Amoco officials were negotiating with the Government of Zaire for expanding the exploration acreage into that country's portion of northern Lake Tanganyika and the Ruzizi Plain. An agreement between Amoco and Zaire could have important beneficial economic implications for both Zaire and Burundi, and onshore seismic work in Zaire logistically supported from Bujumburi could begin almost immediately.

During the year, Ekono Oy of Finland completed further analyses of the Matongo-Bandaga phosphate and carbonatite deposits. The results were submitted in a final report to the Government in May. The project was a followup to a study completed by British Sulphur Corp. Ltd. in 1983, which investigated the phosphatic limestone overlying the carbonatite. Ekono completed 2,000 meters of inclined and vertical core drilling, and proved out sufficient carbonatite reserves to support a 20-year, 100,000-ton-per-year cement manufacturing plant. The reserves were identified at depths below 150 meters. Further progress on developing cement and fertilizer industries at Matongo-Bandaga was under way at yearend with in-depth marketing studies by the

International Bank for Reconstruction and Development (World Bank). Further financial studies on constructing cement and fertilizer plants at the site were still needed.

Coring results of the phase III nickel project were released by the project contractor, Exploration und Bergbau GmbH of the Federal Republic of Germany. Results of the phase work, which involved analyzing cores from 55 holes and 2,500 meters of exploration drilling, were favorable and the Government hopes to attract foreign mining concerns for a joint venture project to exploit the deposit.

During the year, Elkem A/S of Norway completed a reserves study of the Mukanda iron-vanadium deposit of central Burundi and submitted a final report to the Government. The project was sponsored in part by the African Development Bank. The coring study proved out 15 million tons of ore reserves grading 0.5% vanadium. This was considered sufficient reserves and grade potential for a followup feasibility study to evaluate the overall economics of large-scale exploitation of the deposits. Efforts were under way at yearend to secure financing for the recommended study.

With assistance from France's Bureau de Recherches Géologiques et Minières (BRGM), geophysical prospecting within Muyinga Province was completed during the year. Belgium researchers completed their fieldwork for constructing a geological map of the country. Ongoing at yearend were geologic studies by a research team from the Federal Republic of Germany investigating the country's cassiterite and bastnaesite deposits, with an aerial geophysical survey under way. A project sponsored by the United Nations Development Program (UNDP) for mapping out mineral deposits with economic potential was in the last phase and expected to be completed in 1986.

Table 1.—Other countries of East Africa: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Country and commodity	1981	1982	1983	1984[p]	1985[e]
BURUNDI[2]					
Clays: Kaolin	2,000	[e]2,000	4,053	1,990	[3]4,360
Gold troy ounces	[e]100	[e]100	272	1,115	[3]829
Lime	283	302	[e]300	42	[3]1,100
Peat	[e]9,500	[e]14,000	13,293	14,000	[3]10,313
ETHIOPIA[2]					
Cement, hydraulic[e]	130,000	[r]145,000	[r]170,000	240,000	250,000
Clays: Kaolin	9,000	[e]9,000	[e]9,000	NA	NA
Gold, mine output, metal content troy ounces	[3]11,930	12,000	14,000	15,000	15,000
Gypsum and anhydrite, crude[e] cubic meters	[3]4,200	4,000	4,000	[r]4,000	4,000
Petroleum refinery products:					
Gasoline thousand 42-gallon barrels	798	801	855	[e]900	[3]849
Kerosene and jet fuel do.	230	466	465	[e]500	[3]478
Distillate fuel oil do.	1,344	1,493	1,514	[e]1,500	[3]2,149
Residual fuel oil do.	2,224	2,173	2,033	[e]2,000	[3]1,377
Other do.	37	129	146	[e]150	[3]122
Refinery fuel and losses do.	696	548	475	[e]500	[3]544
Total do.	5,329	5,610	5,488	[e]5,550	[3]5,519
Platinum, mine output, metal content[e] troy ounces	125	125	125	125	150
Pumice cubic meters	[r]30,305	[e]30,000	5,625	[e]6,000	6,000
Salt:					
Rock[e]	15,000	15,000	15,000	15,000	15,000
Marine	110,000	110,000	110,000	120,000	120,000
Stone, sand and gravel:					
Limestone[e]	[3]5,500	5,000	5,000	5,000	5,000
Sand[e] cubic meters	[3]655,000	650,000	650,000	650,000	650,000
Other[e]	[3]1,970,000	2,000,000	2,000,000	2,000,000	2,000,000
KENYA[2]					
Barite	[e]6,000	--	300	210	[3]255
Carbon dioxide gas	[e]3,000	2,700	NA	3,161	[3]3,151
Cement, hydraulic thousand tons	[e]1,300	[e]1,300	1,280	1,164	[3]847
Clays:					
Bentonite	--	--	200	NA	NA
Kaolin	[e]1,400	1,077	650	295	[3]320
Corundum	--	(4)	NA	NA	NA

See footnotes at end of table.

Table 1.—Other countries of East Africa: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Country and commodity	1981	1982	1983	1984[p]	1985[e]
KENYA[2] —Continued					
Diatomite	[e]1,700	1,783	1,570	1,512	[3]3,082
Dolomite	--	--	1,920	2,865	3,000
Feldspar	[e]400	--	700	685	[3]692
Fluorspar	[r]96,025	88,726	59,084	46,578	[3]58,174
Gem stones, precious and semiprecious:					
Amethyst kilograms	--	3	5	17	10
Aquamarine do.	NA	(4)	4	7	[3]7
Garnet do.	NA	63	68	107	[3]90
Ruby do.	NA	--	98	187	[3]92
Sapphire do.	NA	33	--	NA	[3]100
Tourmaline do.	NA	11	37	13	[3]31
Gold, mine output, metal content troy ounces	[e]100	21	100	600	[3]442
Gypsum and anhydrite	--	300	1,350	[e]1,500	[e]1,500
Iolite	--	--	5,504	23,000	[3]24,000
Iron and steel:					
Iron ore:					
Gross weight	[r] [e]4,000	4,310	(5)	(5)	--
Iron content	[e]9,000	NA	NA	NA	NA
Steel, crude[e]	10,000	10,000	10,000	10,000	10,000
Kyanite kilograms	--	--	5,447	1,000	[3]1,000
Lime	[e]27,000	21,941	34,869	20,855	[3]27,860
Magnesite	[e]10	--	NA	311,254	[3]300,000
Petroleum refinery products:[e]					
Gasoline, motor thousand 42-gallon barrels	3,285	2,555	2,555	2,600	2,600
Jet fuel do.	3,650	3,285	2,555	2,600	2,600
Distillate fuel oil do.	4,015	3,285	3,285	3,300	3,300
Residual fuel oil do.	4,015	4,745	4,015	4,000	4,000
Unspecified do.	730	730	365	400	400
Refinery fuel and losses do.	730	150	365	400	400
Total do.	16,425	14,750	13,140	13,300	13,300
Phosphatic materials: Guano	[e]50	(4)	--	6	[3]6
Salt:					
Rock	[e]27,000	[e]45,000	[e]60,000	72,885	[3]66,330
Other	[e]21,000	24,411	[e]23,427	28,000	[3]25,800
Total	[e]48,000	[e]69,411	83,427	100,885	[3]92,130
Sodium compounds, n.e.s.:					
Soda, crushed, raw	[e]1,600	2,412	4,260	5,288	[3]5,441
Soda ash	[e]250,000	160,440	193,690	226,050	[3]227,760
Stone, sand and gravel:					
Calcareous:					
Coral (for cement manufacture)	[e]1,000,000	1,442,928	NA	NA	NA
Kunkur (for cement manufacture)	[e]125,000	NA	NA	NA	[3]230,000
Limestone (for cement manufacture)	[e]1,500,000	--	1,579,960	1,444,234	[3]1,333,000
Sand, glass	[e]25,000	NA	74	95	[3]100
Shale	[e]300,000	259,426	231,069	789,484	[3]750,000
Vermiculite	[e]2,600	1,556	[e]1,200	872	[3]1,515
Wollastonite	[e]50	--	--	--	--
LESOTHO[2]					
Diamond:					
Gem[e] carats	42,000	33,119	--	--	--
Industrial[e] do.	10,921	9,000	--	--	--
Total do.	52,921	42,119	--	--	--
Stone[e] cubic meters	25,000	25,000	25,000	25,000	25,000
MALAWI[2]					
Cement, hydraulic	77,926	53,453	70,318	70,058	65,000
Coal	--	--	--	2,000	5,000
Lime	NA	2,041	2,190	2,005	2,000
Stone: Limestone	116,118	79,758	109,186	[e]100,000	100,000
MAURITIUS[2]					
Lime	7,000	7,000	[e]7,000	[e]7,000	7,000
Salt	6,000	6,000	[e]6,000	[e]6,000	6,000
Stone: Basalt, not further described	1,083,500	942,000	[e]1,100,000	[e]1,100,000	1,100,000
MOZAMBIQUE[2]					
Asbestos	1,425	852	[e]800	[e]800	[3]55
Bauxite	--	--	--	--	[3]5,037

See footnotes at end of table.

Table 1.—Other countries of East Africa: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Country and commodity	1981	1982	1983	1984[p]	1985[e]
MOZAMBIQUE[2] —Continued					
Beryllium: Beryl concentrate, gross weight	7	8	6	[r] [e]6	6
Bismuth	4	4	1	NA	NA
Cement, hydraulic thousand tons	232	350	420	[e]450	450
Clays:					
Bentonite	716	1,455	250	405	[3]361
Kaolin	297	310	292	[e]300	[3]152
Coal, bituminous thousand tons	535	67	59	107	[3]20
Copper, mine output, salable ore and concentrate:					
Gross weight	880	1,455	1,189	1,573	[3]590
Metal content	194	310	250	291	118
Feldspar	775	696	817	[e]800	[3]67
Gem and ornamental stones:					
Aquamarine grams	2,558	1,881	2,246	2,400	3,600
Beryl, morganite do	697	198	28	96	50
Emerald do	6,399	3,819	3,531	4,200	5,000
Garnet kilograms	1,802	1,639	1,268	1,625	1,500
Rose quartz do	12,000	8,200	4,911	3,600	2,500
Tourmaline grams	2,937	19,593	1,597	6,000	1,500
Lime, hydraulic[e]	10,000	10,000	10,000	10,000	10,000
Marble cubic meters	167	561	406	575	[3]715
Mica, waste	300	148	309	[e]300	300
Monazite concentrate kilograms	4,267	3,065	4,141	[e]4,000	4,000
Petroleum refinery products:[e]					
Gasoline thousand 42-gallon barrels	[r]713	608	637	140	175
Kerosene and jet fuel do	[r]163	201	162	23	50
Distillate fuel oil do	[r]906	989	454	160	250
Residual fuel oil do	[r]1,022	1,288	652	487	500
Asphalt do	47	7	11	25	25
Total do	[r]2,851	3,093	1,916	835	1,000
Salt, marine[e]	28,000	28,000	28,000	28,000	28,000
Tantalum ores and concentrates, gross weight:					
Microlite kilograms	48,700	29,600	23,000	9,900	[3]6,283
Tantalite	34,100	21,600	13,900	6,700	[3]4,275
RWANDA[2]					
Beryllium: Beryl concentrate, gross weight	59	69	32	44	[3]27
Columbium and tantalum ores and concentrates: Columbite-tantalite, gross weight	57	62	50	52	[3]28
Gold, mine output, metal content troy ounces	1,200	286	623	240	[3]238
Lithium minerals: Amblygonite[e]	([5])	--	--	--	--
Tin:					
Mine output, metal content	[r]1,253	[r]1,159	1,068	1,093	[3]1,162
Smelter output, metal content	--	908	1,110	[e]1,000	[3]800
Tungsten, mine output, metal content	281	324	231	291	[3]310
SEYCHELLES[2]					
Guano[e]	4,500	4,500	4,500	4,500	4,500
SOMALIA[2]					
Salt, marine[e]	30,000	30,000	30,000	30,000	30,000
Sepiolite, meerschaum	--	9	[e]10	[e]10	10
SUDAN[2]					
Cement, hydraulic thousand tons	150	183	[e]200	176	[3]193
Chromium: Chromite concentrate, gross weight[e]	[3]25,515	19,000	20,000	20,000	[3]8,799
Gold, mine output, metal content[e] troy ounces	300	400	500	1,500	1,500
Gypsum and anhydrite, crude[e]	[r]8,000	[r]8,000	8,000	[3]8,000	[3]6,400
Manganese ore[e]	400	400	400	400	400
Mica, all grades	2,000	165	10	10	10
Petroleum refinery products:					
Gasoline thousand 42-gallon barrels	1,099	[e]1,000	[e]1,000	772	1,000
Jet fuel do	308	[e]300	[e]300	334	300
Distillate fuel oil do	2,198	[e]2,000	[e]2,000	1,438	1,500
Residual fuel oil do	2,419	[e]2,000	[e]2,000	1,690	1,500
Other do	241	--	--	216	--
Refinery fuel and losses do	[r]55	[e]300	[e]300	44	300
Total do	6,320	[e]5,600	[e]5,600	4,494	4,600

See footnotes at end of table.

Table 1.—Other countries of East Africa: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Country and commodity	1981	1982	1983	1984[p]	1985[e]
SUDAN[2] —Continued					
Salt	64,253	27,927	[e]75,000	[e]75,000	[3]38,467
SWAZILAND[2]					
Asbestos: Chrysotile	35,264	30,145	26,287	25,832	26,000
Coal, anthracite	157,701	115,043	101,652	124,569	125,000
Diamonds ——— carats	--	--	--	16,837	25,000
Stone: Quarry product ——— cubic meters	82,053	82,041	151,468	97,657	98,000
Tin, mine output, metal content	10	7	5	1	1
TANZANIA[2]					
Cement, hydraulic ——— thousand tons	393	[e]400	[e]420	370	[3]301
Clays:					
Bentonite	[e]50	[e]50	75	75	75
Kaolin	[e]750	[e]750	1,276	1,885	[3]1,636
Coal, bituminous	[e]1,000	[e]1,000	9,996	9,722	[3]20,000
Diamond[6] ——— carats	[e]250,000	[e]250,000	260,574	277,352	270,000
Gem stones, precious and semiprecious excluding diamond:[7]					
Amethyst ——— kilograms	[e]50	NA	NA	NA	NA
Aquamarine ——— do.	560	NA	NA	NA	NA
Beryl (gem only) ——— do.	[e]5	NA	NA	NA	NA
Chrysoprase and opal ——— do.	12	NA	NA	NA	NA
Corundum (gem only) ——— do.	[e]7	NA	NA	NA	NA
Garnet and rhodolite ——— do.	13	NA	NA	NA	NA
Ruby and sapphire ——— do.	[e]11	NA	NA	NA	NA
Scapolite ——— do.	[e]10	NA	NA	NA	NA
Tourmaline ——— do.	1	NA	NA	NA	NA
Zircon ——— do.	[e]4	NA	NA	NA	NA
Zoisite (tanzanite) ——— do.	1	NA	NA	NA	NA
Unspecified ——— do.	[e]10	NA	NA	NA	NA
Total[e] ——— do.	[r]684	650	[3]646	650	[3]646
Gold, refined[e] ——— troy ounces	400	600	800	[3]2,680	[3]1,776
Gypsum and anhydrite, crude[e]	12,000	12,000	12,000	12,000	[3]14,411
Lime, hydrated and quicklime[e]	6,800	6,800	[3]3,006	3,000	[3]2,472
Mica, sheet	5	5	(4)	(4)	(4)
Nitrogen: N content of ammonia[e]	6,000	6,000	6,000	6,000	6,000
Petroleum refinery products:					
Gasoline ——— thousand 42-gallon barrels	[e]800	[e]800	718	892	800
Kerosene ——— do.	[e]300	[e]300	174	213	300
Jet fuel ——— do.	[e]220	[e]220	200	259	220
Distillate fuel oil ——— do.	[e]1,050	[e]1,050	914	1,062	1,050
Residual fuel oil ——— do.	[e]1,750	[e]1,750	1,317	1,904	1,750
Liquefied petroleum gas ——— do.	[e]80	[e]80	54	63	80
Refinery fuel and losses ——— do.	[e]300	[e]300	290	330	300
Total ——— do.	[e]4,500	[e]4,500	3,667	4,723	4,500
Phosphate minerals: Apatite	--	--	[e]20,000	14,536	15,000
Salt, all types	[r] [e]36,800	[e]37,000	28,297	21,659	[3]21,108
Soda ash	--	--	--	298	300
Tin, mine output, metal content	9	9	6	[e]6	[3]2
UGANDA[2]					
Cement, hydraulic	6,695	17,015	[e]20,000	[e]20,000	20,000
Copper, mine output, metal content[e]	--	(5)	(5)	(5)	--
Lime, hydrated and quicklime	84	74	413	[e]500	500
Phosphate minerals: Apatite[e]	--	--	100	100	100
Salt, evaporated[e]	5,000	5,000	5,000	5,000	5,000
Tin, mine output, metal content	--	4	25	[e]25	25
Tungsten, mine output, metal content	1	4	4	[e]4	4

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Includes data available through Aug. 4, 1986.
[2]In addition to the commodities listed, modest quantities of unlisted varieties of crude construction materials (clays, sand and gravel, and stone) presumably are produced, but output is not reported quantitatively, and available information is inadequate to make reliable estimates of output levels.
[3]Reported figure.
[4]Less than 1/2 unit.
[5]Revised to zero.
[6]Diamond figures are estimated to represent 70% gem-quality or semigem-quality and 30% industrial-quality stones.
[7]Exports.

COMOROS

There were no commercially exploitable minerals yet discovered in the Republic of Comoros, an archipelago in the Mozambique Channel off the southeast coast of Africa. Of the four major islands, politically three of them were composed as an independent republic, while the fourth, Mayotte, was a French territorial community. The agricultural production of cloves, copra, vanilla, and ylang-ylang remained the archipelago's major export commodities. Virtually all mineral-related needs were imported. Only small sand and gravel pits were known to have been in operation. The islands had geothermal potential, which was under study for possible use as an energy alternative to costly imported petroleum fuels.

DJIBOUTI

Mineral production in Djibouti, the former French Territory of Afars and the Issas, was limited to locally used construction materials, a small amount of lime, and evaporated salt in 1985. Both the lime and salt operations in 1985 were new. The limestone deposits of Mangadafo were supplying the raw material for a refurbished lime kiln in the town of Dorale, which started up production in midyear, and a salt evaporation pan in the salt marshes of Tadjoura went into production at yearend. Djibouti's import costs in 1984 for lime and salt were approximately $100,000.[3]

In July 1985, the Government of Djibouti issued a request for contract bids for the Hanle-Gaggade geothermal project. The proposed contract program was for the drilling of four exploratory geothermal wells to a depth of 2,000 meters. Spudding of the first well was scheduled for early 1986.

ETHIOPIA

Little changed in Ethiopia's mineral sector in 1985. The country continued to produce small amounts of minerals for domestic consumption, including cement and gypsum, sand and gravel, and stone for general construction purposes; pumice; and rock and marine salt. Placer gold mining using hydromonitors produced some gold for export, while the country's sole petroleum refinery at the Red Sea port of Assab refined imported crude petroleum into products for domestic consumption. Overall, there was little economic growth, with coffee remaining the country's major foreign exchange earner. There were few positive developments in the minerals sector in 1985. An international conference was to have taken place in November to promote petroleum exploration in the country, but was postponed until early 1986. Approximately 25 blocks of concessional territory onshore and offshore, but primarily in the Ogaden area, were expected to be offered for contract exploration and development.

Geothermal studies were completed in early 1985 by the Italian company ELC-Electroconsult. An eight-hole drilling program in the Lake Langano region of the Rift Valley was completed with only moderately successful results reported. Geothermal testing and evaluations showed that well depths would have to be considerably deeper than expected to supply the heat necessary to serve the proposed aboveground 30-megawatt plant. At yearend, plans for the program were to continue developing the site, but scaling down the geothermal plant size to 5-megawatt capacity.

British Sulphur was retained by the National Chemical Corp. of Addis Ababa to undertake a feasibility study of local mineral deposits for production of sulfuric acid and the associated chemicals, aluminum sulfate and sodium sulfate. As part of the study, British Sulphur was to evaluate the possibility of building a fertilizer complex in Ethiopia. In 1984, the UNDP conducted a preliminary survey for phosphate deposits in the southern Ogaden area, and in 1985, Ethiopian geologists began a program to core drill in promising areas to establish grades and reserves. Ethiopia imported all of its fertilizer requirements in 1985, which were estimated at 90,000 tons of diammonium phosphate and urea.

With technical assistance from North Korea, iron ore deposits were discovered in the latter part of 1985, in Ethiopia's west-central Wollega region. Preliminary assessments were completed by project team geologists by yearend. The deposits were described as of good quality and large enough to easily meet Ethiopia's industrial needs through the end of this century.

Ethiopia had four cement plants in operation, with a total production capacity of 750,000 tons per year. The newest of the plants was 75 kilometers north of the city of Heleta. This dry processing operation, the Muger cement plant, was commissioned in 1984 with a production capacity of 300,000 tons per year. All of the plants had operational problems and were producing well under capacity.

KENYA

In 1985, the Kenyan economy showed improvement, with a growth rate of approximately 4%. The Government continued to emphasize increasing agricultural production and manufactured products for export to generate badly needed foreign exchange. The Kenyan Mines and Geological Department began drafting changes to the country's Mining Act during the year to make provisions for improving incentives for both local and foreign investment in the minerals sector. At yearend, except for a few small projects, there had been little new investment in the mining sector over that of the previous decade.

Based on the petroleum legislation of 1984, replacing the Oil Production Act of 1924, exploration activities in Kenya continued to increase in size and scope, with several international petroleum companies active in 1985. Petroleum exploration was being given a high priority by the Government, as petroleum imports continued to be a heavy financial burden, accounting for approximately 40% of the country's total export revenues.

The Kenyan Fluorspar Co. Ltd. exported approximately 64,000 tons of acid-grade fluorspar during the year, a substantial improvement over that of the previous 2 years. Also in 1985, the company began a program to reduce phosphorus impurities in the fluorspar concentrate, which had been adversely affecting sales, and expected to reach a plateau of a fourfold reduction of the phosphorus content by as early as mid-1986. The company expanded the beneficiation plant's flotation circuit by 50%, and added a new drum filter to effect the impurity reductions.

Production of polished marble for the construction industry began in 1985 by the Athi River Mining Ltd. Also during the year, the company marketed montmorillonite clay for the first time, and started up a small talc operation to satisfy local demands. The African Diatomite Industries Ltd. continued with modernization work at its Gilgil plant in the Rift Valley. The Magadi Soda Co. continued to increase production at its mining and processing complex south of Nairobi.

An ongoing exploration program, sponsored by the Government of Finland since 1980, continued with evaluations of a number of industrial mineral deposits. In the Kario Valley, limestone deposits were studied with the intention of developing a local cement industry. Deposits of apatite, kaolin, and wollastonite were also being evaluated for quality and reserves estimates. The UNDP was sponsoring a 6-month drilling program to evaluate a manganese-copper deposit near Kisii. The Samburu-Marsabit geological mapping project, which was being sponsored by the Government of the United Kingdom, was nearing completion at yearend.

Private companies began mining and trading gold during the year. The San Martin Co. began mining gold near Kisumu, the Sabimu Exploration and Mining Co. began alluvial operations in West Pokot, and the Gold Trade and Mining Co. began alluvial operations and also bought gold from artisans panning local rivers. The establishment of these private companies, with both mining and trading rights, was expected to assist the Government in accounting for more of the alluvial gold panned annually from Kenya's rivers.

Four of Kenya's ten petroleum exploration blocks were under active exploration at yearend. Seven international petroleum companies were involved in both onshore and offshore exploration activities. The companies were Amoco Kenya Petroleum Co., Fina Exploration Kenya S.A., Mobil Petroleum Kenya, Marathon Exploration Kenya, Compagnie Française des Pétroles (CFP)-TOTAL, Petro-Canada International Assistance Corp., and the Union Oil Co. of California. All of the contract agreements combined were valued at $168 million,[4] a total to be expended over an 8-year period. Exploratory drilling by Petro-Canada and Union Oil was expected to begin in Block 4 at the beginning of 1986. Drilling in the other active blocks was scheduled for 1987.

Amoco had signed an exploration agreement for Block 10 in northwestern Kenya in November 1984, and in 1985, concluded separate exploration agreements for two other exploration blocks, Blocks 2 and 3, in central-eastern Kenya. Seismic work in Block 10 was expected to be completed in the latter part of 1986, with drilling of at least two required wells to begin early in 1987. No exploration wells were required under the Block 2 and 3 agreements signed in 1985, with only modest seismic programs required to be completed under each of the 3-year agreements. The Block 2 agreement included Fina as a partner, with a 25% interest in the concession. Amoco, with a 75% interest in Block 2, was the operator of the concession.

Table 2.—Kenya: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1981	1982	Destinations, 1982: United States	Destinations, 1982: Other (principal)
METALS				
Aluminum: Metal including alloys:				
Scrap	616	317	--	Japan 136; India 106; Pakistan 55.
Semimanufactures	94	80	--	Rwanda 42; Uganda 20.
Copper: Metal including alloys:				
Scrap	388	272	--	West Germany 120; Belgium-Luxembourg 53; Netherlands 32.
Semimanufactures	7	29	--	Uganda 28.
Iron and steel: Metal:				
Scrap	24	16	--	All to Netherlands.
Pig iron, cast iron, related materials	--	5	--	All to Tanzania.
Steel, primary forms	142	57	--	Do.
Semimanufactures:				
Bars, rods, angles, shapes, sections	3,327	5,703	--	Rwanda 2,160; Sudan 1,121; Uganda 829.
Universals, plates, sheets	2,414	2,817	--	Uganda 688; Yemen (Aden) 636; Rwanda 458.
Hoop and strip	27	61	--	Rwanda 34; Djibouti 21.
Rails and accessories value, thousands	$2	$6	--	Sudan $5.
Wire	507	1,193	--	Uganda 912; Burundi 164.
Tubes, pipes, fittings	786	959	--	Rwanda 486; Sudan 177; Ethiopia 134.
Castings and forgings, rough	3	2	--	All to Zaire.
Magnesium: Metal including alloys, scrap	5	13	--	West Germany 8; Netherlands 5.
Nickel: Metal including alloys:				
Scrap	20	97	--	Netherlands 75; Belgium-Luxembourg 22.
Semimanufactures	--	1	--	Mainly to Uganda.
Silver: Metal including alloys, unwrought and partly wrought value, thousands	$4	--		
Zinc:				
Oxides	10	3	--	Tanzania 2; Uganda 1.
Metal including alloys:				
Scrap	500	173	--	India 106; Belgium-Luxembourg 67.
Semimanufactures	404	28	--	Israel 25; India 2.
Other:				
Ashes and residues	--	150	--	All to India.
Base metals including alloys, all forms	138	--		
INDUSTRIAL MINERALS				
Boron materials: Oxides and acids	1	99	--	All to Yemen (Aden).
Cement	661,039	765,967	--	Sri Lanka 170,594; Oman 136,951; Mauritius 120,623.
Chalk	118	507	--	Uganda 330; Rwanda 105; Burundi 70.
Clays, crude	138	42	2	Rwanda 20; Somalia 20.
Diamond: Gem, not set or strung value, thousands	$21	$20	$11	West Germany $9.
Diatomite and other infusorial earth	703	511	--	Republic of South Africa 360; India 60; Zimbabwe 40.
Feldspar, fluorspar, related materials	59,303	74,889	--	U.S.S.R. 70,751; Japan 4,125.
Fertilizer materials: Manufactured:				
Ammonia	2	3	--	Uganda 1; Zaire 1.
Nitrogenous	28	372	--	Tanzania 342; Uganda 30.
Phosphatic	50	30	--	All to Rwanda.
Potassic	18	30	--	All to Uganda.
Unspecified and mixed	11	8	--	Sudan 5.
Graphite, natural	1	--		
Lime	70	665	--	Uganda 650.
Mica:				
Crude including splittings and waste	2	--		
Worked including agglomerated splittings	3	2	1	Burundi 1.
Phosphates, crude	--	5	NA	NA.

See footnotes at end of table.

Table 2.—Kenya: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1981	1982	Destinations, 1982: United States	Destinations, 1982: Other (principal)
INDUSTRIAL MINERALS —Continued				
Pigments, mineral: Iron oxides and hydroxides, processed	8	15	--	Burundi 10; Uganda 4.
Precious and semiprecious stones other than diamond:				
Natural ______ value, thousands	$985	$720	$35	West Germany $551; Switzerland $42; Japan $26.
Synthetic ______ do	$18	$2	--	All to Thailand.
Salt and brine	103	63	--	Tanzania 50; Sudan 3; Uganda 2.
Sodium compounds, n.e.s.:				
Carbonate, natural[2]	124,947	136,469	--	Thailand 23,700; Singapore 21,851; Malaysia 12,300.
Sulfate, manufactured	2,001	210	--	Belgium-Luxembourg 125; Tanzania 45; Rwanda 25.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	--	14	--	All to France.
Worked	13	22	8	Uganda 12; Switzerland 2.
Gravel and crushed rock	161	3	--	Uganda 2; France 1.
Sand other than metal-bearing	58	17	--	Somalia 10; unspecified 7.
Sulfur:				
Elemental:				
Crude including native and by-product -- value, thousands	$1	--		
Colloidal, precipitated, sublimed	2	1	--	All to Burundi.
Sulfuric acid	13	92	--	Uganda 46; Tanzania 21; Burundi 18.
Talc, steatite, soapstone, pyrophyllite	--	20	--	All to Burundi.
Other: Slag and dross, not metal-bearing	--	6	--	All to France.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	134	--		
Petroleum refinery products:				
Liquefied petroleum gas thousand 42-gallon barrels	12	9	--	Mainly to Uganda.
Gasoline, motor ______ do	872	738	--	Uganda 348; Rwanda 198; Burundi 115.
Mineral jelly and wax ______ do	2	1	--	Mainly to Uganda.
Kerosene and jet fuel ______ do	1,788	1,447	--	Uganda 358; unspecified 964.
Distillate fuel oil ______ do	1,278	1,098	--	Uganda 384; Rwanda 141; unspecified 307.
Lubricants ______ do	122	108	--	Uganda 34; Tanzania 8; unspecified 21.
Residual fuel oil ______ do	5,390	3,088	--	Singapore 1,448; Djibouti 198; unspecified 1,116.
Bitumen and other residues ______ do	16	1	--	Mainly to Burundi.
Bituminous mixtures ______ do	20	1	--	Do.

NA Not available.
[1]Table prepared by Virginia A. Woodson.
[2]May contain other crude nonmetals.

Table 3.—Kenya: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1981	1982	Sources, 1982: United States	Sources, 1982: Other (principal)
METALS				
Alkali and alkaline-earth metals	NA	3	--	United Kingdom 2.
Aluminum:				
Ore and concentrate	--	6	--	All from Netherlands.
Oxides and hydroxides	5,607	1,574	8	India 1,495.
Metal including alloys:				
Scrap	45	62	--	Uganda 36; unspecified 16.
Unwrought	305	935	--	United Kingdom 437; Spain 149; Bahrain 100.
Semimanufactures	1,650	1,926	25	Tanzania 530; West Germany 305; United Kingdom 247.
Cobalt: Oxides and hydroxides	40	25	--	West Germany 21; Netherlands 4.
Copper: Metal including alloys:				
Unwrought	63	64	--	All from Zambia.
Semimanufactures	1,033	1,072	25	United Kingdom 647; Australia 86; Japan 71.

See footnotes at end of table.

Table 3.—Kenya: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1981	1982	Sources, 1982: United States	Sources, 1982: Other (principal)
METALS —Continued				
Iron and steel:				
Iron ore and concentrate: Pyrite, roasted	12,747	29	--	Spain 14; Switzerland 14.
Metal:				
Scrap	81	36	--	All from Uganda.
Pig iron, cast iron, related materials	99	2,919	--	Brazil 2,000; United Kingdom 817.
Ferroalloys:				
Ferromanganese	291	190	--	West Germany 92; Belgium-Luxembourg 69.
Unspecified	342	451	--	Japan 302; West Germany 67; Norway 50.
Steel, primary forms	11,322	15,031	--	West Germany 8,307; United Kingdom 3,044; East Germany 1,105.
Semimanufactures:				
Bars, rods, angles, shapes, sections	28,610	26,535	50	Zimbabwe 3,933; United Kingdom 3,593; Japan 3,329.
Universals, plates, sheets	120,316	103,981	5	Japan 67,226; United Kingdom 13,912; West Germany 5,028.
Hoop and strip	756	1,075	2	Poland 332; United Kingdom 276; Japan 267.
Rails and accessories	474	326	1	United Kingdom 324.
Wire	15,979	6,814	3	Poland 2,307; Belgium-Luxembourg 1,477; West Germany 964.
Tubes, pipes, fittings	5,323	4,115	102	West Germany 1,637; India 794; United Kingdom 200.
Castings and forgings, rough	23	18	--	United Kingdom 17; Japan 1.
Lead:				
Oxides	29	22	--	France 10; West Germany 8.
Metal including alloys:				
Scrap	202	155	--	All from Bahrain.
Unwrought	197	178	--	Zambia 120; United Kingdom 33.
Semimanufactures	31	17	--	United Kingdom 12; West Germany 2.
Manganese:				
Ore and concentrate, metallurgical-grade	2,089	1,407	--	All from Singapore.
Oxides	21	29	--	Japan 20; West Germany 3.
Nickel: Metal including alloys, semimanufactures	16	15	4	China 5; West Germany 5.
Silver: Metal including alloys, unwrought and partly wrought value, thousands	$2	$7	--	All from United Kingdom.
Tin: Metal including alloys:				
Scrap	1	10	--	Do.
Unwrought	1	16	--	United Kingdom 14.
Semimanufactures	190	129	--	United Kingdom 125.
Titanium: Oxides	1,141	1,530	19	West Germany 790; United Kingdom 419; Belgium-Luxembourg 75.
Zinc: Metal including alloys:				
Scrap	--	175	--	Uganda 125; Burundi 22.
Unwrought	5,146	3,460	--	Zambia 2,226; Netherlands 415; Canada 399.
Semimanufactures	456	392	--	West Germany 330; Japan 51.
Other:				
Oxides and hydroxides	124	85	23	West Germany 25; Netherlands 24.
Base metals including alloys, all forms	1	4	--	China 3; United Kingdom 1.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	7	35	4	India 16; Japan 11.
Artificial: Corundum	42	--		
Grinding and polishing wheels and stones	58	76	NA	United Kingdom 42; Czechoslovakia 12; India 8.
Asbestos, crude	865	530	--	Republic of South Africa 407; Canada 123.
Boron materials: Oxides and acids	7	62	--	Belgium-Luxembourg 37; United Kingdom 23.
Clays, crude	1,396	1,382	462	India 500; United Kingdom 324.
Diatomite and other infusorial earth	499	130	30	West Germany 50; United Kingdom 29.
Fertilizer materials:				
Crude, n.e.s	47	--		
Manufactured:				
Ammonia	86	198	--	West Germany 181; Netherlands 9.
Nitrogenous	62,992	70,808	--	Netherlands 40,420; West Germany 9,551; Japan 8,889.
Phosphatic	36,157	28,200	--	Republic of Korea 15,000; Israel 12,200.
Potassic	5,855	20,951	--	Norway 13,700; Sweden 7,250.
Unspecified and mixed	101,662	9,648	4,209	Netherlands 3,200; United Kingdom 1,000.
Gypsum and plaster	40,070	15,745	--	Spain 15,670.
Magnesite	--	186	--	All from Brazil.
Mica:				
Crude including splittings and waste	119	10	--	All from United Kingdom.
Worked including agglomerated splittings value, thousands	$12	$7	--	United Kingdom $4; West Germany $2.
Phosphates, crude	--	29	--	India 28.

See footnotes at end of table.

Table 3.—Kenya: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1981	1982	Sources, 1982: United States	Sources, 1982: Other (principal)
INDUSTRIAL MINERALS —Continued				
Pigments, mineral: Iron oxides and hydroxides, processed	275	243	--	West Germany 114; United Kingdom 51; China 25.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$9	$1	NA	NA.
Synthetic do.	$4	--		
Salt and brine	28,476	2,395	--	Ethiopia 2,283.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	215	218	--	United Kingdom 121; West Germany 48; Denmark 20.
Sulfate, manufactured	15,037	9,220	--	Belgium-Luxembourg 1,620; Romania 1,500; Italy 1,200.
Stone, sand and gravel:				
Dimension stone, crude and partly worked	1	113	--	India 96; United Arab Emirates 17.
Gravel and crushed rock	18	--		
Quartz and quartzite	4	81	--	Belgium-Luxembourg 75.
Sand other than metal-bearing	132	85	--	United Kingdom 40; Sudan 25; Switzerland 20.
Sulfur:				
Elemental:				
Crude including native and byproduct	1,500	538	20	Poland 250; Switzerland 200; West Germany 66.
Colloidal, precipitated, sublimed	1,374	350	--	Mainly from West Germany.
Sulfuric acid	2	2	(2)	West Germany 1.
Talc, steatite, soapstone, pyrophyllite	4,539	3,291	2	India 3,077; United Kingdom 97.
Other: Crude	311	860	--	India 689; United Kingdom 121.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	126	--		
Carbon black	2,827	1,642	354	Israel 856; West Germany 315.
Coal:				
Anthracite and bituminous	90,929	46,505	--	Mozambique 30,807; Republic of South Africa 15,543.
Briquets of anthracite and bituminous coal	20	--		
Coke and semicoke	342	509	--	United Kingdom 304; West Germany 165.
Petroleum:				
Crude thousand 42-gallon barrels	18,409	15,570	--	Saudi Arabia 7,077; United Arab Emirates 4,095; Oman 1,328.
Refinery products:				
Liquefied petroleum gas do.	4	8	--	All from Singapore.
Gasoline, motor do.	61	300	--	France 93; Israel 83; United Kingdom 62.
Mineral jelly and wax do.	23	11	--	West Germany 4; China 3; Japan 1.
Kerosene and jet fuel do.	405	88	--	United Kingdom 48; Netherlands 22; Belgium-Luxembourg 18.
Distillate fuel oil do.	162	301	NA	United Kingdom 155; Bahrain 106.
Lubricants do.	384	155	27	Italy 62; United Kingdom 32; Australia 30.
Residual fuel oil do.	44	115	NA	NA.
Bitumen and other residues do.	49	1	--	Mainly from Netherlands.
Bituminous mixtures do.	7	--		
Petroleum coke do.	(2)	--		

NA Not available.
[1]Table prepared by Virginia A. Woodson.
[2]Less than 1/2 unit.

LESOTHO

During 1985, there were no commercial mining operations in Lesotho. The country's domestic mineral-related activities were limited to sand and gravel operations for local construction purposes. At yearend, the Republic of South Africa repatriated Lesotho mineworkers from the Republic of South Africa, which was expected to have grave economic consequences on Lesotho's foreign exchange earnings in 1986.

MALAWI

The most important mineral event of the year was the official opening of the country's first commercial-scale coal mine, at Kaziwizwi near Livingstonia in the Rumphi District. The underground operation was designed and opened by the Malawi Department of Mines with assistance from the Malawi Geological Survey Department (MGSD). The mine began producing in August under operational control of the parastatal firm Mineral Investment & Development Corp. (MIDCOR). MIDCOR was established early in the year by the Government to develop known mineral deposits within Malawi. MIDCOR was empowered by the Government to use public funds, private funds, or joint venture financial and/or technical arrangements with either domestic or foreign concerns. By yearend, MIDCOR had steadily increased the production rate and leveled off at 500 tons of coal per week. The coal produced had a heating value of approximately 13,000 British thermal units per pound, with an ash content of less than 15%.

A number of exploration projects were under way or being completed in 1985. The countrywide airborne geophysical program sponsored by the UNDP and conducted by Hunting Geology & Geophysics of the United Kingdom was nearing completion. Processing of data and compilation of maps for the almost 900,000 line-kilometers of survey was completed by yearend. The maps were to be studied during 1986 by the MGSD at its Zomba headquarters, and results were to be internationally disseminated in hopes of attracting established mining companies and other technical institutions to conduct further exploration studies of mineral deposits identified from survey maps.

France's BRGM completed a prospecting program during the year for columbium, tin, tungsten, and related minerals within the districts of Mangoche, Zomba, and Mulange. Public information on the results of the program was limited at yearend to confirmation by BRGM that traces of tin and tungsten were found in Malanje and Mangoche, respectively. The British Central Electricity Generating Board continued with an exploration program for uranium in the Karonga-Chitipa area. Preliminary investigations by the MGSD were well under way at yearend for phosphate and vermiculite deposits at Mlindi in the Mwanza District. The MGSD was also investigating the commercial potential of ceramic clays at Linthipe. The MGSD's Industrial Minerals Laboratory produced high-quality experimental pieces of ceramics from the Linthipe clay reserves, which were estimated at 14 million tons. The Malawi Development Corp. was granted a license during the year to exploit a kyanite deposit at Kapiridimba in the Nicheu District. Installation of a processing plant for the gypsum mining pilot operation, near Mponela in the central region, was under way at yearend.

Lime supplies for the construction industry continued to come from small-scale artisans and imports. About 180 wood-fired kilns were supplying approximately 45% of the industry's lime requirements. Some private mineral ventures experienced setbacks. Both BPB Malawi and Lonrho Malawi suspended operations at their respective vermiculite and monazite pilot mines and plants. Financial restraints were reported to be the problem in both cases.

MAURITIUS

Mauritius, an island situated about 800 kilometers east of Madagascar, remained basically an agricultural country in 1985, with sugar production accounting for over one-half of the country's export earnings. Mineral production was limited to stone and gravel quarrying for local construction, along with small salt and lime producing operations, also for domestic consumption.

MOZAMBIQUE

Important mining operations in the country in 1985 were all small. They were limited to asbestos, bauxite, bentonite and kaolin, coal, copper, limestone, microlite and tantalite, monazite, precious and semiprecious stones, and salt. Severe economic conditions continued to plague Mozambique. Owing to a number of factors, particularly the country's continuing civil insurgency problems, sectors such as agriculture and all forms of transportation continued to be severely impeded. Rail transportation problems in particular continued to stifle the coal mining and export sector.

An important addition to the mining industry was the startup of bauxite mining in Manica Province. The Zimbabwean mining firm E.C. Meikle (ECM) signed a mining agreement with the Mozambique Ministry of Mineral Resources in December 1984, and began extraction operations in mid-1985. ECM has supplied raw bauxite to aluminum sulfate manufacturers in Zimbabwe, for use in water purification and paper manufacturing within that country.

Lonrho Ltd. of the United Kingdom signed an exploration and mining agreement with the Government of Mozambique in June for four of seven concession blocks for gold mining in Manica Province. Both lode and alluvial mining was expected to be undertaken by Lonrho. Also in June, a protocol agreement was reached between the U.S. firm, Edlow Resources Inc. and the Government of Mozambique, under which Edlow would prospect and develop titanium deposits along the coast of Zambezia Province from the Quelimane area to the border of Nampula.

Graphite prospecting in the Ancuabe and Mazeze areas of the Cabo Delgado Province was to continue in 1986. Results of studies conducted during the 2-year period 1984-85, by a team of Bulgarian and Yugoslav geologists, identified large graphite deposits in these areas. Further assessment was needed to accurately estimate reserves and better assess the quality of the graphite. Other mineral deposits of asbestos, kaolin, beryl, garnet, copper, and chrome were also identified during the study.

Cia. de Pesquisa de Recursos Minerais (CPRM) of Brazil announced plans for a phase II coal exploration program in the interior Moatize region. Between 1982 and 1985, CPRM conducted a phase I study of coal reserves in the Mucanha Vuyi region. CPRM reported that positive results from the second-phase work could result in large-scale coal exploitation, infrastructural developments, and a large coal exporting industry for Mozambique. CPRM was a Brazilian parastal interested in future commitments from Mozambique to supply coal to Brazil.

Seismic studies for petroleum in northern Mozambique were completed by Esso Petroleum Co. and Shell Exploration Co., and plans were for the consortium to drill its first exploration well early in 1986. By yearend 1985, two drilling sites had been identified within the onshore Rovuma River Basin concession. Amoco International was preparing at yearend to drill its first well in the offshore Zambezi Delta. Drilling operations were expected to begin in February 1986. Work continued during the year, with assistance from East German and Soviet engineers on exploiting the natural gas deposits of the Pande area within the Inhambane Province.

REUNION

The economy of Reunion, an island in the Indian Ocean approximately 640 kilometers east of Madagascar, continued to be heavily dependent on the agricultural sector. Primarily a sugar grower and exporter, trade receipts in 1985 from this commodity accounted for a majority of the island's foreign exchange earnings. Reported mineral activity on the island was limited to small sand and gravel operations for local construction, and the operation of a 200,000-ton-per-year cement clinker grinding facility at Saint Denis, which manufactured cement mix from imported materials.

RWANDA

During 1985, the Rwandan mineral industry suffered a major setback, with the financial collapse of the country's sole mining company, Société Minière du Rwanda (SOMIRWA). SOMIRWA, owned 51% by Belgium's Compagnie Géologique et Minière des Ingenieurs et Industriels Belges and 49% by the Government of Rwanda, went into receivership in September after declaring a cessation of all payments in August. The ramifications on the country's economy were expected to be severe. Efforts were under way at yearend to restructure the industry and refinance SOMIRWA with major assistance from the World Bank.

Planning continued on a UNDP followup project for gold exploration in the Niugwe and Miyove areas of Rwanda. A previous UNDP project completed a considerable amount of geological, geochemical, and trenching work in the Niungwe area. The exploration potential for both areas was considered good. Niungwe was in the southwestern part of Rwanda near the Burundi border, and Miyove was situated approximately 65 kilometers northwest of Kigali. The proposed project would involve more geological mapping, sampling and geochemical testing, trenching, and some diamond drilling. The estimated project cost was $835,000[5] and expected to take 20 months to complete.

Rwanda continued to make strides in reducing its dependency on imported energy. Because of completion of small hydroelectric stations throughout the country, Rwanda's importation of electricity dropped from 60% of its total needs in 1980 to 10% in 1985. Other indigenous energy sources continued to be investigated. The European Economic Community (EEC) approved an aid project valued at approximately $800,000 for a feasibility study of large-scale exploitation of the Lake Kivu methane gas deposits. The project was to be a joint effort between Rwanda and Zaire. Efforts continued during the year on implementing a joint project between Burundi, Rwanda, and Zaire, for building and managing a power distribution network based on the Ruzizi Dam and other regional power stations. The project was being funded by the World Bank, EEC, the Great Lakes Economic Development Bank of Africa, and Italy.

SEYCHELLES

Seychelles is comprised of approximately 115 islands scattered over 1.15 million square kilometers of the Indian Ocean. The archipelago contains a core of granitic islands surrounded by sand cays and coral islands. The only mineral-related operations on the islands in 1985 were small sand and gravel operations for local construction and the collection and processing of guano for use domestically as fertilizer.

A geological study was completed in 1985 on the submerged banks and shelf areas of the islands' sedimentary basin by the Government of Seychelles, in expectation of releasing an international invitation to bid for petroleum exploration concessions in 1986. During the late 1970's and early 1980's, a considerable amount of petroleum exploration, including seismic testing and other geological studies, was completed within the archipelago's waters. However, no petroleum or natural gas deposits had been discovered as of yearend 1985.

SOMALIA

Commercial mineral activities in Somalia were limited to sepiolite (meerschaum) production for export. Small sand and gravel and stone operations existed for local construction projects, as well as sea salt extraction for domestic consumption. Some limestone and clay production was reported for the cement plant commissioned late in 1984 at Berbera, on the northwest coast.

Several international petroleum companies were interested in Somalia during 1985, particularly off the country's northern coastline. Based on the exploration success of Hunt Oil Co. in the Alif Oilfield of the Ma'rib-Jawaf Basin of the Yemen Arab Republic, international companies were speculating that the basin's petroleum deposits could well extend into northern Somalia. Occidental International Oil Inc. and Consolidated International Petroleum Corp., both of Vancouver, Canada, were negotiating separately in the latter part of 1985 for concessions off the northeast coast of Somalia. The Government of Somalia was granting exploration permits for 6 years and production licenses for 25 years. Occidental was interested in an area just north of the Hafun Peninsula on the eastern coast of Somalia. Royal Dutch/Shell was involved in exploration drilling activities off the north coastline of Las Koreh, as well as Italy's Azienda Generali Italiana Petroli S.p.A. (AGIP), which was conducting exploration drilling off Somalia's northeast coastline. Esso Exploration Juba S.A. and Royal Dutch/Shell were under way with geophysical studies within a 205,000-square-kilometer concession along the borders of Kenya and Ethiopia in southwestern Somalia.

Chevron International Ltd. signed an exploration agreement with the Government of Somalia for 4.05 million hectares of onshore and offshore concession. The three-block area of the agreement was along the northwest coast of Somalia and offshore in the Gulf of Aden. Chevron officials stated that geophysical work would begin in 1986 and continue until 1989, when a final decision on drilling would be made.

Little progress was reported regarding

the proposed commercial development of the uranium reserves in the Galgudud area. At yearend 1984, a proposed $300 million[6] project to construct a mine and 500-ton-per-year yellowcake processing plant had been envisioned by contractor Construtora Andrade Gutierrez S.A. of Brazil. The International Atomic Energy Agency had reported 12,000 tons of indicated uranium reserves in the Galgudud area, with 6,000 tons considered economically extractable. However, early in 1985, with the continued depressed state of the uranium industry, the major financial partner for the project, the Arab Mining Co., put the project's construction plans on hold.

SUDAN

The Sudanese economy continued to deteriorate, with the reported gross domestic product decreasing for the ninth consecutive year, in 1985 by an estimated 7.0%. Owing to a number of factors, including the general economy, continued civil strife, and famine problems throughout much of the country, a new Government came to power in April. By yearend, Sudan's external debt was estimated at $10 billion,[7] the country's imports had exceeded exports by 70% in value, and the industrial sector was operating at barely 25% of its capacity.

Sudan's mineral industry continued to be an insignificant contributor to the country's economy. Mineral commodities produced were cement, chromite ore, gold, gypsum, and salt. The total net value of mineral exports, chiefly chromite ore and gold, was approximately $2 million, and was less than 0.5% of the country's total export revenues.

Production of chromite decreased drastically in 1985, owing to continued severe financial difficulties within the Ingessana Hills Mining Co., the country's sole chromite mining operation. Through an agreement reached with the Government of Romania, equipment and technical assistance were expected in 1986.

In October 1985, Greenwich Resources Inc. began commercial-scale gold mining at its Gebeit operation in the Red Sea Hills, having completed approximately 1,000 meters of underground development tunnels and a shaft to reach Gebeit's Wadi Lode at approximately 140 meters depth, from which a majority of the ore was being extracted. Treatment of the gold ore was accomplished in a 300-ton-per-day gravity flotation cyanidation plant.

The mine was expected to steadily increase its production rate to an average of 14 kilograms per month, by October 1986. A cost analysis of the ore body in 1985 estimated a net value of $27 million; however, Greenwich expected to increase the reserve figure of 207,000 troy ounces of gold with further exploration. As of yearend, Greenwich had completed 29 diamond drill holes and 181 percussion holes at the Gebeit minesite, 250 kilometers northwest of Port Sudan. Greenwich held gold exploration rights to 46,000 square kilometers in the Red Sea Hills, and another 41,000 square kilometers in the Nile Valley and Nubian Desert.

Sun Sudan Oil Co., a subsidiary of Sun Oil Co. of the United States, was conducting exploratory drilling in a 220,000-square-kilometer area in central Sudan. The company spudded its first well in September near Dar 'Ogeil in the Kordofan area, 160 kilometers south of Khartoum. By yearend, Sun Oil had completed its first well, a second drilling was under way, and a third site had been located in the Blue Nile Province. No strikes were reported as of yearend. Sun Oil was also conducting further seismic survey work throughout 1985 within its central concession. Sun Oil was the operator of the concession, which was also held by Marathon Petroleum Sudan Ltd. and the state petroleum agency, General Petroleum Corp. of Sudan.

Between June 1984 and October 1985, Chevron drilled a total of eight dry wells at its Muglad site, south of Kordofan. Based on the poor results and insurgency problems that prevented development of its southern fields, Heglig and Unity, Chevron announced it was suspending drilling activities at yearend. With wells costing approximately $4 million each to drill, Chevron was anxious to cut back on unproductive expenditures, and decided to stop its drilling program and study the existing Muglad data. Chevron was to continue survey work in the Muglad and Blue Nile areas until March 1986. At that time, a decision on whether to begin drilling again was to be made.

The French oil company subsidiary, CFP-TOTAL, also ceased exploration activities in latter 1985 in its eastern concession near Gedaref. The company's reasons for halting operations were reported as technical problems with drilling equipment. Total also had a concession in the south adjacent and northwest of Chevron's Unity Field. Owing to the insurgency problems in the area, Total suspended its southern operations shortly after Chevron's suspension of southern operations.

SWAZILAND

Trade export revenues for Swaziland's mineral commodities increased almost 25% in 1985, to $15.0 million.[8] Increased sales of asbestos, coal, and diamonds all contributed to the overall increase. The total employment figure in the mineral sector also increased for the year, to 2,440. Underground miners made up approximately 40% of the work force. Earnings of mineral sector personnel totaled approximately $5 million.

Export sales of chrysotile asbestos increased marginally in total weight, to 24,829 tons. Owing to a unit price increase, sales receipts increased from $8 million to $9.6 million. Major export customers were Ireland, the Republic of South Africa, Taiwan, Thailand, the United Kingdom, and Zambia. In January, total ownership and management of the asbestos mine transferred from Turner and Newhall Ltd. of the United Kingdom, to Swaziland parastatal, Msauli Asbestos Ltd., established by the Government's investment fund agency, Tibyo Taka Ngwane (TTN).

The country's sole coal mine, the Mpaka Colliery, increased both production and export sales. Approximately 101,000 tons of coal was exported for a total of $2.55 million in receipts. Kenya's Bamburi Portland Cement Co. was the major export customer, receiving 75% of the tonnage, with the remainder being shipped to the Republic of Korea. Rail transportation to the port of Maputo in Mozambique continued to be a problem owing to civil strife within Mozambique. Ownership of the Mpaka Colliery changed hands from Swaziland Collieries, a subsidiary of Anglo American Corp. of the Republic of South Africa, to Emaswati Coal Pty., established by the Swaziland Government's TTN.

Diamond production increased at the new Dokolwayo Mine, which began production in 1984. Operations continued to be expanded in 1985, with a $2.5 million project initiated to increase the mine's processing plant capacity. Sales increased over 500% to almost $2 million, as approximately 26,000 carats was sold. Known diamond reserves of the minesite's kimberlite pipe were expected to support an open pit mining operation for approximately 8 years. As depths of the pitching kimberlite pipe become too great for surface mining, operations were expected to change to an underground mining scheme.

TANZANIA

The economy of Tanzania remained in a precarious state in 1985 and the country continued to suffer from a wide range of financial and material shortages. These included mining equipment and fuel, which hampered all mining and exploration activities. After general elections in October, the Ministry of Water, Energy & Minerals, became the Ministry of Minerals & Energy, with water concerns being transferred to another ministry.

Tanzania's State Mining Corp. (STAMICO) announced at midyear the discovery of several gold deposits in the Kahama District of the Shinyanga Region. The deposits were discovered during a 2-year comprehensive exploration project funded by the Finnish International Development Agency. Two Finnish exploration companies, Outokumpu Oy and the Kone Oy Corp., were the principal investigators. Gold reserves were estimated at 4.3 million tons of ore. As part of the project, a feasibility study estimated that 150,000 tons of ore per year could be mined and treated to produce 2,000 kilograms of gold for a minimum of 15 years. Together with STAMICO, the Finnish firms formed a joint venture company during the year, Kahama Gold Mines Ltd., which was expected to begin commercial exploitation of the deposits in 1989. Construction work on a treatment plant and development of an underground mine was under way at yearend, with commissioning of the mine expected within 30 months. STAMICO's ownership share in Kahama was 70%, while each of the two Finnish companies held 15% of the company assets.

Dar Tadine Al Unna (DTU) began drilling operations at its Buhemba site, an old gold mining location, in mid-1985. The company was investigating gold values in old tailing dumps and nearby alluvial deposits. DTU also began a program of buying gold from local artisan miners, regarding the artisans as subcontractors within the DTU concession areas. The Buck Reef gold mine had operational problems during the year that included frequent fuel shortages, flooding of lower mine levels, and disappointing gold recoveries.

At yearend, there were seven international petroleum companies active in Tanzania. Esso Exploration and Royal Dutch/Shell were in the latter part of 1985 drilling their second exploration well southwest of the capital, Dar es Salaam, as was the International Energy Development Corp. (IEDC), which was the operator of a 12,000-square-kilometer concession north of the capital in the Bagamoyo District. The Kuwait Foreign Petroleum Exploration Co. and Société National Elf Aquitaine of France were concession partners with IEDC. Amoco International obtained a 28,500-square-kilometer concession in April, near Lake Rukwa in the west-central area of Tanzania. Geophysical studies were to be completed within 2 years. AGIP, had a small concession, mostly offshore, near Mtwara in the southeast.

With an additional $8 million[9] in assistance allocated by the International Development Agency in June, the Government agency Tanzania Petroleum Development Corp. was to conduct further gas exploration and a market analysis for the Songo-Songo natural gas deposits, just offshore of Tanzania's southeast coast.

Diamond production at Tanzania's sole operation, the Mwadui Mine of Williamson Diamonds Ltd., continued throughout the year. The operation was an open pit approximately 300 feet deep, developed in the crater sediments and kimberlite tuffs. Diamond production for the first 9 months of 1985 was reported to be 221,623 carats.

During the year, a mineral exploration team sponsored by the UNDP investigated gold mineralizations in the greenstone belts of Geita and Nzega West, south of Lake Victoria. Using geological, geochemical, and geophysical techniques, the results obtained by yearend indicated that good grade values might continue over strike distances of several kilometers. The Government was planning a diamond drilling program to begin early in 1986.

A reconnaissance exploration team from the Federal Republic of Germany's Federal Institute for Geoscience and Natural Resources was evaluating areas in northern Tanzania during the last half of 1985. A program of exploration for gold and base metals in selected areas, financed and conducted by the West German institute, was expected to begin in mid-1986. The Tanzania Geological Division of the Ministry of Minerals & Energy continued an exploration program for gold, diamonds, and tin. Several kimberlite pipes were identified in the Shinyanga region, and recoveries from bulk sampling showed diamonds in both the kimberlite and overburden.

UGANDA

The country's mining industry as well as most sectors of the Ugandan economy continued to suffer from nationwide political and civil strife, lack of operating capital, mismanagement, and general neglect. The status of the mining industry was uncertain during the year, and little information was available concerning existing operations. A new Government came to power late in 1985; the second one installed in less than a year.

Two projects that continued to await stabilized civil and political conditions were the Tororo fertilizer project and rehabilitation of the Kilembe copper-cobalt mine. The reserves of apatite and pyrochlore ore in the Sukulu Hills of the Tororo District were estimated at 200 million tons, grading 13% phosphorus pentoxide. The Bearden Potter Corp. of the United States completed a feasibility study in 1984 that proposed an 80,000-ton-per-year superphosphate manufacturing operation based on the Sukulu Hills phosphate reserves and sulfuric acid feedstock manufactured from the large cobaltiferous pyrite tailing concentrates stockpiled at Kilembe. Part of the Kilembe rehabilitation project would be to recover the cobalt content from the tailing piles next to the existing underground mine. In June of 1985, Outokumpu of Finland presented a project proposal to Ugandan officials concerning the possible purchase of 60,000 tons of the stockpiled concentrates. Receipts from the sale of the cobaltiferous tailings would be used to fund a detailed study of mine area reserves and rehabilitation costs. Outokumpu also proposed constructing a tailings processing plant at Tororo for easy transfer of the sulfuric acid byproduct to the proposed Tororo fertilizer project.

The Lake Katse sodium chloride salt plant remained totally inoperative for the fifth consecutive year, and rehabilitation plans moved along slowly. The Swiss firm Silzer Escher Wyss Ltd. of Zurich conducted a study during the year that recommended a complete overhaul of the existing plant, or else scrapping it altogether. According to the study's conclusions, plant equipment was corroded beyond repair, and the plant's total rehabilitation cost was estimated at $14.2 million.[10] The study's rehabilitation recommendations were to install new processing equipment, expected to double the plant's capacity to 6 tons per hour of 98% pure salt, with an expected annual production of 45,000 tons. Uganda reported its total estimated annual consumption of 35,000 tons of salt in 1985. The Ugandan Development Corp., the Government agency responsible for the plant, funded the Swiss study estimated to cost $600,000. The plant's future was uncertain at yearend.

The petroleum exploration promotion project being funded by a $4 million World Bank loan was stalled during most of the year. Based on the positive results of seismic, aeromagnetic, and geophysical work carried out during 1983-84 under a U.S. International Development Agency project, the World Bank issued a tender for managing the exploration promotion project in April 1985. However, continued strife within the country was hampering project progress.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Burundi francs (FBu) to U.S. dollars at the rate of FBu123.00=US$1.00.

[3]Where necessary, values have been converted from Djibouti francs (DF) to U.S. dollars at the rate of DF180.50=US$1.00.

[4]Where necessary, values have been converted from Kenyan shillings (K Sh) to U.S. dollars at the rate of K Sh16.14=US$1.00.

[5]Where necessary, values have been converted from Rwandan francs (RF) to U.S. dollars at the rate of RF103.05=US$1.00.

[6]Where necessary, values have been converted from Somali shillings (So. Sh.) to U.S. dollars at the rate of So. Sh.40.61=US$1.00.

[7]Where necessary, values have been converted from Sudanese pounds (£S) to U.S. dollars at the rate of £S2.45=US$1.00.

[8]Where necessary, values have been converted from Swazi emalangeni (E) to U.S. dollars at the rate of E1.97=US$1.00.

[9]Where necessary, values have been converted from Tanzanian shillings (T Sh) to U.S. dollars at the rate of T Sh17.66=US$1.00.

[10]Where necessary, values have been converted from Ugandan shillings (U Sh) to U.S. dollars at the rate of U Sh1,000.00=US$1.00.

The Mineral Industry of Other West African Countries

By Ben A. Kornhauser[1]

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BENIN

Benin's industrial sector experienced severe economic and financial problems in 1985, including disappointing performances of the Onigbolo cement plant and the Semé Oilfield, plus a shortage of technically trained personnel and experienced management. Oil production remained about 7,000 barrels per day. Import and export trade between Benin and the United States remained minimal. Because much of Benin's outstanding external debt was in U.S. dollars, the stronger dollar greatly increased the debt burden.

The 1985 budget of $304 million[2] was composed of an investment budget of $194 million and a current budget of $110 million. Of the investment budget, 84% was expected to be externally financed. About $45 million was given to three priority projects: the joint Benin-Togo Nangbeto hydroelectric project scheduled for completion in 1986; drilling of new exploratory wells of the Semé petroleum project, and the Dassa-Parakou highway. The budget deficit was projected to exceed $43 million despite a decrease in projected revenue owing to an anticipated decline of 25% in import tax revenue, normally the largest source of Government revenue.

COMMODITY REVIEW

Crude oil production from the Semé Oilfield was about 7,000 barrels per day, equaling 1984 production. The Government encouraged other foreign oil companies to explore for onshore and offshore oil, outside the Semé Field. All crude oil was exported because there was no domestic refinery and was sold on the spot market in 1985 for about $68 million. Société Nationale de Commercialisation des Produits Petroliers was the sole importer and marketer of petroleum products.

In August, Benin terminated the service contract that Saga Petroleum A/S held on the Semé Oilfield and concluded a $2 billion agreement with Pan Ocean Oil Co. (Panoco) of Switzerland. The agreement covered increased production from the Semé Oilfield from 8,000 to 25,000 barrels per day within a year, continued development of oil and other mineral potential, and participation in fertilizer, hydroelectric, refining, and civil engineering projects. At yearend, the Panoco agreement was closed.

Table 1.—Other countries of West Africa: Production of mineral commodities[1]

Country[2] and commodity[3]	1981	1982	1983	1984[p]	1985[e]
BENIN					
Cement, hydraulic[4] ---------- metric tons--	297,000	314,542	300,000	300,000	[5]300,000
Petroleum, crude - thousand 42-gallon barrels--	--	--	1,000	2,500	2,500
Salt, marine[e] ---------- metric tons--	400	100	100	100	100
Stone: Gravel[e] ---------- do----	22,000	NA	NA	NA	NA
BURKINA FASO (formerly Upper Volta)					
Phosphate rock[e] ---------- thousand tons--	3	3	3	3	3
CAPE VERDE ISLANDS					
Pumice and related volcanic materials[e] metric tons--	10,000	NA	10,000	10,000	10,000
Salt ---------- do----	6,445	6,500	6,500	6,500	6,500
IVORY COAST					
Cement[e 4] ---------- thousand metric tons--	1,200	1,100	636	536	679
Petroleum:[6]					
Crude ------ thousand 42-gallon barrels--	2,220	3,278	8,760	9,960	8,060
Refinery products:					
Gasoline ---------- do----	[r]1,942	[r]1,896			
Kerosene and jet fuel ---------- do----	[r]899	[r]895			
Distillate fuel oil ---------- do----	[r]3,710	[r]3,536	NA	NA	NA
Residual fuel oil ---------- do----	[r]3,996	[r]4,029			
Liquefied petroleum gas ---------- do----	[r]75	[r]81			
Refinery fuel and losses ---------- do----	100	803			
Total ---------- do----	[r]10,722	[r]11,240	NA	NA	NA
MALI					
Cement, hydraulic ---------- metric tons--	20,000	27,000	20,000	25,365	[5]19,005
Gold, mine output, metal content[7] - troy ounces--	16,000	13,000	13,000	16,075	[5]16,075
Phosphate rock[e] ---------- metric tons--	5,000	10,000	10,000	3,250	[5]3,000
Salt[e] ---------- do----	4,500	4,500	4,500	4,500	4,500
Stone:					
Marble ---------- do----	500	NA	NA	NA	[5]769
Limestone ---------- do----	4,600	NA	NA	NA	NA
NIGER					
Cement, hydraulic ---------- do----	37,000	38,000	38,000	38,000	38,000
Coal ---------- do----	72,800	75,000	118,609	123,644	[5]150,635
Gypsum[e] ---------- do----	2,720	3,000	3,000	3,000	3,000
Molybdenum concentrate, metal content - do----	113	42	40	33	[5]32
Phosphate rock ---------- do----	6,000	1,000	1,000	1,000	1,000
Salt[e] ---------- do----	3,000	3,000	3,000	3,000	3,000
Stone, sand and gravel:					
Gravel ---------- cubic meters--	180,000	NA	NA	NA	NA
Sand ---------- do----	6,000	NA	NA	NA	NA
Tin, mine output, metal content -- metric tons--	55	41	40	76	[5]179
Uranium concentrate, U_3O_8 content ---- do----	5,137	5,014	4,041	3,276	[5]3,236
SENEGAL					
Cement, hydraulic ---------- do----	371,600	363,470	394,916	384,821	[5]406,890
Clays: Fuller's earth (attapulgite) ------ do----	32,973	98,999	100,375	115,498	[5]95,957
Petroleum refinery products:					
Gasoline ----- thousand 42-gallon barrels--	1,144	738	484	546	540
Jet fuel and kerosene ---------- do----	942	651	442	401	400
Distillate fuel oil ---------- do----	996	825	538	675	680
Residual fuel oil ---------- do----	1,593	1,200	566	786	790
Other ---------- do----	75	40	20	23	20
Refinery fuel and losses ---------- do----	186	147	137	233	230
Total ---------- do----	4,936	3,601	2,187	2,664	2,660
Phosphate rock and related products:					
Crude:					
Aluminum phosphate thousand metric tons--	199	279	1,187	279	[5]355
Calcium phosphate ---------- do----	1,500	902	1,254	1,932	[5]1,814
Manufactured:					
Aluminum phosphate, dehydrated do----	106	136	144	142	[5]200
Other[8] ---------- do----	5	5	3	[7]7	[5]8
Salt[e] ---------- metric tons--	140,000	160,000	170,000	165,000	[5]160,000
TOGO					
Cement products:					
Clinker -------- thousand metric tons--	602	868	693	154	--
Cement[9] ---------- do----	285	279	232	243	284

See footnotes at end of table.

Table 1.—Other countries of West Africa: Production of mineral commodities[1] —Continued

Country[2] and commodity[3]	1981	1982	1983	1984[p]	1985[e]
TOGO —Continued					
Iron and steel:[e]					
Crude thousand metric tons	5	5	2	--	--
Semimanufactures do	10	10	2	--	6
Phosphate rock, beneficiated product do	2,215	2,800	2,010	2,400	2,450
Salt[e] [10] metric tons	600	100	--	--	--
Stone: Marble, dimension[11] square meters	NA	15,087	5,177	5,317	[5]5,671

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Includes data available through Aug. 12, 1985.
[2]In addition to the countries listed, The Gambia and Guinea-Bissau, which are covered in the text of this chapter, presumably produced a variety of crude construction materials (clays, sand and gravel, and stone) and may produce gypsum, lime, and salt, but output is not reported quantitatively, and available information is inadequate to make reliable estimates of output levels.
[3]In addition to the commodities listed, a variety of crude construction materials (clays, sand and gravel, and stone) presumably is produced, but output is not reported quantitatively, and available information is inadequate to make reliable estimates of output levels.
[4]Output based entirely on imported clinker.
[5]Reported figure.
[6]Data are for years ending July 30 of that stated.
[7]Production for Soviet-Malian Mine.
[8]Products marketed under the trade names "Balifos" and "Phospal."
[9]One third of domestically produced clinker from limestone mined at Tabligbo, Togo, was used domestically for cement production. Ghana and the Ivory Coast each received one-half of remaining clinker output. Togo also imported clinker for the production of cement by Ciment du Togo.
[10]Togo's national refinery closed in 1981 and its salt company closed in 1982.
[11]The Société Togolaise de Marbrerie et de Matériaux also produced 1,205 metric tons of marble block in 1985.

BURKINA FASO
(formerly Upper Volta)

The country's secondary economic sector, which included mining and manufacturing, retained its 15% share of the gross domestic product (GDP) even though the GDP declined in 1985. Mining of phosphate rock continued as the principal mineral produced even though of negligible value. In the 1985 budget, capital spending rose 8%, twice that of 1984, and the debt-service ratio rose from 10% in 1983 to 19% in 1985 on Government revenues of $160 million.[3]

COMMODITY REVIEW

Although the Poura gold mine, operated by the Société de Recherche et d'Exploitation Minière du Burkina, was financed and commissioned, the extent of the production since operations resumed in October 1984, had not been reported. The Société Minières Coreò-Burkinabè (Somicob), which was formed in 1985, was owned 60% by the Government and 40% by the Government of North Korea. Somicob intended to explore further the gold deposits in the far north at Sebba that had been under investigation by North Koreans. Société des Mines du Sahel, 65% owned by the Government and 35% by the San Martin Mining Co. of the United States, continued to evaluate the feasibility of gold mining at Dori-Yalogo. Deposits at Bouroum and Kwademen had been studied earlier.

Financial support was not found for the Tambao manganese deposit although Eastern European countries had expressed interest in developing the relatively rich but small ore body. The project required an estimated $47 million to develop the mine and $60 million for a 228-mile railroad to link the mine to distribution points. In view of the depressed state of the manganese market, the project was held in abeyance.

Burkina, a nonproducer of petroleum or natural gas, met its petroleum requirements mainly through imports from an Ivory Coast company, Société Ivorienne de Raffinage (SIR), in which the Burkina Government was a small shareholder.

CAPE VERDE ISLANDS

The mineral industry remained limited to elementary construction materials and salt. The African Development Fund (ADF) approved a \$21.1 million[4] loan toward financing the \$28.9 million cement factory for domestic consumption on the Island of Maio. The European Investment Bank also agreed to lend \$4.2 million for the project. In June, Cimenterie du Cap-Vert was to be established, with the Government as the majority stockholder, to manage the 3-year project, which was scheduled to start in 1986. The plant would have a vertical clinker kiln with an output capacity of 175 tons per day and a crushing capacity of 12.5 tons per hour.

The Nigeria Trust Fund and the ADF were lending \$6 million and \$2.8 million, respectively, to construct a port facility to serve the cement factory and the existing salt mine and to deliver supplies to the island. The \$9.7 million project, managed by the Ministry of Housing and Public Works, involved construction of a 1,000-foot access road and ancillary buildings, and the supply and installation of handling equipment. The 2-year project also was to start in 1986.

THE GAMBIA

Mineral industry activity remained insignificant. The economy depended heavily on agriculture, which contributed about 50% of the GDP and which was affected severely by recent drought. Hopes for a mineral industry centered around heavy mineral sands, principally ilmenite, rutile, and zircon. Surveys indicated that mining operations were feasible only if production coincided with a significant prolonged upturn in the zircon market. However, 1985 did not provide that upturn.

GUINEA-BISSAU

Mineral production was limited to unknown quantities of crude construction materials. The majority of the country's trade was with Eastern and Western Europe, particularly Portugal.

Guinea-Bissau substantially eased its laws governing oil and gas leasing and extraction and established very favorable terms for foreign enterprise. The International Court at the Hague resolved the dispute between Guinea-Bissau and Guinea regarding ownership of their territorial waters where offshore oil prospecting had occurred. The Court's arbitration panel bisected the sovereignty of the waters, enabling both countries to prospect for offshore oil.

France was planning a \$180,000 program to study the exploitation of phosphates in the north. The study would include mining, land transport, and sea shipments.

IVORY COAST

The Ivory Coast relied largely upon agriculture, which contributed a quarter of the \$6.8 billion[5] GDP and employed 80% of the labor force. Coffee and cocoa accounted for approximately 50% of the foreign exchange generated from exports in 1985. Twenty-five percent of the hydraulic cement production was exported and was valued at \$11.3 million. The near self-sufficiency in petroleum production helped the economy measurably.

The total debt in 1985 amounted to \$6.8 billion with debt servicing amounting to about \$1.1 billion before rescheduling and \$625 million after rescheduling. The estimated values of exports and imports were \$3.75 and \$2.16 billion, respectively, leaving a positive balance of \$1.59 billion. The special investment and equipment budget was \$226 million, a 57% reduction compared with that of 1984.

Mining was not a major activity although gold and diamond deposits were known. The previous large investment in hydroelectric power generation was productive again after the 2-year drought of 1983-84. The long-planned Soubre Dam complex was in abeyance in light of the possibilities of using gas-fired turbines and inability to finance the dam at present.

In mid-1985, the fall in oil prices stopped offshore exploration, particularly since offshore oil had been found only in small deposits in deep water. The exploitation of offshore fields, which began in 1980, made the country about 85% self-sufficient in petroleum. Production in 1985 was estimated at 22,000 barrels per day.

COMMODITY REVIEW

Gold.—The Ivory Coast Syndicate, owned 60% by Eden Roc Mineral Corp. and 40% by Dibi Resources Inc., continued its drilling and evaluation of the Asupiri No. 1 and Aniuri Zones. The property was believed to contain several horizons containing gold mineralization and alluvial accumulations of exploitable material.

Mineral Fuels.—Natural gas had been found in sufficient quantity to consider its exploitation for power generation, industrial and household use, and process heating at the Abidjan oil refinery. Phillips Petroleum Co. and the Government had been discussing the development of offshore gas reserves near Jaqueville. Two wells and a 35-mile, 8-inch pipeline were necessary to deliver gas for electricity generation from the field in B-1 block.

Abidjan was the site of the SIR refinery. SIR, which had a capacity of 30 million barrels per year, refined about 70% of the country's crude oil and imported crude. Gulf Oil Trading (now Chevron Corp.) contracted with SIR to process 5 million barrels of crude in 1985 because SIR's capacity far outstripped domestic demand.

MALI

The mineral industry still consisted of the production of cement, gold, phosphate rock, for local consumption, and salt. There was increased activity in the exploration for and production of gold. Although Mali had few proven mineral resources, extensive geological surveys, underwritten by sponsors such as the U.S.S.R., France's Bureau de Recherches Géologiques et Minières (BRGM), and the United Nations Department of Technical Cooperation for Development, identified mineralization of gold, phosphate rock, bauxite, iron ore, and uranium in several areas. The country's landlocked situation, coupled with poor transportation links and infrastructure and the worldwide depression in commodity prices, militated against mineral exploitation, except for gold.

The Kalana gold mine, which operated in 1985, was developed with the U.S.S.R.'s financial and technical assistance. It was operated by the Société de Gestion et d'Exploitation des Mines d'Or de Kalana (SOGEMORK) under the state-owned Société Nationale des Recherches Minières (SONAREM). Production was valued at $2.3 million.[6] At full capacity, output from processing 65,000 tons of ore per year was expected to be 58,000 troy ounces of gold and 15,000 troy ounces of silver. Exploration of the area continued as did plans for increasing processing capacity. A company, owned by BRGM and Mali, was considering the development of another gold mine at Loulo.

Transportation constraints of the landlocked country limited phosphate production to the domestic market. Various international development funds and countries financed highway and electric power projects whose purposes were to help Mali's development. The 1985 projections for GDP, trade deficit, and external debt were comparable to those of 1984.

NIGER

The mining industry, the most important factor in Niger's economy, continued to derive most of the country's foreign exchange from uranium sales from two operating mines. Uranium sales, amounting to $218 million,[7] provided less than 10% of the Government's total revenue. The other components of the mineral industry were small but welcome contributors to the economy. France obtained about 50% of its uranium by purchasing the majority of Niger's uranium production, paying a premium price of approximately $75 per kilogram on a long-term contract. Servicing the public debt, both domestic and foreign, absorbed about 30% of the budget. The situation was exacerbated by the rising strength of the dollar, in which 51% of the external debt was held. Total indebtedness was about 54% of the 1985 GDP.

Niger's principal trading partner was France, followed by Nigeria, which supplied most of Niger's petroleum products and was a major purchaser of animal exports. Trade with the United States was insignificant. Other trading partners were Western Europe and Japan. Japan mainly purchased uranium from the country and exported electronic equipment and vehicles to it.

A Japanese consortium, International Resources Corp., planned to resume prospecting for uranium in two districts that it had investigated previously. An economic feasibility study of both deposits would follow the drilling of 55 exploratory holes.

BRGM made a preliminary aeromagnetic exploration of the diamond potential of the Liptako-Gourma region in accordance with an agreement of the French Cooperation Mission with Niger. The Liptako region was located in the northeastern part of the West African craton, which was a kimberlite-bearing area. BRGM proposed widening its survey to include other minerals.

Niger's Parc W phosphate rock reserves were examined to determine their potential use in manufacturing fertilizer for domestic use. A partially acidulated phosphate rock would require less acid to convert the phosphate rock into a form other than superphosphate. Parc phosphate was in this category. Most of the country's fertilizer in 1985 came from Nigeria.

SENEGAL

The primary mineral resource that was exploited industrially was phosphate. However, attapulgite production from the areas from which Société Senegalaise des Phosphates de Thies mined phosphates quadrupled compared with that of 1983. Because of factors such as Senegal's budgetary crisis, falling oil prices, and reduced iron ore demand, exploitation of sizable localized deposits of lignite, peat, and iron ore were not favored by the International Bank for Reconstruction and Development or foreign investors. Investment was favored for mineral projects that required less up-front financing of support infrastructure and plant construction, and could be on-stream in shorter time frames. Senegal's debt service was about 26% of export revenues.

France continued as Senegal's principal trading partner. Phosphate production decreased 2% while phosphate exports increased 2.3% compared with those of 1984. Of the phosphate exported, Western Europe and Eastern Europe received 45.4% and 32.6%, respectively. The major recipients, in descending order, were France, 30.6%, the Netherlands, 19.6%, Yugoslavia, 19.0%, Poland, 13%, and Belgium, 12.8%. The United States only imported 3.6% of the product.

COMMODITY REVIEW

Iron Ore.—Early in the year, Romania signed an agreement to furnish $150 million[8] and technical assistance to build a railway and a port to export ore produced by Société des Mines de Fer du Senegal Oriental (Miferso). The loan would be repaid by yearly shipments of 1.5 million tons of iron ore concentrate when the mine operated. The cost of the port and railway was estimated at $770 million. Of the 371 million tons of proven reserves, the deposits were of the following sizes, in million tons: Koudekourou, 261; Karakaeni, 60; and Couroudiako, 51.

The ore, which averaged 53.5% iron, could be enriched easily to 83% iron. The Miferso project required an investment of $635 million to produce the targeted 6 million tons per year. If the 190-mile railway were built connecting the mines with Tambacounda, the railway would open the Senegal Oriental Province to other mining activities and better commerce. The potential impact of the iron ore exports plus the provision of employment for about 3,000 persons kept the project hopes alive.

Petroleum.—The dispute over the Senegal-Guinea Bissau territorial water boundary had not been settled. However, significant oil shows in earlier drilling presumed eventual resumption of exploration. Most offshore testing concentrated on the Casamance region of southern Senegal that bordered Guinea-Bissau.

TOGO

The mineral industry relied primarily on the production of phosphate rock, which accounted for 10% to 15% of GDP. Exports of the mineral accounted for about 35% to 46% of Togo's foreign exchange. The Office Togolais des Phosphates (OTP), Togo's state mining company, handled both the production and sales of the phosphate rock concentrate. During the year, the Société Commerciale des Potasses et de l'Azote assisted in marketing phosphate products. Privatization of state-run companies, although advocated, proceeded slowly and mainly through leasing.

Phosphate rock exports decreased 11.4% compared with those of 1984. Togo exported

2.4 million tons of phosphate, of which Eastern and Western Europe imported 89% of the phosphate concentrate. The major customers, with their purchases shown in thousand tons, were France, 532; the Netherlands, 341; Yugoslavia, 332; Poland, 227; and Belgium, 222.

Ciment du Togo (CIMTOGO), the only operating cement company, exported 60,000 tons. The Société Togolaise de Marbrerie et de Matériaux (SOTOMA), two-thirds owned by the Government, exported 1,182 square meters of marble valued at $24,293.[9] Since SOTOMA operated at a loss for several years, the Government sought to sell or lease the company to foreign private investors.

COMMODITY REVIEW

Cement.—The Société Ciments de l'Afrique de l'Ouest (CIMAO), which closed in 1984, remained shut. The Governments of Ghana, Ivory Coast, and Togo, which jointly owned CIMAO, were studying how to make the plant viable and did not expect to reopen it before 1987. CIMTOGO, jointly owned by Togo and Norcem Ciment A/S of Norway, imported all the clinker used in its cement production. Norcem purchased L. Lambert Freres et Cie.'s Ets. S.A.'s share in 1984.

Iron and Steel.—Société Togolaise de Sidérurgie (STS), the U.S. owned company that leased Togo's steel mill, rerolled used rails into strip. Used rails plus Spanish billets were the feedstock for rebars. The rails were imported from Italy, the Ivory Coast, and Spain. STS also was cutting small ships into scrap, which it expected to sell to Italy and Spain. Rolled steel output for 1985 was expected to be 7,000 tons for domestic use and 5,000 tons for export.

Petroleum.—Unocal Togo Ltd., which took over Texaco-International (Togo) Ltd.'s (formerly Getty International (Togo) Ltd.) agreement with Togo for exclusive exploratory drilling rights, was to drill offshore the Port of Lome in 1986. The test was to go to 6,250 feet and was based on Texaco's previous seismic data. The venture, owned 60% by Togo and 40% by Unocal, provided for profit sharing, which was to be figured after cost recovery. Togo did not produce any petroleum products. Its state-owned refinery was closed, and it depended entirely on imported supplies. The refinery tankage was expected to be leased to a private company and to be reactivated in late 1985 for fuel storage.

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[1]Physical scientist, Division of International Minerals.
[2]Where necessary, values have been converted from Communauté Financiére Africaine francs (CFAF) to U.S. dollars at the rate of CFAF462=US$1.00. The official CFAF exchange was maintained and freely convertible at 50CFAF per French franc.
[3]Where necessary, values for Burkina Faso have been converted from CFAF to U.S. dollars at the rate of CFAF478=US$1.00.
[4]Where necessary, values for Cape Verde have been converted from Escudos (Esc) to U.S. dollars at the rate of Esc80=US$1.00.
[5]Where necessary, values for Ivory Coast have been converted from CFAF to U.S. dollars at the rate of CFAF450=US$1.00.
[6]Where necessary, values for Mali have been converted from CFAF to U.S. dollars at the rate of CFAF330=US$1.00.
[7]Where necessary, values for Niger have been converted from CFAF to U.S. dollars at the rate of CFAF455=US$1.00.
[8]Where necessary, values for Senegal have been converted from CFAF to U.S. dollars at the rate of CFAF449=US$1.00.
[9]Where necessary, values for Togo have been converted from CFAF to U.S. dollars at the rate of CFAF445=US$1.00.

The Mineral Industry of the Islands of the Caribbean

By Doris M. Hyde[1]

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BAHAMAS

The Bahama's petroleum-dominated minerals sector constricted again in 1985. The declines were mostly the result of a soft market demand for crude oil and petroleum products. In early 1984, it was a growing unprofitability that prompted Charter Oil Co. to cease using the 350,000-barrel-per-day Bahamas Oil Refining Co. facility that it jointly owns with Chevron Oil Bahamas Ltd. After midyear 1985, because of poor petroleum economics, Chevron announced it would close the refinery, leaving only a maintenance crew. In 1984, the refinery exported less than 26 million barrels of petroleum products. Chevron's throughput was reported as averaging about 8,000 barrels per day at the time of the announcement.

The crude oil transshipment terminal also registered declining activity and financial losses in 1984 and 1985. Transshipments of petroleum in 1985 amounted to about 100,000 barrels per day, one-half as much as in 1982.

Tenneco Oil Co. was granted a third petroleum exploration license that increased its total concession area to over 2 million acres in 19 contiguous blocks. In December, Tenneco became the first of the licensed companies to spud a wildcat in the Bahamas offshore area. The wellsite was about 150 miles southwest of Nassau and 50 miles north of Cuba.

Table 1.—Islands of the Caribbean: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Country[2] and commodity	1981	1982	1983	1984[p]	1985[e]
BAHAMAS[3]					
Cement, hydraulic thousand tons	29	[e]64	26	--	--
Petroleum refinery products[e] thousand 42-gallon barrels	68,650	70,810	62,780	[r]44,000	6,000
Salt thousand tons	970	816	862	[e]870	850
Stone:					
Aragonite do.	3,423	3,049	2,337	[e]2,200	2,000
Limestone, for cement manufacture do.	532	--	--	--	--

See footnotes at end of table.

Table 1.—Islands of the Caribbean: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Country[2] and commodity	1981	1982	1983	1984[p]	1985[e]
BAHAMAS[3] —Continued					
Sulfur, byproduct of petroleum[e] thousand tons	5	5	5	[r]3	1
BARBADOS[3]					
Cement, hydraulic do	--	--	--	[e]150	200
Gas, natural:					
Gross[e] million cubic feet	450	550	[r]752	[r]893	900
Marketed do	[4]284	[e]350	[e]360	[e]370	370
Petroleum:					
Crude thousand 42-gallon barrels	211	[e]265	380	635	690
Refinery products do	[4]1,408	[e]1,455	[e]1,480	[e]1,500	1,500
CUBA[3 5]					
Cement, hydraulic thousand tons	3,292	3,163	3,231	3,347	3,160
Chromite do	21	27	34	38	40
Cobalt[6]	1,715	[e]1,500	1,621	1,397	1,420
Copper, mine output, metal content	2,908	2,645	2,667	2,701	3,140
Gas, natural:					
Gross[e] million cubic feet	1,450	2,000	2,300	2,300	2,400
Marketed do	470	378	293	120	120
Gypsum[e] thousand tons	130	127	130	130	130
Iron and steel: Steel, crude do	330	301	364	338	375
Lime do	140	[r]146	153	151	150
Nickel:					
Mine output, Ni-Co content of oxide and sulfide	40,260	37,600	39,257	33,227	33,800
Metallurgical products, Ni content:[6]					
Granular oxide and powder	8,487	9,001	9,342	8,447	8,500
Oxide sinter	12,115	11,750	11,542	8,894	9,000
Sulfide	17,943	15,346	16,752	14,489	14,880
Total	38,545	36,097	37,636	31,830	32,380
Nitrogen: N content of anhydrous ammonia thousand tons	167	98	86	172	200
Petroleum:					
Crude[7] thousand 42-gallon barrels	1,684	[r]3,600	4,937	5,125	5,800
Refinery products do	46,686	47,340	48,180	48,340	46,020
Pyrite, gross weight thousand tons	33	48	13	([8])	--
Salt do	161	198	180	184	185
Sulfur:[e]					
S content of pyrite do	14	20	5	([8])	--
Byproduct of petroleum do	8	8	8	8	8
Total do	22	28	13	[r]8	8
DOMINICAN REPUBLIC[3]					
Aluminum: Bauxite, dry equivalent, gross weight do	[r]405	[r]152	--	--	--
Cement, hydraulic do	[r]952	[r]948	1,104	1,143	1,150
Coal, subbituminous	--	--	--	--	600
Copper, mine output thousand tons	3	[e]3	[e]3	--	--
Gold thousand troy ounces	408	386	354	338	337
Gypsum:					
For cement manufacture thousand tons	[4]180	[e]180	[e]180	[e]180	200
Other do	[4]24	[e]30	[e]30	[e]30	30
Iron and steel: Ferroalloys, ferronickel[9]	[r]49,970	[r]14,375	52,278	63,966	68,824
Lime[e]	40,000	40,000	40,000	40,000	40,000
Mercury 76-pound flasks	77	49	[e]40	[e]30	20
Nickel:[9]					
Mine output, metal content	18,689	[r]5,376	19,552	23,923	26,000
Metal, smelter, Ni content of ferronickel shipments	18,679	5,484	21,200	24,220	[r]25,809
Petroleum refinery products thousand 42-gallon barrels	10,529	10,250	10,910	[e]11,000	11,300
Salt[e]	60,000	60,000	60,000	[r]60,000	60,000
Silver thousand troy ounces	2,034	[r]2,198	1,329	1,207	1,560
GUADELOUPE[5]					
Abrasives, natural: Pumice[e] thousand tons	240	240	240	240	240
Cement[e] do	160	160	160	160	160
HAITI[3]					
Aluminum: Bauxite, dry equivalent, gross weight do	427	377	--	--	--
Cement, hydraulic do	236	213	216	[e]220	220
JAMAICA[3]					
Aluminum:					
Bauxite, dry equivalent, gross weight do	11,682	8,378	7,683	8,937	[4]5,255
Alumina do	2,556	1,758	1,851	1,749	[4]1,513

See footnotes at end of table.

Table 1.—Islands of the Caribbean: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Country[2] and commodity	1981	1982	1983	1984[p]	1985[e]
JAMAICA[3] —Continued					
Cement, hydraulic ---------- thousand tons --	165	211	277	[r]261	[4]236
Gypsum ---------- do ----	180	108	108	180	[4]180
Lead, refined (secondary)[e] ----------	1,000	1,000	1,000	1,000	1,000
Lime ---------- thousand tons --	133	114	121	115	[4]86
Petroleum refinery products thousand 42-gallon barrels --	5,758	[e]6,100	8,366	8,243	8,300
Salt ----------	--	--	--	--	200
Silica sand ---------- thousand tons --	8	10	15	14	[4]16
Stone:					
Limestone ----------	--	--	--	83,000	100,000
Marble ----------	40	30	32	37	[4]50
Marl[e] ---------- thousand tons --	9,450	10,260	9,069	8,640	8,700
Sand and gravel[e] ---------- do ----	6,250	6,500	9,135	8,625	8,500
MARTINIQUE[3]					
Cement, hydraulic[e] ---------- do ----	180	200	200	200	200
Petroleum refinery products thousand 42-gallon barrels --	[4]4,357	[e]4,320	[e]4,300	[e]4,300	4,300
Pumice, converted from cubic meters thousand tons --	[4]156	[e]156	[e]150	[e]150	150
NETHERLANDS ANTILLES[3]					
Petroleum refinery products[e] thousand 42-gallon barrels --	217,700	158,100	[r]150,700	[r]139,000	20,000
Phosphate rock ---------- thousand tons --	--	--	3	19	20
Salt[e] ---------- do ----	[r]217	[r]272	202	[r]356	350
Sulfur, byproduct of petroleum ---------- do ----	[e]90	[e]90	87	63	25
ST. VINCENT[3]					
Salt ---------- do ----	50	50	50	50	50
TRINIDAD AND TOBAGO[3]					
Asphalt, natural ---------- do ----	23	30	49	31	[4]33
Cement, hydraulic ---------- do ----	139	189	390	405	[4]573
Gas, natural:					
Gross ---------- million cubic feet --	[r]197,845	[r]206,237	223,128	252,432	260,000
Marketed ---------- do ----	[r]68,883	[r]97,834	109,627	119,695	[4]124,197
Iron and steel:					
Iron, sponge ---------- thousand tons --	180	[r]218	302	239	[4]205
Steel, crude ---------- do ----	53	[r]179	210	199	[4]174
Semimanufactures (wire rod) ---------- do ----	29	[r]116	164	135	[4]103
Lead, refined (secondary)[e] ----------	2,000	2,000	2,000	2,000	2,000
Natural gas liquids[e] thousand 42-gallon barrels --	40	35	40	40	40
Nitrogen: N content of ammonia thousand tons --	[r]397	[r]701	993	1,080	[4]1,125
Petroleum:					
Crude ---------- thousand 42-gallon barrels --	69,112	[r]64,647	58,344	61,918	[4]64,290
Refinery products ---------- do ----	63,344	55,107	27,178	28,148	[4]29,678
Sulfur, byproduct of petroleum[10] thousand tons --	44	13	10	[e]7	([11])

[e]Estimated. [p]Preliminary. [r]Revised.

[1]Table includes data available through June 13, 1986.

[2]In addition to the countries listed, Antigua, Bermuda, Dominica, Grenada, Montserrat, and St. Lucia presumably produced crude construction materials (clays, sand and gravel, and stone), but output is not always reported, and information is inadequate to make reliable estimates of output levels. Antigua also has a petroleum refinery that was closed in 1976 but became operational again for a short period in 1982.

[3]In addition to the commodities listed, crude construction materials (lime, salt, sand and gravel, stone, etc.) may also be produced, but data on such production are not always available and information is sometimes inadequate to make reliable estimates of output levels.

[4]Reported figure.

[5]In addition to the commodities listed, iron ore and manganese ore presumably were produced during the period covered by this table, but available information is inadequate to make reliable estimates of output levels.

[6]Anuario Estadistico de Cuba provides figures on nickel-cobalt content of granular and powder oxide, oxide sinter, and sulfide production. Using an average cobalt content in these individual products of 0.9% in total granular and powder oxide, 1.1% in total oxide sinter, and 4.5% in total sulfide, the cobalt content of reported Ni-Co production was determined as being 1.16% of granular and powder oxide, 1.21% of oxide sinter, and 7.56% of sulfide. The remainder of reported figures would represent the nickel content.

[7]Cuba reports crude oil production in metric tons. A conversion to barrels was made using a factor of 6.652. Some published production figures indicate a need to use a conversion factor of 7.3 to balance the units of measurement. However, pending more accurate information, the original factor will continue to be used in this publication.

[8]Revised to zero.

[9]The Dominican Republic reports gross weight of ferronickel production. When official data are not available, figures for nickel content of mine production are determined from an average of 37.4% Ni contained in ferronickel production. Nickel content of ferronickel shipments is obtained from Falconbridge Dominicana C. por A. annual reports.

[10]Limited quantities of sulfur as a byproduct of natural gas may also be produced.

[11]Less than 1/2 unit.

BARBADOS

Contrary to a slowdown in the overall 1985 economy, the mineral industries expected to expand production in 1986 to meet an increased domestic demand for construction materials. After the almost 3% real growth recorded in 1984, the economy slowed to an estimated 0.3% increase in 1985 and experienced an inflation rate of almost 4%.

Mobil (Barbados) Ltd. invested $165,000 for a 70% expansion of asphalt production capacity to 22,000 gallons per day. An airport runway expansion and new road projects were responsible for the increased sales. Mobil is the owner of the small, local crude oil refinery.

Arawak Cement Co. Ltd. expected new public projects to continue the 1985 increase in domestic cement consumption. However, despite these increases, the cement plant was still only operating at 70% to 75% of capacity.

Two private U.S. investors sought to use the trade advantages of the duty-free provisions of the Caribbean Basin Initiative (CBI) to reopen an idled clay brick factory in the St. Andrew area. The new owners of the Building Supplies Ltd. plant expected to export as much as 90% of their floor and roof tile production to the United States. Clay brick tiles from non-CBI beneficiaries are subject to a 23% U.S. import duty. It may take as long as 5 years to bring the plant into full production utilizing clay mined in the eastern coastal area.

Cluff Oil Ltd. acquired 20-year exploration rights to a 403-square-mile area about 35 miles off the northeast coast of Barbados. Working with the state-owned Barbados National Oil Co., Cluff began seismic studies in April.

Development drilling since 1982 was responsible for the 146% increase in 1984 crude oil production from the Woodbourne Field. During this period, the level of petroleum self-sufficiency rose from 24% in 1982 to 52% in 1984. Although the rate of crude oil production increase was less in 1985, output was expected to satisfy at least 50% of domestic requirements.

CUBA

Real economic growth was just under the 5% goal projected for 1985. Mineral production maintained an overall growth, but declining petroleum prices lessened the benefit of increased volumes of crude oil and petroleum product exports and reexports on convertible currency earnings. In 1984, the reexport of petroleum became increasingly important as a source of convertible currency and netted Cuba an estimated $400 million.[2]

In 1985, gasoline was listed as a reexport commodity for the first time, and crude oil exports reportedly increased 65% over those of 1984. Even so, convertible currency earnings from petroleum were less than expected because of reduced price.

Venezuela and the U.S.S.R. again increased the volume of crude oil in their exchange agreement. Venezuela agreed to ship 40,000 barrels per day to Cuba in exchange for the shipment of the same amount by the U.S.S.R. to the Gelsenkirchen refinery in the Federal Republic of Germany. Both the U.S.S.R. and Venezuela benefit by saving about $1.00 per barrel per day in freight costs. These exchanges have been taking place since 1977, at which time shipments amounted to about 5,000 barrels per day.

Venezuela was also negotiating to sell Cuba 40,000 tons of steel and 30,000 tons of seamless pipe. Argentina, which had not previously been a market for Cuban nickel, reportedly ordered 162 tons of nickel sinter in 1985.

Gold production has not been reported from Cuba, but in November 1985, the Government announced it had reopened the Delita gold and silver mine on the Island of Juventud, about 140 kilometers south of Havana. The mine had been reported closed because of flooding.

Although no details were reported, a small manganese mine initiated production in July in Cambute, Santiago de Cuba Province. Output was expected to be utilized in the manufacture of dry batteries. Also in July, a small zeolite mine was opened in Villa Clara Province. Production was expected to be used in agriculture, as an animal feed additive, and for some industrial applications. Natural zeolites in Cuba were previously reported as being high in calcium content and low in sodium. In addition to being used in animal feed, production has been used to treat waste water from the Nicaro nickel processing plant, for gas purification, and in the production of pozzolanic cement. Cuba benefits from the initiation of small mining operations because they allow a certain reduction in import requirements, could extend exports, enhance regional development, use domestically manufactured equipment, and require a small capital investment. Marble quarrying and, more recently, salt extraction have also gained importance for their export potential.

The new Comandante Che Guevara nickel oxide sinter plant at Punta Gorda did not open in late 1985 as scheduled. The plant was rescheduled to begin production in January 1986. The $800 million facility was not expected to produce more than 7,500 tons of nickel sinter in 1986 because construction for its full 30,000-ton-per-year capacity will not be completed until at least November of that year.

Cuba's domestic crude oil production continued an upward climb. Based on confirmed reserves, the Government expected annual output to exceed 13 million barrels by 1990. With assistance from the U.S.S.R., the Government is emphasizing new exploration studies in Pinar del Río Province, off the coast of Matanzas Province, and in Cárdenas Bay. Matanzas is less than 100 miles from Cay Sal in the Bahamas, where active oil exploration programs were under way. About 96 onshore wells in the Matanzas region produced more than one-half of Cuba's 1985 crude oil.

Construction reportedly began on a $278 million oil complex at the Port of Matanzas and included a deepwater dock, pipelines, storage tanks, and treatment plants. The pipeline work included a 100-mile, 16-inch crude oil conduit from the port to the new Cienfuegos refinery, and two petroleum product lines, one a 28-mile, 12-inch line from Matanzas to a Havana powerplant, and one a 3-mile, 8-inch line extending to the Matanzas power station. A Spanish firm, Empresa Nacional de Ingeniería y Tecnología S.A., was awarded the contract to lay the two product pipelines.

A deep well drilled in the Varadero-Cárdenas District on the north coast, east of Havana, produced a lighter grade crude oil at the 7,870-foot depth than previously encountered in shallower wells.

Table 2.—Cuba: Apparent exports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Destinations, 1984
METALS			
Aluminum:			
Ore and concentrate	NA	432	All to Belgium-Luxembourg.
Ash and residue containing aluminum	360	410	All to Netherlands.
Metal including alloys, scrap	4,455	4,085	Do.
Chromium: Ore and concentrate, refractory grade	[2]28,897	[2]41,208	Austria 2,694; Canada 1,254; West Germany 1,072.
Copper:			
Ore and concentrate[2]	2,527	2,544	NA.
Ash and residue containing copper	131	227	All to Netherlands.
Metal including alloys, scrap	2,075	2,799	Do.
Iron and steel: Metal:			
Scrap	45,539	49,137	Italy 48,280; Netherlands 749; Japan 108.
Steel, primary forms	30,299	22,227	Turkey 16,987; Italy 5,240.
Semimanufactures	[2]112,003	[2]80,604	Singapore 4,952; Italy 1.
Lead: Metal including alloys, all forms	272	409	All to Netherlands.
Nickel:			
Matte and speiss	167	2,126	Italy 1,729; Austria 397.
Oxides and hydroxides, metal content[2] [3]	8,728	6,389	Czechoslovakia 2,438; U.S.S.R. 1,409; West Germany 680.
Sinter, metal content[2] [3]	15,277	13,810	Italy 2,821; West Germany 1,564; India 1,430.
Sulfide, metal content[2] [3]	17,448	16,457	All to U.S.S.R.
Metal including alloys, unwrought	NA	430	Japan 360; Austria 70.
Silver: Waste and sweepings value, thousands	$745	NA	
Zinc:			
Matte	NA	28	All to Netherlands.
Ash and residue containing zinc	532	463	Do.
Metal including alloys:			
Scrap	381	313	Do.
Unwrought	NA	300	All to France.
Other:			
Ores and concentrates	5,011	10,054	All to Sweden.
Oxides and hydroxides	NA	1,710	Italy 1,647; Japan 43; Belgium-Luxembourg 20.

See footnotes at end of table.

Table 2.—Cuba: Apparent exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Destinations, 1984
INDUSTRIAL MINERALS			
Cement[2]	213,107	224,728	NA.
Stone, sand and gravel: Dimension stone:			
Crude and partly worked	1,860	270	All to Italy.
Worked value, thousands	[2]$340	NA	
Sulfur: Elemental, colloidal, precipitated, sublimed	NA	2	All to Belgium-Luxembourg.
MINERAL FUELS AND RELATED MATERIALS			
Coal: Lignite including briquets	NA	25	All to Italy.
Petroleum:			
Crude 42-gallon barrels	592,182	632,645	Italy 411,067; Belgium-Luxembourg 221,578.
Refinery products:			
Liquefied petroleum gas do	NA	12,853	All to France.
Gasoline do	2,723,683	1,209,550	Netherlands 1,037,629; United Kingdom 171,921.
Kerosene and jet fuel do	NA	221	All to United Kingdom.
Asphalt do	NA	17,465	All to Canada.
Bitumen and other residues do	139	NA	

[p]Preliminary. NA Not available.

[1]Table prepared by H. D. Willis. Owing to a lack of official trade data published by Cuba, this table should not be taken as a complete presentation of this country's mineral trade. Unless otherwise specified, these data have been compiled from United Nations information and data published by the partner trade countries. The United States reported no trade in mineral commodities with Cuba in 1983 or 1984.

[2]Anuario Estadistico de Cuba, 1984.

[3]Includes contained cobalt.

Table 3.—Cuba: Apparent imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Sources, 1984
METALS			
Aluminum:			
Oxides and hydroxides	61	243	Japan 241; France 2.
Metal including alloys:			
Unwrought	23	35	All from United Kingdom.
Semimanufactures	15,738	386	West Germany 334; Italy 23; Japan 17.
Chromium, oxides and hydroxides	NA	15	All from United Kingdom.
Copper:			
Oxides and hydroxides	NA	46	All from West Germany.
Metal including alloys:			
Unwrought	31	NA	
Semimanufactures	264	2,277	Japan 1,104; United Kingdom 546; Canada 387.
Iron and steel:			
Iron ore and concentrate excluding roasted pyrite	NA	395	Netherlands 310; United Kingdom 85.
Metal:			
Scrap	97,445	NA	
Pig iron, cast iron, related materials	NA	70	Mainly from France.
Steel, primary forms	47	46	United Kingdom 42; West Germany 4.
Semimanufactures:			
Bars, rods, angles, shapes, sections	8,195	8,342	West Germany 3,960; Belgium-Luxembourg 2,679; Austria 1,002.
Universals, plates, sheets	[2]670,131	[2]781,336	Japan 18,229; West Germany 814; Belgium-Luxembourg 574.
Hoop and strip	304	997	West Germany 575; Japan 314; Belgium-Luxembourg 108.
Rails and accessories	26	155	All from France.
Wire	1,095	3,254	United Kingdom 1,131; France 721; Belgium-Luxembourg 616.
Tubes, pipes, fittings	[2]75,491	[2]94,917	Japan 5,544; France 1,263; West Germany 975.
Castings and forgings, rough	[2]182,213	[2]224,611	NA.
Lead:			
Oxides	282	1	All from United Kingdom.
Metal including alloys:			
Unwrought	1,173	140	United Kingdom 90; Netherlands 50.
Semimanufactures	444	1,428	Belgium-Luxembourg 1,100; West Germany 292; Japan 36.

See footnotes at end of table.

Table 3.—Cuba: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Sources, 1984
METALS —Continued			
Manganese:			
Ore and concentrate	375	456	All from Netherlands.
Oxides	206	501	All from Japan.
Metal including alloys, all forms	NA	15	All from Italy.
Mercury 76-pound flasks	NA	58	All from Netherlands.
Nickel: Metal including alloys:			
Unwrought	11	4	Do.
Semimanufactures	NA	7	Japan 4; West Germany 2; Canada 1.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$13	$37	All from Japan.
Silicon, metal	NA	370	All from Norway.
Silver: Metal including alloys, unwrought and partly wrought value, thousands	$2	$208	All from United Kingdom.
Tin: Metal including alloys, unwrought	82	40	Denmark 30; Belgium-Luxembourg 10.
Titanium: Oxides	28	101	West Germany 95; United Kingdom 6.
Zinc:			
Oxides	152	109	United Kingdom 87; France 18; Japan 4.
Metal including alloys:			
Unwrought	535	225	All from Netherlands.
Semimanufactures	33	57	Canada 56; West Germany 1.
Other: Base metals including alloys, all forms	17	18	Italy 15; Canada 3.
INDUSTRIAL MINERALS			
Abrasives, n.e.s.:			
Natural: Corundum, emery, pumice, etc	NA	1	All from Italy.
Artificial:			
Corundum	3	7	All from West Germany.
Silicon carbide	NA	150	All from Japan.
Grinding and polishing wheels and stones	6	48	Japan 38; Austria 8; West Germany 2.
Asbestos, crude	1,794	1,428	All from Canada.
Barite and witherite	2,552	NA	
Boron materials: Oxides and acids	326	345	Italy 342; Japan 1; United Kingdom 1.
Cement	24,903	4,202	All from Denmark.
Diatomite and other infusorial earth	32	31	Italy 30; United Kingdom 1.
Feldspar, fluorspar, related materials	22	232	Italy 200; United Kingdom 32.
Fertilizer materials: Manufactured:			
Ammonia	[2]16,276	[2]16,283	United Kingdom 10; West Germany 3.
Nitrogenous	[2]641,337	[2]626,786	Japan 30,750; West Germany 3.
Phosphatic (total)	342,351	310,336	NA.
Of which:			
Superphosphate, simple[2]	296,851	262,100	NA.
Superphosphate, triple[2]	45,500	48,236	NA.
Potassic (total)	340,208	353,406	NA.
Of which:			
Potassium chloride[2]	315,502	333,733	NA.
Potassium sulfate[2]	24,706	19,673	NA.
Unspecified and mixed	1,479	1,079	United Kingdom 807; Belgium-Luxembourg 244; West Germany 28.
Graphite, natural	233	586	Japan 583; United Kingdom 3.
Gypsum and plaster	158	158	All from West Germany.
Iodine	NA	2	All from Netherlands.
Magnesium compounds	12	NA	
Mica:			
Crude including splittings and waste	247	39	All from France.
Worked including agglomerated splittings	1	3	All from Japan.
Phosphates, crude	5,010	NA	
Pigments, mineral: Iron oxides and hydroxides, processed	64	74	West Germany 63; Japan 11.
Precious and semiprecious stones other than diamond: Synthetic value, thousands	$13	$22	All from Switzerland.
Salt and brine	NA	119	West Germany 63; United Kingdom 54; Switzerland 2.
Sodium compounds, n.e.s.: Carbonate, manufactured	6	6	West Germany 4; United Kingdom 2.
Stone, sand and gravel:			
Dimension stone, worked	23	NA	
Gravel and crushed rock	NA	20	All from France.
Quartz and quartzite	48	38	All from Sweden.

See footnotes at end of table.

Table 3.—Cuba: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Sources, 1984
INDUSTRIAL MINERALS —Continued			
Sulfur:			
Elemental, all forms	185,004	71,266	Canada 71,258; West Germany 7; United Kingdom 1.
Sulfuric acid	57	19	United Kingdom 10; West Germany 9.
Talc, steatite, soapstone, pyrophyllite	50	42	All from Japan.
Other: Crude	4,000	136	United Kingdom 135; Japan 1.
MINERAL FUELS AND RELATED MATERIALS			
Carbon: Carbon black	3,838	598	West Germany 592; United Kingdom 6.
Coal:			
Anthracite[2]	75,219	85,271	NA.
All grades including briquets	NA	364	All from Japan.
Coke and semicoke	[2]56,274	[2]54,590	Japan 700.
Petroleum:			
Crude thousand 42-gallon barrels	[2]50,090	NA	
Refinery products:			
Liquefied petroleum gas do	11	NA	
Gasoline, motor do	[2]2,121	(3)	Mainly from United Kingdom.
Mineral jelly and wax do	2	19	Japan 14; West Germany 3; Netherlands 2.
Distillate fuel oil do	[2]28,232	(3)	Mainly from United Kingdom.
Lubricants do	[2]854	315	Italy 155; France 127; United Kingdom 28.
Residual fuel oil do	[2]7,265	NA	
Bitumen and other residues 42-gallon barrels	745	1,006	United Kingdom 994; West Germany 12.
Bituminous mixtures do	NA	442	United Kingdom 315; Japan 127.
Unspecified value, thousands	[2]$53,400	NA	

[p]Preliminary. NA Not available.

[1]Table prepared by H. D. Willis. Owing to a lack of official trade data published by Cuba, this table should not be taken as a complete presentation of this country's mineral trade. Unless otherwise specified, these data have been compiled from United Nations information and data published by the partner trade countries. The United States reported no trade in mineral commodities with Cuba in 1983 or 1984.

[2]Anuario Estadistico de Cuba, 1984.

[3]Less than 1/2 unit.

DOMINICAN REPUBLIC

The commitment the Government made in 1983 to develop domestic mineral resources has been followed as vigorously as financial and other resources permitted. The Dirección General de Minería has taken advantage of foreign exploration and technological training assistance programs. These programs have been sponsored by the United Nations Development Program (UNDP), France, the Federal Republic of Germany, Japan, Sweden, and the United States among others. Especially notable has been the identification of many gold-bearing deposits as well as deposits of copper, lead, zinc, and various nonmetals. The exploration programs make the Dominican Republic one of the most dynamic mineral-active small countries in the Caribbean and Central America. However, except for small-scale amber, clay, coal, copper, and alluvial gold operations, the possible exploitation of other mineral deposits remain subjects for additional study.

Mining contributed about 4% to the 1985 gross domestic product (GDP). The economy declined by about 1% as measured in terms of 1980 dollars. Exports of doré bullion and ferronickel were about commensurate with 1984, and their combined $238 million value accounted for 31% of total exports.

The Government mining agency (Dirección General de Minería) worked with geologists from Heidelberg University of the Federal Republic of Germany in the investigation of copper, lead, and zinc deposits in the northwestern part of the country near the Haitian border in the Cordillera Septentrional. The existence of vein deposits was confirmed, but an economically minable deposit has not yet been established. Sampling has indicated gold values as high as 0.707 troy ounce per ton.

The 3-year-old cooperative exploration project of the Dirección General de Minería and Japan's metal mining agency entered the test drilling phase in 1985. The project involved geological mapping of about 2,000 square kilometers in the Cordillera Central areas of Mata Grande southwest of Santiago and San José de las Matas, and Las Cañitas to the west of Bonao and Constanza. Test drilling in the El Gramoso area of Las Cañitas yielded samples averaging 4.36% copper, 0.05% lead, 0.02% zinc, 0.006 troy ounce of gold per ton, and 0.074 troy ounce of silver per ton.

East of the general region under Japanese exploration, in the area known as El Yujo between Jarabacoa and San José de las Matas, the Spanish company Huellera-Vasco-Leonesa S.A. joined with the Government to establish a company to exploit a copper-gold-silver prospect found during regional explorations begun in 1979. The two entities share equal ownership of Cía. Mineral Dominicana El Yujo C.A. A drilling program was under way. Initial capitalization of the new company was $6 million,[3] and an investment of up to $15 million was expected by the time the company enters the exploitation stage.

The UNDP alluvial gold exploration project in the Miches and Bulla-Hato Viejo-Naranjo areas began in 1981 and was completed in 1985. The Dirección General de Minería was to continue with the investigations.

Rosario Dominicana S.A. geologists began exploration work in the Los Candelones area in the western region of the country where the Dirección General de Minería had initiated the Neita Reservas Mineras Fiscales (RMF) exploration studies in 1983. Test drilling and sampling encountered significant gold values in an oxidized zone, minor amounts of copper, and some lesser values of lead and zinc. The gold in one test hole assayed 1.46 troy ounces per metric ton. Los Candelones is in the southern part of the Neita RMF. Northward, in the Restauración area, drilling into a sulfide zone indicated the presence of gold. Although complex, the area appeared to tie in geologically and mineralogically with gold discoveries across the Haitian border in the Mount Organize-Milot areas.

The Dirección General de Minería began a program to assist in the organization of small labor-intensive mining cooperatives in rural areas. The Government does the prospect exploratory and evaluation work and then trains local workers on how to extract the ore and perform any administrative duties. These operations were designed to be self-sustaining and require a minimum investment for handtools and transport wagons. Alluvial gold recovery was the basis for establishing mining cooperatives to pan for gold in the rivers near the Haitian border in Dajabón Province. The cooperatives sell the gold to Rosario Dominicana. If successful, the Government expected to organize similar projects in other areas where alluvial gold prospects are favorable.

The Dirección General de Minería also discovered a copper deposit in the San Cristóbal area west of Santo Domingo. The agency expected to organize a cooperative to mine this deposit in 1986. The Instituto Technico Dominicana was to provide the cooperative with processing technology. Production was expected to be sold domestically to the artisan industry.

Another new mining project was developed near Hato Mayor in El Seibo Province where the mining agency began extracting low-grade coal at the rate of about 60 tons per month. The coal, mixed with a better grade imported from the United States, was used as fuel at the state-owned cement plant. Exploration work at the Hato Mayor coal deposits led to the discovery of amber and potter's clay. The mining agency began organizing cooperatives to exploit these two materials for sale to local artisans.

State-owned Rosario Dominicana continued to mine the oxide ore at its Pueblo Viejo gold-silver deposit at Cotui. Rosario Dominicana planned to start mining the underlying gold sulfide deposits at Cotui because of the expected depletion of oxide reserves in 1990. Fluor Corp. engineers were completing a feasibility study for mining the sulfide ore. Necessary new investment was estimated at about $300 million, and construction would require 4 years for development. Sulfide reserves were estimated sufficient for about 15 years of mining. The Government was seeking development financing from the Inter-American Development Bank. A $200,000 grant from the U.S. Trade and Development Program financed the Fluor feasibility study.

Rosario Dominicana continued investigations on a newly acquired concession generally identified as Pueblo Viejo II. The concession adjoins Pueblo Viejo to the southeast and includes the areas of El Callejón, Los Cacaos, and Monte Negro. Ore was reportedly being extracted from the Cumba and Mejita I and II Mines.

Falconbridge Dominicana S.A. planned a 5-week shutdown starting December 20,

1985. During this period, the company was to perform plant maintenance and a scheduled changeover of melting furnaces. An added benefit was the opportunity to reduce accumulating stocks of ferronickel.

Ideal Basic Industries Inc. of Denver, Colorado, finalized an agreement with the Aluminum Co. of America (Alcoa) for the purchase of the limestone operation in the southwest, near Cabo Rojo. Ideal wanted the dry limestone for use at its Theodore, Alabama, cement plant.

In addition to the Hato Mayor coal project, the Dominican Electric Co. (DEC) was interested in the lignite studies under way in the Sánchez-Samaná peninsular area in the northwest. DEC's future plans included the construction of a 125-megawatt generating plant in this general region, to be fueled by this lignite mixed with imported coal, possibly from El Cerrejon in Colombia. DEC would also like to establish the manufacture of lignite briquets to substitute for charcoal in household use. A similar project was under active study in Haiti.

HAITI

Changes in Haiti's construction-oriented minerals sector were insignificant. Cement from the state-owned plant continued to sell domestically for about $95 per ton, and production remained steady despite the considerably lower world price of between $50 and $60 per ton. Haiti does not export cement.

The economy slowed to reflect less than a 1% real growth rate in 1985 as the GDP reached an estimated $2 billion.[4] In 1985, the lack of foreign exchange resulted in oil shortages that added to electricity generation problems. Poor equipment maintenance, low water reservoir levels, and a lack of fuel caused power outages. The cost of electricity, at $0.14 per kilowatt hour to industrial users, was reported to be one of the highest in the Caribbean. Other infrastructure such as transportation, communication, and living standards remained poor. Freight rates from the major seaport facility at Port-au-Prince were considered high. Labor-management relations remained good and the minimum wage was $3.00 per day.

A U.S. company was rehabilitating the former underground Sedren copper mine at Mémé, about 18 kilometers from Gonaïves. Closed in the early 1970's because of low copper prices, it is now called the Mémé Mine. Originally, the mine produced 150,000 tons per year of 1.44% copper ore. The new owners purchased additional land for a possible open pit development capable of extracting several million tons of ore per year. The company estimated the eventual employment of 200 to 300 local workers. The mine was scheduled to reopen in July 1985, but infrastructural work may have caused a delay.

Investigations continued on developing an estimated 6 million tons of Miocene lignite resources in the Maïssade area of the Central Plateau. The feasibility of producing smokeless briquets was under study. Exploration and evaluation work continued on the gold deposits at Cap Haïtien, Grand Bois, and Milot. The Government published notices that it sought discussions with interested mining companies. First-phase drilling indicated gold values ranging from 0.193 troy ounce to as much as 2.06 troy ounces per ton. The UNDP and the United Nations Revolving Fund for Natural Resources Exploration were assisting Haiti in the gold deposit investigations.

JAMAICA

Faced with the imminent prospect of losing nearly two-thirds of its alumina production because of cutbacks in North American aluminum capacities and the two plant closures, Jamaica was forced to reverse its general divestiture policy and to take decisive action to reinstate at least a part of the lost capacity.

In 1984, Jamaica earned $220 million in foreign exchange from the bauxite production levy, royalty payments, and local cash inflows from domestic bauxite and alumina production. All mining operations contributed about 9% to the GDP and about 69% of total exports. In 1985, generally reduced output and the closure during the year of the two alumina company operations, reduced Jamaica's foreign exchange earnings from the bauxite production levy, royalties, and local costs to an estimated $150 million. The estimated GDP was $1.8 billion,[5] and in real terms, the economy declined by about

4%. Exports of sugar (down 45%), bauxite (down 54%), and alumina (down more than 25%) were primarily responsible for the overall 19% drop in the total value of exports. Bauxite and alumina represented 50% of the total value of exports. Unemployment declined slightly to 25%, and the rate of inflation was estimated to have declined slightly to 23% at midyear.

Competition from new international bauxite and alumina capacities and a need to establish markets to stimulate lagging domestic production caused the Government to become active in marketing efforts through the Bauxite and Alumina Trading Co. (BATCO). This company has been successful in arranging for barter and countertrade agreements, as well as cash sales of bauxite and alumina.

In 1985, the Government and Rothschild Bank A.G. formed a Zurich-based joint venture holding company, Jamaica Overseas Investment Corp. (JOIC), to seek additional export outlets, particularly in Western Europe. Jamaica's interest in JOIC will be equally held by BATCO and the Petroleum Corp. of Jamaica (Petrojam). The venture planned to deal primarily in alumina, bauxite, and oil. Trading will be through Jamaica Overseas Marketing Ltd., a wholly owned subsidiary of JOIC that will operate primarily from London and be managed by Rothschild.

The Government's desire to establish a downstream aluminum link using Jamaica's bauxite or alumina for feedstock has been evident for a number of years. Attempts to form joint ventures to construct a refinery have repeatedly failed for various reasons, mostly because the weak world aluminum market and an underutilization of available world capacities did not indicate financial success. In 1984, Jamaica signed a protocol with Colombia for the construction of a jointly owned 140,000-ton-per-year aluminum refinery on the coast of Colombia. This project has failed to progress, and Jamaica reportedly was investigating the possibility of purchasing equity in an existing U.S. aluminum refinery. Such a move would offer an opportunity for Jamaica to gain access to U.S. markets and, at the same time, benefit from the technical and marketing expertise of the U.S. partner. The list of potential venture opportunities included the Mount Holly plant of Alumax Inc., owned by AMAX Inc. and Japan's Mitsui Group.

In February 1985, Alcoa stopped production at its Clarendon alumina plant just a few months after increasing capacity from 550,000 tons per year to 800,000 tons per year. Alcoa claimed the closure was temporary and the plant would reopen when world market conditions justified resumption. In addition to the 900 directly employed workers, the closure would affect as many as another 5,000 persons indirectly dependent on the plant's operation. The Government has a 6% equity interest in the Clarendon alumina plant. In May, it was announced that the Government had formed a new company, Clarendon Alumina Production Ltd., and had taken a 2-year lease on the Alcoa plant. Alcoa agreed to manage the facility. Costs were to be reduced by eliminating some personnel and functions such as public relations and purchasing. The plant reopened in late July at a reduced production level with a market for 600,000 tons of alumina. The Government did not expect the operation to necessarily be profitable, but it would maintain the direct and indirect work force and provide foreign exchange and revenue earnings to the hard-pressed economy.

A feasibility study was under way on the possible construction of a coal-fired powerplant near the Clarendon alumina plant. Initial estimates reported that a 20% to 25% savings in power costs could be achieved at this plant by using coal-fired power instead of oil.

On August 13, 1985, 11 days after announcing the assumption of Atlantic Richfield Co.'s 26% interest in the Aluminum Partners of Jamaica (Alpart) alumina plant at Nain, Kaiser Aluminum & Chemical Corp. and Reynolds Metals Co. announced that the plant would be closed for at least 6 months. The closure resulted in the loss of about 75,000 tons of alumina, or about 5% of Jamaica's projected 1985 production. The Alpart plant had been operating at about one-half of its 1.2-million-ton-per-year capacity. All but about 100 of Alpart's 1,200 employees were laid off. The plant closure was attributed to high production costs that exceeded weak market prices.

After Alcoa's February closure, the Aluminum Co. of Canada (Alcan) firmly denied rumors that it was also considering a shutdown. However, at the end of 1985, there were indications that Alcan was attempting to persuade a reluctant Government to adjust the bauxite production levy.

The Government has been seeking ways to stimulate private sector investment in the quarrying of marble and limestone for export. The Italian development of technology to produce epoxy-resin marble tiles instead of cementaceous tiles would substantially lower shipping costs and, therefore, opportunities to open new markets were under study. Limestone exports have also been increasing, and market surveys were under way.

A $450 million loan to finance the construction of a second cement plant in eastern Jamaica was under negotiation with a Swiss company. Output from the proposed 300,000-ton-per-year plant would be exported to U.S. markets. Meanwhile, the state-owned Caribbean Cement Co. plant in Kingston was reported to be expanding capacity to 800,000 tons per year and converting to coal as a fuel.

A 350-ton-per-year pilot plant to produce solar salt was installed in southern Jamaica about midyear. The project was apparently successful, and the Government was studying the possibility of establishing a full-scale project that could save a substantial amount annually in salt import costs and also earn foreign exchange from exported salt. A spinoff benefit could include the production of brine shrimp for use at domestic fish farms.

State-owned Petrojam received a $1.2 million grant from Norway to finance petroleum exploration studies in the eastern, northern, and western regions of the country. Petrojam did not drill any wells in 1985, but expected that some drilling could take place in 1986 or 1987.

Table 4.—Jamaica: Exports and reexports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS				
Aluminum:				
Ore and concentrate thousand tons	3,120	4,559	3,769	U.S.S.R. 756; West Germany 34.
Oxides and hydroxides do	1,904	1,721	684	Canada 556; United Kingdom 198.
Metal including alloys:				
Scrap	34,342	375	343	Netherlands 32.
Semimanufactures	396	321	12	Trinidad and Tobago 277; Antigua and Barbuda 8.
Copper: Metal including alloys, scrap	302	264	114	West Germany 113; Netherlands 19.
Gold: Waste and sweepings value, thousands	$8	$8	--	All to Canada.
Iron and steel: Metal:				
Scrap	41	94	45	Netherlands 25; West Germany 24.
Semimanufactures:				
Bars, rods, angles, shapes, sections	37	--		
Universals, plates, sheets	4,450	5,077	61	Trinidad and Tobago 4,670; Grenada 133.
Hoop and strip	--	6	--	All to St. Vincent and the Grenadines.
Rails and accessories	--	10	--	All to Cayman Islands.
Wire	2	--		
Tubes, pipes, fittings	102	126	2	Trinidad and Tobago 97; Dominica 27.
Castings and forgings, rough	5	1	--	All to Trinidad and Tobago.
Nickel: Metal including alloys, semimanufactures	--	4	4	
Platinum-group metals:				
Waste and sweepings value, thousands	$29	--		
Metals including alloys, unwrought and partly wrought troy ounces	32	--		
Silver: Waste and sweepings value	$5,525	$1,343	$1,045	Canada $298.
Tin: Metal including alloys:				
Scrap	525	474	474	
Semimanufactures	90	24	24	
Zinc: Metal including alloys, scrap	35	6	--	All to West Germany.
Other: Base metals including alloys, all forms	18	--		
INDUSTRIAL MINERALS				
Asbestos, crude	--	3	--	All to St. Vincent and the Grenadines.
Cement	494	--		
Chalk	1,460	494	--	All to Trinidad and Tobago.
Clays, crude value	$65	--		

See footnotes at end of table.

Table 4.—Jamaica: Exports and reexports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Fertilizer materials: Manufactured, nitrogenous	2	--		
Gypsum and plaster -- thousand tons	58	171	93	Colombia 38; Haiti 13.
Lime	105	1,776	1	Trinidad and Tobago 1,341; Barbados 191.
Pigments, mineral: Iron oxides and hydroxides, processed --- kilograms	--	231	231	
Salt and brine thousand tons	1,132	3	([2])	Mainly to Trinidad and Tobago.
Stone, sand and gravel:				
Dimension stone, crude and partly worked	--	23	23	
Limestone other than dimension	30	61,305	61,100	NA.
Sand other than metal-bearing	32	--		
Sulfur: Sulfuric acid	14	57	--	All to Haiti.
Talc, steatite, soapstone, pyrophyllite	2	5,700	--	All to Trinidad and Tobago.
Other: Slag and dross, not metal-bearing value, thousands	$3	$36	$36	
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	--	104	--	All to Cayman Islands.
Petroleum refinery products:				
Gasoline 42-gallon barrels	--	([3])	([3])	
Mineral jelly and wax do	--	1	--	Mainly to Belize.
Kerosene and jet fuel do	r([4])	503	--	All to Ireland.
Distillate fuel oil do	31,304	504,172	--	Cayman Islands 233,063; Netherlands Antilles 185,486; Honduras 83,749.
Lubricants do	r128,275	100,611	414	Guatemala 20,760; Guyana 17,386; Suriname 13,245.
Residual fuel oil do	239,019	2,522	2,264	NA.
Bitumen and other residues do	6	2,297	--	All to Cayman Islands.

rRevised. NA Not available.
[1]Table prepared by H. D. Willis.
[2]Less than 1/2 unit.
[3]Unreported quantity valued at $105.
[4]Unreported quantity valued at $97.

Table 5.—Jamaica: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides	22	4	3	United Kingdom 1.
Metal including alloys:				
Scrap	199	177	--	All from Canada.
Unwrought	1,494	804	--	Do.
Semimanufactures	1,933	2,236	768	United Kingdom 541; Canada 442.
Chromium: Ore and concentrate	--	4	4	
Copper:				
Sulfate	1	2	([2])	United Kingdom 2.
Metal including alloys:				
Unwrought	2	--		
Semimanufactures	750	542	161	United Kingdom 322; Hong Kong 51.
Gold:				
Waste and sweepings value	--	$209	--	All from Canada.
Metal including alloys, unwrought and partly wrought troy ounces	2,540	450	--	United Kingdom 289; Canada 161.
Iron and steel: Metal:				
Scrap	--	1	1	
Pig iron, cast iron, related materials	4	16	16	
Ferroalloys	201	61	61	
Steel, primary forms	11,940	14,199	216	Trinidad and Tobago 13,689; United Kingdom 279.
Semimanufactures:				
Bars, rods, angles, shapes, sections	14,273	13,257	2,120	Trinidad and Tobago 3,154; Portugal 2,197.
Universals, plates, sheets	37,467	17,398	2,480	Japan 9,670; United Kingdom 1,833.
Hoop and strip	300	525	193	United Kingdom 169; Belgium-Luxembourg 151.

See footnotes at end of table.

Table 5.—Jamaica: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Iron and steel: Metal —Continued				
Semimanufactures —Continued				
Rails and accessories	255	271	271	
Wire	4,426	2,991	281	Belgium-Luxembourg 1,023; West Germany 604; United Kingdom 478.
Tubes, pipes, fittings	10,137	4,223	3,104	United Kingdom 549; Belgium-Luxembourg 273.
Castings and forgings, rough	134	186	119	Trinidad and Tobago 39; Canada 17.
Lead:				
Oxides	153	158	149	United Kingdom 7; Netherlands 2.
Metal including alloys:				
Unwrought	168	21	21	
Semimanufactures	30	31	29	United Kingdom 2.
Magnesium: Metal including alloys, semimanufactures value	r$607	$7,743	$7,666	United Kingdom $77.
Manganese: Ore and concentrate	219	71	--	United Kingdom 61; West Germany 10.
Molybdenum: Metal including alloys:				
Unwrought kilograms	--	3	3	
Semimanufactures do	1,928	531	531	
Nickel: Metal including alloys:				
Unwrought value, thousands	$5	--		
Semimanufactures	5,095	10,293	7,290	West Germany 3,000.
Platinum-group metals: Metals including alloys, unwrought and partly wrought troy ounces	386	161	(3)	All from United Kingdom.
Silver:				
Waste and sweepings value	$69	$1,207	--	All from Canada.
Metal including alloys, unwrought and partly wrought troy ounces	35,880	26,010	5,626	West Germany 10,867; United Kingdom 6,687.
Tin: Metal including alloys:				
Scrap	98	--		
Unwrought	4	2	--	All from United Kingdom.
Semimanufactures	7,195	9,882	1,837	United Kingdom 6,522; Japan 1,161.
Titanium: Oxides	761	509	167	United Kingdom 242; West Germany 100.
Tungsten:				
Ore and concentrate value	$135	--		
Metal including alloys, semimanufactures kilograms	141	386	296	NA.
Uranium and/or thorium: Metal including alloys, all forms	2	1	1	
Zinc:				
Ore and concentrate	--	7	--	Norway 5; Italy 1; Trinidad and Tobago 1.
Oxides	82	275	193	Mexico 27; West Germany 22.
Blue powder	12	3	(3)	United Kingdom 3.
Metal including alloys:				
Scrap value	$46	--		
Unwrought	918	1,043	77	Canada 891; Japan 75.
Semimanufactures	125	19	12	United Kingdom 6; Canada 1.
Other:				
Ores and concentrates value	$15,626	$89	$89	
Oxides and hydroxides	21	85	66	United Kingdom 13; Poland 3.
Base metals including alloys, all forms kilograms	621	21	21	
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	9,362	19	18	United Kingdom 1.
Grinding and polishing wheels and stones	24	12	4	West Germany 4; Norway 2.
Asbestos, crude	16	29	27	United Kingdom 2.
Boron materials: Crude natural borates	2	1	1	
Cement	7,273	1,339	782	Denmark 253; West Germany 189.
Chalk	12	74	14	United Kingdom 42; France 18.
Clays, crude	265	257	257	
Diamond: Industrial stones value	$384	$361	--	All from United Kingdom.
Diatomite and other infusorial earth	38	202	144	United Kingdom 58.
Feldspar, fluorspar, related materials	30	24	24	
Fertilizer materials:				
Crude, n.e.s value, thousands	$1	--		
Manufactured:				
Ammonia	203	173	89	United Kingdom 50; Japan 32.
Nitrogenous	24,911	30,379	335	Canada 29,954; Austria 50.
Phosphatic	7,414	2,310	118	Netherlands 2,189; China 3.
Potassic	6,726	15,048	10	Canada 15,038.
Unspecified and mixed	1,592	9,211	14	Canada 9,197.

See footnotes at end of table.

Table 5.—Jamaica: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Graphite, natural — value, thousands	$2	$4	$4	
Gypsum and plaster	162	210	102	West Germany 54; Venezuela 54.
Lime — value	$378	$598	$598	
Magnesium compounds: Oxides and hydroxides	2	2	--	All from United Kingdom.
Mica:				
Crude including splittings and waste	134	59	2	Norway 57.
Worked including agglomerated splittings — kilograms	5,038	1,959	161	United Kingdom 1,798.
Nitrates, crude	1	--		
Phosphates, crude	17,804	367	367	
Pigments, mineral:				
Natural, crude	12	3	2	United Kingdom 1.
Iron oxides and hydroxides, processed	159	102	17	West Germany 63; United Kingdom 18.
Potassium salts, crude — value	$14	$45,695	$45,695	
Precious and semiprecious stones other than diamond — value, thousands	$7	$15	(2)	Mainly from Israel.
Salt and brine	18,235	46,495	46,435	United Kingdom 59.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	5,634	4,644	4,415	France 151; United Kingdom 40.
Sulfate, manufactured	4,147	1,789	345	Mexico 1,420; Netherlands 20.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	60	8	3	Italy 5.
Worked	29	22	22	
Gravel and crushed rock	7	50	43	United Kingdom 7.
Limestone other than dimension — value	$10	$152	$152	
Quartz and quartzite — do.	$1,600	$258	$258	
Sand other than metal-bearing	377	897	897	
Sulfur:				
Elemental:				
Crude including native and byproduct	19	34	4	Belgium-Luxembourg 28; United Kingdom 2.
Colloidal, precipitated, sublimed	2,962	3,002	3,002	
Dioxide		1	1	
Sulfuric acid	27	16	1	Haiti 15.
Talc, steatite, soapstone, pyrophyllite	505	390	299	Norway 89; Australia 2.
Other: Crude	17	71	71	
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	53	2,903	59	Netherlands Antilles 2,844.
Carbon: Carbon black	816	1,060	26	Venezuela 570; Mexico 452.
Coal: Briquets of anthracite and bituminous coal	8	--		
Coke and semicoke	90	142	94	West Germany 45; United Kingdom 3.
Petroleum:				
Crude — 42-gallon barrels	547	182	182	
Refinery products:				
Liquefied petroleum gas — thousand 42-gallon barrels	167	245	244	United Kingdom 1.
Gasoline:				
Aviation — do.	12	20	(3)	Mainly from Netherlands Antilles.
Motor — do.	172	397	10	Netherlands Antilles 313; Panama 49; Trinidad and Tobago 25.
Mineral jelly and wax — do.	10	17	4	United Kingdom 7; West Germany 3.
Kerosene and jet fuel — do.	248	313	3	Netherlands Antilles 287; Panama 23.
Distillate fuel oil — do.	202	267	--	All from Netherlands Antilles.
Lubricants — do.	32	66	14	Netherlands Antilles 27; Panama 25.
Residual fuel oil — do.	14,212	10,316	1,349	Netherlands Antilles 4,284; Venezuela 2,950.
Bitumen and other residues — do.	9	2	2	
Petroleum coke — value	r$576	--		

rRevised. NA Not available.
[1]Table prepared by H. D. Willis.
[2]Less than 1/2 unit.
[3]Unreported quantity valued at $137.

NETHERLANDS ANTILLES

The petroleum industry encountered numerous problems during the year. In March, the 420,000-barrel-per-day Exxon Corp. crude oil refinery on Aruba shut down after more than 60 years of operation. The refinery had contributed about 40% to Aruba's gross national product (GNP). Underutilization, causing substantial financial losses, had been a problem for several years. Lago Oil and Transport Co. and its parent company, Exxon, agreed to transfer ownership of the refinery and all related facilities to Aruba for the sum of $1.00. The finalization of the agreement between Exxon and Aruba did not come into force before the end of 1985 because the Government was still involved in efforts to establish a mutually agreeable arrangement between Aruba, Exxon, and Venezuela that could enable the refinery to reopen. The oil transshipment facilities on Aruba and Bonaire have also suffered from severe curtailments.

The closure of the Lago refinery on Aruba was expected to decrease that island's revenues by $100 to $150 million and cause a 35% drop in the GNP. Aruba hoped to eventually overcome the economic impact by increasing tourism, now practically the only other source of income. On January 1, 1986, the island of Aruba will obtain internal autonomy as a country within the Kingdom of the Netherlands, and it no longer will be a part of the Netherlands Antilles. Full independence for Aruba was scheduled to take place in 1996.

The same deteriorating rate of crude oil throughput and poor market conditions also affected the Royal Dutch/Shell Group's 320,000-barrel-per-day refinery on Curaçao. The company announced a firm decision to close, and the Government of Curaçao began a series of negotiations with Petróleos de Venezuela S.A. (PDVSA) regarding a viable mechanism for keeping the plant in operation after the September 1985 deadline set by Royal Dutch/Shell.

Shortly before this deadline, the company sold its refinery, marine service company, marketing organization, and the Curaçao Oil Terminal N.V. oil transshipment facility at Bullenbay to the Government of Curaçao for the equivalent of $0.56[6] each, plus compensation for inventories of crude and product. The Royal Dutch/Shell Group began operations in Curaçao in 1919.

On October 1, 1985, a PDVSA subsidiary, Refinería Isla Curazao S.A., leased the refinery and terminal to process and ship Venezuelan crude oil. The PDVSA lease period was 5 years at a rate of $11 million per year with option to renew for 2-year periods. During the lease period, PDVSA was to be exempt from any taxes in Curaçao. Refinery employment was to be about 1,400, compared with the previous 1,900, and throughput was expected to be 150,000 barrels per day.

The Curaçao oil industries had provided about 30% of that island's GNP, which declined by an estimated 6.5% in 1984, and was expected to again register a negative change in 1985.

TRINIDAD AND TOBAGO

The Government assumed a larger role in its domestic crude oil exploration, production, and refining through the purchase of facilities owned by Tesoro Petroleum Corp. and Texaco Inc. Crude oil production continued to climb in 1985, but lagging prices dampened the effect on Trinidad and Tobago's depressed economy. The future prospects for the fertilizer industries and the new methanol plant remained bright, but output fell at the problem-plagued iron and steel complex as it continued to seek acceptable solutions for future operations.

Trinidad and Tobago's economy showed a slight improvement in 1985, whereas in 1984, the economy declined by 7.4%. Earnings from the oil sector continued to fall as a result of lower world prices, even though the volume exported increased over that of 1984.

In December, the Government devalued its currency by 50%, and a two-tiered pricing system was adopted. The former exchange rate for Trinidad and Tobago dollars (TT$) of TT$2.40=US$1.00 would apply to imports of essential foods, agricultural supplies, schoolbooks, and pharmaceuticals. A new rate of TT$3.60=US$1.00 was effected for other transactions. At the same time, the Government removed a 12% stamp tax on imported raw materials and other items for industry that was originally imposed in January 1985, eliminated an 18% purchase tax on packaging materials, and added a

15% surcharge on imports from extra-regional countries and a 10% tax on overseas tourist package tours.

In mid-1985, a subsidiary of Santa Fe International Corp. was selected to construct the new 369,000-ton-per-year ammonia plant for the Trinidad and Tobago Nitrogen Co. capacity expansion to 770,000 tons per year. The new plant was to use C. F. Braun and Co.'s Purifier Process for low energy consumption, and incorporate Union Carbide Corp.'s Benfield carbon-dioxide removal system. The $178 million methanol plant had a successful year, and sales contracts were concluded with the Federal Republic of Germany for 170,000 tons per year, Tenneco Inc. for 120,000 tons per year, and with the Mitsui Group of Japan for 50,000 tons per year. Imperial Chemical Industries Ltd. and the Government agreed to each take a 30% interest in a new methanol plant scheduled to be constructed by 1988 at Point Lisas. Two unnamed international entities were to assume the remaining equity in this 500,000-ton-per-year plant.

The outlook for the urea facility was also favorable as India and China joined the United States, the European Economic Community countries, and South America as purchasers of the urea product.

Early in 1985, it was reported that the Iron and Steel Co. of Trinidad and Tobago (ISCOTT) would enter into a joint agreement with Bechtel Operating Services Corp. of California and Laclede Steel Co. of Missouri to bring new capital, technology, and management practices into the troubled steel complex. In September, a letter of intent had reportedly been signed with the Federal Republic of Germany's Neue Hamburger Stahlwerke GmbH and Austria's Voest-Alpine AG to provide management and technical assistance. This would appear to signal that the Government no longer intended to offer equity in ISCOTT; however, at the same time, it was reported that negotiations with other interested companies were continuing.

The Government formed a new company, Trinidad and Tobago Petroleum Co., to assume the operations of the former Trinidad-Tesoro Petroleum Co. Ltd. Tesoro Petroleum Co. sold its 49.9% interest in the operation for a reported 3.23 million barrels of residual fuel oil. In 1984, Tesoro had asked for $188 million for its land-based assets. Members of the Oilfield Workers Trade Union reportedly complained that the acquisition price paid by the Government was too high and that the existing state-owned oil company, Trinidad and Tobago Oil Co. (Trintoc), should be given complete control of the Trinidad-Tesoro assets since it already had a 50.1% interest in the joint venture.

In 1985, the Government finalized an agreement to purchase the Texaco Trinidad Inc. (Textrin) 220,000-barrel-per-day petroleum refinery at Pointe-a-Pierre. In addition, the purchase price included all of Textrin's onshore producing facilities, its share of offshore rights to Block 1 and the South East Coast Consortium, and various real estate holdings. Excluded from the sale were Textrin's crude oil and petroleum product inventories, a one-third interest in Trinidad Marine Ltd. (Trinmar), a 30% interest in Trinidad Northern Areas, and the interest in offshore production rights to Block 6. Textrin agreed to sell its offshore Trinidad production to the refinery at commercial prices. The Government's prime motivation for this $189.2 million purchase was to maintain employment levels and to avoid the economic shock of an assured Textrin refinery closure. Terms of the sale included $72.8 million in cash and $25.2 million from Trintoc for materials, supplies, and rights in a natural gas supply contract. The balance of the purchase price was to be paid over a 10-month period in the form of petroleum products at the rate of 9,800 barrels per day.

In June, the Government introduced a new tax package that increased tax deductions for those companies having marine operations to between 14% and 15%. Amoco Trinidad Oil Co. Ltd. was paying about 94% taxes on its gross revenue, but the new law reduced this to between 85% and 86%. The Government believed the reduced taxes would stimulate exploration and production, which would eventually result in increased revenue.

Other Government incentives introduced in 1985 included allowing the deduction of royalty payments on crude oil from gross income prior to determination of the supplemental petroleum tax, effective January 1984, and replacing the existing schedule of incremental production allowances by a single annual production allowance of 30% of gross income from up to 2 million barrels of oil production per field.

Both Amoco and Trinmar launched offshore exploration programs in 1985. Amoco began a $40 million drilling and seismic survey program off the southeast coast. Amoco's first well, about 13 miles off the coast, was dry and abandoned. A second well in the four-well program was drilled in 120 feet of water about 1 mile northeast of Amoco's original Mora Field discovery well. Amoco's offshore production averaged about 95,000 barrels per day in 1985.

Trinmar began an exploration and development program that included development work to prove a new southwest Soldado Field in the Gulf of Paria that was originally identified in 1982. Trinmar expected the new field would add 1,500 barrels per day to its total production.

[1]Physical scientist, Division of International Minerals.
[2]Where necessary, values have been converted from Cuban pesos (CP$) to U.S. dollars at the rate of CP$0.92=US$1.00.
[3]Where necessary, values have been converted from Dominican Republic pesos (RD$) to U.S. dollars at the rate of RD$3.00=US$1.00.
[4]Where necessary, values have been converted from Haitian gourdes (HG$) to U.S. dollars at the rate of HG$5.00=US$1.00.
[5]Where necessary, values have been converted from Jamaican dollars (J$) to U.S. dollars at the rate of J$5.56=US$1.00.
[6]Where necessary, values have been converted from Netherlands Antilles florin (NAFl) to U.S. dollars at the rate of NAFl$1.80=US$1.00.

Table 6.—Trinidad and Tobago: Exports and reexports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS				
Aluminum:				
Oxide kilograms	550	20	--	Guyana 20.
Metal including alloys, all forms	14	38	1	Guyana 35.
Copper:				
Matte and speiss	16	--		
Metal including alloys, all forms	519	511	18	United Kingdom 292; West Germany 160.
Iron and steel: Metal:				
Scrap	9	20	--	Netherlands 18; Dominica 2.
Pig iron, cast iron, related materials	42,263	64,482	--	Spain 21,500; Liberia 19,761; Panama 14,938.
Steel, primary forms	7,927	1,231	--	All to Jamaica.
Semimanufactures	120,763	150,304	82,420	Jamaica 13,660; West Germany 12,309.
Lead:				
Oxides	(2)	--		
Metal including alloys, all forms	166	928	89	Brazil 679; Barbados 92.
Silver: Waste and sweepings kilograms	389	6,307	--	All to Canada.
Tin: Metal including alloys, all forms	11	75	74	
Titanium: Oxides	--	5	--	Mainly to Guyana.
Tungsten: Metal including alloys, all forms kilograms	4	--		
Zinc:				
Oxides	--	2	--	All to Jamaica.
Metal including alloys, all forms	7	(2)	--	All to Guyana.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.: Grinding and polishing wheels and stones	1	2	--	Mainly to Guyana.
Barite and witherite	3,757	--		
Cement	15	43	--	Do.
Diamond: Gem, not set or strung value, thousands	$5	--		
Fertilizer materials, manufactured:				
Ammonia	1,196,655	1,173,923	778,396	Denmark 88,026; France 67,612.
Nitrogenous	54,223	61,904	13,165	India 14,855; Canada 11,010.
Phosphatic	10	--		
Unspecified and mixed	7	398	--	Barbados 380; St. Lucia 18.
Pigments, natural: Iron oxides and hydroxides, processed	(2)	--		
Pyrites, unroasted	18	--		
Salt and brine	259	253	--	Barbados 201.
Sodium compounds, n.e.s.:				
Carbonate	--	2	--	Mainly to Guyana.
Sulfate kilograms	NA	130	--	Guyana 75; Barbados 49.
Stone, sand and gravel:				
Dimension stone: Worked	--	26	--	All to Guyana.
Gravel and crushed rock	5	3	--	Grenada 2; Guyana 1.
Sand other than metal-bearing	3	17	--	Grenada 9; Suriname 2; Guyana 1.

See footnotes at end of table.

Table 6.—Trinidad and Tobago: Exports and reexports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Sulfur:				
Elemental: Crude including native and byproduct	18	--		
Dioxide kilograms	--	392	--	All to Guyana.
Sulfuric acid	5	3	--	All to Barbados.
Talc, steatite, soapstone, pyrophyllite	10	--		
Other, crude	--	40	--	All to St. Vincent.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	15,353	23,215	367	West Germany 17,489; United Kingdom 4,526.
Carbon: Carbon black kilograms	--	113	--	All to Grenada.
Petroleum:				
Crude thousand 42-gallon barrels	32,570	32,180	31,755	Bunkers 425.
Refinery products:				
Liquefied petroleum gas do	212	174	(2)	Guyana 37; Barbados 34; Grenada 25.
Gasoline do	5,465	3,465	886	Guyana 415; Suriname 345.
Mineral jelly and wax do	1	(2)	--	Mainly to Barbados.
Kerosene and jet fuel do	2,769	2,885	224	Barbados 780; Antigua 366.
Distillate fuel oil do	5,793	5,126	761	Suriname 700; Guyana 698.
Lubricants do	338	444	1	Costa Rica 7; bunkers 404.
Residual fuel oil do	16,404	14,511	2,198	United Kingdom 5,889; Netherlands 1,491.
Bitumen and bituminous mixtures do	47	3	--	Mainly to Guyana.

NA Not available.
[1]Table prepared by H. D. Willis.
[2]Less than 1/2 unit.

Table 7.—Trinidad and Tobago: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS				
Aluminum:				
Ore and concentrate	240	180	180	
Oxides and hydroxides	124	43	28	West Germany 15.
Metal including alloys, all forms	12,341	19,781	1,779	Sweden 15,875; Jamaica 1,261.
Copper:				
Sulfate	r14	11	(2)	Mainly from United Kingdom.
Metal including alloys, all forms	1,559	1,506	526	United Kingdom 763; Canada 130.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite	246,596	199,755	--	All from Brazil.
Metal:				
Scrap	1,734	2,316	2,315	United Kingdom 1.
Pig iron, cast iron, related materials	888	431	29	Brazil 398.
Ferroalloys	3,885	2,913	2,430	United Kingdom 293; Norway 100.
Steel, primary forms	8,379	30,362	13	Finland 15,400; France 11,073; Japan 2,584.
Semimanufactures	231,644	101,227	32,528	United Kingdom 20,140; Japan 11,099.
Lead:				
Oxides	855	5	(2)	West Germany 3; India 1.
Metal including alloys, all forms	10,055	1,665	1,289	Dominican Republic 136; Barbados 130.
Magnesium: Metal including alloys, all forms	3	1	--	All from United Kingdom.
Nickel: Metal including alloys, all forms	7	26	1	United Kingdom 21; Spain 4.
Platinum-group metals: Metals including alloys, unwrought and partly wrought troy ounces	2,090	1,093	129	United Kingdom 707; Canada 257.
Silver:				
Waste and sweepings kilograms	25	1	--	All from United Kingdom.
Metal including alloys, unwrought and partly wrought troy ounces	47,454	79,251	14,757	Canada 64,462; West Germany 32.
Tin: Metal including alloys, all forms	618	2,641	3	United Kingdom 2,452; Japan 180.

See footnotes at end of table.

Table 7.—Trinidad and Tobago: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Titanium: Oxides	1,042	1,233	572	United Kingdom 661.
Tungsten: Metal including alloys, all forms kilograms	109	272	249	United Kingdom 15; Brazil 8.
Zinc:				
Oxides	231	148	23	United Kingdom 71; West Germany 22.
Metal including alloys, all forms	24	254	2	Belgium-Luxembourg 221; United Kingdom 26.
Other:				
Ores and concentrates	6	24	24	
Oxides and hydroxides	7	10	(2)	Norway 5; West Germany 5.
Base metals including alloys, all forms	19	20	5	United Kingdom 15.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	30	40	39	United Kingdom 1.
Dust and powder of precious and semiprecious stones value	$200	$22,456	$22,456	
Grinding and polishing wheels and stones	6,079	1,548	1,478	Venezuela 21; United Kingdom 14.
Asbestos, crude	--	19	18	United Kingdom 1.
Barite and witherite	35,811	12,147	5,665	Turkey 6,420; West Germany 62.
Boron materials: Crude natural borates	1	1	--	All from United Kingdom.
Cement	265,324	115,343	2,866	Colombia 104,418; Barbados 5,000.
Chalk	798	690	51	United Kingdom 430; France 182.
Clays, crude	2,176	2,504	2,313	Netherlands 119; United Kingdom 71.
Diamond:				
Gem, not set or strung carats	1,992	7,874	133	Belgium-Luxembourg 5,500; India 1,305; United Kingdom 863.
Industrial stones do	30,000	25,000	--	All from United Kingdom.
Diatomite and other infusorial earth	92	56	21	Netherlands 28; United Kingdom 7.
Feldspar, fluorspar, related materials	55	59	--	Netherlands 40; France 10; Canada 6.
Fertilizer materials: Manufactured:				
Ammonia	8	28	18	Netherlands 5; United Kingdom 5.
Nitrogenous	372	2,678	44	Dominican Republic 2,000; West Germany 433.
Phosphatic	11	1,380	81	Dominican Republic 1,120; West Germany 108.
Potassic	973	8,230	5,394	Dominican Republic 1,480; United Kingdom 1,142.
Unspecified and mixed	5,913	8,621	1,762	West Germany 3,042; Belgium-Luxembourg 2,934.
Graphite, natural value	$1,057	$1,013	$1,013	
Gypsum and plaster	9,760	2,048	421	Venezuela 971; Jamaica 512.
Lime	3,866	2,518	22	Jamaica 1,099; United Kingdom 907.
Magnesium compounds: Magnesite	40	16	10	United Kingdom 4.
Mica:				
Crude including splittings and waste	197	176	--	Norway 101; United Kingdom 75.
Worked including agglomerated splittings kilograms	132	386	385	United Kingdom 1.
Phosphates, crude	478	205	110	Dominican Republic 40; United Kingdom 40.
Pigments, mineral: Iron oxides and hydroxides, processed	122	89	19	Canada 39; West Germany 14.
Potassium salts, crude	--	197	108	West Germany 89.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$1,179	$2,429	$135	Canada $1,358; Belgium-Luxembourg $612.
Synthetic do	$96	$20	$1	France $9; Switzerland $6.
Salt and brine	53,486	55,632	315	Jamaica 34,326; Netherlands Antilles 17,144; United Kingdom 2,976.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	5,118	4,438	137	United Kingdom 4,279; West Germany 22.
Sulfate, manufactured	2,388	1,834	1	Belgium-Luxembourg 1,678; Netherlands 107; United Kingdom 41.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	210	79	2	China 77.
Worked	23	676	421	Italy 220; Portugal 18.
Dolomite, chiefly refractory grade	133	47	--	Republic of Korea 45; Norway 2.
Gravel and crushed rock	2,298	1,409	510	China 498; Netherlands 255.
Limestone other than dimension	233,476	66,305	24,988	Netherlands 23,390; Netherlands Antilles 11,600.
Quartz and quartzite	193	9	8	United Kingdom 1.
Sand other than metal-bearing	9,996	898	892	United Kingdom 6.

See footnotes at end of table.

Table 7.—Trinidad and Tobago: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Sulfur:				
Elemental:				
Crude including native and byproduct	3,062	56	--	United Kingdom 51; West Germany 5.
Colloidal, precipitated, sublimed	6	3	1	Netherlands 2.
Sulfuric acid	143	5,956	3,389	Spain 1,500; West Germany 1,013.
Talc, steatite, soapstone, pyrophyllite	2,413	1,172	599	Canada 397; Norway 149.
Other, crude	5	29	17	Canada 9; Barbados 2.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	4	12	12	
Carbon: Carbon black	1,570	766	2	Venezuela 400; Colombia 300; Mexico 61.
Coal: All grades including briquets	375	258	225	Canada 27; Belgium-Luxembourg 4.
Coke and semicoke	30	20	20	
Peat including briquets and litter	328	417	81	Ireland 199; United Kingdom 89.
Petroleum:				
Crude thousand 42-gallon barrels	692	(2)	(2)	
Refinery products:				
Liquefied petroleum gas 42-gallon barrels	106,117	110,977	32,956	Algeria 40,182; Netherlands Antilles 23,072.
Mineral jelly and wax do.	2,597	2,920	234	United Kingdom 1,898; West Germany 660.
Kerosene and jet fuel do.	436,588	--		
Distillate fuel oil do.	7	8	8	
Lubricants including nonlubricating oils thousand 42-gallon barrels	572	1,206	165	Netherlands Antilles 423; United Kingdom 371.
Residual fuel oil 42-gallon barrels	r7,856	8,850	8,850	
Bitumen and bituminous mixtures do.	15,350	15,174	13,999	United Kingdom 697; Canada 255.
Petroleum coke do.	3,668	--		

rRevised.
[1]Table prepared by H. D. Willis.
[2]Less than 1/2 unit.

The Mineral Industry of Central American Countries

By Doris M. Hyde[1]

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BELIZE

Belize remained relatively insulated from the social and political turmoil that affected some of its Central American neighbors. This stability encouraged new foreign investments that assisted the economy, especially in tourism and agriculture.

The mineral sector remained limited to construction-oriented materials. Oil exploration efforts continued by the various concessionaires.

Table 1.—Central American Countries: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Country and commodity	1981	1982	1983	1984[p]	1985[e]
BELIZE					
Stone, sand and gravel:					
Limestone	479,640	356,130	608,860	[e]600,000	600,000
Marl	617,460	503,930	--	--	--
Sand and gravel	589,290	521,030	554,370	[e]500,000	500,000
COSTA RICA					
Cement	460,319	423,700	385,300	[e]350,000	350,000
Clays: Kaolin	450	522	[e]500	[e]500	500
Diatomite	550	470	[e]450	[e]450	450
Gold[e] troy ounces	20,000	27,000	30,000	35,000	35,000
Lime[e]	7,000	9,000	10,000	10,000	10,000
Petroleum refinery products thousand 42-gallon barrels	[e]3,750	[e]3,700	2,298	2,200	2,200
Pumice[e]	1,300	1,500	1,500	1,500	1,500
Salt, marine[e]	39,000	110,200	110,000	110,000	110,000
Silver[e] troy ounces	1,500	2,000	2,000	2,000	2,000
Stone, sand and gravel:					
Crushed rock and rough stone[e] cubic meters	550,000	534,600	525,000	500,000	500,000

See footnotes at end of table.

Table 1.—Central American Countries: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Country and commodity	1981	1982	1983	1984[p]	1985[e]
COSTA RICA —Continued					
Stone, sand and gravel —Continued					
Limestone and other calcareous materials[e]	70,000	109,100	110,000	100,000	100,000
Sand and gravel[e] ____ cubic meters	250,000	276,700	280,000	250,000	250,000
EL SALVADOR					
Aluminum metal including alloys, semimanufactures	1,175	1,143	1,344	1,154	[2]1,266
Cement	457,897	417,796	431,552	407,482	[2]466,625
Gold ____ troy ounces	3,883	3,300	650	285	--
Gypsum[e]	6,000	5,000	4,500	4,500	4,000
Iron and steel: Metal:					
Steel, crude	[e]10,000	7,265	15,281	11,197	10,000
Semimanufactures	25,420	16,166	15,799	27,985	23,472
Limestone	810,000	800,000	850,000	870,000	890,000
Petroleum refinery products thousand 42-gallon barrels	4,432	4,002	[e]4,000	4,450	4,500
Salt, marine[e]	1,700	1,800	2,000	2,500	2,700
Silver, fine ____ troy ounces	137,005	85,713	21,988	21,750	--
GUATEMALA					
Antimony, mine output, metal content	511	(3)	--	90	[2]1,057
Barite	5,200	2,000	[e]300	[e]300	[2]1,300
Cement	514,074	506,369	451,913	785,327	[2]988,291
Clays:					
Bentonite	[e]2,500	2,500	[e]8,000	8,500	[2]3,000
Other	165,641	160,000	137,672	[e]144,000	[2]175,364
Copper, Cu content of concentrates	726	[e]700	--	--	--
Feldspar	10,044	[e]12,000	[e]6,000	5,000	[2]5,582
Gas, natural, gross ____ million cubic feet	515	1,097	1,118	1,200	--
Gypsum, crude:					
For cement manufacture	18,588	[e]17,000	16,588	14,635	[2]16,868
Other	10,134	[e]11,000	[e]22,000	11,017	--
Iron and steel:					
Iron ore, gross weight	4,025	4,000	860	365	705
Steel, crude	NA	25,000	28,000	26,600	27,000
Semimanufactures	NA	27,600	34,892	34,500	34,000
Lead, metal including secondary	41	40	60	64	[2]70
Lime	24,655	[e]24,500	27,091	50,534	[2]61,761
Petroleum:					
Crude ____ thousand 42-gallon barrels	1,494	2,292	2,549	1,759	1,068
Refinery products ____ do	5,345	4,508	4,306	4,760	4,926
Pumice and related materials:					
Pumice[e]	15,000	12,000	15,000	13,200	33,000
Volcanic ash	5,451	[e]4,000	[e]100	200	--
Salt[e]	[2]13,679	14,000	15,100	[r]16,000	17,300
Silver, mine output, metal content[e] troy ounces	8,000	3,000	--	--	--
Stone, sand and gravel:					
Limestone ____ thousand tons	920	950	[e]1,215	1,200	990
Marble ____ cubic meters	1,226	1,200	[e]1,000	1,200	380
Silica sand	35,582	35,000	[e]18,400	18,000	22,355
Sand and gravel ____ cubic meters	269,844	[r]476,000	[e]525,000	370,000	315,737
Tungsten, mine output, W content of concentrate	42	40	--	--	6
Zinc, mine output, metal content	2,996	(3)	--	--	--
HONDURAS					
Antimony, mine output, metal content	[e]20	--	--	230	400
Cadmium, mine output, metal content	177	270	386	415	447
Cement	310,888	277,440	485,435	534,183	500,000
Copper, Cu content of lead and zinc concentrates	454	450	[e]650	770	790
Gold ____ troy ounces	1,579	1,711	2,151	2,784	2,500
Gypsum[e]	20,000	20,000	22,000	[r]22,000	22,000
Iron and steel: Metal, semimanufactures[e]	20,000	20,000	20,000	22,000	23,600
Lead, mine output, metal content	12,592	15,120	19,291	20,544	[2]21,250
Petroleum refinery products thousand 42-gallon barrels	1,901	685	3,938	3,303	2,400
Salt[e]	30,000	30,000	30,000	30,000	30,000
Silver ____ thousand troy ounces	1,823	2,100	2,587	2,697	2,678
Stone:[e]					
Limestone	450,000	500,000	500,000	500,000	500,000
Marble	40,000	40,000	40,000	40,000	40,000
Zinc, mine output, metal content	16,190	24,554	37,980	41,483	[2]44,026
NICARAGUA					
Cement[e]	[2]167,361	100,000	100,000	100,000	100,000
Gold, mine output, metal content ____ troy ounces	61,913	54,384	46,428	[r] [e]35,000	[2]24,491
Gypsum and anhydrite, crude	[e]30,000	20,290	11,350	[e]10,000	[2]8,310
Lime	[e]30,000	5,000	4,700	[e]3,000	[2]3,702
Petroleum refinery products thousand 42-gallon barrels	3,925	4,244	3,914	3,277	3,715

See footnotes at end of table.

Table 1.—Central American Countries: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Country and commodity	1981	1982	1983	1984[p]	1985[e]
NICARAGUA —Continued					
Salt, marine[e]	18,000	18,000	18,000	15,000	15,000
Sand and gravel ___ cubic meters	NA	502,812	481,743	490,000	450,000
Silver, mine output, metal content _ troy ounces	140,136	75,552	63,417	[e]50,000	[2]29,665
PANAMA					
Cement	520,000	349,991	326,170	303,950	[2]305,200
Clays and clay products:					
Crude	99,071	84,261	58,284	71,104	[2]98,382
Products ___ cubic meters	52,010	60,606	18,255	32,649	[2]37,343
Manganese ore	2,500	--	--	--	--
Petroleum refinery products thousand 42-gallon barrels	10,524	11,845	11,755	10,622	8,864
Salt, marine	32,100	24,300	85,491	[4]18,585	[4]16,024
Stone, sand and gravel:					
Limestone[5]	393,722	439,952	448,145	212,205	[2]293,726
Sand and gravel ___ thousand cubic meters	828	894	802	712	[2]674
Sand, silica	34,195	27,289	26,779	[e]20,000	[2]13,882

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Includes data available through Aug. 17, 1986.
[2]Reported figure.
[3]Revised to zero.
[4]Represents sales. Figures for 1981, 1982, and 1983 reflect crude salt production.
[5]Excludes approximately 8,000 cubic meters per year, apparently dimension stone.

COSTA RICA

Small quantities of gold and silver were produced during 1985, and a precious metal mine was under active development. A few other mineral exploration programs were in various stages of study, but notable changes in overall mineral production were not expected in the near future.

There was a 2% real growth in the $3.7 billion[2] gross domestic product (GDP). The Government continued to apply fiscal and monetary restraints to slow internal demand and increase the competitiveness of Costa Rican exports. To keep pace with the rate of inflation, the national currency was devalued 20 times. These minidevaluations were in line with agreements with the International Monetary Fund.

Almost all of Costa Rica's gold and silver production came from the Santa Clara deposits about 65 kilometers west of San José. These deposits were mined by Minera Macacona S.A., which was owned by United Hearne Resources Ltd., 60%, and Canadian Barranca Corp. Ltd., 40%.

The Bellavista-Montezuma Mine is another precious metal deposit that has been under development for several years by the Midland Energy Corp. and Westlake Resources Inc. The operator for this project was Rea Gold Corp., which also held a 16% interest in Midland Energy. Continuing explorations by underground drifting and crosscutting have allowed a periodic upgrading of ore reserves. Proven reserves, including 145,000 tons averaging about 0.2 troy ounce of gold per ton, were upgraded in 1985 to 333,600 tons. There was an estimated 53,500 tons of probable reserves grading about 0.32 troy ounce per ton, and another 2.4 million tons of inferred reserves grading about 0.4 troy ounce per ton. The venture was seeking financing to construct a 150-ton-per-day mill and commence mining operations.

The Government had undertaken a number of exploration projects, chiefly for alluvial and vein gold deposits, but also for coal, lignite, and radioactive minerals. The Ministerio de Industria, Energía y Minas was computerizing the process of granting mineral concessions and hoped to have an up-to-date register in the near future.

Japan agreed to extend a $52 million low-interest loan to build a 55-megawatt geothermal powerplant on the slopes of the Miravalle Volcano. Following a 7-year grace period, Costa Rica would repay the loan in 25 years at a 4.75% interest rate.

The contract between Costa Rica and Mexico for crude oil exploration was terminated in 1985. Limited exploration was carried out in the Talamanca area by state-owned Refinadora Costarricense de Petróleo S.A. (Recope). Recope was cooperating with the U.S. Geological Survey in coal development studies.

In 1985, bidding was reopened for construction of a 1-million-barrel-per-day crude oil transoceanic pipeline. The original bid period in 1984 attracted only four respondents.

EL SALVADOR

The minerals sector remained in a depressed state because of the continued civil strife and its accompanying security problems that discouraged investment and endangered personnel. The 1985 GDP reached an estimated $4.5 billion,[3] and the economy grew by about 2% in real terms. International financial assistance, mostly from the United States, continued to play a vital role in the El Salvadoran economy.

The San Cristóbal gold and silver mine remained closed. Commerce Group Corp. has so far been unable to proceed with its San Sebastián gold mine venture because of risk insurance problems.

GUATEMALA

There was little progress in the minerals sector during 1985, and output remained almost entirely limited to industrial minerals and materials. An announced effort to reestablish lead and zinc mining in the Huehuetenango Department evidently was not successful, but antimony and tungsten mines were reopened. Crude oil production reached its lowest level in 10 years, and exports fell from about 1.3 million barrels in 1984 to 458,000 barrels in 1985.

After almost no growth in 1984, the $9.1 billion[4] GDP for 1985 indicated a 1.6% decline in the economy. The economic and social disarray caused by violent insurgency actions continued. The Government maintained economic austerity, but its attempts to increase prices and revenues were resisted with varying degrees of success by the business sector and organized labor. Import restrictions and a shortage of foreign exchange muted existing productive capacity. The lack of foreign exchange to pay for petroleum imports curtailed deliveries and resulted in periodic fuel shortages. In July, the Government sold 96,000 troy ounces of gold, or one-fifth of its national reserves, to Moncatta Metals Corp. for about $30.6 million. About $26 million of the proceeds were used to pay outstanding oil import debts. This was only a temporary solution, and oil import payment arrears continued to perpetuate periodic oil shortages. Domestic crude oil exports fell because of lower production and increased domestic use by the public power company. Petroleum import costs in 1985 totaled $269 million, and 22% of the oil was used to generate electricity.

The International Development Bank (IDB) authorized $57 million in additional financing for the 300-megawatt Chixoy hydroelectric complex. With this loan, IDB involvement in the project reached $232 million. The remainder of the $890 million total cost was provided by the International Bank for Reconstruction and Development, the Central American Bank of Economic Integration, the Venezuelan Investment Fund, and Guatemalan investors. The Government expected to reduce its 1986 oil import bill by $55 million, owing to the early 1986 inauguration of Chixoy and the placement of thermal power facilities in a minimal standby status.

It was projected by the Instituto Ecuatoriano de Electrificación that Guatemala would be able to export 240 megawatts of electricity if markets became available. Maintenance shut downs at other hydroelectric facilities and dry season power curtailments could reduce this export capability. Even so, the foreign exchange savings from reduced petroleum imports was expected to relieve some of the financial pressure on the Government.

On July 12, 1985, a new mining law, Decree 69-85, became effective. Exploration concession areas were reduced, but the time period was extended to 5 years. Foreign companies were granted exploitation rights, and the maximum exploitation concession area was increased to 50 square kilometers. The new law was not explicit on several mining issues, and clarification was expected through the future issuance of regulations.

Two international entities were actively assisting Guatemala's minerals sector. The Los Alamos National Laboratory was engaged in studies for utilizing geothermal potential in western Guatemala near Zunil in Quezaltenango Department. Taiwan signed a technical cooperation agreement, donated a testing laboratory to the Ministry of Energy and Mines, and was conducting feasibility studies on the development of bentonite and diatomite deposits.

After closing in 1981 because of low prices and guerrilla attacks, the Annabella and Los Lirios antimony-tungsten mines officially reopened. By the end of the year, production reached about 75 tons per day of 3.5% antimony ore. About 590 tons of 45% antimony lump ore was sold during the year to Anzon America Inc. and to a company in Belgium. The underground mining complex in San Ildefonso de Ixtahuacán in Huehuetenango Department is owned by Minas de Guatemala S.A.

The Ministry of Energy and Mines initiated a gold and silver exploration project in a 1.3-square-kilometer area near the towns of El Pato and Poxte in Chiquimula Department. Work was to include trenching, tunneling, and the drilling of up to 32 holes to a depth of 200 meters. The mineralized area under investigation contained gold-bearing quartz veins in granite. Ore samples graded 0.233 troy ounce to 0.729 troy ounce of gold per ton and 0.146 troy ounce to 0.438 troy ounce of silver per ton.

Société Nationale Elf Aquitaine withdrew from the joint petroleum venture with Hispánica de Petróleos S.A. (Hispanoil) and Basic Resources International (Bahamas) Ltd. (BRISA). Hispanoil became operator of the partnership's Block I-80 concession, with BRISA holding the other 50% interest. Along with the ownership change, the concession was converted into a new contract, A-1-85, and became governed by the revised 1983 petroleum law. The A-1-85 area contains the Caribe, West Chinaja, and Rubelsanto producing fields. The partnership was awarded three other blocks that were previously successfully drilled. In Block H-2-84, the No. 1 Xan produced about 3,000 barrels per day of 15.6° API gravity crude oil in 1981; the No. 1 Yalpemech in Block J-9-84 flowed 700 barrels per day of 36.5° API gravity crude oil, and the No. 1 San Diego in Block K-9-84 flowed 600 barrels per day of 30.5° API gravity crude. New drilling and well workovers in the A-1-85 production area and the activation of the shut-in wells in the other three concessions was expected to increase production in 1986.

BRISA joined with Fipp Petroleum Investment B.V. to explore contract area 5-85, north of the Hispanoil-BRISA contract area A-1-85. Esso Central America S.A. and Amoco Exploration Guatemala S.A. were to begin seismic surveys in 1986 over their respective contract areas, 3-85 and 4-85.

HONDURAS

The El Mochito lead, silver, and zinc mine dominated the minerals sector in Honduras. El Mochito remained the largest mine in Central America, and was the only producer of lead and zinc in the Caribbean region, except for Colombia, where very small quantities of lead have been mined, and Guatemala, where small mines have been inactive.

In 1985, the GDP reached $3.4 billion[5] and maintained the 3% real growth rate achieved in 1984. The economic base continued to be weak, and a shortage of foreign credit persisted as investor confidence failed to improve. Traditional export markets were restrained as trading partners limited imports to contend with their own economic problems. Honduras imposed strict import payment controls, but shortages of foreign exchange persisted and, on occasion, caused long payment delays for imported goods. Mineral exports were valued at an estimated $65 million and represented about 8% of the total. Petroleum, valued at about $110 million, accounted for 18% of total imports.

In May, the U.S. Agency for International Development (USAID) authorized a $69 million economic recovery grant to Honduras as part of the United States Caribbean Basin Initiative (CBI). Honduras was to provide a like amount for this joint economic development program. This grant brought total CBI funding for Honduras since 1982 to over $272 million. Although scheduled for 1985 disbursement, USAID did not release the funds that year because of economic policy differences with the Government. The major point of contention involved the USAID belief that the national currency should be devalued.

Uneasiness provoked by the general regional instability persisted, and private foreign investment and credit continued to be restrained. The Government endeavored to attract new investment in the mineral industries by providing geological studies to reduce the risk capital companies need for basic exploration.

At yearend, AMAX Inc. reported that the El Mochito Mine had 4.8 million tons of ore reserves averaging 9% zinc, 4.6% lead, and 4.9 troy ounces of silver per ton. The company planned to increase metal recovery by reactivating a cyanide circuit and installing a small pilot flotation plant for copper recovery.

Small-scale gold placer mining has been carried out in Honduras for many years. In

Olancho Department, the most active placer area, there are three gold mining cooperatives composed of a total of about 150 prospectors. In all of Honduras, there are reportedly five active gold mining companies, but the Government has long believed that the country has considerable untouched gold and silver resources.

In midyear, the United Nations (UN) approved an initial sum of about $1.4 million for a 14-month geological exploration program in eastern Honduras. If the results prove favorable, the investigative period would be extended 1 year and would be funded by the UN with an additional $1 million. The program was to initially concentrate on the San Gertrudis and Guayabillas deposits in a 60-square-kilometer area of El Paraíso Department in southeastern Honduras, where gold and silver occurrences have already been identified. Exploration work was also planned for La Paz and Santa Bárbara Departments, where known deposits of copper, silver, and zinc were thought to have commercial potential. Results of the UN studies were to be made available to private mining companies through a bidding process, thereby reducing the risk capital investment for preliminary exploration surveys.

Salt production could be increased if justified by a United Nations Industrial Development Organization (UNIDO) feasibility study. The UNIDO study concerned installing a solar evaporation plant for brines in the Pacific coastal area of Choluteca Department. Salt produced in the region has come from evaporation plants using nonsolar fuel for drying.

The Latin America Energy Organization (OLADE) assisted in the preparation of new petroleum legislation for consideration by the congress. OLADE has also provided petroleum-related technical training in Guatemala for Honduran geologists. In the Government's continuing effort to supply industry with more information regarding hydrocarbon potential, AERO Services of Canada was contracted to conduct a geophysical survey over the Mosquitia Basin area in Gracias a Dios Department. AERO also was to perform gravimetric studies of the Atlantic coastal areas.

NICARAGUA

Mineral production continued to slide downward, but the Government remained confident that this trend would be reversed. Multinational technical and financial assistance has allowed increased exploration, mine and plant rehabilitation projects, and replacement purchases for deteriorating U.S.-manufactured equipment. Guerrilla activity in northern Zelaya Department continued to interfere with mining operations.

In real terms, the Nicaraguan economy declined by about 2%. Most economic sectors deteriorated to some extent. Industry suffered from strict import controls, shortages of raw materials, a scarcity of foreign exchange, unrealistic exchange rates, and soaring inflation that jumped to an annual rate of 320% for 1985. Total exports declined to about $378 million,[6] although by some estimations this amount could have been as low as $293 million. The cost of imports continued to rise and was estimated at about $919 million. Increased human and financial resources were needed to counter guerrilla activity, estimated in 1985 to have required about 6% of the labor force and 50% of the national budget. In May, the United States imposed a trade embargo against Nicaragua and effectively halted what remained of an already reduced level of exchange between the two countries. U.S. attempts to influence actions of the international community had a mixed result as some foreign government credits, grants, materials, and technical assistance continued to be made available to Nicaragua.

When crude oil imports from the Middle East failed to materialize, early in 1985 Nicaragua arranged to secure petroleum from the U.S.S.R., and troublesome, periodic fuel shortages were alleviated.

Acts of sabotage reportedly damaged transmission lines and towers from the Momotombo geothermal plant. In early May, a contract was signed with Italy's Industrial Electromechanical Group to build a second geothermal plant at the Momotombo Volcano site. Work was scheduled to begin by mid-1986 and to be completed in 1988.

Nicaragua took another step toward compensating companies for the 1979 nationalization of foreign-owned mines. In 1982 and 1983, compensation agreements were signed with ASARCO Incorporated and Rosario Resources Corp. In 1985, negotiations were to begin on the amount of compensation due Empresa Minera de El Setentrión, the majority of which was owned by Noranda

Mines Ltd. of Canada. El Setentrión operated the El Limón Mine in Chinandega Department.

Problems with physical security, a lack of trained personnel, and deteriorating mine and plant equipment caused mineral output to fall to new lows. The Government was confident that the downtrend would reverse in 1986 as the result of assistance from several foreign governments in mining projects. Both technical and financial mining assistance had been supplied by Bulgaria, Czechoslovakia, Sweden, the U.S.S.R., and several Latin American countries. In addition to improving gold production from mines under active rehabilitation, the Government expected to restart lead and zinc production from the Vesubio Mine southeast of the Bonanza mining area in Zelaya Norte Department. Bulgaria had been assisting with the rehabilitation of this mine and reportedly invested over $3 million in the project. Vesubio was formerly owned by Neptune Mining Co., a joint venture of Asarco and Rosario Resources. Prior to its nationalization in 1979, the mine and plant produced concentrate containing gold, silver, lead, zinc, and some copper.

Regardless of the positive technological and equipment improvements under way in Nicaragua's mining sector, the problems of physical security and personnel shortages needed to be improved before mineral production could make a significant economic contribution through foreign exchange earnings.

PANAMA

There was little new activity in the minerals sector during 1985. The Government worked with the U.S. Geological Survey on a preliminary investigation of coal deposits in Bocas del Toro Province near the Bahía de Limón and on Popa Island in northwestern Panama. OLADE assisted in the identification of geothermal potential in western Chiriquí Province. Early estimates gave the area a geothermal energy potential of 400 megawatts. There was also a resurgence of interest in former gold producing areas in the Darién Province.

Panama's GDP of $4.7 billion[7] failed to show any real economic growth in 1985. Mining remained of minor importance, contributing little to exports or employment, and only negligibly to the GDP. A new petroleum law was to be presented for legislative discussion in 1986. The last revision to the petroleum law was in 1968. According to the Dirección General de Hidrocarburos, several international oil companies have expressed an interest in obtaining exploration contracts after the new petroleum legislation is enacted.

The Dirección General de Recursos Minerales offered a 5-year development plan to assist and stimulate the development of the mineral sector through private initiatives. The Government of Japan was assisting in the construction of the Centro de Investigaciones Minero Metalúrgico de Panamá. The center was designed for use in geological and mining technological studies. Using nonreimbursable funds from the Inter-American Development Bank, the Mineral Resources Directorate planned to resume the national minerals survey and geological mapping program that was discontinued in 1972. Other international agencies were assisting in various mineral investigations.

In 1985, there were 45 licenses issued for alluvial gold mining, and 10 companies requested permission for mineral exploration and/or exploitation. Among these latter were gold mining contracts granted to Sociedad de Inversiones Ixtapa S.A., RCO Mining Co. S.A., Río Alba S.A., and Nueva Iberia Minera S.A. Company requests still under consideration included Robbins Enterprises S.A., Maquinaria Pesada S.A., and Cía. Mineral Provincial S.A. Contracts for industrial mineral mining were issued to Arcillas de Chitré S.A. and Fertilizantes del Istmo S.A. Requests still under consideration included Constructora Urbana S.A. and Moliendas Generales S.A. One company, Cía. Mineral Basico S.A., opened a new limestone quarry and plant, but the location was not reported.

The Ixtapa investment group cited above formed a joint venture with Freeport Exploration Co., a division of Freeport Minerals Co., to explore the Cana gold concession in the Darién jungle. The area contains a number of abandoned mines, including Santo Espíritu and Mina del Rey. One of the alluvial gold mining concessions was granted to Darién Mining Co. S.A. to work in the Tuquesa River. The company was still evaluating the area in 1985. Another group of investors was evaluating manganese deposits in Colón Province.

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[1]Physical scientist, Division of International Minerals.

[2]In 1984, the average rate of exchange of Costa Rican colones (c) to U.S. dollars was c44.50=US$1.00. The average exchange rate for 1985 was c50.60=US$1.00.

[3]Where necessary, values have been converted from El Salvadoran colones (c) to U.S. dollars at the rate of c2.50=US$1.00.

[4]Where necessary, values have been converted from Guatemalan quetzals (Q) to U.S. dollars at the rate of Q1.00=US$1.00.

[5]Where necessary, values have been converted from Honduran lempiras (L) to U.S. dollars at the rate of L2.00=US$1.00.

[6]Where necessary, values have been converted from Nicaraguan cordobas (C$) to U.S. dollars at the rate of C$26.50=US$1.00.

[7]Where necessary, values have been converted from Panamanian balboas (B) to U.S. dollars at the rate of B1.00=US$1.00.

The Mineral Industry of Other Areas of the Far East and South Asia

By E. Chin, Gordon L. Kinney, Travis Q. Lyday, and John C. Wu

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BANGLADESH[1]

The mineral industry of Bangladesh was totally dominated by natural gas production and its downstream uses. A small amount of cement was produced, and clays were used locally for ceramics and construction materials. Nitrogenous fertilizer was produced from natural gas and a modest, scrap-based steel industry produced steel for local consumption. The country has been developing and using its abundant and inexpensive gas reserves as fast as practical. The population, however, was predominantly dependent on agriculture for its livelihood. The industrial sector accounted for 10% of the economy, and most of the industrial output was directly associated with agricultural products—jute, tobacco, and textiles. Industrial expansion, even with the availability of gas, was severely constrained because of limited domestic demand, lack of skilled work force and management, poor infrastructure, and a low rate of domestic savings. To put greater emphasis on the industrial sector, the Government established a National Committee for Industrial Development in July. The Committee instituted policy reforms in the areas of trade and investment. One important step was to move from a positive import list to a negative list, thereby permitting imports of items not restricted or banned. The system for recovering and approving new domestic or foreign industrial investments was streamlined to expedite what had become a cumbersome, bureaucratic exercise.

To encourage industrial development in areas away from the crowded urban centers, several economic incentives reportedly were adopted. These included a reduced tax rate on imported machinery, exemption of import license fees, a reasonable debt equity rate, and a 9-year income tax exemption period.[2] In the trade sector, imports increased 12% in fiscal year (FY) 1984[3] mainly because of increased foodgrain purchases.[4] Imports were expected to decrease by 7%, however, in FY 1985. The main mineral imports were fuels, fertilizers, and iron and steel products. Exports have risen substantially since 1982, but are highly dependent on the growing conditions and world market for jute, jute products, tea, and ready-made garments.

COMMODITY REVIEW

Metals.—*Iron and Steel.*—Bangladesh has one of the lowest per capita steel outputs of the more populous countries. The main steel producer was the nominal 250,000-ton-per-year-capacity Chittagong steel mill. The scrap-based plant still uses open-hearth furnaces to produce an output of only 160,000 tons per year. A Japanese loan was obtained to help modernize the plant and install 200,000-ton-per-year continuous billet-slab casting equipment. The improvements were designed to increase efficiency and not bring the plant back to its full original design capacity.

A small Dhaka steel foundry has ordered a one-strand continuous caster from Concast (India) Ltd. to produce sections of 80 millimeters by 130 millimeters in various grades of steel. Startup was scheduled for late 1986.

Indian and Bangladesh officials have been discussing a $150 million project to construct a direct-reduced iron (DRI) plant at Chittagong. The 600,000-ton-per-year plant would be based on high-grade Indian iron ore and low-cost Bangladesh natural gas recently made available at Chittagong with the completion of a natural gas pipeline.[5]

Industrial Minerals.—*Fertilizer Materials.*—The country's fifth urea fertilizer factory was completed by yearend 1985 with financial assistance from China and Japan. The $65 million plant is at Ghorasal, 40 kilometers east of Dhaka. The plant has a capacity of 95,000 tons of urea fertilizer per year and brings the annual fertilizer capacity to 1 million tons, still somewhat below its 1.2-million-ton annual requirement.

Plans continued for a totally export-oriented ammonia-urea plant to be built at Chittagong. An Italian firm will be partial owner and operate the plant. The company will be known as Karnaphuli Fertilizer Co. and have a 1,000-ton-per-day ammonia plant and a 1,725-ton-per-day urea plant. Construction was scheduled to begin in the summer of 1985.

The big Zia fertilizer plant at Ashuganj has apparently solved the technical problems that have been causing trouble since the plant was completed in 1981. The factory spokesperson stated that after testing, the plant appears to be able to produce at more than its 1,600-ton-per-day rated capacity. Production had been as low as 137,000 tons in FY 1982. A dropoff in the gas supply to the plant has also contributed to poor production. This supply problem has been corrected with the completion of new gas production wells.

Mineral Fuels.—*Coal.*—The occurrence of coal in Bangladesh has been known since at least 1962. The coal is good quality, has high British thermal unit (Btu) value, and is up to 33 meters thick. Unfortunately, it is too deep to be economically mined by present methods. Despite the unfavorable outlook, the Geological Survey of Bangladesh has been carrying out a survey for economic mineral deposits in the northern region of the country. Test drilling to a depth of 450 meters in Dinajpur District revealed seven seams of coal between a depth of 160 and 370 meters. Seam thicknesses are from less than 1 meter to more than 40 meters and the calorific value ranged from 11,000 to over 14,000 Btu per pound. These were reported to be the shallowest coal deposits thus far found in Bangladesh. The deposits are 6 kilometers from a railroad and appear to have a good prospect for commercial development.

There are several occurrences of peat in the western part of the country. Bangladesh Oil, Gas, and Mineral Corp. was considering the development of a deposit at Kolamouza in Khulna. W. P. London and Associates of Canada was chosen to conduct a feasibility study of using the peat for power generation and to design a 10- to 15-megawatt powerplant. Reserves at Kolamouza were estimated at 8 million tons. The study could also be applied to other peat deposits in the western part of the country where reserves were estimated to be more than 120 million tons.

Oil and Natural Gas.—The seismic surveys for oil and gas contracted in 1984 were nearly completed by yearend 1985. Approximately 3,000 line-kilometers were completed, mostly in virgin sediments in the western part of the country. The Government was hoping to make discoveries in the west in order to minimize the development costs. Bringing gas pipelines into the west from the abundant eastern fields would involve several crossings of major branches of the large rivers. The engineering and construction costs would be formidable. Gas finds in the west would be used locally. Discovery of oil anywhere in the country in commercial amounts would be extremely helpful to the country's overall economy.

New drill rigs have been purchased and several prospective oil and gas sites have been located for test drilling. Meanwhile, drilling of the seventh and eighth wells at the Titas Gasfield and the third and fourth wells at the Habinganj Gasfield were completed in 1985. These new wells are expected to increase production capacity by 125 million cubic feet per day and bring total capacity to 600 million cubic feet per day from a total of 22 wells in 7 producing fields.[6] Even with this increased production and use, Bangladesh's consumption of gas relative to proved reserves remains one of the lowest of any country in the world.

The second gas development project consisting of the Kailashtila, Beanibazar, and Rashidpur Gasfields was just getting under way at yearend. The project is being financed by several international lending organizations as well as by Canada, the Netherlands, and the United Kingdom. It is divided into four contracts—drilling, pipelaying, and two surface facilities. In 1986, plans are to drill nine new production wells and rehabilitate two existing wells. A pipeline is to be constructed to connect the three fields with the main line from the Titas and Habinganj Gasfields. The surface support facilities are to be constructed concurrently.

Table 1.—Other Areas of the Far East and South Asia: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Area and commodity	1981	1982	1983	1984[p]	1985[e]
BANGLADESH[2]					
Cement, hydraulic[3]	344,830	326,247	306,688	272,619	[4]240,176
Clays: Kaolin[3]	9,982	5,862	2,269	2,613	[4]4,116
Gas, natural, marketed[3 5] million cubic feet	49,936	63,717	70,133	80,257	[4]92,043
Iron and steel: Metal:[3]					
Steel, crude (ingot only)	139,343	108,624	47,401	73,387	[4]101,419
Steel products	186,013	172,080	54,552	100,741	[4]126,582
Nitrogen: N content of ammonia	152,493	182,252	178,695	352,888	[4]358,480
Petroleum refinery products thousand 42-gallon barrels	9,420	8,853	7,168	7,958	[4]7,357
Salt, marine[3]	276,000	574,790	243,091	671,832	[4]489,000
Stone: Limestone, industrial[3]	38,550	44,592	32,101	24,564	[4]35,214
BRUNEI[2]					
Gas, natural:					
Gross million cubic feet	350,000	343,000	352,000	[e]330,000	330,000
Marketed do	312,533	306,459	[e]315,000	[e]300,000	[4]307,645
Natural gas liquids:					
Condensate thousand 42-gallon barrels	4,230	5,570	[e]5,910	[e]5,460	5,500
Natural gasoline do	196	289	[e]305	[e]280	300
Liquefied petroleum gas do	104	166	[e]125	[e]115	110
Total do	4,530	6,025	[e]6,340	[e]5,855	5,910
Petroleum:					
Crude do	60,614	60,225	63,875	58,560	54,300
Refinery products:					
Gasoline do	408	697	553	605	600
Distillate fuel oil do	276	321	358	395	400
Residual fuel oil do	1	7	7	8	8
Other including refinery fuel and losses do	283	200	250	272	300
Total do	968	1,225	1,168	1,280	1,308
CAMBODIA[e 2]					
Salt	[4]24,390	[4]38,100	40,000	40,000	40,000
CHRISTMAS ISLAND[2]					
Phosphate rock, marketable:					
Gross weight thousand tons	1,423	1,323	1,094	1,259	[4]1,200
P_2O_5 content do	499	466	385	443	[4]418

See footnotes at end of table.

Table 1.—Other Areas of the Far East and South Asia: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Area and commodity	1981	1982	1983	1984[p]	1985[e]
HONG KONG[2]					
Cement, hydraulic thousand tons	1,517	1,436	1,717	1,847	[4]1,835
Clays: Kaolin	8,216	286	834	70	[4]9,602
Feldspar	194	1,744	5,275	23,101	[4]26,777
Feldspar sand	3,325	31,114	51,272	92,293	[4]82,446
Iron and steel: Steel, crude[e]	120,000	120,000	120,000	120,000	120,000
Quartz	--	--	--	34	[4]116
NORTH KOREA[e 2]					
Aluminum metal ingot, primary	10,000	10,000	10,000	10,000	10,000
Barite	100,000	--	--	--	--
Cadmium, smelter	130	100	100	100	100
Cement, hydraulic thousand tons	8,000	8,000	8,000	8,000	8,000
Coal: Anthracite do	36,000	36,000	36,000	36,000	36,000
Coke do	3,000	3,000	3,000	3,000	3,000
Copper:					
Mine output, metal content	15,000	15,000	15,000	15,000	15,000
Metal:					
Smelter, primary and secondary	18,000	18,000	18,000	18,000	18,000
Refined, primary and secondary	22,000	22,000	22,000	22,000	22,000
Fluorspar	40,000	40,000	40,000	40,000	40,000
Gold, mine output, metal content troy ounces	160,000	160,000	160,000	160,000	160,000
Graphite	25,000	25,000	25,000	25,000	25,000
Iron and steel:					
Iron ore and concentrate, marketable:					
Gross weight thousand tons	8,000	8,000	8,000	8,000	8,000
Fe content do	3,200	3,200	3,200	3,200	3,200
Metal:					
Pig iron do	5,000	5,250	5,500	5,750	5,750
Ferroalloys, furnace type unspecified do	120	120	120	120	120
Steel, crude do	5,500	5,800	6,100	6,500	6,500
Lead:					
Mine output, metal content	110,000	95,000	75,000	[r]110,000	110,000
Metal, primary and secondary	65,000	60,000	60,000	[r]95,000	95,000
Magnesite, crude thousand tons	1,900	1,900	1,900	1,900	1,900
Nitrogen: N content of ammonia do	450	450	450	450	450
Phosphate rock	500,000	500,000	500,000	500,000	500,000
Salt, all types	570,000	570,000	570,000	570,000	570,000
Silver, mine output, metal content thousand troy ounces	1,600	1,600	1,600	1,600	1,600
Sulfur thousand tons	255	230	230	230	230
Talc, soapstone, pyrophyllite	170,000	170,000	170,000	170,000	170,000
Tungsten, mine output, metal content	2,200	2,200	500	1,000	1,000
Zinc:					
Mine output, metal content	140,000	140,000	140,000	140,000	160,000
Metal, primary	120,000	120,000	120,000	120,000	120,000
LAOS[e 2]					
Cement (from imported clinker)	--	--	--	--	[4]2,500
Gypsum	[4]40,500	[4]60,000	70,000	[4]82,000	82,000
Salt, rock	20,000	[4]8,949	10,000	[4]8,000	10,000
Tin, mine output, metal content	[r]255	[r]302	[r]359	[r]430	540
MONGOLIA[2]					
Cement, hydraulic thousand tons	210	350	336	[e]350	400
Coal:[e]					
Anthracite and bituminous do	250	250	250	250	300
Lignite and brown do	4,350	4,980	5,180	5,600	6,000
Total do	4,600	5,230	5,430	5,850	6,300
Copper, mine output, metal content	71,800	90,000	104,000	118,000	128,000
Fluorspar, all grades thousand tons	595	670	700	740	740
Gypsum[e] do	32	32	32	32	32
Lime, hydrated and quicklime[e] do	50	60	62	67	70
Molybdenum, mine output, metal content[e]	661	830	960	1,000	1,000
Petroleum refinery products:[e]					
Kerosene thousand 42-gallon barrels	23	23	23	23	23
Residual fuel oil do	20	20	20	20	20
Salt[e]	15,000	15,000	16,000	16,000	16,000
Tin, mine output, metal content[e]	--	--	1,000	1,000	1,000
Tungsten, mine output, metal content[e]	1,000	1,500	1,500	1,500	1,500
NEPAL[6]					
Cement, hydraulic	30,574	[e]25,000	45,587	39,225	[4]31,479

See footnotes at end of table.

Table 1.—Other Areas of the Far East and South Asia: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Area and commodity	1981	1982	1983	1984[p]	1985[e]
NEPAL[6] —Continued					
Clays for cement manufacture[e]	2,000	2,000	2,000	2,000	[4]4,242
Coal: Lignite	8,174	[e]8,000	8,244	7,595	[4]6,808
Copper ore:					
Gross weight	6	6	11	[e]9	6
Cu content	2	2	4	[e]3	[4]2
Gem stones:					
Garnet kilograms	105,925	[e]30,000	[e]23,000	[e]20,000	[4]27,300
Tourmaline do.	13	[e]10	[e]10	[e]12	[4]60
Lime, agricultural	[e]10,000	[e]10,000	[e]10,000	7,000	[4]7,000
Magnesite, crude	[e]20,000	[e]20,000	15,016	14,603	[4]19,851
Salt	8	[e]10	6	700	[4]7,500
Stone:					
Limestone	83,565	[e]80,000	50,422	[e]45,000	[4]55,953
Marble:					
Chips	366	[e]400	482	609	600
Cut square meters	3,561	[e]4,000	3,208	[e]3,000	[4]7,641
Craggy cubic meters	963	[e]1,000	3,530	708	[4]691
Talc	71	[e]3,000	15,263	7,595	[4]6,015
SINGAPORE[2]					
Cement, hydraulic thousand tons	2,253	2,695	3,153	2,821	[4]1,992
Iron and steel: Metal: Steel, crude do.	350	350	350	350	350
Petroleum refinery products:					
Gasoline thousand 42-gallon barrels	21,072	14,562	19,738	17,731	18,000
Jet fuel do.	35,228	28,922	30,690	43,578	44,000
Kerosene do.	27,224	29,144	31,377	14,338	14,000
Distillate fuel oil do.	83,008	91,992	88,258	76,677	77,000
Residual fuel oil do.	99,270	80,902	81,906	87,418	87,000
Lubricants do.	3,740	3,152	3,852	3,959	4,000
Other do.	35,728	44,966	41,663	45,560	46,000
Refinery fuel and losses do.	6,755	11,391	8,536	4,024	4,000
Total do.	312,025	305,031	306,020	293,285	294,000
Stone: Granite, broken thousand cubic meters	4,474	5,947	7,569	7,422	[4]6,743
Sulfur, byproduct of petroleum	378	15,188	3,666	5,557	6,000
SRI LANKA					
Cement, hydraulic thousand tons	642	[e]650	506	[e]500	600
Clays:					
Ball clay	9,234	9,291	11,980	16,500	[4]23,825
Kaolin	7,292	8,206	7,976	11,100	[4]5,405
Brick and tile clay[e]	60,000	60,000	60,000	70,000	70,000
Clays for cement manufacture	39,081	62,591	51,931	[e]50,000	[4]39,123
Feldspar, crude and ground	[e]4,000	2,922	2,609	5,200	[4]9,789
Gem stones, precious and semiprecious, other than diamond value, thousands	$201	[e]$10,000	$39,814	$20,569	$20,000
Graphite, all grades	7,573	8,803	5,528	5,623	[4]7,413
Iron and steel: Metal: Semimanufactures	--	--	24,546	15,990	[4]9,310
Mica, scrap	182	291	171	[e]200	200
Nitrogen: N content of ammonia	43,100	103,600	62,700	[e]70,000	30,000
Petroleum refinery products:					
Gasoline thousand 42-gallon barrels	NA	968	806	[e]1,100	1,100
Jet fuel do.	NA	908	517	[e]700	700
Kerosene do.	NA	1,226	1,047	[e]1,400	1,400
Distillate fuel oil do.	NA	4,783	3,703	[e]5,000	5,000
Residual fuel oil do.	NA	4,833	3,235	[e]4,350	4,350
Other do.	NA	[e]1,000	1,252	[e]1,650	1,650
Refinery fuel and losses[e] do.	NA	600	600	800	800
Total do.	[e]15,000	14,318	11,160	[e]15,000	15,000
Phosphate rock	15,294	[e]20,000	[e]16,000	13,685	14,000
Rare-earth metals: Monazite concentrate, gross weight	60	304	[e]300	147	200
Salt	104,388	176,437	129,222	107,000	[4]76,858
Stone:					
Limestone thousand tons	1,812	1,616	947	[e]1,000	1,000
Quartz, massive	[e]800	794	764	1,100	[4]1,566
Titanium concentrate, gross weight:					
Ilmenite	80,011	68,282	81,778	102,048	[4]114,854
Rutile	13,301	7,212	8,093	6,467	[4]8,558
Zirconium: Zircon concentrate, gross weight	3,266	5,789	5,721	3,708	[4]4,061

See footnotes at end of table.

Table 1.—Other Areas of the Far East and South Asia: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Area and commodity	1981	1982	1983	1984[p]	1985[e]
VIETNAM[7]					
Bauxite: Gross weight[e]	--	1,000	3,000	5,000	6,000
Cement, hydraulic thousand tons	545	[e]800	928	[e]1,100	1,300
Chromium: Chromite[e]	15,000	16,000	16,000	16,000	15,000
Clays: Kaolin[e]	1,250	1,000	1,200	1,000	1,000
Coal: Anthracite thousand tons	5,900	5,700	6,019	5,840	[4]6,200
Gypsum[e]	15,000	25,000	25,000	25,000	25,000
Iron and steel: Metal:[e]					
Steel, ingot thousand tons	110	120	100	100	110
Steel, rolled do	65	40	40	40	50
Nitrogen: N content of ammonia	(8)	(8)	(8)	(8)	(8)
Phosphate rock:[e]					
Gross weight thousand tons	181	110	200	200	220
P_2O_5 content do	60	36	66	66	73
Salt do	403	650	890	[e]800	800
Tin:					
Mine output, metal content	380	[e]500	[e]550	[e]500	600
Metal, smelter	--	475	[e]520	[e]475	570
Zinc:[e]					
Mine output, metal content	6,000	6,000	7,000	7,000	5,000
Metal, smelter, primary	5,000	5,000	6,000	6,000	4,200

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.

[1]Table includes data available through Aug. 25, 1986.

[2]In addition to the commodities listed, other crude construction materials such as sand and gravel and other varieties of stone presumably are produced, but available information is inadequate to make reliable estimates of output levels.

[3]Data are for years ending June 30 of that stated.

[4]Reported figure.

[5]Gross production is not reported; the quantity vented, flared, or reinjected is believed to be negligible.

[6]Data are for the Nepalese fiscal year ending mid-July of that stated.

[7]In addition to the commodities listed, iron ore was mined in the past and pig iron was produced at industrial facilities, but the status of these industries under prevailing conditions is not sufficiently clear to allow formulation of reliable estimates of output levels. Similarly, data on output of crude construction materials are not available, and no basis is available to make reliable estimates of output levels.

[8]Nitrogen (N content of ammonia) production capacity of the country's only known plant is 54,000 tons per year; it is not known at what output level the plant is operating.

BRUNEI[7]

Brunei is one of the smallest, yet wealthiest countries in the Asian-Pacific area. It has one of the most mineral-dominated economies of any nation in the world. Production of crude oil, natural gas, and oil refinery products accounted for over 98% of the country's income in 1985. A small percentage of the natural gas was consumed domestically. The remainder of the output was exported in the form of liquefied natural gas (LNG) to Japan under a long-term contract. The crude oil was exported on the world market.

Despite the total economic domination of the petroleum sector, Brunei was not without other mineral deposits. A cobble-and-pebble-sized gravel deposit in Temburong was quarried for crushed stone and aggregate. Reserves at the deposit were over 21 million cubic meters. Brunei also has deposits of coal, peat, and silica sand, none of which were being exploited. A high volatile bituminous coal was mined at Muara at the turn of the century and during World War II. Except for petroleum exploration, very little detailed mineral survey work has been done in the country.

Exploration for oil was down during 1985, reflecting the drop in market demand. Brunei Shell Petroleum Co., the country's only producer of gas and oil was also the only company to be actively drilling. Four exploration wells were drilled compared with nine in 1984. Twenty-three appraisal-production wells were drilled in 1985 compared with 62 in 1984.

Oil production was down a small amount, but the severe drop in world prices cut the value of production considerably. Whether the country's economy and balance of trade continues to be in surplus will depend on just how low the cost of oil drops.

To maintain a favorable production-to-reserves ratio, the Government was encouraging the other concession holders to speed up their somewhat dormant exploration programs. Jasra Jackson, the local joint venture between Jackson Petroleum Co. of the United States and Jasra Sdn. Bhd. of Brunei was to have drilled two wells by yearend 1985. Jackson Petroleum was trying to arrange financing for the drilling by selling shares of the venture. The company was confident that drilling could be started early in 1986. The other two concessionaires, Woods Petroleum Co. and Sunray Oil Co., both of the United States, were also under pressure by the Government to begin drilling in their concessions. As with Jackson Petroleum, both companies were looking for someone to share the risk and funding for the drilling programs. Sunray Oil had been inactive because of several ownership changes in the company. It appears now that Mobil Oil Corp. of the United States holds the rights to the old Sunray Oil concession area.

Brunei Shell had a gas compression plant under construction at its Seria Field. Gas will be reinjected into the reservoir in order to increase the oil recovery rates. Testing of four production wells in the new Rasau Field indicated a much higher production potential than originally believed. The capacity was expected to reach 12,000 barrels per day by yearend.

Since Brunei's independence in 1984, the emphasis of the country's first 5-year development plant (1986-90) was to steer its economy away from oil domination to boldly establishing itself as a regional banking and financial center. The plan called for an expenditure of $3.7 billion[8] to stimulate the economy and improve its standard of living even though Brunei already has the highest per capita income of any Asia-Pacific nation. It will actively boost the nonoil private sector, investing where necessary, in high-risk ventures. The Government would consider setting up a monetary authority to shape Brunei's future as a financial center; a development bank for industry and commerce; a national training scheme to make full use of the local work force; privatization of some Government services; and public corporations and holding companies to participate in joint ventures and technology transfer. High value-added, nonlabor-intensive industries and bioindustry would be given priority during the 5-year period.[9]

Table 2.—Brunei: Exports and reexports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
Cement	11,333	10,213	--	Malaysia 10,199.
Gas, natural: Liquefied[2] value, millions	$1,365	$1,338	--	All to Japan.
Iron and steel: Metal:				
Scrap	8,640	11,329	--	Thailand 4,267; Singapore 1,321; Malaysia 152.
Semimanufactures	2,570	1,335	--	Malaysia 1,096; Singapore 235.
Petroleum:				
Crude thousand 42-gallon barrels	62,372	60,500	5,846	Japan 27,828; Singapore 7,575; Thailand 6,962.
Refinery products:				
Gasoline, motor 42-gallon barrels	3,052,197	576,300	--	Japan 386,427; Singapore 127,755; Malaysia 62,110.
Kerosene and jet fuel do.	279	728	--	All to Malaysia.
Lubricants do.	266	476	--	Singapore 390; Malaysia 86.
Nonlubricating oils do.	13	21	--	All to Malaysia.
Bituminous mixtures do.	9,375	8,763	--	Malaysia 8,726.
Rare-earth metals including alloys, all forms	--	52	--	All to Malaysia.
Other metals: Ashes and residues	68	549	--	Singapore 448; Malaysia 51.

[1]Table prepared by Audrey D. Wilkes.
[2]May include small amounts of liquefied petroleum gas.

Table 3.—Brunei: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS				
Aluminum: Metal including alloys, all forms	1,092	1,716	24	Singapore 1,350; United Kingdom 112; Australia 44.
Copper: Metal including alloys, all forms	669	432	41	Singapore 199; United Kingdom 75.
Iron and steel: Metal: Semimanufactures:				
Bars, rods, angles, shapes, sections	37,853	34,286	35	Japan 14,807; Singapore 3,407; United Kingdom 1,078.
Universals, plates, sheets	6,421	5,908	12	Singapore 2,629; Japan 2,101; Belgium-Luxembourg 256.
Wire	594	926	2	Singapore 381; Japan 145; China 134.
Tubes, pipes, fittings	34,152	28,375	814	Japan 18,389; Singapore 3,338; France 2,822.
Castings and forgings, rough	998	4,763	10	Japan 3,459; France 595; Netherlands 287.
Unspecified	r12	5	--	Singapore 4; New Zealand 1.
Lead: Metal including alloys, all forms	81	46	(2)	Singapore 32; China 4; Hong Kong 4.
Nickel: Metal including alloys, all forms	29	70	1	Singapore 62; Netherlands 6.
Rare-earth metals including alloys, all forms	15	31	--	Singapore 23.
Silver: Metal including alloys, unwrought and partly wrought value, thousands	$70	$118	--	All from United Kingdom.
Tin: Metal including alloys, all forms	89	78	1	Japan 74.
Other: Ashes and residues	8,502	10,842	22	Singapore 9,608; Japan 1,212.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.: Grinding and polishing wheels and stones value, thousands	$96	$73	$2	Japan $32; China $11; Singapore $11.
Cement	172,848	161,839	--	Republic of Korea 30,092; Singapore 7,648; Japan 3,489.
Clays, crude	3,645	1,524	--	India 1,372; Singapore 151.
Fertilizer materials:				
Crude, n.e.s	--	2,172	3	Malaysia 1,828; Singapore 191; West Germany 91.
Manufactured:				
Ammonia	11	13	1	Singapore 12.
Nitrogenous	181	608	--	West Germany 386; Singapore 194.
Phosphatic	47	519	--	Singapore 516.
Potassic	111	919	--	West Germany 478; Singapore 297; Malaysia 143.
Unspecified and mixed	155	388	7	West Germany 229; Singapore 75; New Zealand 50.
Gypsum and plaster	236	323	7	Thailand 210; United Kingdom 53; Austria 33.
Lime	377	682	--	Singapore 649.
Nitrates, crude	329	16	3	Singapore 13.
Phosphates, crude	111	5	--	Singapore 4.
Pigments, mineral:				
Natural, crude	54	--		
Iron oxides and hydroxides, processed	10	1	--	All from Singapore.
Salt and brine	1,133	1,339	--	Thailand 481; Singapore 424; Japan 203.
Stone, sand and gravel, all types	18,046	20,212	27	Malaysia 9,340; Singapore 9,352; Thailand 1,062.
Other: Crude	11,434	5,810	1	Thailand 5,044; Singapore 732.
MINERAL FUELS AND RELATED MATERIALS				
Petroleum refinery products:				
Gasoline, motor 42-gallon barrels	299,923	224,664	42	Singapore 224,621.
Mineral jelly and wax do	39	55	16	Singapore 24; United Kingdom 8.
Kerosene and jet fuel do	884	659	46	Singapore 612.
Lubricants do	31,794	28,056	945	Singapore 25,333; United Kingdom 1,064.
Nonlubricating oils do	3,251	2,212	266	Singapore 1,554; United Kingdom 329.
Bitumen and other residues do	67	8,181	--	NA.
Bituminous mixtures do	6,315	14,102	6	Singapore 8,108; United Kingdom 5,437.

rRevised. NA Not available.
[1]Table prepared by Audrey D. Wilkes.
[2]Less than 1/2 unit.

CAMBODIA[10]

The Cambodian mineral industry was the least developed of any of the Southeast Asian nations. The only organized production consisted of very small amounts of brick, cement, ceramics, lime, and salt. These were produced for districtwide, or in some cases, provincewide consumption.

A report of illicit gem production during 1985 was published.[11] According to the report, the old Thai gem mining sites near Borai, Chanthaburi, were nearly depleted, and the unemployed Thai miners crossed the border and mined gem stones near Pailin, in Battambang, Cambodia. According to the report, mining was not condoned by the Cambodian Government nor by the Vietnamese military personnel in the area. Reportedly, those caught were sent to Pailin to work on road construction.

The political situation in the country was still disrupted by sporadic military confrontations with anti-Government forces. The turmoil has made any realistic planning for mineral development nearly impossible. Current development by the Government was mostly directed to the basic transportation, communication, and electric power sectors. The economy continued to be based almost entirely on small farm and subsistence agriculture.

The Government, with Soviet aid, was making improvements to the inadequate electric power generating capacity. In Kompong Cham Province, northeast of Phnom Penh, a 2,000-kilowatt powerplant was under construction. Two 315-kilowatt generators were installed at the site. The largest known project was in the major port of Kompong Som. The plant began first-phase power production at 1,600 kilowatts on March 30, in a ceremony attended by high Government officials and the Soviet Ambassador to Cambodia. When completed, the plant is to have a designed capacity of 3,400 kilowatts and will serve the entire municipality.

A few thousand tons of mineral imports was received from market economy countries during 1983, the latest available figures. These were mostly refinery products, plus a few hundred tons of cement, clays, semifinished metals, and salt. In addition, the U.S.S.R. was believed to have supplied considerable aid in the form of chemical fertilizers, coal, and petroleum.

CHRISTMAS ISLAND[12]

Production of phosphate rock from Christmas Island, a tiny (135-square-kilometer area) coral limestone-covered volcanic island in the Indian Ocean about 360 kilometers south of the western end of Java and 2,600 kilometers nothwest of Perth, Australia, decreased 4.7% from that of 1984. Phosphate Mining Co. of Christmas Island, the island's sole organized mineral industry, accounted for 0.8% of total world output of phosphate rock on a gross-weight basis and 0.9% of total world output in terms of phosphorus pentoxide (P_2O_5) content of product. The island's ranking among world phosphate rock producers slipped to 15th owing to a scantily higher production by Algeria during the year than by Christmas Island. The average P_2O_5 content of phosphate rock produced was 34.9%. Virtually all production was exported, with the traditional markets of Australia and New Zealand continuing to account for a smaller and smaller share as export markets continued to diversify. Australia and New Zealand together took under 70% of total exports compared with more than 71% in 1984 and 88% as recently as 1982. Christmas Island has been an external territory of Australia since October 1, 1958.

Table 4.—Christmas Island: Exports of phosphate rock, by destination

(Thousand metric tons)

Destination	1983	1984	1985
Australia	536	493	499
China	21	55	--
Indonesia	6	--	38
Japan	--	40	39
Korea, Republic of	31	35	45
Malaysia	165	208	231
New Zealand	302	387	327
Philippines	--	--	2
Taiwan	5	16	6
Total	1,066	1,234	1,187

HONG KONG[13]

Hong Kong has an insignificant minerals industry. At yearend 1985, there was one mining lease and three mining licenses for mining and production of feldspar and kaolin. In addition, quarry operations produced 11 million tons of stone aggregate. The Mines Division of the Labour Department enforces legislation and safety regulations relating to mining and explosives; processes mining and prospecting applications; inspects mining and prospecting areas, stone quarries, blasting sites, and explosive storage; and issues blasting certificates.

Hong Kong's land area totals 1,068 square kilometers. Land used for agriculture comprises 9% of the area; developed areas account for 16.5%, and the remainder is marginal land of varying degrees. Light industry manufacturing is the mainstay of Hong Kong's primary production, accounting for 25% of the gross domestic product (GDP) and 36% of total employment. Close to 90% of the manufacturing output is exported. The clothing and textile industry is the largest followed by the electronics industry.

Hong Kong's economy is primarily based on entrepôt trade inasmuch as it is a free port. China was the largest market for Hong Kong's reexports, followed by the United States, Japan, Singapore, Taiwan, and the Republic of Korea. China was also the most important source of goods reexported through Hong Kong, followed by Japan and Taiwan.

Table 5.—Hong Kong: Exports and reexports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS				
Aluminum:				
Ore and concentrate	18,110	17,748	--	Taiwan 14,640; Indonesia 1,500; Republic of Korea 1,158.
Oxides and hydroxides	2,523	613	--	Taiwan 500; Republic of Korea 105.
Metal including alloys:				
Scrap	19,179	19,447	--	Japan 18,852; Taiwan 225.
Unwrought	25,150	22,648	--	Thailand 5,178; Taiwan 3,879; Indonesia 3,704.
Semimanufactures	10,924	13,397	1,921	China 4,918; Taiwan 1,164.
Arsenic: Oxides and acids	51	34	--	Taiwan 17; Indonesia 10.
Chromium:				
Ore and concentrate	70	99	--	All to Nigeria.
Oxides and hydroxides	37	33	--	China 15; Philippines 10.
Cobalt: Oxides and hydroxides	16	19	--	Taiwan 6; Republic of Korea 4; Thailand 4.
Copper: Metal including alloys:				
Scrap	22,212	22,802	--	Japan 14,303; Taiwan 3,111; China 2,807.
Unwrought	145	3,059	132	China 1,470; North Korea 1,000.
Semimanufactures	4,361	4,365	2	China 2,381; Taiwan 546; Singapore 482.
Gold:				
Waste and sweepings value, thousands	$2,640	$2,739	$67	Switzerland $2,361; United Kingdom $267.
Metal including alloys, unwrought and partly wrought thousand troy ounces	1,147	48	1	Macau 28; Japan 8.
Iron and steel: Metal:				
Scrap	329,556	300,067	16	Taiwan 124,343; Japan 72,591; Indonesia 72,430.
Pig iron, cast iron, related materials	4,421	127	--	Fiji 67; China 60.
Ferroalloys:				
Ferromanganese	102	5,430	--	North Korea 5,250; Indonesia 150.
Ferrosilicon	610	--		
Unspecified	162	114	--	Republic of Korea 61; North Korea 20; Japan 18.
Steel, primary forms	24,217	41,574	--	China 38,438; Taiwan 3,136.
Semimanufactures	295,412	597,458	416	China 529,350; Macau 21,529.

See footnotes at end of table.

Table 5.—Hong Kong: Exports and reexports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued				
Lead:				
Oxides	96	55	--	All to Indonesia.
Metal including alloys:				
Scrap	2,596	3,097	--	Taiwan 2,898; China 199.
Unwrought	233	729	--	China 569; Nigeria 58; Indonesia 50.
Semimanufactures	19	45	--	Malaysia 14; China 12; Brunei 9.
Magnesium: Metal including alloys, all forms	39	73	--	Japan 43; North Korea 29.
Manganese:				
Ore and concentrate, metallurgical-grade	323	102	--	All to Republic of Korea.
Oxides	1,431	504	--	Indonesia 192; Republic of Korea 153; Taiwan 124.
Mercury 76-pound flasks	2,210	169	--	North Korea 145; Sri Lanka 20.
Nickel:				
Oxides and hydroxides	146	189	--	Taiwan 107; Singapore 36; Republic of Korea 31.
Metal including alloys:				
Scrap	378	293	--	Japan 286.
Unwrought	4,277	3,020	--	Taiwan 1,455; North Korea 517; Republic of Korea 476.
Semimanufactures	814	933	--	Taiwan 363; Republic of Korea 299; Thailand 144.
Platinum-group metals:				
Waste and sweepings value, thousands	$5,488	$1,985	$73	United Kingdom $976; West Germany $565; Singapore $185.
Metals including alloys, unwrought and partly wrought troy ounces	8,741	13,876	--	Switzerland 5,173; Taiwan 4,618; Japan 2,705.
Silver:				
Waste and sweepings value, thousands	$127,769	$97,844	$798	United Kingdom $52,139; France $21,915; West Germany $20,484.
Metal including alloys, unwrought and partly wrought thousand troy ounces	373	1,211	--	Japan 977; Singapore 119; Taiwan 64.
Tin: Metal including alloys:				
Scrap	66	59	--	Japan 28; United Kingdom 24.
Unwrought	627	766	--	Taiwan 503; Singapore 120; Japan 70.
Titanium: Oxides	2,055	1,926	--	Indonesia 913; China 335; Philippines 176.
Tungsten: Metal including alloys, all forms	3	5	--	China 2; Austria 1.
Uranium and/or thorium: Oxides and other compounds kilograms	5,350	226	--	Indonesia 200; United Kingdom 25.
Zinc:				
Oxides	357	344	--	China 195; Vietnam 75; Philippines 28.
Metal including alloys:				
Scrap	30	94	--	All to China.
Unwrought	2,714	3,437	--	Macau 1,929; China 1,005; Indonesia 199.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	524	1,894	--	Macau 623; China 571; Republic of South Africa 243.
Artificial:				
Corundum	6,023	7,768	--	Republic of Korea 3,262; Taiwan 2,934; Japan 579.
Silicon carbide	477	1,391	--	Taiwan 680; Republic of Korea 547; Thailand 63.
Dust and powder of precious and semiprecious stones including diamond value, thousands	$7	$53	--	All to China.
Grinding and polishing wheels and stones	1,212	2,108	64	Indonesia 1,580; China 148; Philippines 102.
Asbestos, crude	84	19	--	Republic of Korea 18.
Barite and witherite	886	262	--	Taiwan 136; Republic of Korea 86; Indonesia 34.

See footnotes at end of table.

Table 5.—Hong Kong: Exports and reexports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Boron materials: Oxides and acids	246	92	--	North Korea 48; Republic of Korea 18; China 14.
Cement	318,459	726,884	--	China 484,388; Macau 235,806; Vietnam 6,680.
Clays, crude:				
Kaolin	2,997	10,276	--	Taiwan 8,974; Indonesia 800; Republic of Korea 300.
Unspecified	90,590	101,872	--	Taiwan 77,410; Republic of Korea 15,305; Indonesia 7,159.
Diamond:				
Gem, not set or strung carats	390,871	397,542	112,522	Belgium-Luxembourg 62,142; Singapore 59,118.
Industrial stones do	1,984	7,967	700	Netherlands 4,976; Belgium-Luxembourg 2,291.
Diatomite and other infusorial earth	26	22	--	India 8; China 7; Indonesia 3.
Feldspar, fluorspar, related materials	17,038	36,957	--	Taiwan 27,186; Indonesia 9,644.
Fertilizer materials:				
Crude, n.e.s	3,331	1,856	--	Taiwan 1,276; China 258; United Arab Emirates 124.
Manufactured:				
Ammonia	5	68	--	China 44; Vietnam 24.
Nitrogenous	105,133	136,644	--	China 136,604.
Potassic	--	306	--	All to Singapore.
Unspecified and mixed	7,377	8,409	6	China 8,364.
Graphite, natural	53	856	--	Republic of Korea 816.
Gypsum and plaster	6,738	1,677	--	Indonesia 1,520; China 76.
Iodine	--	2	--	Mainly to North Korea.
Lime	92	64	--	All to China.
Magnesium compounds:				
Magnesite, crude including calcined	15,330	18,399	--	Taiwan 16,930; Nigeria 655; Indonesia 400.
Oxides and hydroxides	r86	--		
Mica:				
Crude including splittings and waste	27	20	--	Republic of South Africa 15; Singapore 3.
Worked including agglomerated splittings	75	48	(2)	China 19; Republic of South Africa 12; Belgium-Luxembourg 7.
Pigments, mineral:				
Natural, crude	416	273	--	Indonesia 147; Dominican Republic 117.
Iron oxides and hydroxides, processed	1,926	1,674	--	Indonesia 870; China 564; Japan 126.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$88,507	$82,499	$29,501	Japan $23,484; Thailand $5,192.
Synthetic do	$731	$1,296	$537	Republic of Korea $238; Japan $233.
Salt and brine	6,497	1,519	--	Philippines 708; China 554; Papua New Guinea 105.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	41,924	106,854	--	China 106,189; Vietnam 426.
Sulfate, manufactured	1,715	1,339	--	Vietnam 1,170; China 96; Indonesia 50.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	5,559	5,915	98	Taiwan 5,486; Indonesia 235.
Worked	2,603	5,414	138	China 4,044; Indonesia 846; Macau 278.
Dolomite, chiefly refractory-grade	3,171	72	--	All to China.
Gravel and crushed rock	2,312	2,205	554	China 576; Singapore 558.
Limestone other than dimension	243	806	--	All to China.
Quartz and quartzite	285	387	--	Thailand 201; Indonesia 100; Taiwan 51.
Sand other than metal-bearing	278	4,110	--	China 4,068.
Sulfur:				
Elemental:				
Crude including native and byproduct	21	12	--	Vietnam 9; China 3.
Colloidal, precipitated, sublimed	4	36	--	Taiwan 20; Vietnam 10.
Sulfuric acid	97	66	--	China 36; Philippines 18.
Talc, steatite, soapstone, pyrophyllite	14,121	13,881	--	Indonesia 9,842; Taiwan 3,001; China 481.
Other:				
Crude	712	1,081	--	Taiwan 650; Nigeria 300; Indonesia 110.
Slag and dross, not metal-bearing	1,718	1,230	5	Taiwan 700; Republic of Korea 500.

See footnotes at end of table.

Table 5.—Hong Kong: Exports and reexports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	38	24	--	China 22.
Carbon black	936	2,892	--	China 2,161; Indonesia 463; Vietnam 247.
Coke and semicoke	3,598	436	--	Indonesia 310; Nigeria 120.
Petroleum refinery products thousand 42-gallon barrels	2,075	2,058	(2)	Macau 1,019; China 723; Thailand 134.

[r]Revised.
[1]Table prepared by Audrey D. Wilkes.
[2]Less than 1/2 unit.

Table 6.—Hong Kong: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS				
Aluminum:				
Ore and concentrate	17,504	23,630	--	China 18,380; Malaysia 5,250.
Oxides and hydroxides	2,308	351	2	China 243; Japan 83.
Metal including alloys:				
Scrap	1,083	1,107	106	Macau 428; China 172; Vietnam 127.
Unwrought	55,796	35,565	2,979	Canada 8,633; Australia 6,496; New Zealand 3,628.
Arsenic: Oxides and acids	61	242	--	All from China.
Chromium:				
Ore and concentrate	172	--		
Oxides and hydroxides	337	479	65	West Germany 258; Italy 91.
Cobalt: Oxides and hydroxides	28	22	--	China 11; United Kingdom 11.
Copper:				
Oxides and hydroxides	200	236	--	West Germany 90; Norway 90; United Kingdom 46.
Sulfate	277	193	1	France 84; United Kingdom 54; Taiwan 23.
Metal including alloys:				
Scrap	2,898	7,394	1,205	Vietnam 3,929; Japan 593.
Unwrought	748	5,788	324	North Korea 1,655; Chile 1,600; Tanzania 1,001.
Gold:				
Waste and sweepings value, thousands	$2,475	$366	$45	Papua New Guinea $199; Singapore $72.
Metal including alloys, unwrought and partly wrought thousand troy ounces	971	5,319	111	Switzerland 2,380; United Kingdom 1,492; Australia 860.
Iron and steel: Metal:				
Scrap	26,883	27,748	2,903	China 9,244; Macau 5,472; Japan 4,087.
Pig iron, cast iron, related materials	12,145	5,779	5	Japan 5,463; China 240.
Ferroalloys:				
Ferromanganese	563	6,326	--	Republic of South Africa 6,091; Republic of Korea 200.
Ferrosilicon	1,259	1,067	--	Republic of South Africa 583; Belgium-Luxembourg 198; Netherlands 181.
Unspecified	1,240	1,547	18	Republic of South Africa 1,072; Philippines 200; Taiwan 100.
Steel, primary forms	72,371	147,722	--	Spain 49,924; Republic of South Africa 37,000; Taiwan 10,500.
Semimanufactures thousand tons	1,766	1,943	18	Japan 741; Taiwan 199; Spain 84.

See footnotes at end of table.

Table 6.—Hong Kong: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Lead:				
Oxides	218	155	--	China 45; United Kingdom 41; West Germany 36.
Metal including alloys:				
Scrap	157	287	65	Australia 101.
Unwrought	2,591	1,893	--	North Korea 526; Japan 415; Canada 363.
Semimanufactures	224	218	1	Republic of South Africa 77; Belgium-Luxembourg 55; Taiwan 29.
Manganese:				
Ore and concentrate, metallurgical-grade	204	135	--	All from China.
Oxides	2,983	1,977	--	China 1,436; Japan 312; Republic of South Africa 122.
Mercury 76-pound flasks	2,888	446	1	China 441.
Nickel:				
Oxides and hydroxides	280	142	--	Canada 112; China 20; Netherlands 10.
Metal including alloys, unwrought	5,009	4,494	5	Canada 1,776; Norway 1,680; Australia 531.
Platinum-group metals:				
Waste and sweepings value, thousands	$2,805	--		
Metals including alloys, unwrought and partly wrought troy ounces	r10,759	39,411	12,578	United Kingdom 21,576; Japan 2,001.
Silver:				
Waste and sweepings value, thousands	$594	$79	--	Philippines $54; Taiwan $14.
Metal including alloys, unwrought and partly wrought thousand troy ounces	r822	1,729	73	Japan 1,052; Australia 256; West Germany 129.
Tin: Metal including alloys:				
Scrap	1	7	--	All from Malaysia.
Unwrought	1,675	1,908	11	China 1,162; Thailand 304; Malaysia 252.
Titanium: Oxides	6,108	6,633	703	Japan 1,533; Australia 1,313; United Kingdom 1,218.
Tungsten: Ore and concentrate	--	47	--	All from China.
Uranium and/or thorium: Oxides and other compounds	109	26	2	France 20.
Zinc:				
Oxides	715	929	9	China 313; France 192; West Germany 146.
Blue powder	129	184	7	West Germany 96; United Kingdom 36; Norway 18.
Metal including alloys, unwrought	33,467	31,803	770	Australia 13,363; Canada 7,380; Peru 4,458.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	5,742	8,464	394	Japan 3,726; China 2,726; Indonesia 1,308.
Artificial:				
Corundum	7,435	6,788	43	China 6,283; Japan 319; West Germany 91.
Silicon carbide	712	1,564	18	China 1,511.
Dust and powder of precious and semiprecious stones, including diamond value, thousands	$53	$194	$9	Belgium-Luxembourg $92; United Kingdom $53; Australia $29.
Asbestos, crude	101	28	--	All from China.
Barite and witherite	1,252	378	--	United Kingdom 168; China 102; Thailand 90.
Boron materials: Oxides and acids	397	303	224	China 78.
Cement thousand tons	3,037	2,876	(2)	Japan 1,702; Taiwan 779; China 116.
Clays, crude:				
Kaolin	13,234	42,503	--	China 41,351; Japan 396; Macau 370.
Unspecified	105,849	90,457	1,405	China 60,390; Macau 22,310; Japan 4,388.

See footnotes at end of table.

Table 6.—Hong Kong: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Diamond:				
Gem, not set or strung thousand carats	1,286	1,336	74	India 563; Israel 312; Belgium-Luxembourg 227.
Industrial stones do	20	149	2	United Kingdom 79; Netherlands 21; Ireland 20.
Diatomite and other infusorial earth	484	562	510	Denmark 50.
Feldspar, fluorspar, related materials	16,267	21,842	--	China 21,542; Japan 300.
Fertilizer materials:				
Crude, n.e.s	3,589	2,919	--	China 2,374; Netherlands 412; United Kingdom 69.
Manufactured:				
Ammonia	1,917	1,855	47	China 1,670; Japan 69.
Nitrogenous	110,637	124,127	--	U.S.S.R. 65,541; Canada 31,504; United Arab Emirates 21,000.
Potassic	--	4,525	--	U.S.S.R. 4,200; Taiwan 306.
Unspecified and mixed	14,287	17,734	91	West Germany 11,682; Japan 2,179; Netherlands 2,019.
Graphite, natural	494	1,545	--	China 1,540.
Gypsum and plaster	77,842	89,364	176	Thailand 44,758; Japan 40,929; China 2,160.
Lime	36,024	49,062	--	China 48,782.
Magnesium compounds:				
Magnesite, crude including calcined	18,742	22,593	--	China 22,494.
Oxides and hydroxides	[r]1,636	1,089	--	Japan 936; West Germany 72.
Mica:				
Crude including splittings and waste	19	48	--	United Kingdom 44.
Worked including agglomerated splittings	769	910	2	Japan 452; Belgium-Luxembourg 238; France 152.
Pigments, mineral:				
Natural, crude	367	496	--	China 476.
Iron oxides and hydroxides, processed	3,029	2,990	302	China 809; West Germany 808; Japan 781.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$80,132	$60,271	$8,892	Thailand $17,525; India $5,859.
Synthetic do	$1,781	$2,814	$212	Japan $931; West Germany $753; Switzerland $370.
Salt and brine	101,053	92,620	28	China 84,879; West Germany 2,882; Israel 2,106.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	84,116	148,902	117,627	East Germany 14,852; France 5,751.
Sulfate, manufactured	15,878	15,551	6	China 13,566; Republic of South Africa 1,316; Taiwan 440.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	7,651	8,236	--	China 8,156; Italy 74.
Worked	17,772	21,340	14	Italy 16,433; China 3,051; Taiwan 685.
Dolomite, chiefly refractory-grade	228	253	--	United Kingdom 181; Norway 72.
Gravel and crushed rock	2,008,567	2,564,688	284	China 2,191,915; Macau 361,638.
Limestone other than dimension	693,097	876,487	114	Japan 852,406; China 23,745.
Quartz and quartzite	1,971	1,797	--	China 1,394; Macau 203; Belgium-Luxembourg 75.
Sand other than metal-bearing	990,779	1,151,818	22	China 1,148,192; Malaysia 1,123; Taiwan 1,017.
Sulfur:				
Elemental:				
Crude including native and by-product	696	644	2	West Germany 252; Singapore 216; Japan 100.
Colloidal, precipitated, sublimed	273	308	--	Singapore 288.
Sulfuric acid	4,135	4,827	75	China 3,536; Taiwan 1,102.
Talc, steatite, soapstone, pyrophyllite	15,526	15,258	425	China 14,110; Norway 323.
Other				
Crude	4,463	3,606	485	China 2,455; Republic of South Africa 324.
Slag and dross, not metal-bearing	892	683	--	China 470; Thailand 165; Japan 32.

See footnotes at end of table.

Table 6.—Hong Kong: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	124	182	20	United Kingdom 162.
Carbon black	1,347	3,429	116	Republic of Korea 2,100; China 440; Taiwan 202.
Coal:				
Anthracite	2,309	2,602	1	Vietnam 2,141; China 455.
Bituminous thousand tons	3,416	4,460	--	Australia 1,880; Republic of South Africa 1,751; China 695.
Coke and semicoke	4,851	2,925	--	China 1,569; Japan 700; Taiwan 650.
Petroleum refinery products thousand 42-gallon barrels	52,843	38,942	2,291	Singapore 24,716; China 7,698.

[r]Revised.
[1]Table prepared by Audrey D. Wilkes.
[2]Less than 1/2 unit.

NORTH KOREA[14]

North Korea's largest mining product is anthracite, which is its only indigenous fuel source aside from hydropower. Increased coal production was to come from developments at the Anju, Kangdong, Northern, and Suchon coal mining districts. Surface mines were under development at Anju, which is the country's largest producing area. An open pit mine was placed in operation in Kangdong with an annual capacity of 300,000 tons. In the Northern District, mine construction was under way at Hakdong, Hamyon, Kukdong, Nongpo, and Soksong. At Sunchon, a belt conveyor with an annual capacity of 2.5 million tons was installed at the Chonsong Mine. During the year, 70 cutting faces were completed at the mines around Kaechon.

The country imports annually about 9 million barrels of crude oil from China, 6 million barrels from the U.S.S.R., 3 million barrels from Iran, and small amounts from Indonesia. On September 19, 1985, the *Son Bong,* North Korea's largest tanker (230,000 tons), was air bombed and destroyed while berthed at an oil terminal on Kharg Island, Iran. The loss of the *Son Bong,* the country's only tanker capable of transoceanic crossings, was believed to increase North Korea's dependence on Soviet crude oil. The country's aggregate daily refining capacity by two oil refineries is only 7,000 barrels.

The largest metallurgical sector is iron and steel with a total annual output capacity of 7.5 million tons. The principal steel complexes are Chollima, Hwanghae, Songjin, and Kim Chaek with the latter being the largest. The country's largest iron ore mine is at Musan.

Output of nonferrous metals, particularly lead and zinc, was to increase through mine expansion at Komtok and Tanchon. Mine output of copper and tin is insignificant. In addition, North Korea produces gold, silver, and tungsten.

Korea Rakwon Trading Corp. awarded a contract to Wright Engineers Ltd. of Canada for a feasibility study to develop a gold mine at Unsan, 55 kilometers north of Pyongyang. In addition, Korea Rakwon was looking for foreign equity participation to develop the mine. Korea Rakwon, established by the Ministry of Natural Resources Development, is also responsible for developing other sectors of the nation's mining industry. Wright Engineers is believed to be the first market economy country firm to receive a mining-related contract from the Government of North Korea.

North Korea is a major producer of magnesite. The mine at Yongyang was being expanded to be one of the world's largest magnesite mines. Magnesite from Yongyang is trucked to Tanchon for calcining. In 1985, six kilns were placed in operation at Tanchon to increase magnesia output. Construction of a railway from Yongyang to Tanchon was under study for direct transport of the magnesite.

Salt production was to be expanded through increased harvest from seawater evaporites. Large acreages of salt flats, which are amenable to mechanization, were to be constructed. Increased salt production by 1990 would serve as feedstock to the food and chemical industries.

A graphite deposit was being developed at Hungsang. Output from this surface mine will meet the domestic needs and provide a large quantity for export.

Table 7.—North Korea: Apparent exports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Principal destinations, 1984
METALS			
Aluminum: Metal including alloys, all forms	203	200	All to Japan.
Copper: Metal including alloys, all forms	100	2,947	Hong Kong 1,808; Japan 939.
Gold: Metal including alloys, unwrought and partly wrought troy ounces	232,868	347,179	West Germany 344,752.
Iron and steel: Metal:			
Scrap	6,400	NA	
Pig iron, cast iron, related materials	31,466	68	All to Japan.
Ferroalloys	3,100	748	Do.
Steel, primary forms	57,800	37,491	Japan 24,524; Hong Kong 7,924; Philippines 5,043.
Semimanufactures:			
Bars, rods, angles, shapes, sections	1,665	4,175	Turkey 3,744; Indonesia 200.
Universals, plates, sheets	62,667	48,348	Japan 35,477; Hong Kong 5,859; Cuba 5,283.
Hoop and strip	20	20	All to Singapore.
Wire	227	100	Mainly to Malaysia.
Tubes, pipes, fittings	409	10	All to Cyprus.
Castings and forgings, rough	101	--	
Lead: Metal including alloys, all forms	9,554	15,837	Japan 15,257; Hong Kong 526.
Nickel: Metal including alloys, all forms	--	160	All to Indonesia.
Silver: Metal including alloys, unwrought and partly wrought troy ounces	2,478,766	1,458,293	West Germany 1,111,257; Austria 321,764.
Tungsten: Ore and concentrate	--	4	All to West Germany.
Zinc:			
Ore and concentrate	17,067	19,150	All to Japan.
Metal including alloys, all forms	23,641	18,674	Japan 17,620; Hong Kong 1,054.
Other:			
Ores and concentrates	4	--	
Ashes and residues	1,862	3,343	All to Japan.
INDUSTRIAL MINERALS			
Barite and witherite	--	220	Do.
Cement	216,064	NA	
Clays, crude	7,691	NA	
Feldspar	189	957	Do.
Fertilizer materials: Manufactured:			
Nitrogenous	40,382	6,461	Do.
Unspecified	1,000	1,005	All to Malta.
Graphite, natural	1,400	11,026	All to Japan.
Kyanite and related materials	--	99	Do.
Magnesium compounds	784,968	138,780	Japan 94,178; West Germany 33,287.
Mica: Worked including agglomerated splittings	9	--	
Precious and semiprecious stones other than diamond value, thousands	$12	--	
Stone, sand and gravel:			
Dimension stone	8,887	9,665	All to Japan.
Gravel and crushed rock	216	488	Do.
Quartz and quartzite	922	1,678	Do.
Sulfur: Elemental kilograms	--	100	All to Malaysia.
Talc, steatite, soapstone, pyrophyllite	25,511	27,171	Japan 27,121.
Other: Crude	406	NA	
MINERAL FUELS AND RELATED MATERIALS			
Carbon black	53	190	All to Thailand.
Coal: Anthracite and bituminous	30,276	93,470	Japan 92,603.
Petroleum refinery products:			
Lubricants 42-gallon barrels	35	--	
Residual fuel oil do	60,579	122,131	All to Hong Kong.

[p]Preliminary. NA Not available.
[1]Table prepared by Audrey D. Wilkes. Owing to a lack of official trade data published by North Korea, this table should not be taken as a complete presentation of this country's mineral trade. These data have been compiled from United Nations information and data published by the partner trade countries.

Table 8.—North Korea: Apparent imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Principal sources, 1984
METALS			
Aluminum:			
Oxides and hydroxides	20,433	24,101	Japan 24,097.
Metal including alloys:			
Unwrought	2,489	631	All from Hong Kong.
Semimanufactures	1,752	1,105	Japan 580; Belgium-Luxembourg 266; Austria 180.
Beryllium: Metal including alloys, all forms	--	2	All from Japan.
Chromium:			
Ore and concentrate	14,000	NA	
Oxides and hydroxides	138	75	Do.
Cobalt: Oxides and hydroxides	3	1	Mainly from Japan.
Columbium and tantalum: Metal including alloys, all forms, tantalum kilograms	426	260	All from Japan.
Copper:			
Ore and concentrate	4,508	8,448	All from Philippines.
Metal including alloys:			
Scrap	1,981	18	All from Malaysia.
Unwrought	--	1,000	All from Hong Kong.
Semimanufactures	231	285	Japan 153; Australia 124.
Gold:			
Contained in copper ore and concentrate value, thousands	--	$638	All from Philippines.
Metal including alloys, unwrought and partly wrought troy ounces	1,081	3	All from Japan.
Iron and steel: Metal:			
Scrap	1,735	NA	
Pig iron, cast iron, related materials	15,999	NA	
Ferroalloys:			
Ferromanganese	13,321	13,310	Japan 8,060; Hong Kong 5,250.
Unspecified	1,693	2,487	Turkey 2,000; Japan 270.
Steel, primary forms	199	9,858	Thailand 9,741.
Semimanufactures:			
Bars, rods, angles, shapes, sections	3,083	2,191	Japan 2,181.
Universals, plates, sheets	9,864	6,430	Japan 5,238; West Germany 701.
Hoop and strip	132	370	Japan 361.
Rails and accessories	6,496	2,578	All from Japan.
Wire	729	1,065	Japan 505; Hong Kong 500.
Tubes, pipes, fittings	7,207	7,524	Japan 7,484.
Castings and forgings, rough	--	16	United Kingdom 10; Japan 6.
Lead:			
Ore and concentrate	3,000	1,363	All from Japan.
Metal including alloys:			
Unwrought	2,394	2,848	All from Sweden.
Semimanufactures	1	205	All from Japan.
Magnesium: Metal including alloys, all forms	34	441	Singapore 351; Japan 61.
Manganese:			
Ore and concentrate	20,170	NA	
Oxides	230	365	Singapore 265; Japan 100.
Mercury 76-pound flasks	1,884	290	Hong Kong 145; Singapore 145.
Molybdenum: Metal including alloys, all forms kilograms	2,039	304	All from Japan.
Nickel: Metal including alloys:			
Unwrought	387	517	All from Hong Kong.
Semimanufactures	154	217	Cuba 203.
Platinum-group metals: Metals including alloys, unwrought and partly wrought troy ounces	749	1,217	Japan 703; West Germany 514.
Silver: Metal including alloys, unwrought and partly wrought value, thousands	$54	$6	All from Japan.
Tin			
Oxides	3	19	Italy 16.
Metal including alloys:			
Unwrought	1	143	Singapore 138.
Semimanufactures	239	2	All from Japan.
Titanium:			
Oxides	105	39	Japan 27; Singapore 12.
Metal including alloys, all forms	([2])	4	All from Japan.
Tungsten:			
Ore and concentrate	60	170	All from Singapore.
Metal including alloys, all forms	([2])	31	Singapore 30.
Zinc: Metal including alloys, semimanufactures	201	NA	
Other:			
Ashes and residues	18	1,590	Japan 1,550.
Base metals including alloys, all forms	112	109	Hong Kong 70; Singapore 36.
INDUSTRIAL MINERALS			
Abrasives, n.e.s.:			
Artificial: Corundum	20	96	All from Japan.
Dust and powder of precious and semiprecious stones excluding diamond kilograms	25	--	
Grinding and polishing wheels and stones	42	[3]28	Japan 17; West Germany 11.
Asbestos, crude	--	27	All from Canada.

See footnotes at end of table.

Table 8.—North Korea: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Principal sources, 1984
INDUSTRIAL MINERALS —Continued			
Boron materials: Oxides and acids	207	54	Hong Kong 48; Japan 6.
Cement	30	--	
Diamond:			
Gem, not set or strung — value, thousands	--	$4	All from United Kingdom.
Industrial stones — carats	500	3,300	All from Japan.
Diatomite and other infusorial earth	3	--	
Fertilizer materials: Manufactured:			
Ammonia	89	NA	
Nitrogenous	22,258	NA	
Potassic	99,012	NA	
Unspecified	--	9	Do.
Fluorspar	130	--	
Graphite, natural	--	6	Do.
Gypsum and plaster	25	--	
Kyanite and related materials	3	--	
Mica, all forms	(2)	20	Malaysia 18.
Pigments, mineral: Iron oxides and hydroxides, processed	--	11	All from Belgium-Luxembourg.
Precious and semiprecious stones other than diamond: Synthetic — value, thousands	$502	$30	All from Japan.
Salt and brine	404	147	Do.
Sodium compounds, n.e.s.: Carbonate, natural and manufactured	--	20	All from Singapore.
Stone, sand and gravel: Dimension stone, all types	86	481	Italy 478.
Sulfur:			
Elemental, all forms	13,000	62	Singapore 60.
Sulfuric acid	2	26	Japan 24.
Talc, steatite, soapstone, pyrophyllite	--	10	All from Italy.
Other: Crude	2	17	All from Japan.
MINERAL FUELS AND RELATED MATERIALS			
Carbon black	100	5	Do.
Coal, all grades	--	36,487	Australia 20,251; Indonesia 8,000.
Coke and semicoke	140,276	66,033	All from Japan.
Petroleum refinery products:			
Liquefied petroleum gas[4] — 42-gallon barrels	NA	81	All from Italy.
Gasoline — do	NA	97,478	All from Singapore.
Mineral jelly and wax — do	2,273	4,022	Hong Kong 1,889; Japan 952; West Germany 866.
Kerosene and jet fuel — do	113	352	All from Japan.
Distillate fuel oil — do	746	NA	
Lubricants — do	4,660	2,820	Japan 1,826; Hong Kong 385; West Germany 280.
Residual fuel oil — do	1,279	50	All from Japan.
Bitumen and other residues — do	12	12	Do.
Petroleum coke — do	32,725	8,244	Do.

[p]Preliminary. NA Not available.
[1]Table prepared by Audrey D. Wilkes. Owing to a lack of official trade data published by North Korea, this table should not be taken as a complete presentation of this country's mineral trade. Unless otherwise specified, these data have been compiled from United Nations information and data published by the partner trade countries.
[2]Less than 1/2 unit.
[3]Excludes unreported quantity imported from Switzerland valued at $24,000.
[4]Excludes unreported quantities imported from Japan valued at $2,300 in 1983 and $2,400 in 1984.

LAOS[15]

Laos continued to be a mostly agricultural nation with only the most rudimentary of industrial development. One of the poorest nations in the world, the economy receives only a very small but growing contribution from the mineral industry. In 1985, the most important minerals were tin from the Pa Then Basin, and gypsum from Savannakhet Province. By far, the biggest foreign exchange earner was the revenue from exported electric power, generated at the 150,000-kilowatt Nam Ngum hydroelectric powerplant.

The most important developments during the year were the construction industry projects. Although small by any standards, they represent the country's first steps at independence in building its own industrial and domestic programs. These include the first asphalt paving plant, a modern brick plant, rock quarrying and screening facilities, a portland cement clinker grinding plant, and a reinforced concrete products plant. All of these products have been imported in the past or were made by primitive manual labor processes.

The major problems with development of a more vigorous mineral industry were the primitive transportation system, the near total lack of technological expertise, and the lack of capital for large-scale projects. The transport system is barely able to handle basic products such as food and fuel. Any large-scale mineral projects would require a substantial outlay for infrastructure development before heavy mining equipment could be brought to the site. The mainly small-farm and subsistence agriculture economy generated very little capital for expensive mineral developments. Even moderate-scale mineral development would require both technical and financial support from outside the country. Vietnam and the U.S.S.R. have been furnishing most of the aid to Laos during the last decade.

Exploration work for mineral development has been under way by Soviet and Vietnamese geologists. In July, an agreement was signed with Vietnam for exploration of the iron ore deposits in Lao Houa Phan, Xieng Khouang, and Vientiane Provinces and of a coal deposit in Saravan Province. Soviet experts have completed aerial photographic surveys for compiling a geological map of Laos.

COMMODITY REVIEW

Metals.—*Tin.*—A major rebuilding and expansion project at the three tin mining areas was scheduled for completion by yearend after 5 years of Soviet-aided construction. Although production increased steadily despite the construction during the period, it was not known if the entire project was completed as scheduled. The new facilities were to have a processing capacity of 500,000 to 550,000 tons of ore per year and a tin-in-concentrate output of 1,500 tons per year. The word "tin" in Lao publications was apparently used interchangeably for the metal, the metal content of the concentrate, and for the gross weight of concentrate. This has made it difficult to interpret the few figures published by the Government of Laos. It is believed that the 1985 target production of 540 tons as reported in the press refers to tin-in-concentrate and that the target was met.

There was a small smelter at Phontiou, but it was not known if it could handle the planned 1,500-ton-per-year output of the concentrators.

Iron and Steel.—What was apparently the country's first steel foundry began production in March. Built with Vietnamese aid, the plant will melt steel scrap at a rate of 0.5 ton per hour and produce such items as spare parts for bicycles, knives, bowls, and pots.

Industrial Minerals.—*Cement.*—The Ministry of Construction began production of cement from the 10,000-ton-per-year Sai Phou Louang (clinker grinding) cement plant in Thong Pong, 15 kilometers north of Vientiane. The plant was built with equipment and technical aid from Vietnam and the U.S.S.R. Although completed in March 1984, trial production only began in January 1985. The Lao workers had to be trained in the operation and maintenance of the equipment before commercial production could begin. By yearend 1985, a total of 2,500 tons of cement had been ground. The plant has a clinker grinding and mixing function only, with the clinker being imported from Vietnam.

Construction Materials.—The Lao Ministry of Construction has been given high priority for establishing mineral-based construction industries, virtually nonexistent in 1975. The first two rock crushing and screening plants were completed in 1984 and began supplying aggregate for road and bridge construction in 1985. In the first 6 months of 1985, the brick factory produced 6,000 square meters of brick in trial production. The country's first asphalt paving plant was under construction in Vientiane. The plant apparently consists of used equipment from the U.S.S.R. Regarding construction, the project chief stated, "We have never installed or repaired machines like this. It is hard to reassemble and repair the machinery because the materials and components of this plant were neglected for a long time. Some parts were bad...and needed to be repaired. Large parts were dismantled to aid in transporting and did not reassemble well." The construction "required effort, persistence, and creativity."[16] The plant was designed to produce 25 tons of asphalt paving mix per hour from local aggregate. It was expected to have been completed early in 1985. Another important plant was Laos' first reinforced concrete products plant, 7 kilometers east of Savannakhet on Route 9. It was begun in April 1984 and was scheduled for completion in December 1985. The plant will produce reinforced concrete poles and crossbeams; prefabricated concrete flooring, wall, and roof sections; and concrete construction blocks.

Mineral Fuels.—The Lao press published an article on the first coal production plant in Laos. Construction began in November 1984 and production started in July 1985. The 6-month production of only 42 tons and the strange context of the report indicated that material or a product other than the normal form of "coal" was produced.[17] Coal deposits have been reported previously in Laos and were being surveyed with Vietnamese technical assistance.

Conflicting Lao press reports also made it difficult to determine if the oil pipeline from Vietnam to Vientiane was completed in 1985. When completed, the transportation of petroleum products should be much less expensive and greatly simplified.

Table 9.—Laos: Apparent exports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Destinations, 1984: United States	Destinations, 1984: Other (principal)
Copper: Metal including alloys, scrap	304	NA		
Diamond: Gem, not set or strung value, thousands	$63	$71	$71	
Iron and steel: Metal:				
Scrap	960	69	--	All to Thailand.
Steel, primary forms	--	5,514	--	All to Turkey.
Semimanufactures: Tubes, pipes, fittings	10	--		

[p]Preliminary. NA Not available.
[1]Table prepared by Audrey D. Wilkes. Owing to a lack of official trade data published by Laos, this table should not be taken as a complete presentation of this country's mineral trade. These data have been compiled from United Nations information and data published by the partner trade countries.

Table 10.—Laos: Apparent imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Principal sources, 1984
METALS			
Copper: Metal including alloys, all forms	--	99	Thailand 74; Japan 25.
Gold: Metal including alloys, unwrought and partly wrought troy ounces	129	--	
Iron and steel: Metal: Semimanufactures:			
Bars, rods, angles, shapes, sections	789	214	Thailand 132; Japan 82.
Universals, plates, sheets	2,541	2,892	All from Japan.
Rails and accessories	21	--	
Wire	30	5	All from Thailand.
Tubes, pipes, fittings	554	377	Thailand 373.
Lead: Metal including alloys, all forms	10	358	Mainly from Japan.
Tin: Metal including alloys, all forms	--	2	All from Japan.
Uranium and thorium: Ore and concentrate kilograms	--	36	All from Thailand.
Zinc: Metal including alloys, all forms	502	193	Do.
INDUSTRIAL MINERALS			
Abrasives, n.e.s.: Grinding and polishing wheels and stones	2	1	Do.
Cement	7,740	6,768	Do.
Chalk	--	3	Do.
Clays, crude	--	1	Do.
Fertilizer materials: Manufactured:			
Ammonia	4	(2)	Do.
Nitrogenous	200	NA	
Gypsum and plaster	15	250	Do.
Salt and brine	--	95	Do.
Sodium compounds, n.e.s.: Sulfate, natural and manufactured	NA	232	Do.
Stone, sand and gravel:			
Dimension stone: Worked	7	(2)	Do.
Limestone other than dimension	--	3	Do.
Sulfur:			
Elemental: Colloidal, precipitated, sublimed	16	--	
Sulfuric acid	--	1	Do.

See footnotes at end of table.

Table 10.—Laos: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Principal sources, 1984
MINERAL FUELS AND RELATED MATERIALS			
Carbon black	10	4	All from Thailand.
Petroleum refinery products:			
Liquefied petroleum gas 42-gallon barrels	23	--	
Gasoline do	96,467	55,828	Singapore 54,698; Thailand 1,130.
Kerosene and jet fuel do	35,418	32,599	Singapore 32,589.
Distillate fuel oil do	143,299	84,686	All from Singapore.
Lubricants do	5,299	4,956	Do.
Unspecified do	309	12	All from Thailand.

[p]Preliminary. NA Not available.
[1]Table prepared by Audrey D. Wilkes. Owing to a lack of official trade data published by Laos, this table should not be taken as a complete presentation of this country's mineral trade. These data have been compiled from United Nations information and data published by the partner trade countries.
[2]Less than 1/2 unit.

MONGOLIA[18]

Mongolia remained the world's leading producer of fluorspar accounting for 15% of the world mine production, and an important producer of copper, molybdenum, tin, and tungsten in the centrally planned economy countries. During 1985, the Mongolian mining industry continued to expand in mining of coal, fluorspar, gold, limestone, tin, tungsten, and zinc with financial and technical assistance from the Soviet Union and other member countries of the Council for Mutual Economic Assistance (CMEA) from Eastern Europe.

According to Mongolian press reports, the total output of coal, copper, fluorspar, and molybdenum accounted for 18% of the country's gross national product (GNP) and 40% of total export earnings in 1985.[19] As a result of continuing growth in the industrial and agricultural sectors, Mongolian GNP grew 4.7% with a 12% growth in agricultural output and a 6.6% growth in industrial output. Mongolia invested about $1.4 billion in the national economy to strengthen its material and technical resources. Of the total capital invested, about 70% was for the basic assets of the agricultural and industrial sectors.[20]

During the seventh 5-year plan (1981-85), total foreign trade rose 3.5% per year with an annual average merchandise trade, valued at $743 million.[21] About 98% was with centrally planned economy countries, mainly the U.S.S.R. and other CMEA member countries, which accounted for 96% of the total merchandise trade. Mongolia exported most of its mineral commodities including copper and molybdenum concentrates and fluorspar as well as agricultural products to the U.S.S.R., while Mongolia imported most of its capital goods including machines and equipment for the agricultural, industrial, and construction sectors, as well as petroleum products, rolled steel products, instruments, and consumer goods from the Soviet Union.

COMMODITY REVIEW

Metals.—Production of copper and molybdenum at the Erdenet Mine in Bulgan Province of north-central Mongolia, reportedly, had been at full capacity of 16 million tons per year of ore since the fourth-phase construction was completed in October 1983. Most copper and molybdenum concentrate was exported to the Soviet Union. In 1985, a 10% increase in exports of copper and molybdenum to the Soviet Union was reported. The output of copper and molybdenum from the mine reportedly contributed about 84% to the total value of the Mongolian mining industry and accounted for 30% of the country's export earnings.

Construction of the fifth-phase expansion project for raising the mining capacity to 20 million from 16 million tons of ore per year had begun at the Erdenet Mine. Under the fifth phase, an additional flow line was to be added in the concentration plant to reduce power consumption and to ensure effective processing of clayey and old ore tailings. A crushing mill capable of crushing 300 tons of ore per hour would also be added.

Production of tungsten from the Buren Tsogt (also known as Booren Chogt) Mine, reportedly had increased substantially since 1982. Most tungsten ore and concentrate was exported to East European countries. Mongolia also produced tin and zinc in Selenge Province as well as gold from streambeds and underground mines by a joint Mongolian-Soviet company called Mongolsovtsvetmet. Most tin and zinc concentrates were exported to Czechoslovakia, while gold production and trade remained a state secret. A large gold deposit reportedly was discovered near the industrial center of Darhan, and production of gold from the mine reportedly had started.

In November, an agreement was signed between Mongolia and Hungary for development of a wolfram mine at Tsagaandavaa, about 70 kilometers from Ulan Bator. Under the bilateral agreement, Wolframinvest, a Hungarian company, was to develop the mine and construct an ore dressing plant by 1988. About 88% of the output of 3,000 tons of wolframite concentrate per year would be exported to Hungary.[22]

Industrial Minerals.—Production of fluorspar was estimated to remain at the same level as that of 1984. By December, construction of the Herlen (Kerulen) Mine and an ore dressing plant with an annual capacity of 400,000 tons of ore to produce 118,000 tons of fluorite was completed.

At Hotol, between Darhan and Erdenet, in central Mongolia, the first furnace with an annual capacity of 250,000 tons of cement was installed and put into operation in October adjacent to the Hotol lime works.

Mineral Fuels.—Coal production was expected to reach 7 million tons by the end of the seventh 5-year plan (1981-85). The first-stage development of the Baga Nuur Mine, an opencast coal mine, developed with assistance from the Soviet Union, reportedly produced more than 2 million tons of coal in 1985. A mining town and a railway connecting Baga Nuur to Moscow, through Ulan Bator, were also completed. The output of coal from the Baga Nuur Mine was shipped to Ulan Bator to feed the No. 4 powerplant, which has a capacity of 380 megawatts. Construction of a powerplant at Baga Nuur was planned.[23]

Table 11.—Mongolia: Apparent exports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Principal destinations, 1984
Cement[2]	6,900	3,100	NA.
Clays, crude	--	5	All to Italy.
Copper: Ore and concentrate	4,631	--	
Iron and steel: Metal: Scrap	22,100	--	
Precious and semiprecious stones other than diamond, natural ... value, thousands	$63	--	

[p]Preliminary. NA Not available.
[1]Table prepared by Audrey D. Wilkes. Owing to a lack of official trade data published by Mongolia, this table should not be taken as a complete presentation of this country's mineral trade. Unless otherwise specified, these data have been compiled from United Nations information and data published by the partner trade countries.
[2]Statistical Yearbook of Members of the Council for Mutual Economic Assistance, Moscow, U.S.S.R.

Table 12.—Mongolia: Apparent imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Principal sources, 1984
Aluminum: Metal including alloys, all forms	--	17	All from United Kingdom.
Coal: Anthracite and bituminous[2]	--	11,500	NA.
Cement[2]	45,300	87,000	NA.
Fertilizer materials: Manufactured:[2]			
Nitrogenous	8,000	11,700	NA.
Phosphatic (P_2O_5 content)	14,100	18,400	NA.
Iron and steel: Metal: Semimanufactures:			
Tubes, pipes, fittings[2]	10,800	11,700	NA.
Unspecified[2]	48,000	45,000	NA.
Petroleum refinery products[2] thousand 42-gallon barrels	4,894	5,004	NA.
Precious and semiprecious stones other than diamond, natural ... value, thousands	$35	$11	All from Switzerland.
Sodium compounds, n.e.s.: Carbonate, natural and manufactured[2]	1,300	900	NA.
Stone: Dimension, worked	--	60	All from Italy.
Sulfur: Sulfuric acid[2]	1,700	1,700	NA.

[p]Preliminary. NA Not available.
[1]Table prepared by Audrey D. Wilkes. Owing to a lack of official trade data published by Mongolia, this table should not be taken as a complete presentation of this country's mineral trade. Unless otherwise specified, these data have been compiled from United Nations information and data published by the partner trade countries.
[2]Statistical Yearbook of Members of the Council for Mutual Economic Assistance, Moscow, U.S.S.R.

NEPAL[24]

The mineral industry's contribution to the country's economy was insignificant. The potential for increased exploitation of the mineral sector was considerable, however, as some deposits were being developed which, when completed, would increase the value of mineral production considerably. Also, very little of the country has been explored for minerals by any but the most primitive methods.

During 1985, there was no commercial production of metallic ore in the country. High-grade copper veins have been mined by hand since ancient times, but no detailed assessment of the veins has been made. Yearly production amounts to one or two dozen tons of handpicked ore. The miner, smelterer, and fabricator are usually one and the same person, or at least several members of the same family. The output is crafted into brass utensils for local markets.

The main developments were a small, high-grade lead and zinc mine high in the mountains northwest of Kathmandu. The Nepal Metal Co. Ltd. was driving an incline at the Ganesh Himal zinc-lead mine to an elevation of 4,419 meters above sea level (higher than Pikes Peak in the United States). Progress was slow because no heavy mining equipment could reach the site until a road can be built up the valley. The road was scheduled for completion in late 1986 or early 1987. The mine is being designed to produce 400 tons of ore per day and about 20,000 tons of concentrate per year. Although small by world standards, the project will be a major industry in an area previously inaccessible to motorized vehicles. It is to employ 700 persons and will open the area to trade, tourism, and development of forest resources and agriculture.

Commercial sales of cement from the 750-ton-per-day, dry-process, rotary kiln Hetauda cement plant began in December. Plant construction, begun in 1978, had high cost overruns during the long construction period. With the startup of the Hetauda kiln, the Himal Cement Co. Ltd. plans to go ahead with a long-delayed modernization program at its 160-ton-per-year shaft-kiln plant in Chobar. The Federal Republic of Germany's Dyckerhoff Engineering GmbH. has been asked to assist in the project. The 2-year project is to increase capacity to 400 tons per day and provide for captive electric power supply to prevent problems caused by electric power shortages.

Plans for a large cement plant at Udayapur have been bogged down in negotiations with India for several years. The 1,200-ton-per-day output would make Nepal self-sufficient in cement if it is constructed.

Triveni Cement (Nepal) Pvt. Ltd. was reported to be building a minicement plant at Bharatpur, Narayani Anchal.

Annapurna Cement Pvt. Ltd. was planning to set up a 30-ton-per-day minicement plant at Abu Khaireni in Tanahu District. The plant was to be built with technical aid from the Cement Institute of India and was expected to take 1 year to complete. Gypsum and coal for the plant are to be imported from India.

The third Chinese-aided brick factory was completed at yearend 1985 and was scheduled to begin trial production in March 1986. The new plant was at Lumbini and designed for a 40,000- to 50,000-brick-per-day capacity. The other major brick plants are at Harisiddi and Bhaktapur.[25]

Nepal Orind Magnesite (Pvt.) Ltd. continued the development of its magnesite mine and processing plant in Dolakha District. Reportedly, Larsen & Toubro Ltd. was awarded the contract for the dry-grinding system, 7,000-kilowatt motor, air classification system, bag filters, and conveyor system. The 20-ton-per-hour system is being fabricated at the company's Kansbahal plant near Rourkela in India. Larsen & Toubro are also involved in the installation of the aerial ropeway for the transport of the crude magnesite.[26]

The Department of Mines and Geology conducted a series of promotional meetings in London (United Kingdom), Houston (United States), and Kathmandu (Nepal) to attract oil prospecting companies to the country. The southern one-third of the country was delineated into 10 exploration blocks and opened to bidding for exploration rights. The closing dates for bids was October 16, 1985. Several companies reportedly paid $12,000 for the geological data compiled earlier for the Government. Shell Nederland BV of the Netherlands; British Petroleum Co. of the United Kingdom; Chevron Oil Co., Diamond Shamrock Co., Triton Energy Corp., and Mobil Oil Co. of the United States; and several national oil companies were believed to be considering making a bid. The proposed exploration agreement was drafted to attract foreign investment and has some fairly liberal terms. Companies may import equipment free of customs duty, export their entitlement oil, and repatriate funds. Royalty would be 12.5%, and income tax, 50%. Exploration costs would be paid completely by the oil company, but it would be entitled to 87.5% of the oil produced until exploration and operating costs have been recovered. Exploration would have to begin within 3 months of the effective date of the agreement. Under the production-sharing provisions, any portion of the 87.5% share not required for cost recovery would be shared between the two parties on a sliding scale tied to production.[27]

SINGAPORE[28]

Singapore's land area totals only 620 square kilometers. Despite the scarcity of land, there are about 7,900 licensed farms, occupying 5,982 hectares, raising vegetables, livestock, and fish. The only primary mining operation in Singapore is granite quarrying. Output of granite aggregate runs about 7 million cubic meters per year.

Because Singapore is a free port, trade plays a large role in its economy. In 1985, trade accounted for 23.4% of the GDP, followed by finance and business services, 23.1%; transportation and communication, 22.3%; manufacturing, 19.0%; construction, 7.6%; and other, 4.6%. Input of quarrying to GDP was only 0.5%.

The United States continued to be Singapore's largest trading partner, accounting for 18% of total trade, followed by Malaysia, 15%; Japan, 13%; China, 5%; and Hong Kong, 4%.

The major commodities imported included crude petroleum, $5.8 billion; petroleum products, $1.9 billion; office machinery and telecommunication apparatus, each $0.8 billion; and electric power machinery, $0.6 billion.[29] The major exports were petroleum products, $6.1 billion; office machinery, $1.4 billion; telecommunication apparatus, $1.3 billion; electrical circuit apparatus and crude rubber, each $0.7 billion; and clothing, $0.5 billion.

Table 13.—Singapore: Exports and reexports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides	1,476	1,277	--	Malaysia 1,202.
Metal including alloys:				
Scrap	8,789	9,963	--	Japan 8,492; Taiwan 658; Pakistan 537.
Unwrought and semimanufactures	27,891	14,251	35	Malaysia 9,012; Hong Kong 1,559; Brunei 629.
Chromium:				
Ore and concentrate	66	7	--	Republic of Korea 6.
Oxides and hydroxides	41	41	--	Philippines 21; Malaysia 20.
Cobalt: Oxides and hydroxides	14	24	--	Mainly to Malaysia.
Columbium and tantalum:				
Ore and concentrate (tantalite)	29	20	20	
Metal including alloys, all forms, tantalum kilograms	22,000	7	--	Mainly to Australia.
Copper: Metal including alloys:				
Scrap	19,507	17,882	19	Japan 6,942; India 5,125; Taiwan 2,036.
Unwrought and semimanufactures	8,981	7,770	9	Malaysia 5,134; Taiwan 1,543; Japan 282.
Gold:				
Waste and sweepings value, thousands	NA	$9,747	$174	Japan $7,309; West Germany $1,735; Australia $262.
Metal including alloys, unwrought and partly wrought troy ounces	NA	111,209	514	Malaysia 56,328; Japan 27,650; Philippines 22,345.

See footnotes at end of table.

Table 13.—Singapore: Exports and reexports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS —Continued				
Iron and steel: Metal:				
Scrap	119,468	108,948	--	Malaysia 42,970; Japan 37,618; Thailand 21,690.
Pig iron, cast iron, related materials	6,887	6,936	--	Malaysia 4,087; Bangladesh 2,820.
Ferroalloys	601	606	--	Malaysia 359; North Korea 196.
Steel, primary forms	4,416	4,879	--	Malaysia 4,862.
Semimanufactures	264,490	307,658	5,259	Malaysia 177,475; Thailand 16,014; China 14,584.
Lead:				
Oxides	1,148	1,806	--	Japan 1,662; Malaysia 122.
Metal including alloys:				
Scrap	1,862	3,597	--	Thailand 1,729; Taiwan 792; Malaysia 775.
Unwrought and semimanufactures	2,514	1,791	(2)	Malaysia 861; Republic of Korea 508; Vietnam 200.
Magnesium: Metal including alloys, all forms	330	430	--	North Korea 351; Republic of Korea 73.
Manganese:				
Ore and concentrate, battery-grade	27,449	25,492	--	India 4,350; Republic of Korea 4,320; Iran 3,211.
Oxides	1,399	1,996	--	Malaysia 1,161; North Korea 265; Republic of Korea 180.
Mercury 76-pound flasks	434	194	--	North Korea 145.
Nickel:				
Ore and concentrate	201	--		
Matte and speiss	145	846	--	United Kingdom 828.
Metal including alloys:				
Scrap	413	160	18	Japan 125.
Unwrought and semimanufactures	9,534	4,798	(2)	India 3,813; United Kingdom 871.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$125	$201	$75	Japan $96; Malaysia $30.
Silver:				
Ore and concentrate[3] do	$95	$353	--	Mainly to Spain.
Waste and sweepings[3] do	$5,827	$876	$70	Japan $264; France $208; Australia $195.
Metal including alloys, unwrought and partly wrought do	$4,103	$1,149	$43	Malaysia $521; Saudi Arabia $176; Australia $140.
Tin:				
Ore and concentrate	10,604	11,253	578	Netherlands 3,642; Spain 3,498; Republic of Korea 1,779.
Ash and residue containing tin	1,856	781	--	Netherlands 506; Taiwan 246.
Metal including alloys:				
Scrap	551	465	7	Taiwan 422.
Unwrought and semimanufactures	20,975	18,004	5,207	Japan 5,813; Netherlands 1,611; U.S.S.R. 1,510.
Titanium: Oxides	827	1,793	--	Japan 1,102; Malaysia 558.
Tungsten:				
Ore and concentrate	875	1,695	860	West Germany 373; India 204; North Korea 170.
Metal including alloys, all forms	91	105	42	North Korea 30; West Germany 21.
Uranium and/or thorium: Oxides and other compounds value, thousands	$18	$51	NA	Bangladesh $31; Taiwan $12.
Zinc: Metal including alloys:				
Scrap	1,050	758	--	Japan 369; Taiwan 300; Malaysia 43.
Unwrought and semimanufactures	4,275	5,051	--	Malaysia 3,448; India 817; Philippines 229.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.: Dust and powder of precious and semiprecious stones including diamond value, thousands	$5	$19	$19	
Asbestos, crude	8,692	6,715	--	Malaysia 6,371.
Barite and witherite	15,821	11,303	--	Malaysia 5,209; Spain 2,336; Bangladesh 1,999.
Boron materials:				
Crude natural borates	508	939	--	All to Malaysia.
Oxides and acids	116	125	--	Malaysia 107; Australia 18.
Cement	462,276	557,699	9	Malaysia 520,145; Brunei 18,145.

See footnotes at end of table.

Table 13.—Singapore: Exports and reexports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Clays, crude	37,455	33,342	--	Malaysia 22,302; Thailand 3,212; Australia 1,996.
Diamond:				
Gem, not set or strung value, thousands	$7,456	$18,106	$1,238	Malaysia $6,532; Belgium-Luxembourg $3,640; Saudi Arabia $1,478.
Industrial stones do.	$546	$1,256	$84	Malaysia $404; Belgium-Luxembourg $226; Philippines $207.
Diatomite and other infusorial earth	795	366	--	Thailand 244; Malaysia 87.
Feldspar, fluorspar, related materials	4,894	4,938	--	All to Malaysia.
Fertilizer materials:				
Crude, n.e.s	61,143	40,390	--	Malaysia 40,324.
Manufactured:				
Nitrogenous	301,855	150,556	--	China 54,442; Vietnam 45,544; Australia 33,766.
Phosphatic	2,324	3,526	--	Philippines 1,285; Malaysia 1,316; Papua New Guinea 665.
Potassic	205,429	168,828	--	Malaysia 72,999; Sri Lanka 48,131; China 24,140.
Unspecified and mixed	56,980	79,481	--	Malaysia 49,068; Vietnam 28,640.
Graphite, natural	186	146	--	Malaysia 128.
Gypsum and plaster	1,784	2,315	--	Malaysia 2,202.
Lime	5,019	3,912	--	Malaysia 2,191; Brunei 1,030; Thailand 410.
Magnesium compounds: Magnesite, crude including magnesia	151	602	3	Australia 472; Malaysia 117.
Mica, all forms	366	415	--	Taiwan 123; Thailand 121; Malaysia 64.
Nitrates, crude	18	5	--	All to Malaysia.
Phosphates, crude	14,395	5,095	--	Malaysia 4,295; Hong Kong 422; Taiwan 360.
Pigments, mineral: Iron oxides and hydroxides, processed	782	755	--	Malaysia 677; Bangladesh 69.
Potassium salts, crude	68	12	--	All to Malaysia.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$21,852	$11,844	$812	Thailand $4,808; Switzerland $1,793; Hong Kong $1,736.
Synthetic do.	$3	$235	--	Thailand $111; Republic of Korea $87; Bahrain $19.
Salt and brine	17,458	20,523	--	Malaysia 15,246; Thailand 2,070; Brunei 1,988.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	2,914	3,626	--	Malaysia 2,780; Vietnam 740.
Sulfate, manufactured[4]	3,949	4,922	--	Malaysia 4,157; Vietnam 438; Burma 140.
Stone, sand and gravel:				
Dimension stone	9,388	5,021	4	Malaysia 3,876; Brunei 348; Maldives 168.
Dolomite, chiefly refractory-grade	683	293	--	Cambodia 125; Papua New Guinea 105.
Gravel and crushed rock	14,233	15,936	--	Brunei 13,852; Malaysia 2,082.
Limestone other than dimension	2,293	781	--	Malaysia 540; Hong Kong 176.
Sand other than metal-bearing	6,073	1,024	--	Brunei 552; Malaysia 389.
Sulfur:				
Elemental:				
Crude including native and byproduct	28,997	24,269	--	Thailand 9,467; Taiwan 5,629; Malaysia 4,737.
Colloidal, precipitated, sublimed	8,570	14,743	--	Malaysia 8,910; Taiwan 3,130; Sri Lanka 943.
Sulfuric acid	1,130	1,359	--	Sri Lanka 621; Malaysia 506.
Talc, steatite, soapstone, pyrophyllite	981	536	--	Malaysia 508.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	28,674	20,888	1	Yemen (Sanaa) 5,726; Burma 4,284; Yemen (Aden) 2,100.
Carbon black	986	1,295	--	Malaysia 448; India 430; Burma 144.
Coal, all grades including briquets	328	355	--	Philippines 77; Thailand 65; Japan 50.
Coke and semicoke	7,969	10,145	--	Malaysia 8,723; Bangladesh 1,137.

See footnotes at end of table.

Table 13.—Singapore: Exports and reexports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum:				
Crude thousand 42-gallon barrels	3,395	2,415	--	Australia 1,220; Japan 631; Philippines 291.
Refinery products do.	172,286	180,441	11,481	Japan 40,453; Malaysia 27,520; Hong Kong 24,968.

NA Not available.
[1]Table prepared by Audrey D. Wilkes.
[2]Less than 1/2 unit.
[3]May include platinum-group metals.
[4]Includes hydrogen sulfate and pyrosulfate.

Table 14.—Singapore: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984	
			United States	Other (principal)
METALS				
Aluminum:				
Ore and concentrate	340	153	--	Mainly from Malaysia.
Oxides and hydroxides	9,605	9,339	194	Japan 6,975; China 1,805; India 272.
Metal including alloys:				
Scrap	639	796	--	Malaysia 371; United Arab Emirates 200; Brunei 117.
Unwrought and semimanufactures	53,586	44,067	2,668	Australia 6,802; Japan 6,432; Malaysia 4,084.
Chromium:				
Ore and concentrate	13	24	--	Japan 18; China 6.
Oxides and hydroxides	340	331	218	Japan 70; Italy 17.
Cobalt: Oxides and hydroxides	8	3	--	Belgium-Luxembourg 1; Canada 1.
Columbium and tantalum: Ore and concentrate, tantalum	162	112	--	Thailand 90; Australia 11; Malaysia 11.
Copper: Metal including alloys:				
Scrap	4,019	3,436	434	Malaysia 2,162; Brunei 304.
Unwrought and semimanufactures	36,922	42,146	784	Japan 21,691; Taiwan 5,667; Australia 3,795.
Gold:				
Waste and sweepings value, thousands	NA	$318	$103	Hong Kong $107; Taiwan $44.
Metal including alloys, unwrought and partly wrought troy ounces	NA	142,524	9,870	Japan 108,959; West Germany 14,821.
Iron and steel: Metal:				
Scrap	94,513	78,646	31,103	United Kingdom 28,288; Malaysia 15,746.
Pig iron, cast iron, related materials	57,396	9,003	68	Brazil 6,000; Japan 2,395; Malaysia 291.
Ferroalloys	4,713	10,754	24	Australia 5,502; Mozambique 2,355; New Caledonia 1,430.
Steel, primary forms	210,607	114,657	167	Netherlands 60,034; France 15,270; United Kingdom 14,736.
Semimanufactures thousand tons	2,218	1,581	7	Japan 910; United Kingdom 98; Belgium-Luxembourg 65.
Lead:				
Oxides	758	440	([2])	Australia 275; West Germany 69; United Kingdom 37.
Metal including alloys:				
Scrap	90	426	--	Qatar 288; Burma 48; Brunei 46.
Unwrought	5,873	6,349	2	Australia 3,017; Japan 1,963; Burma 807.
Magnesium: Metal including alloys, all forms	90	176	153	Japan 7; United Kingdom 6.

See footnotes at end of table.

Table 14.—Singapore: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Manganese:				
Ore and concentrate	44,840	35,095	52	NA.
Oxides	4,801	2,361	7	Japan 1,149; Ireland 630; China 250.
Mercury 76-pound flasks	812	411	215	Italy 145; China 40.
Molybdenum: Metal including alloys, all forms	19	11	4	Japan 6.
Nickel:				
Ore and concentrate	203	2	--	All from Australia.
Metal including alloys:				
Scrap	145	182	--	Malaysia 129; Philippines 38; Thailand 15.
Unwrought and semimanufactures	11,612	1,201	15	New Caledonia 854; Norway 144; Canada 61.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$313	$382	$21	Hong Kong $210; Australia $116.
Silver:				
Ore and concentrate[3]	NA	20	--	China 10; Hong Kong 10.
Waste and sweepings[3] value, thousands	$103	$258	$32	Taiwan $108; United Kingdom $94.
Metal including alloys, unwrought and partly wrought do	$4,760	$4,402	$277	Australia $2,234; Japan $554; United Kingdom $373.
Tin:				
Ore and concentrate	3,674	6,504	--	Thailand 5,841; Burma 536; Malaysia 83.
Ash and residue containing tin	2,732	9,261	--	Malaysia 7,566; Thailand 853; Burma 842.
Metal including alloys:				
Scrap	2,630	436	--	Malaysia 208; Japan 200.
Unwrought and semimanufactures	3,548	3,199	20	Malaysia 935; Thailand 857; Japan 775.
Titanium: Oxides	6,365	9,236	780	Japan 3,213; France 2,200; Australia 1,307.
Tungsten:				
Ore and concentrate	1,210	2,429	--	Burma 1,956; Turkey 263; China 100.
Metal including alloys, all forms	94	83	3	China 45; Austria 30.
Uranium and/or thorium: Oxides and other compounds value, thousands	$51	$332	$45	Japan $232; France $53.
Zinc:				
Metal including alloys:				
Scrap	479	211	--	Malaysia 138; Australia 36.
Unwrought and semimanufactures	17,406	13,713	66	Australia 6,319; Canada 4,630; Norway 725.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	564	625	481	Japan 47; Italy 38.
Dust and powder of precious and semiprecious stones excluding diamond value, thousands	$93	$115	$29	Taiwan $74.
Grinding and polishing wheels and stones	1,835	2,541	44	Japan 962; China 677; Taiwan 354.
Asbestos, crude	10,215	9,951	335	Canada 5,275; Italy 469.
Barite and witherite	21,554	11,428	9	Malaysia 7,511; Thailand 3,376; China 380.
Boron materials:				
Crude natural borates	408	935	935	
Oxides and acids	755	557	212	China 184; Italy 56.
Cement thousand tons	3,607	3,711	([2])	Japan 1,547; Taiwan 1,325; Republic of Korea 558.
Chalk	3,432	3,564	61	United Kingdom 1,329; Thailand 990; Japan 441.
Clays, crude	103,025	72,346	33,748	Malaysia 18,618; United Kingdom 7,453; West Germany 3,104.
Cryolite and chiolite	1	3	--	All from United Kingdom.
Diamond:				
Gem, not set or strung value, thousands	$62,467	$45,113	$4,431	India $12,786; Israel $10,296; Belgium-Luxembourg $10,008.
Industrial stones do	$1,124	$1,886	$1,132	Belgium-Luxembourg $494; West Germany $68.
Diatomite and other infusorial earth	1,031	1,146	1,042	China 60; United Kingdom 19.

See footnotes at end of table.

Table 14.—Singapore: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Feldspar, fluorspar, related materials	7,856	7,812	--	India 4,180; Thailand 1,831; China 1,605.
Fertilizer materials:				
Crude, n.e.s	1,223	2,867	(2)	Thailand 2,748.
Manufactured:				
Nitrogenous	274,483	171,744	123	U.S.S.R. 109,285; Qatar 37,461; Canada 15,160.
Phosphatic	2,761	2,150	1,045	Malaysia 1,085.
Potassic	269,136	172,688	--	Canada 100,792; Israel 43,794; Jordan 13,750.
Unspecified and mixed	54,139	50,080	312	West Germany 47,058.
Graphite, natural	455	1,125	45	Japan 543; China 334; Republic of Korea 118.
Gypsum and plaster	149,291	141,613	277	Australia 102,133; Thailand 35,289; Finland 1,658.
Lime	26,899	21,041	(2)	Malaysia 17,616; China 1,979; United Kingdom 840.
Magnesium compounds: Magnesite, crude including magnesia	371	567	24	China 257; Norway 108; West Germany 60.
Mica, all forms	1,597	2,063	3	India 1,523; China 398; Malaysia 84.
Phosphates, crude	16,149	9,528	--	Christmas Island 8,276; India 550; China 450.
Pigments, mineral: Iron oxides and hydroxides, processed	2,343	3,011	224	West Germany 1,279; Japan 664; China 576.
Precious and semiprecious stones other than diamond:				
Natural ----- value, thousands	$17,721	$9,269	$127	Hong Kong $2,248; France $2,047; Switzerland $1,428.
Synthetic ----- do	$102	$238	$18	U.S.S.R. $123; Thailand $74.
Salt and brine	r50,472	43,161	199	Australia 20,880; Thailand 9,780; Israel 4,236.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	10,459	11,260	3	Kenya 8,150; Malaysia 2,592.
Sulfate, manufactured[4]	14,788	6,102	132	Taiwan 2,800; China 2,026; India 600.
Stone, sand and gravel:				
Dimension stone	6,691	64,145	125	Italy 41,554; Portugal 6,908; China 4,379.
Dolomite, chiefly refractory-grade	6,047	4,211	--	Thailand 3,870.
Gravel and crushed rock	730,227	798,738	223	Malaysia 795,025; Thailand 1,424.
Limestone other than dimension	41,434	68,935	--	Japan 39,214; Malaysia 29,591.
Quartz and quartzite	1,995	1,193	--	Thailand 648; Japan 321; China 100.
Sand other than metal-bearing	1,324,077	1,462,493	3,167	Malaysia 1,455,771.
Sulfur:				
Elemental:				
Crude including native and byproduct	69	84	4	Poland 59; Malaysia 12.
Colloidal, precipitated, sublimed	159	281	229	Japan 22.
Talc, steatite, soapstone, pyrophyllite	8,119	8,382	209	China 6,237; Republic of Korea 722; Australia 327.
Other:				
Crude	63,513	36,372	57	West Germany 33,545; Malaysia 1,475; Mozambique 558.
Slag and dross, not metal-bearing	7,763	11,865	1	Japan 11,600.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	2,959	2,710	281	Japan 2,130.
Carbon black	5,597	6,408	377	Malaysia 3,907; Japan 683.
Coal, all grades including briquets	2,163	1,945	1,175	Japan 274; Australia 178.
Coke and semicoke	12,307	17,120	14	Australia 8,760; Japan 5,563; West Germany 2,200.
Peat including briquets and litter	9	702	NA	NA.
Petroleum:				
Crude thousand 42-gallon barrels	227,895	238,420	--	Saudi Arabia 92,785; Malaysia 40,632; Kuwait 26,655.
Refinery products ----- do	69,958	57,116	6,994	Bahrain 7,739; Saudi Arabia 5,221; Malaysia 4,171.

rRevised. NA Not available.
[1]Table prepared by Audrey D. Wilkes.
[2]Unreported quantity valued at $23,000.
[3]May include other precious metals.
[4]Includes hydrogen sulfate and pyrosulfate.

SRI LANKA[30]

Sri Lanka's major mineral products were heavy-mineral beach sands, gem stones, and graphite. Apatite, cement, several clay minerals, feldspar, limestone, mica, and salt also were produced mostly for local consumption. A copper-iron deposit was discovered at Seruwila on the east coast, but it has not been exploited. Mining and quarrying accounted for 2% of real GDP in 1984 and showed a real growth of 1.5%. Projected growth for the mining sector during 1985-89 was 4.3%.[31]

The mineral industry accounted for only a few percent of total export value, most of which was from gems and a surplus of some refinery products. Sri Lanka's main mineral product imports were crude oil, fertilizers, and metal semimanufactures.

The mining, processing, and export of minerals from Sri Lanka was mainly under the control of the Government. The major exception was the cottage-industry-oriented gem stone sector.

Economic growth was hindered by violent clashes between Tamil insurgents and Government security forces during 1985. This ethnic conflict between the Sinhalese majority and the Tamil minority adversely affected tourism and investment. Cement and salt production in particular were also adversely affected by the situation.

COMMODITY REVIEW

The Ceylon Mineral Sands Corp. was able to make at least one shipment of over 30,000 tons of ilmenite concentrate from its Pulmoddai plant on the northeast coast.[32] Terrorist activity in the area has damaged the transportation system severely hindering mineral shipments.

Lanka Cement Corp. finished expansion of its Kankesanturai cement plant, reportedly bringing production capacity to 3,200 tons per day.

The Geological Survey Department has discovered a major deposit of high-grade kaolin at Meetiyagoda in the South Western District. Preliminary estimates indicated 350,000 tons of minable kaolin, sufficient for at least 60 years of supply at present consumption. Sri Lanka's Ceylon Ceramic Corp. had practically exhausted its Boralesgamuwa kaolin deposit.[33]

Sri Lanka State Fertilizer Manufacturing Corp. has again closed its 310,000-ton-per-year urea plant at Sapugaskanda after a 3-month closing in early 1984. The $192 million plant started trial production in early 1981 and was the country's largest industrial investment at the time. It has suffered heavy losses since it opened. The high cost of naphtha feedstock has made it cheaper to import urea. Production had only been a small fraction of its capacity during most of the year.

The State Mining and Mineral Development Corp. (SMMDC) and Moriroku Co. Ltd. of Tokyo were discussing plans to set up a graphite mining operation. Two abandoned graphite mines at Pussehena and Siyambalptiya would be rehabilitated at a cost of $54 million. The Japanese company would pay for the project and buy the entire output of the mines. SMMDC would supply the resources.

By April, Phoenix Offshore Petroleum Corp. of Canada was the only remaining company of a group of international exploration companies working offshore Sri Lanka. The Canadian survey vessel *Bernier* had completed a seismic survey in 1984 and data processing was completed in 1985. Phoenix Offshore Petroleum concessions were blocks 9 and Deepwater 1 off the west coast.

Ceylon Petroleum Corp. (CPC), the Government-owned oil company, was making plans to offer further incentives to oil companies to increase exploration. In particular, CPC planned to assure that the exploration company would be able to recover its capital cost of exploration during the first 5 years of production. Under previous contracts, cost recovery could have taken decades. Other incentives would protect the exploration company from declining oil prices and would change the conditions of sale for the company's profit oil.[34]

Table 15.—Sri Lanka: Exports and reexports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS				
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite	20,279	8,698	--	Japan 5,430; Netherlands 3,000.
Pyrite, roasted	11,190	96,066	--	Japan 45,316; Netherlands 25,000; Brazil 20,000.
Metal, scrap	1,600	11,000	--	India 5,500; Republic of Korea 5,500.
Lead: Metal including alloys, all forms	55	128	--	India 110.
INDUSTRIAL MINERALS				
Diamond:				
Gem, not set or strung value, thousands	--	$24,227	$2,861	Japan $11,530; Hong Kong $2,693; Singapore $1,879.
Industrial stones do	--	$3,518	$3	Belgium-Luxembourg $3,445.
Graphite, natural	4,223	7,215	1,014	United Kingdom 1,870; Japan 1,798; Pakistan 572.
Mica: Crude including splittings and waste	1,043	631	--	All to Japan.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$39,813	--		
Synthetic do	$18	$7	$2	Hong Kong $3; West Germany $2.
Salt and brine	86,150	37,153	--	Bangladesh 25,000; Maldives 8,652; Kenya 3,500.
Stone, sand and gravel:				
Dimension stone: Crude and partly worked	502	121	--	Japan 77.
Dolomite, chiefly refractory-grade	101	100	--	All to Indonesia.
Gravel and crushed rock	(2)	301	--	Maldives 300.
Limestone other than dimension	634	225	--	All to Maldives.
Quartz and quartzite	600	--		
Sand other than metal-bearing	2,504	17,007	--	Brazil 15,000; Maldives 775; Malaysia 750.
MINERAL FUELS AND RELATED MATERIALS				
Petroleum refinery products:				
Nonbunker:				
Liquefied petroleum gas value, thousands	$12	$3	--	All to Maldives.
Gasoline 42-gallon barrels	961	16,796	--	Bangladesh 10,608; Maldives 6,188.
Kerosene and jet fuel do	222	221	--	All to Maldives.
Distillate fuel oil do	656	201	--	Do.
Lubricants do	5,152	9,051	--	Malaysia 8,211.
Residual fuel oil do	470,616	644,182	--	Bangladesh 245,441; Singapore 174,565; Hong Kong 114,046.
Bunker:				
Gasoline do	--	1,624		
Jet fuel do	593,817	700,234		
Distillate fuel oil do	283,786	387,965		
Lubricants do	9,786	8,393		
Residual fuel oil do	1,317,668	2,090,114		

[1] Table prepared by Audrey D. Wilkes.
[2] Less than 1/2 unit.

Table 16.—Sri Lanka: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS				
Aluminum: Metal including alloys, all forms	2,444	2,680	1	United Kingdom 558; India 393; Malaysia 358.
Copper: Metal including alloys, all forms	1,495	2,198	--	Japan 579; Republic of South Africa 493; India 383.

See footnotes at end of table.

Table 16.—Sri Lanka: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Iron and steel: Metal:				
Ferroalloys	732	292	--	Norway 111; United Kingdom 90; Belgium-Luxembourg 50.
Steel, primary forms	6,404	6,564	--	Austria 5,850; Japan 306; China 299.
Semimanufactures	109,686	305,779	572	Japan 152,932; Zimbabwe 55,540; Republic of South Africa 40,778.
Lead:				
Ore and concentrate value, thousands	--	$2	--	All from United Kingdom.
Metal including alloys, all forms	2,795	1,269	--	Australia 816; United Kingdom 186; Japan 102.
Manganese:				
Ore and concentrate: Metallurgical-grade	867	1,342	--	Singapore 1,291.
Oxides	523	475	--	Japan 206; India 128; Singapore 60.
Mercury 76-pound flasks	NA	29	--	Mainly from China.
Molybdenum: Metal including alloys, all forms	40,000	(2)	NA	NA.
Tin:				
Ore and concentrate	158	87	--	All from Singapore.
Metal including alloys, all forms	83	1,417	50	United Kingdom 672; Japan 171; Republic of South Africa 147.
Titanium: Oxides	65	211	--	Belgium-Luxembourg 76; West Germany 30; Australia 28.
Tungsten: Metal including alloys, all forms	NA	25	--	Mainly from Sweden.
Zinc:				
Oxides	454	622	--	West Germany 202; Belgium-Luxembourg 153; United Kingdom 73.
Metal including alloys, all forms	960	815	100	Canada 250; Australia 246; Japan 163.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	36	30	15	China 10.
Artificial: Corundum	39	2	--	All from India.
Dust and powder of precious and semiprecious stones including diamond value, thousands	$9	$3	--	Hong Kong $2.
Grinding and polishing wheels and stones	2,809	40	NA	India 11; United Kingdom 7; China 6.
Asbestos, crude	7,243	5,057	--	Canada 4,636; Republic of South Africa 261.
Barite and witherite	68	57	--	India 56.
Cement	220,996	257,119	5	Japan 190,807; Kenya 40,599; U.S.S.R. 21,785.
Chalk	320	295	--	Belgium-Luxembourg 190; United Kingdom 84.
Clays, crude	3,973	3,604	7	Republic of Korea 1,054; Thailand 900; United Kingdom 695.
Diamond:				
Gem, not set or strung value, thousands	$21	$4,356	$28	Switzerland $1,547; Belgium-Luxembourg $998; Guyana $509.
Industrial stones do	--	$27	--	All from Belgium-Luxembourg.
Diatomite and other infusorial earth	1,651	3,419	17	Thailand 3,144; Singapore 217.
Fertilizer materials:				
Crude, n.e.s	14,407	7	1	Republic of South Africa 5.
Manufactured:				
Ammonia	71	113	--	United Kingdom 58; Netherlands 29.
Nitrogenous	34,680	110,830	116	Japan 40,289; Kuwait 21,703; Poland 18,566.
Phosphatic	31,065	26,479	--	Jordan 20,500; Egypt 3,000.
Potassic	76,314	65,448	--	Canada 37,250; West Germany 12,063; Singapore 11,015.
Unspecified and mixed	26,751	22,024	35	Japan 16,662; Netherlands 5,264.
Gypsum and plaster	15,007	7,086	--	India 5,792; United Kingdom 534; West Germany 522.
Magnesium compounds: Magnesite, crude	1,004	287	--	Austria 258.
Mica:				
Crude including splittings and waste	16	6	--	All from United Kingdom.
Worked including agglomerated splittings	NA	2	NA	NA.
Pigments, mineral: Iron oxides and hydroxides, processed	727	641	--	West Germany 357; Netherlands 142; India 74.

See footnotes at end of table.

Table 16.—Sri Lanka: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
INDUSTRIAL MINERALS —Continued				
Precious and semiprecious stones other than diamond:				
Natural _____ value, thousands__	$75	$23	$11	West Germany $7.
Synthetic ____________do____	$16	$22	$3	Thailand $15.
Sodium compounds, n.e.s.: Carbonate, manufactured _______________	4,013	1,498	--	France 515; Poland 327; West Germany 242.
Stone, sand and gravel ___________	1,287	2,817	29	India 1,426; United Kingdom 864; Italy 150.
Sulfur:				
Elemental, all forms___________	568	1,215	4	Singapore 558; Republic of Korea 398.
Sulfuric acid________________	468	825	2	Singapore 645; Netherlands 72; West Germany 50.
Talc, steatite, soapstone, pyrophyllite __	703	1,310	2	China 742; India 457; Norway 60.
MINERAL FUELS AND RELATED MATERIALS				
Carbon black _________________	2,385	2,944	19	Australia 1,524; Thailand 878; West Germany 133.
Coal, all grades including briquets ____	48,839	470	2	Thailand 450.
Coke and semicoke______________	1,231	1,622	1	West Germany 555; Belgium-Luxembourg 515; Singapore 150.
Petroleum:				
Crude thousand 42-gallon barrels__	(3)	14,158	--	Saudi Arabia 10,400; Iran 1,858; Malaysia 955.
Refinery products:				
Liquefied petroleum gas 42-gallon barrels__	(4)	35,484	12	Singapore 20,961; Thailand 7,378; Yugoslavia 6,948.
Gasoline __________do____	123,888	4,250	(5)	Australia 2,848; Netherlands 791; China 459.
Mineral jelly and wax __do____	7,658	4,525	55	China 2,534; Singapore 1,023.
Kerosene and jet fuel___do____	540,322	106,997	395	Singapore 55,149; China 51,383.
Distillate fuel oil _____do____	2,076,140	1,086,206	--	Singapore 905,413; China 145,358.
Lubricants __________do____	14,756	18,515	378	Singapore 8,029; France 3,003; Netherlands 2,968.
Residual fuel oil value, thousands__	--	$1	$1	
Bitumen and other residues 42-gallon barrels__	--	18	--	Japan 12.
Bituminous mixtures___do____	194	297	61	Singapore 133; United Kingdom 97.
Unspecified ________do____	180,176	--		

NA Not available.
[1]Table prepared by Audrey D. Wilkes.
[2]Unreported quantity valued at $6,000.
[3]Unreported quantity valued at $300,579,000.
[4]Unreported quantity valued at $650,000.
[5]Less than 1/2 unit.

VIETNAM[35]

Vietnam produced several minerals for its own consumption and a few in sufficient quantity to allow for small exports. Coal and tin were almost certainly its only economically important mineral exports. Most important to the country's economy were the clays for brick and tile production and limestone, gypsum, and clays for the expanding cement industry. Also, phosphate fertilizer was produced for domestic consumption, but its output has not reached levels obtained in the 1970's before the Lao Cai apatite mine was destroyed during the Chinese-Vietnamese border dispute in March 1979. A small amount of domestic natural gas was used to power gas-turbine generators in the Hanoi area. Peat was being exploited initially on a very limited scale in the southern part of the country around Ho Chi Minh City.

Of great potential importance to the entire economy was the December report that the first production of crude oil had begun from the No. 1 offshore platform southeast of Dong Nai Province. The new oilfield has been named Bach Ho (White Tiger). Vietnam has had to import all of its petroleum needs at considerable cost in foreign exchange and Soviet dependency. Early reports gave estimates of huge reserves but these have been tempered considerably in later months. Exploration was really in its early stages in the offshore area and a better picture of the recoverable reserves will be available as more wells are drilled and tested. The U.S.S.R. was furnishing the financing and technical expertise needed for the rapid development.

In the 10 years since the unification of the country, the Government has been conducting a systematic exploration and mapping program in the area formerly known as South Vietnam. Some of the results of its program are as follows:

1. A 1:500,000-scale geologic map was completed and tied into the existing northern Vietnam map. The map was accompanied by sections on mineralogy, quaternary deposits, tectonic data, and aerial photos.

2. A national geologic map on the 1:200,000 scale was begun in 1977. By yearend 1985, one-fourth of the South had been completed and one-half of the remaining territory was under way.

3. A 1:500,000 scale geohydrologic map was completed in 1984 and linked to the unified map of the country.

4. Work was under way on a 1:200,000-scale geohydrologic-engineering geology map of the Mekong Delta, eastern Nam Bo, and selected parts of the Central Highlands.

5. An aerial geophysical survey was under way over regions that have special mineral prospects.

6. A program of geologic-geophysics surveys was being conducted to promote oil and gas prospecting in the Mekong Delta and the southern Continental Shelf.

As a result of the above general survey activity, a number of mineral deposits have been reevaluated or discovered. The old Mo Duc iron mine and the Bong Mieu lode gold mine have been reevaluated. The discoveries included at least 15 peat and lignite deposits in 7 Provinces; heavy mineral sands along the coastal areas; bauxite in 4 Provinces; tin and tungsten prospects in Tra My, Ma Ty-Du Long, and Me Pu (all unlocated), molybdenite and uranium in several locations; pyrite at Nam Dong, Binh Tri Thien Province; clay deposits of ceramic quality in Nghia Binh, Lam Dong, and Song Be Provinces; and a number of locations containing bentonite, brick clay, diatomite, graphite, limestone, phosphorite, or zircon.

These mapping and exploration achievements will continue to be an important basis for determining the direction of investigations and development of mines in the southern region of Vietnam.[36]

The following production plans were announced by the National Assembly for 1986: coal to increase 11%; fertilizers of all types, 6%; steel, 2.6%; and natural gas, crude oil, and construction materials, an undisclosed amount.

COMMODITY REVIEW

Metals.—*Bauxite.*—Mining of 45% aluminum oxide content bauxite was being carried on for such uses as abrasives, medicinal aluminum, and alum for the domestic water supply system. The Hai Duong factory was supplied by mines in Lo Son and Mieu, probably in Hai Hung Province. Five northern bauxite deposits were discovered by Government geologists but were described as difficult to mine and smelt and not of high quality.

Iron Ore.—All three major types of iron ore were being produced in Vietnam, but on a very limited scale. Limonite and magnetite were produced at Linh Nhan, Tai Cau, and Tien Bo Mines. The ore supplied the needs of the Thai Nyugen iron and steel complex during its early years of operation but limited reserves at these mines were apparently depleted. Larger hematite reserves were available at the Quy Xa Mine on the west side of the Red River. Currently, the largest mine was Thach Khe iron mine in Thach Ha District of Nghe Tinh Province. This was a blind deposit that was discovered using modern geophysical survey methods. The quality and quantity of reserves at Thach Khe reportedly were sufficient for the Government to begin planning to mine and refine the ore on a "large scale." The mine was also favorably situated along water and land transportation routes.[37]

In addition to the active mines, nine ore deposits in seven Provinces have been discovered and are in various stages of exploration, evaluation, or development.

Government officials were interested in setting up a DRI project and have been discussing technology with Indian officials. A Vietnamese delegation was to visit the Kothagudem DRI plant in Andhra Pradesh, India, and samples of Vietnamese iron ore were to be tested for suitability.

Industrial Minerals.—*Cement.*—Capacity of the cement industry has been expanded from 1.0 million tons in mid-1981 to at least 3.2 million tons in January 1984. The capacity was distributed as follows: Bim Son, 1.2 million tons; Huang Thach, 1.0 million tons; Haiphong, 500,000 tons; Ha Tien, 300,000 tons; and 53 cupola furnace minicement plants, 200,000 tons. Despite the impressive increase, the industry was still encumbered by problems that combined to limit the output. The Vietnamese press has admitted to the following causes of lower than expected production: lack of coordination in operating the plants; erratic or uncertain availability of raw materials, suppliers, and electricity; and inadequate transportation.

The result of the problems was evident in the Government's production plan for the Bim Son plant. Workers were urged to raise production to 160,000 tons in the second quarter of 1985. The first kiln began operating in late 1981 and the second kiln in 1984 and yet a ceremony celebrating the plant's first 1 million tons of cement was held in March 1985.

Moving finished cement on the crowded, low-capacity railroad and highways has been a constant problem. Inadequate capacity of the bagging machines was a bottleneck at the Haiphong and Bim Son plants. The Ministry of Construction was trying to promote the use of more bulk cement by high-volume users. This would allow an increase in capacity utilization. During 1985, only 2% of production was used in bulk form.

Construction of a new production line at the Ha Tien cement plant was apparently delayed or proceeding at a very slow pace. The 1-million-ton-per-year expansion was originally scheduled for completion in 1981. Completion was recently rescheduled for the end of this decade.

Construction Materials.—To complement recent gains in cement capacity, the construction materials industry has also been involved in a vigorous expansion program for the last several years. According to the Vietnamese press, 943 construction material producing installations were to be operating by yearend 1985. They include 57 cement plants, 4 with rotary kilns; 423 brick and tile plants with an aggregate annual capacity of 5.3 billion units; 114 stone quarries; 59 lime and/or limestone production installations having a lime capacity of 1.1 million tons; 30 sand and gravel pits; 7 precast concrete plants; 15 sawmills; and 238 facilities for other construction materials such as sanitary porcelain, glass, fasteners, doors, windows, and roofing material.

Despite the impressive capacity, the operational, technical, and transport problems limited output to one-half capacity, according to the Government.

Production of brick was 2.5 billion in 1983 and 3.1 billion in 1984. The 1985 goal was 2.7 billion or roughly 6 million tons of finished brick. Firing of the bricks required 1.2 million tons of low-grade coal. Other 1985 plans included production of 7.2 million cubic meters of construction stone, 416 tons of sanitary porcelain, 900 tons of construction glass, and 220,000 cubic meters of precast concrete. A total of 93,800 workers were employed in the construction materials sector, and an additional 161,000 were employed in small industry and crafts related to the construction sector.

The main constraints to the industry were failure to achieve homogenous equilibrium among various sectors in producing, circulating, and distributing construction materials, shortages of electricity and coal, transportation and communication inadequacies, and serious shortages of spare parts. Quality control problems and the illicit brick manufacturing for sale on the free market were additional constraints faced by the construction materials sector.

Fertilizer Materials.—The Government has continued to put priority on the development of the fertilizer industry. The primary goal was to reduce foreign exchange expenditures on fertilizer materials and to eventually become self-sufficient in phosphate fertilizer and later in nitrogen. In the 1970's, apatite from Lao Cai Mine was one of the country's most important mineral exports. Since the mining facility's destruction in 1979 during a border conflict with China, rebuilding the mining facility has been slow. Several improvements including new facilities have been completed or started in 1985.

Several facilities roast phosphate for direct application to crops. The process is simple and inexpensive compared with superphosphate production and yields a product useful to several major crops. In order to coordinate production, distribution, and use, the General Department of Chemicals created Roasted Phosphate Fertilizer Enterprise No. 1. The new enterprise included at least the major facilities of Van Dien phosphate fertilizer plant, Ninh Binh phosphate fertilizer plant, and the Thanh Hoa serpentine mine.

Single superphosphate (SSP) capacity reportedly has been increased at Lam Thao SSP plant from 36,000 to 55,000 tons of phosphorus pentoxide per year with the completion of a second production unit. The U.S.S.R. provided assistance for the project. Several management and policy changes were made during 1985 to increase production and efficiency at the Lao Cai apatite mine. Repairs of machinery and electrical equipment were contracted out, increasing the quality of work and decreasing the time needed for repairs. Capital construction projects were contracted out also. Salaries were paid on the basis of output for a number of mining tasks. These changes have resulted in an increase in labor productivity and ore output. Loading productivity at the Lang Giang railroad station increased from 20 to 27 ore cars per day.

A further development at Lao Cai was groundbreaking for an apatite ore sorting plant to be built with Soviet assistance. The new plant is one of the key projects under the 1986-90 Government Development Plan. It is to be designed for a capacity of 760,000 tons per year of apatite. This is probably some type of concentration plant. The Lao Cai ore comprises four grades with the lower two grades not being fully utilized. Mine officials have been seeking a way of upgrading the low-grade material for years.

Exploration for additional deposits of phosphorus minerals has been under way for several years. The Vietnamese press reported the discovery of a number of new deposits and better delineation of some of the known deposits outside the Lao Cai area. The Lao Cai Mine produced apatite but the new deposits are referred to as phosphorite and "new type raw material."[38] Several locations were mentioned including Nhu Xuan and Do Luong in Nghe Tinh Province with tens of millions of tons, Ha Son Binh with 3 million tons, and at least four other districts with six deposits of 100,000 to 300,000 tons each. Reserves were calculated using a 10% phosphorus pentoxide content cutoff. Several of these deposits were being exploited locally on a small scale. Nghe Tinh Province was producing at an annual rate of 5,000 to 8,000 tons; Thanh Hao Province, 6,000 tons; and Cao Bang Province, 2,500 tons. Phosphorite production in 1984 was estimated at 25,000 tons. This material was ground as fine as available equipment permitted and applied directly to the soil.

Mineral Sands.—Vietnamese scientists apparently have been using heavy mineral sands from the beach between Mon Cay and Phan Thiet in Thuan Hai Province for several years. No details were available on how the titanium minerals were used, but the zircon was separated and used for high-quality ceramics and porcelain. Zircon normally has been imported at high costs, but test runs of 90%-pure domestic zircon reportedly gave excellent results on a 35,000-tile test batch at the Thanh Thanh plant. As a result, the Ministry of Construction recommended that a commercial zircon extraction plant be built.[39]

Mineral Fuels.—*Coal.*—The Government's 1980 coal target of 10 million tons has been plagued with problems at all levels from workers food and housing to the highest planning and policy groups. Several methods have been tried to improve production, but it has stayed at 5 million tons despite opening some new high-capacity mines. In 1985, however, there appeared to be a moderate turnaround as several new policy changes were apparently effective in improving worker morale and incentives. One of the major changes was gradually decentralizing mine management—each coal mine manager eventually becoming responsible for production and costs. Mine managers were authorized to reorganize their staff by reassigning personnel at all levels from mine workers to deputy chiefs.[40]

With local management control, several major mines reported improvements in production and operations. These included the Coc 6, Deo Nai, Ha Tu, Coc Sau, and Thong Nhat Mines. At Coc Sau Mine, the manager reorganized the operation and determined that 4.4 million cubic meters of overburden and the 1985 production goal of 1.4 million tons of coal could be reached while reducing the staff from 3,500 to 3,000. The surplus workers were reassigned to more productive work. Also, mine management redesigned the coal sorting plant resulting in considerably higher capacity. By November, the mine was expected to exceed its annual goal by 75,000 tons.[41]

The Hon Gai to Lo Phang railroad line was completed at yearend. The line will be used to ship coal from mines in the Hon Gai area.

Because of high freight costs from anthracite mines in the North to population centers in the South, the Government has been looking for local energy sources for residential and industrial use. Following a survey of peat and lignite deposits, measured peat resources for 10 million tons were delineated. Several of the peat deposits were being exploited for local consumption, mostly for fuel, after drying or processing into beehive briquets. An additional 90 million tons of inferred reserves was discovered, mostly in the Nam Bo Delta area. Peat production was estimated to be 50,000 tons, and coal output was 10,000 to 15,000 tons from the Ngoc Kinh Mine, the South's only coal mine. Plans were to produce 200,000 to 250,000 tons of peat and coal annually, including 30,000 tons from Ngoc Kinh Mine.

Oil and Natural Gas.—There was considerable activity in Vietnam's fledgling oil industry. Additional exploration wells were completed during the year, most wells reportedly striking oil. Installation of the No. 1 drilling platform was completed in May at the offshore Bach Ho (White Tiger) Oilfield about 120 kilometers southeast of the Vung Tau petroleum exploration support base. The first production well was spudded in late June from the platform. Commercial production of oil was believed to have begun by yearend. Because no pipelines have been layed to shore yet, production will be limited to the offshore platform-to-tanker loading capacity. In September, the No. 2 drilling platform was installed and the first leg of the No. 3 platform was assembled.

The U.S.S.R. announced that it would quadruple its investment in the oil sector during the 1986-90 5-year plan, compared with the 1981-85 plan. Plans were being made at yearend for a 6-million-ton-per-year refinery to be built along the road between Vung Tau and Ho Chi Minh City.

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[1]By Gordon L. Kinney, physical scientist, Division of International Minerals.
[2]The New Nation (Dhaka). June 9, 1985, p. 3.
[3]The Bangladesh fiscal year begins July 1 of the year stated.
[4]U.S. Embassy, Dhaka, Bangladesh. State Dep. Airgram A-01, Feb. 2, 1986, p. 7.
[5]Metal Bulletin (London). No. 7026, Oct. 8, 1985, p. 33.
[6]Petroleum News. V. 16, No. 10, Jan. 1986, p. 9.
[7]By Gordon L. Kinney, physical scientist, Division of International Minerals.
[8]Expenditure supplied in U.S. dollars.
[9]Kuala Belait BORNEO Bulletin in English. Dec. 28, 1985. p. 1.
[10]By Gordon L. Kinney, physical scientist, Division of International Minerals.
[11]The Nation Review (Bangkok). Feb. 5, 1985, p. 5.
[12]By Travis Q. Lyday, physical scientist, Division of International Minerals.
[13]By E. Chin, physical scientist, Division of International Minerals.
[14]By E. Chin, physical scientist, Division of International Minerals.
[15]By Gordon L. Kinney, physical scientist, Division of International Minerals.
[16]Vientiane VIENTIANE MAI in Lao. Feb. 12, 1985, p. 2.
[17]Vientiane PASASON in Lao. July 24, 1985, p. 2.
[18]By John C. Wu, economist, Division of International Minerals.
[19]MONTSAME (Ulaanbaatar). Jan. 7, 1986.
[20]———. Dec. 5, 1985.
[21]Values have been converted from Mongolian tugriks (Tug) at the rate of Tug3.36=US$1.00.
[22]Metal Bulletin (London). No. 7044, Dec. 10, 1985, p. 15.
[23]Tass (Moscow). Nov. 15, 1985.
[24]By Gordon L. Kinney, physical scientist, Division of International Minerals.
[25]Nepal Press Digest. V. 30, No. 11, Mar. 17, 1986, p. 88.
[26]Indian Mining & Engineering Journal (Bombay, India). V. 24, No. 5, May 1985, p. 30.
[27]Petroleum News. V. 16, No. 10, Jan. 1986, p. 57.
[28]By E. Chin, physical scientist, Division of International Minerals.
[29]Where necessary, values have been converted from Singapore dollars (S$) to U.S. dollars at the rate of S$2.20=US$1.00.
[30]By Gordon L. Kinney, physical scientist, Division of International Minerals.
[31]U.S. Department of State, U.S. Embassy, Colombo, Sri Lanka. Foreign Economic Trends and Their Implications for the United States. Oct. 1985, p. 4.
[32]Metric tons (2,204.6 pounds) are used throughout this report.
[33]Mining Journal (London). Oct. 18, 1985, p. 311.
[34]Petroleum News. V. 16, No. 10, Jan. 1986, p. 63.
[35]By Gordon L. Kinney, physical scientist, Division of International Minerals.
[36]TAP CHI HOAT DONG KHOA HOC in Vietnamese (Hanoi). July 1985, pp. 1-4.
[37]Linh, H. (Iron ore.) QUAN DOI NHAN DAN in Vietnamese (Hanoi), Dec. 10, 1984, p. 3.
[38]Joint Publications Research Service-South East Asia. JPRS-SEA-85-080, May 1985, p. 179.
TAP CHI HOAT DONG KHOA HOC in Vietnamese (Hanoi). Jan. 1985, pp. 27-89.
[39]Tieu, P. H. (Phosphate, a Source of Mineral Fertilizer for Farm Fields.) QUAN DOI NHAN DAN in Vietnamese (Hanoi), Oct. 20, 1985, p. 2.
[40]NHAN DAN in Vietnamese (Hanoi). Nov. 28, 1985, p. 3.
[41]———. Nov. 12, 1985, p. 1.

Table 17.—Vietnam: Apparent exports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Principal destinations, 1984
Aluminum: Metal including alloys, all forms	1	374	Hong Kong 371.
Chromium: Ore and concentrate	--	6,277	All to Japan.
Coal: Anthracite and bituminous	110,366	204,387	Japan 157,371; France 25,148; Belgium-Luxembourg 11,464.
Copper: Metal including alloys, all forms	1,417	4,043	Hong Kong 3,929; Singapore 100.
Fertilizer materials: Manufactured, nitrogenous	--	16	All to Malaysia.
Iron and steel: Metal, scrap	12,091	2,355	Hong Kong 2,321.
Mica: Crude including splittings and waste	--	20	All to Japan.
Salt and brine	603	3,524	Singapore 2,200; Hong Kong 1,324.
Silver: Metal including alloys, unwrought and partly wrought value, thousands	$1	--	
Stone, sand and gravel: Dimension stone:			
Crude and partly worked	1,461	NA	
Worked value, thousands	$2	$2	All to Singapore.

[p]Preliminary. NA Not available.
[1]Table prepared by Audrey D. Wilkes. Owing to a lack of official trade data published by Vietnam, this table should not be taken as a complete presentation of this country's mineral trade. These data have been compiled from United Nations information and data published by the partner trade countries.

Table 18.—Vietnam: Apparent imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Principal sources, 1984
METALS			
Aluminum:			
Oxides and hydroxides	250	(2)	
Metal including alloys, all forms	1,036	1,048	Japan 1,045.
Arsenic: Oxides and acids	10	--	
Chromium: Oxides and hydroxides	13	5	All from Japan.
Cobalt: Oxides and hydroxides	11	2	Hong Kong 1; Japan 1.
Copper: Metal including alloys:			
Unwrought	55	--	
Semimanufactures	89	55	Japan 54.
Gold: Metal including alloys, unwrought and partly wrought troy ounces	759	31	All from Japan.
Iron and steel: Metal:			
Ferroalloys	256	362	Japan 332; Hong Kong 30.
Steel, primary forms	2	--	
Semimanufactures:			
Bars, rods, angles, shapes, sections	16,091	5,628	Japan 2,858; Singapore 1,139; Hong Kong 944.
Universals, plates, sheets	9,795	11,498	Japan 5,996; Singapore 5,091.
Hoop and strip	59	595	Japan 419; Hong Kong 100; France 55.
Wire	2,295	1,408	Sweden 879; Japan 442.
Tubes, pipes, fittings	853	461	Sweden 202; Japan 139; Hong Kong 61.
Lead:			
Oxides	80	103	All from Japan.
Metal including alloys, all forms	4	300	Singapore 201; Japan 99.
Manganese:			
Ore and concentrate	--	5	All from Japan.
Oxides	360	511	Japan 501.
Mercury 76-pound flasks	290	40	All from Singapore.
Molybdenum: Metal including alloys, all forms kilograms	NA	50	All from Japan.
Nickel: Metal including alloys, semimanufactures	16	15	Sweden 9; Japan 6.
Silver: Metal including alloys, unwrought and partly wrought troy ounces	6,060	[3]7,726	All from Japan.
Titanium: Oxides	622	42	Japan 20; Hong Kong 18.
Tungsten: Metal including alloys, all forms kilograms	--	364	All from Japan.
Zinc:			
Oxides	605	210	Japan 115; Hong Kong 75.
Metal including alloys:			
Unwrought	101	NA	
Semimanufactures	7	NA	
Other:			
Oxides and hydroxides	2	1	All from Sweden.
Base metals including alloys, all forms	--	26	Hong Kong 25.
INDUSTRIAL MINERALS			
Abrasives, n.e.s.:			
Natural: Corundum, emery, pumice, etc	--	1	All from Singapore.
Grinding and polishing wheels and stones	31	6	Mainly from Japan.
Asbestos, crude	325	--	
Boron materials: Oxides and acids	29	--	
Cement	17,508	37,468	Japan 30,386; Hong Kong 6,680.
Diamond: Gem, not set or strung, natural value, thousands	$1	--	
Diatomite and other infusorial earth	291	NA	
Feldspar, fluorspar, related materials	130	80	All from Japan.
Fertilizer materials: Manufactured:			
Ammonia	871	115	Japan 81; Hong Kong 24.
Nitrogenous	667,917	45,552	Singapore 45,544.
Potassic	23,901	--	
Unspecified and mixed	7,750	28,675	Singapore 28,640.
Gypsum and plaster	--	2	All from Singapore.
Magnesium compounds:			
Magnesite	100	NA	
Oxides and hydroxides	32	NA	
Mica: Worked including agglomerated splittings	2	(4)	All from Japan.
Pigments, mineral: Iron oxides and hydroxides, processed	110	NA	
Precious and semiprecious stones other than diamond value, thousands	$7	NA	

See footnotes at end of table.

Table 18.—Vietnam: Apparent imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984[p]	Principal sources, 1984
INDUSTRIAL MINERALS —Continued			
Pyrite, unroasted	20,000	NA	
Sodium compounds, n.e.s.:			
Carbonate, natural and manufactured	1,140	3,393	France 1,900; Singapore 740; Hong Kong 426.
Sulfate, natural and manufactured	640	1,608	Hong Kong 1,170; Singapore 438.
Stone, sand and gravel: Dimension stone, worked	NA	11	All from Italy.
Sulfur:			
Elemental, all forms	3	9,515	Canada 8,996; Singapore 500.
Sulfuric acid	7	124	Japan 122.
Talc, steatite, soapstone, pyrophyllite	270	3	All from Japan.
MINERAL FUELS AND RELATED MATERIALS			
Carbon black	1,254	898	Japan 610; Hong Kong 247.
Coal: Anthracite and bituminous	10,000	38,502	Australia 28,502; Indonesia 10,000.
Coke and semicoke	5,100	14,610	All from Japan.
Petroleum refinery products:			
Gasoline ... 42-gallon barrels	NA	357	All from Singapore.
Mineral jelly and wax ... do	9,680	7,893	Japan 4,832; Singapore 2,361; Hong Kong 669.
Kerosene and jet fuel ... do	302	2,480	All from Hong Kong.
Distillate fuel oil ... do	121,605	323,309	Singapore 323,287.
Lubricants ... do	146,487	61,712	Italy 34,860; Japan 14,392; Hong Kong 1,974.
Bitumen and other residues ... do	19,998	97,978	Singapore 94,039; Japan 3,939.
Bituminous mixtures ... do	67	--	

[p]Preliminary. NA Not available.
[1]Table prepared by Audrey D. Wilkes. Owing to a lack of official trade data published by Vietnam, this table should not be taken as a complete presentation of this country's mineral trade. These data have been compiled from United Nations information and data published by the partner trade countries.
[2]Unreported quantity imported from France valued at $2,000.
[3]Excludes unreported quantity imported from France valued at $38,000.
[4]Less than 1/2 unit.

The Mineral Industry of Other Near East Countries

By Michael D. Fenton[1] and Charles L. Kimbell[2]

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AFGHANISTAN[3]

The very modest-sized mineral industry of Afghanistan was burdened for another year with problems of internal strife occassioned by the presence of Soviet armed forces. Despite this, production of the few traditional commodities continued, and the mineral industry moved to develop additional mines and plants for both traditional and new products with considerable technical and construction assistance from the U.S.S.R.

Among the limited range of mineral commodities for which production was reported, there were no startling changes between 1984 and 1985. Production of both coal and natural gas advanced only slightly, despite substantially higher 5-year plan goals, and cement output was down marginally. Probably the most significant development in 1985 was the possibility that mine and/or smelter production of copper was initiated during the year.

Afghanistan's trade in mineral commodities has not been reported in detail for a number of years, but liquid petroleum products—chiefly aviation and motor vehicle fuels—have remained the dominant imports in terms of value, while natural gas remained the only significant mineral commodity export, unless copper production and shipments were initiated. Presumably, limited exports of lapis lazuli have continued; Afghanistan was long known as the principal world source of this ornamental and jewelry stone, but output fell drastically at the time of the Soviet invasion.

There have been persistent press reports of Soviet interest in developing reputedly high-grade chromite reserves in the Logar Valley near Herat.

The $600 million Ainak copper mine, beneficiation plant, and smelter, under development for several years in Logar Province 12 kilometers south of Kabul, was reportedly completed during 1985,[4] but the precise meaning of "completed" had not been made evident. The facility, nominally an Afghan Government installation, was actually almost entirely financed and built by the U.S.S.R. with some Czechoslovak participation. Presumably, reporting on the project has been sparse because of traditional Soviet secrecy regarding their copper industry, for it was reported that most, if not all of the facility's output, will be exported to the U.S.S.R. to assist in alleviating the country's copper deficiencies. It was not clear if the report of completion applies to the mine and beneficiation plant only, or to the smelter as well. The operation was founded on a reserve variously reported between 280 and 360 million tons of ore grading 0.7% to 1.5% copper, and was slated to produce between 114,000 and 150,000 tons of concentrates annually, which were to be delivered by truck to the smelter in Kabul. Assuming that the concentrates produced correspond in grade to those produced in Western countries, the smelter could produce between 25,000 and 38,000 tons of copper per year, providing that there is no disruption in transport of concentrates or in power supply to the smelter.

Development of the Hajigak iron ore deposits in the Hindu Kush Mountains about 100 kilometers northwest of Kabul apparently continued, but there was no evidence of commercial production through yearend 1985. Reserves have been estimated at 1.7 million tons of mixed hematite and magnetite ore averaging 62% iron.

For unexplained reasons, reported 1985 cement production was only 21% of the 360,000-ton-aggregate rated annual capacity of Afghanistan's three plants. These include the 210,000-ton-per-year plant in the city of Herat reportedly completed in 1982, the 120,000-ton-per-year Ghori plant, and the 30,000-ton-per-year Jabel Saraj plant. It was originally intended that a major share of output from the Czechoslovak-built plant in Herat would be exported to the Soviet Union.

Afghanistan's energy requirements in 1985 were estimated at about 1 million tons of standard coal equivalent (SCE), slightly above the 990,000-ton SCE level reported by the United Nations for 1984; the estimate assumes that the Kabul copper smelter did not come on-stream. Of the 1984 total, domestically mined coal accounted for 17%, domestically produced natural gas for 26%, domestic hydroelectric power for 9%, and petroleum products, all imported save for a very small amount of natural gas condensate, for the remaining 48%. In terms of the actual level of total energy production, Afghanistan in theory could be self-sufficient, with output totaling nearly four times consumption, but this output has been dominated by natural gas, produced largely for export to the Soviet Union, and obviously an unsatisfactory substitute for the liquid fuels required for the dominant forms of commercial transportation—aircraft and highway vehicles. Traditionally, of the country's total natural gas production, less than 10% has been used indigenously.

Plans announced in 1983 for the construction of an oil refinery at Angot, relatively near the country's limited (70 million barrels) oil reserve, have not been recently reported, and thus this project seemingly awaited more settled conditions.

Coal production continued from traditional mines—Karkar, Ishpushta, Darra-i-Suf, the latter apparently continuing to provide the bulk of total output. Total coal reserves of 500 million tons have been reported, including 100 million tons of high-grade proved reserves. Of the latter, 60 million tons or more, including some coal suitable for coking, are at the Darra-i-Suf property. Ambitious plans to raise coal reserves to 2 million tons and coal production to 300,000 tons in the year beginning March 21, 1983, clearly were not met.

Natural gas production remained centered in the Shibarghan area of northern Afghanistan, about 100 kilometers by pipeline route from the Soviet border. Here the Gogerdak Field has been in production since the mid-1960's. Soviet exploration teams have undertaken considerable work in this field and in the relatively nearby Jorq-aduq and Khwaja Gasfields, with goals of expanding reserves to 35 trillion cubic feet, and raising annual production to about 145,000 million cubic feet.

Gas consumed within Afghanistan was used for power generation at the 34-megawatt thermal plant near Mazar-e Sharif, about 88 kilometers from the gasfield, and at the nitrogen fertilizer plant in the same area.

Soviet interests in Afghanistan's mineral potential were not restricted to chromite, copper, and natural gas. Investigations of deposits of barite, bauxite, beryl, emeralds, fluorspar, lead, lithium minerals, tantalum, uranium, and zinc have been noted, and in the case of uranium it was reported that limited amounts have been mined in the mountainous Lashkangah area near Kabul.

Table 1.—Other countries of the Near East: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Country and commodity	1981	1982	1983	1984[p]	1985[e]
AFGHANISTAN[2]					
Barite	1,000	[e]2,000	[e]2,000	2,000	2,000
Cement, hydraulic[e]	[r]77,000	[r]87,000	[r]90,000	[r]80,000	[3]77,000
Coal, bituminous	[r]125,000	[r]145,000	[r e]165,000	[r e]170,000	180,000
Gas, natural:					
Gross[e] ---- million cubic feet	[r]99,000	[r]95,000	100,000	106,000	111,000
Marketed ---- do	[r]88,745	[r]85,744	90,016	95,879	100,000
Gypsum[e]	3,000	[3]3,000	[r]3,000	[r]3,000	3,000
Natural gas liquids[e] thousand 42-gallon barrels	[r]117	[r]117	[r]127	[r]117	120
Nitrogen: N content of ammonia	[3]9,070	8,000	[e]8,000	8,000	9,000
Salt, rock[e]	6,000	10,000	10,000	10,000	10,000
BAHRAIN					
Aluminum metal: Primary, smelter	141,000	170,960	171,700	177,300	[3]177,600
Gas, natural:					
Gross ---- million cubic feet	122,000	130,507	139,325	145,152	[3]173,227
Marketed ---- do	78,059	91,373	96,321	130,000	133,000
Natural gas liquids:					
Butane ---- thousand 42-gallon barrels	817	890	914	864	815
Propane ---- do	1,028	986	996	1,010	930
Naphtha ---- do	1,170	1,139	1,209	1,251	1,165
Petroleum:					
Crude ---- do	16,902	16,067	15,164	15,289	15,301
Refinery products:					
Gasoline ---- do	11,173	10,068	4,993	[e]6,100	5,600
Jet fuel ---- do	13,456	8,341	9,984	[e]12,500	11,500
Kerosene ---- do	2,617	2,676	1,096	[e]2,000	1,800
Distillate fuel oil ---- do	25,270	19,515	16,848	[e]21,500	19,800
Residual fuel oil ---- do	28,648	19,866	16,344	[e]17,000	15,700
Lubricants ---- do	22	363	2,340	[e]200	215
Other ---- do	12,615	9,975	10,881	[e]12,100	11,100
Refinery fuel and losses ---- do	2,177	1,534	1,822	[e]2,000	2,000
Total ---- do	95,978	72,338	64,308	73,400	67,715
Sulfur, byproduct of petroleum	36,000	34,060	49,275	[e]54,000	49,000
LEBANON[2]					
Cement, hydraulic ---- thousand tons	2,391	[r]1,700	1,500	1,250	1,000
Gypsum	9,500	[e]5,000	[e]5,000	5,000	3,000
Iron and steel: Metal, semimanufactures thousand tons	185	[e]150	[e]100	100	90
Lime[e] ---- do	61	50	20	20	10
Petroleum refinery products:[e]					
Gasoline ---- thousand 42-gallon barrels	3,000	2,400	2,300		3,200
Jet fuel ---- do	600	400	300		NA
Kerosene ---- do	100	50	50		600
Distillate fuel oil ---- do	2,400	2,000	2,000	NA	3,200
Residual fuel oil ---- do	4,300	3,800	3,500		5,800
Liquefied petroleum gas ---- do	300	200	175		8,000
Unspecified ---- do	200	150	125		NA
Refinery fuel and losses ---- do	600	500	400		NA
Total ---- do	11,500	9,500	8,850	NA	20,800
Salt[e] ---- thousand tons	15	10	5	[r]5	5
OMAN					
Cement, hydraulic	--	--	[e]2,200	477,000	[3]648,501
Chromite, gross weight	--	--	[e]24,000	7,000	--
Copper:					
Mine output, metal content	--	--	11,300	16,200	18,000
Smelter	--	--	7,600	21,300	20,000
Refinery	--	--	3,800	15,100	[3]14,014
Gas, natural:					
Gross ---- million cubic feet	19,000	19,000	27,000	35,500	51,000
Marketed ---- do	[r]9,000	[r]9,500	13,500	17,500	26,000
Natural gas liquids:[e]					
Butane ---- thousand 42-gallon barrels	[3]46	50	50	50	50
Propane ---- do	[3]5	5	5	5	5
Natural gasoline ---- do	[3]730	800	800	800	800

See footnotes at end of table.

Table 1.—Other countries of the Near East: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Country and commodity	1981	1982	1983	1984[p]	1985[e]
OMAN —Continued					
Petroleum:					
Crude ______ thousand 42-gallon barrels__	119,808	122,598	145,000	150,000	179,300
Refinery products:					
Gasoline ________________do____	--	--	[e]1,500		
Jet fuel ________________do____	--	--	[e]1,000		
Kerosene________________do____	--	--	[e]500		
Distillate fuel oil ___________do____	--	--	[e]3,000		
Residual fuel oil ___________do____	--	--	[e]2,500	NA	NA
Liquefied petroleum gas_______do____	--	--	[e]500		
Naphtha ________________do____	--	--	[e]300		
Unspecified ______________do____	--	--	[e]200		
Refinery fuel and losses _______do____	--	--	[e]100		
Total ______________do____	--	--	[e]9,600	NA	NA
Sand and gravel __________ thousand tons__	[e]800	1,343	3,410	6,420	[3]6,842
Stone:					
Marble__________________do____	[e]20	50	33	37	37
Unspecified________________do____	[e]3,000	6,200	11,224	4,530	4,530
Sulfur, pyrites ______________________	--	--	[e]11,000	31,000	31,000
QATAR[2]					
Cement, hydraulic_________ thousand tons__	258	[r]229	375	478	319
Gas, natural:					
Gross_____________million cubic feet__	222,000	212,100	194,000	225,300	210,000
Marketed __________________do____	[r]152,600	178,500	184,800	209,400	200,000
Iron and steel: Metal, semimanufactures thousand tons__	[r]469	[r]495	469	488	504
Natural gas liquids thousand 42-gallon barrels__	6,126	6,516	13,800	16,600	17,000
Nitrogen: N content of ammonia ___________	366,612	434,016	586,300	631,800	640,000
Petroleum:					
Crude ______ thousand 42-gallon barrels__	[r]148,900	120,289	102,000	138,400	108,000
Refinery products:					
Gasoline ________________do____	[r]1,168	[r]1,022	1,097	1,700	
Kerosene________________do____	[r]511	[r]511	511	800	
Distillate fuel oil ___________do____	[r]1,095	[r]1,095	1,387	2,100	NA
Other[e] ________________do____	[r]73	[r]73	73	72	
Total ______________do____	[r]2,847	[r]2,701	3,068	4,672	4,700
Stone: Limestone _________ thousand tons__	2,300	2,185	[e]1,600	1,500	1,100
Sulfur __________________________	5,600	12,000	19,000	33,264	36,500
SYRIA					
Asphalt, natural __________ thousand tons__	90	71	54	NA	NA
Cement, hydraulic_______________do____	[r]2,316	[r]2,520	3,626	4,279	5,000
Gas, natural:[e]					
Gross_____________million cubic feet__	55,000	52,000	[r]16,729	17,922	19,200
Marketed __________________do____	8,000	9,000	[r]2,344	4,556	4,800
Gypsum __________________________	79,545	[e]80,000	169,000	200,000	200,000
Iron and steel: Steel, crude____ thousand tons__	110	99	80	69	69
Nitrogen: N content of ammonia ___________	30,000	64,900	113,400	120,000	120,000
Petroleum:					
Crude ______ thousand 42-gallon barrels__	58,990	55,625	61,320	60,400	61,000
Refinery products:					
Naphtha ________________do____	NA	NA	4,672	5,329	
Gasoline ________________do____	4,818	[e]5,255	6,242	7,190	
Kerosene and jet fuel ________do____	4,051	[e]4,400	3,285	3,212	
Distillate fuel oil ___________do____	30,998	[e]32,000	46,757	52,889	
Residual fuel oil ___________do____	14,231	[e]17,700	[e]18,000	NA	NA
Liquefied petroleum gas_______do____	1,423	[e]1,500	1,314	1,606	
Asphalt_________________do____	2,227	[e]2,250	2,336	2,409	
Refinery fuel and losses _______do____	1,752	[e]1,800	1,533	1,716	
Total ______________do____	59,500	[e]64,905	84,139	74,351	NA
Phosphate rock___________ thousand tons__	1,321	1,455	1,229	1,514	1,270
Salt_____________________do____	90	102	87	87	87
Stone, sand and gravel:					
Stone: Dimension, marble ___ cubic meters__	60,000	20,000	71,000	71,000	71,000
Sand and gravel ________ thousand tons__	[e]20	205	5,780	5,829	6,000
Sulfur, byproduct of petroleum and natural gas do____	6	22	[e]30	105	105

See footnotes at end of table.

Table 1.—Other countries of the Near East: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Country and commodity	1981	1982	1983	1984[p]	1985[e]
PEOPLE'S DEMOCRATIC REPUBLIC OF YEMEN					
Petroleum refinery products:[e]					
Gasoline thousand 42-gallon barrels	1,800	2,000	2,200		
Jet fuel do	2,000	2,300	2,500		
Kerosene do	1,200	1,500	1,800		
Distillate fuel oil do	3,000	3,500	4,000	NA	NA
Residual fuel oil do	12,000	13,000	14,000		
Other do	1,200	1,500	1,800		
Refinery fuel and losses do	1,000	1,200	1,200		
Total do	22,200	25,000	27,500	NA	NA
Salt[e] thousand tons	75	75	75	75	75
YEMEN ARAB REPUBLIC[2]					
Cement do	82	237	600	850	[3]1,400
Gypsum	[e]20,000	21,923	23,138	24,295	[3]25,000
Salt[e]	65,000	57,000	141,000	148,000	[3]150,000

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Table includes data available through Sept. 10, 1986.
[2]In addition to the commodities listed, asbestos and lapis lazuli (in Afghanistan) and a variety of other crude construction materials (clays, sand and gravel, and stone) presumbably are produced, but output is not reported quantitatively, and available information is inadequate to make reliable estimates of output levels.
[3]Reported figure.

BAHRAIN[5]

Bahrain was the smallest oil and refined products producer in the Persian Gulf region, and the Government was trying to profitably diversify the industrial sector of its economy into aluminum refining and manufacturing, petrochemicals, and iron ore beneficiation. State revenues in 1985 amounted to $1,526.6 million, of which $957.8 million was attributed to oil. Low oil and metal prices resulting from worldwide overproduction, and unexpected competition resulted in a current account deficit of $16 million that was expected to increase in 1986 to $26 million.

The Bahrain National Oil Co. (Banoco) was producing, in 1985, 41,922 barrels per day (bbl/d) of oil from 380 wells in Bahrain's only onshore field, Awali. The reserve was officially estimated to be 223 million barrels. Production efficiency was improved by new recovery techniques, including injection of 46 million cubic feet per day of gas. Banoco continued to develop the Khuff gas reservoir by completing 10 wells. Formations beneath the Khuff were reached and additional deep wells may be drilled. Production capacity was 980 million cubic feet per day, and reserves should last for 5 years. Banoco also planned a 5-year development program of 80 infill wells to begin in 1986.

The Abu Saafa offshore field, which is shared equally with Saudi Arabia, produced about 65,000 bbl/d of oil from a reserve of 6 billion barrels. This field provided about 40% of Government revenues, while the Awali Field provided only a little more than 20%.

The Bahrain National Gas Co. (Banagas) produced 475 million cubic feet per day from the Khuff Zone of the Awali Field, which holds a reserve of 11 trillion cubic feet of gas that was projected to last over 60 years.

The Banagas natural gas liquefaction plant at Jebel al Dukham used associated gas that was piped from the oilfield to the plant for the production of butane, propane, and naphtha for the aluminum industry, power and desalination plants, and the Bahrain Petroleum Co. Ltd. (Bapco) refinery. In 1984, Banagas' production of propane, butane, and naphtha had reached a record high 3.12 million barrels, compared with 3.07 million barrels in 1983, but production fell in 1985 to 2.9 million barrels.

Banagas began construction on the $2.9 million project at its liquefied gas plant to raise design capacity from 110 to 170 million cubic feet per day. Twenty-five miles of gas and product lines, three fractionating towers, several heat exchangers, process pumps, and ancillary pipes were to be installed. The 110-million-cubic-foot-per-day plant had been modified earlier to 125 million cubic feet per day and then to 145 million cubic feet per day.

The net income of Banagas for 1985 was $7.2 million, down from $18.3 million in 1984. Increased feed gas charges for 170 million cubic feet per day from Banoco were blamed for the decline. Revenue from the sale of naphtha, propane, and butane was down by more than 15% to $57.8 million, because of the drop in the price of naphtha and lower overall production.

Bahrain's importance as an oil refining center was overshadowed by the new export refining capacity in Saudi Arabia and Kuwait. The one 250,000-bbl/d refinery, operated by Bapco on Sitra Island, had the following capacities: 100,000 bbl/d of vacuum distillation, 19,000 bbl/d of visbreaking, 40,000 bbl/d of catalytic cracking, 18,000 bbl/d of catalytic reforming, and 50,000 bbl/d of light isomate production. Feedstock was crude from Bahrain's Awali Field, while 65% to 70% of the crude was from Saudi Arabia, and a small amount was from Oman and Dubai.

Refinery runs in 1985 were 180,000 bbl/d at 69% capacity; in 1984, 201,000 bbl/d of oil was processed at 77% capacity. Refined product exports were 65.3 million bbl/d shipped to the Middle East, Far East, Africa, and Southeast Asia.

The Arab Iron and Steel Co. (AISCO) iron ore pelletization plant at Al Hiddhide near the Bahrain airport, was built to supply direct-reduced iron plants and scrap-based steel plants in Iraq, Qatar, and Saudi Arabia while using inexpensive energy and nearby limestone deposits. A blend of iron ores from India and Brazil was to be used, and port facilities were capable of accommodating vessels of up to 100,000 deadweight tons. The $290 million plant was commissioned in December 1984, but then operated at only 50% of its design capacity of 4 million tons per year during the first half of 1985. Technical problems and a lack of orders in an oversupplied and depressed market brought about a shutdown in early May. Only one sale of 20,000 tons had been made to Saudi Arabia's Saudi Iron and Steel Co., and a stockpile of 250,000 tons of pellets had accumulated. The plant was restarted in early July when Turkey placed an order. AISCO had earlier supplied 65,000 tons of pellets to the West German steelmaking company Klöckner-Werke AG. In 1985, AISCO rescheduled about $240 million in loan repayments.

A consortium of aluminum users, including Kaiser Aluminum & Chemical Corp. of the United States, needed its own source of aluminum, and the Government needed to use its plentiful national gas reserves and to diversify its economy. Since May 1971, almost 2 million tons of aluminum has been produced at the Aluminium Bahrain Ltd. (ALBA) Sitra Island smelter. Production in 1985 reached 176,731 tons of hot metal and 174,825 tons of finished product. ALBA's alumina source was the Australian branch of the Aluminum Co. of America.

As one of three Arab aluminum smelting companies, ALBA also was competing in an oversupplied, depressed market. Other new smelters were built in countries that had inexpensive fuel, and also had their own alumina. A decline in demand caused sales to be reduced by 30% to 129,310 tons, from 186,916 tons in 1984. Bahrain-Saudi Aluminium Marketing Co. (BALCO) reported sales of 118,533 tons; profits fell to $6.4 million from $39.5 million in 1984. BALCO exported ALBA products mostly to the Far East, Japan, and Europe. In 1985, about 12% went to domestic downstream industries, and sales were expected to reach 40% of production when the Gulf Aluminium Rolling Mill Co.'s 40,000-ton-per-year mill, which was under construction in 1985, was to be operating at full capacity in 1986. Other domestic buyers were Bahrain Atomisers and Midal Cables Co. and Bahrain Aluminium Extrusion Co.

A two-phase modernization and expansion project at ALBA was approved in principle in late 1985 for implementation in 1986 if future world aluminum market conditions appear favorable. The first phase would increase capacity from 170,000 to 200,000 tons by extending pot rooms 5 and 6 and by installing an additional 76 pots. A waste-recovery system would supply extra power, thereby avoiding increased gas consumption. ALBA used 51.6 billion cubic feet of gas in 1984. Phase 2 will increase production to 220,000 tons by 1990 by increasing amperage to the original four pot rooms and by installing computerized alumina point feeding.

The Gulf Petrochemical Industry Co.'s ammonia-methanol plant, built by Italy's Snamprogetti S.p.A. at Sitra at a cost of

$400 million, was fully operational in July. The plant, owned by Saudi Arabia, Kuwait, and Bahrain, used Bahrain gas feedstock to produce at a daily rate of 1,000 tons for each product. SABIC Marketing Ltd. of Saudi Arabia and Kuwait Petrochemical Industries Co. were to market the methanol and ammonia, respectively. The first export shipment comprised 15,000 tons of methanol to an unspecified market and 8,000 tons of liquid ammonia to a Tunisian fertilizer company.

LEBANON[6]

The Lebanese economy continued to suffer as the civil war continued in its 11th year. Total industry was running at barely 40% of capacity, and exports were down by nearly 75% since 1980.

Within the petroleum industry, Lebanon continued to be dependent on sea shipments of crude oil to its two intermittently operating refineries. Lebanon imported 13.9 million barrels of oil in 1985, 8.5 million barrels to the Tripoli refinery and 5.4 million barrels to the Zahrani refinery, from Saudi Arabia, Romania, and Iraq. The largest of two refineries, at Tripoli, had a maximum throughput of 35,000 bbl/d, but was shut down temporarily and its annual operating capacity was only 22,000 to 23,000 bbl/d. The second refinery, at Zahrani near Sidon, had a maximum throughput of 17,500 bbl/d, but operated at about 16,000 bbl/d. With a $553 million deficit in the Fuel Subsidy Fund and a total oil import bill of $690 million[7] at yearend 1985, the Government raised petroleum product prices 118% to ease its financial burden and to inhibit further increases in consumption. Future shortfalls were predicted for fuel oil, gasoline, and middle distillates.

OMAN[8]

Oman was one of the smaller Arab oil producing countries and was not a member of the Organization of Petroleum Exporting Countries. Oil and associated products, the basis of Oman's economy, accounted for nearly all of Oman's exports, provided the Government with over 80% of its revenues, and accounted for about 50% of its gross domestic product. Oil production was increased significantly to try to offset falling oil prices and to cover the budget deficit. The Government seemed determined to maintain its political and economic stability and to achieve its economic goals by producing the necessary oil and diversifying its economy.

Production of oil was about 180 million barrels, and of 164.8 million barrels exported, 109.3 million barrels went to Japan. The Republic of Korea and Thailand were major buyers. Exports were piped to the Mina al-Fahal terminal near Muscat on the Gulf of Oman through a pipeline network that had been overhauled and extended to bring pumping capacity to 650,000 bbl/d. The pipeline project comprised the replacement of the Fahud-Mina al-Fahal pipeline with 56 miles of 42-inch pipe and 25 miles of 30-inch pipe, the construction of a 28-inch line between Sahmah and Hubara and Sahmah and Qarn al'Alam, the construction of oil and gas lines at Suwachat, and the construction of a 19-mile, 4-inch service gasline between Ghaba and Saih Nihayda in central Oman. Petroleum Development Oman (PDO), Elf-Aquitaine Oman, and Occidental (Oman) are the three companies producing very light crude (38° API) to heavy crude (16° API) with 2% to 3% sulfur. Reserves were about 4 billion barrels that should remain recoverable until 2006 with the application of secondary and tertiary recovery techniques.

PDO started production from the Sayyala Oilfield in south-central Oman at a rate of 9,435 bbl/d from three production wells. Five more wells were expected to raise production to 15,725 bbl/d. The facility included bulk and test separators, a dehydration tank, and a water disposal system for reinjection. The very light crude (48° API) had a high proportion of natural gas liquids (NGL) that were expected to be processed in an NGL plant in mid-1986.

Development of natural gas resources continued to be a high priority project, even more so than for oil. Production was important because more petroleum could be released for export by using gas to fuel power stations, to boost oil recovery, and as an energy source in main towns. Less than one-half the produced gas was marketed, most was reinjected to increase and maintain pressure in oilfields, but a significant proportion was flared. Known reserves were reported at nearly 6.4 trillion cubic feet.

Natural gas was piped through a 190-mile pipeline from Yibal Gasfields to the Al Gubrah power station and desalination complex, the copper mining complex near Sohar, and the Rusayle industrial complex near Muscat. The expansion project at the Yibal gas treatment plant, which cost $30 million, was completed at yearend, and the capacity of the plant was raised to 194 million cubic feet per day. The search for gas and condensate continued in the Bukha reservoir 9 miles off the Musandam Peninsula and 19 miles east of the Saleh gas and condensate field off Ras al Khaimah, the United Arab Emirates.

Ashland Oil Co. of the United States operated the Government-owned Oman Refinery Co., whose 50,000-bbl/d plant was scheduled to be expanded to 80,000 bbl/d by 1987. The Japanese Mitsui Engineering & Shipbuilding Co. Ltd. that built the refinery was expected to make the alterations within 22 months at a cost of $18.9 million.

Oman acquired an interest in, and was to supply up to 125,000 bbl/d of crude to a refinery in Philadelphia, Pennsylvania, that had been sold to the Dutch oil trader John Deuss by Atlantic Richfield Co. The arrangement meant that Oman would have a fixed outlet for about one-quarter of its total crude oil production.

Oil exploration activity was begun by PDO west of Haima, to the north of the Muscat-Thamairit National Highway, and future exploration was planned by this group for near the junction of the border of Saudi Arabia and Yemen (Aden). Placid Oil Co. of Dallas, Texas, spudded a wildcat in the Gulf of Oman, 17 miles east of the Musandam Peninsula, in 308 feet of water. The projected 15,000-foot well would test an anticline with 1,800 feet of vertical relief. Gas exploration increased significantly in late 1984 and 1985, and by September 1985, PDO had drilled 19 successful gas wells including 2 significant discoveries.

Oman's main mineral production activity was copper mining by Oman Mining Co. (OMC) near Sohar, 156 miles northwest of Muscat. The $213 million, 20,000-ton-per-year copper mining smelter complex that opened in 1983 was operating at below design capacity because of low metal prices. Production of ore grading 1.7% copper in 1985 was about 1 million tons from two underground mines, Lasail and Bayda. These mines, with the Aarja deposit, hold 12 million tons of 2.1% copper ore. Two additional deposits, Rakah and Darus, contain 600,000 tons of 3% copper. All copper production exported through the nearby port of Majis brought nearly $21 million[9] in revenue. Smelter production was 20,000 tons, down 6% from that of 1984, and refined production was 14,014 tons, down 7% from that of 1984. Silver production was 727 pounds and gold production was 24 pounds.

Oman's two cement factories produced 60% of domestic requirements. Oman Cement Co. near Muscat had an annual capacity of 624,000 tons, and Raysut Cement Co. near Salalah had a capacity of 210,000 tons per year.

OMC mined about 6,000 tons of chromite in each of 1984 and 1985, all of which was exported, from the Nakhl and Rajmi podiform chromite deposit. Reserves were estimated to be 5 to 10 million tons. Plans were being considered to expand production to between 100,000 and 150,000 tons per year. The reserves of newly discovered gypsum deposits in Dhofar, Wadi Harsoon, Wadi Thumrait, and Wadi Halouf were estimated at 2 million tons and were of good quality for the cement industry. A potential was also reported by the Government for the development of clays, granite, marble, sandstone, and quartz deposits.

Table 2.—Oman: Exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
METALS				
Copper: Metal including alloys, unwrought	4,143	13,276	15	Republic of Korea 3,900; Japan 3,400; West Germany 2,320.
Iron and steel: Metal, semimanufactures:				
Bars, rods, angles, shapes, sections	417	746	--	All to United Arab Emirates.
Universals, plates, sheets	542	94	--	Do.
Wire	3	93	--	Do.
Tubes, pipes, fittings	641	1,343	--	United Arab Emirates 732; India 578.

See footnotes at end of table.

Table 2.—Oman: Exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
INDUSTRIAL MINERALS				
Cement	1,365	1,452	--	United Arab Emirates 1,395.
Diamond: Gem, not set or strung value, thousands	--	$52	--	All to India.
Fertilizer materials: Manufactured, nitrogenous	701	15	--	Do.
Lime	21	346	--	Kuwait 290; United Arab Emirates 38.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	1	30	--	All to United Arab Emirates.
Worked	3	--		
Gravel and crushed rock	22,392	22,437	--	Do.
Limestone other than dimension	195	--		
Sand other than metal-bearing	1,470	6,482	--	United Arab Emirates 6,422.
Other: Crude	40	5,042	--	United Arab Emirates 3,964; West Germany 1,000.
MINERAL FUELS AND RELATED MATERIALS				
Petroleum:				
Crude thousand 42-gallon barrels	124,173	134,631	3,770	Japan 83,471; Republic of Korea 21,541; Singapore 10,770.
Refinery products:				
Liquefied petroleum gas do.	58	(2)	--	Mainly to United Arab Emirates.
Gasoline do.	33	(2)	--	All to United Arab Emirates.
Mineral jelly and wax do.	(2)	--		
Kerosene and jet fuel do.	1	--		
Lubricants do.	164	3	--	Do.
Residual fuel oil do.	(2)	--		

[1]Table prepared by Virginia A. Woodson.
[2]Less than 1/2 unit.

Table 3.—Oman: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS				
Aluminum: Metal including alloys, all forms	2,487	1,143	14	United Arab Emirates 228; Belgium-Luxembourg 162; Republic of Korea 144.
Copper: Metal including alloys, semimanufactures	228	395	17	United Kingdom 224; Australia 37.
Iron and steel: Metal:				
Pig iron, cast iron, related materials	11,321	7,644	--	Japan 7,623.
Steel, primary forms	42	565	--	Japan 540; United Kingdom 24.
Semimanufactures:				
Bars, rods, angles, shapes, sections	133,671	189,772	NA	Japan 108,222; United Arab Emirates 28,521; Spain 12,486.
Universals, plates, sheets	21,068	29,137	16	Japan 13,712; United Arab Emirates 10,102.
Hoop and strip	64	19	--	United Kingdom 10; West Germany 6.
Rails and accessories	891	5	--	All from United Arab Emirates.
Wire	1,829	1,536	--	United Arab Emirates 793; United Kingdom 258.
Tubes, pipes, fittings	87,326	165,472	1,864	West Germany 70,609; Japan 70,361.
Castings and forgings, rough	10,456	86	--	Japan 34; United Kingdom 16.
Lead: Metal including alloys, all forms	66	14	--	Belgium-Luxembourg 10; India 2.
Silver: Metal including alloys, unwrought and partly wrought[2] value, thousands	$232	$251	$102	United Arab Emirates $89; Netherlands $60.
Zinc: Metal including alloys, all forms	NA	60	--	All from Belgium-Luxembourg.
Other: Base metals including alloys, all forms value, thousands	$8	$12	--	All from United Arab Emirates.

See footnotes at end of table.

Table 3.—Oman: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984	
			United States	Other (principal)
INDUSTRIAL MINERALS				
Abrasives, n.e.s.: Grinding and polishing wheels and stones	181	864	4	India 443; Italy 312.
Cement thousand tons	1,280	1,009	--	United Arab Emirates 938; West Germany 26.
Diamond: Gem, not set or strung value, thousands	$31	$17	--	France $11; West Germany $6.
Fertilizer materials:				
Crude, n.e.s	2,409	2,760	--	Ireland 1,148; United Arab Emirates 551; Netherlands 342.
Manufactured:				
Nitrogenous	2,684	6,997	6	Belgium-Luxembourg 2,315; United Arab Emirates 1,925; Italy 1,004.
Phosphatic	153	469	--	United Arab Emirates 181; India 160.
Potassic	1,631	618	--	West Germany 328; Belgium-Luxembourg 212.
Unspecified and mixed	9,044	3,635	NA	West Germany 1,625; Belgium-Luxembourg 1,003.
Gypsum and plaster	6,422	10,788	--	United Arab Emirates 9,605; Brazil 980.
Lime	7,689	3,786	--	United Arab Emirates 3,370; United Kingdom 218.
Salt and brine	6,133	11,724	90	Netherlands 9,158; United Arab Emirates 1,648.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	3,205	2,162	--	Italy 1,680; Greece 331.
Worked	4,283	7,701	--	Italy 4,710; Greece 848.
Gravel and crushed rock	905	973	--	India 807; United Kingdom 85; United Arab Emirates 78.
Limestone other than dimension	99	111	--	Belgium-Luxembourg 100; United Kingdom 6.
Sand other than metal-bearing	1,487	357	--	United Arab Emirates 185; India 69.
Other: Crude	20,491	18,041	1,150	Turkey 6,791; United Arab Emirates 3,731; United Kingdom 1,305.
MINERAL FUELS AND RELATED MATERIALS				
Petroleum refinery products:				
Liquefied petroleum gas 42-gallon barrels	129,224	85,492	NA	United Arab Emirates 84,900.
Gasoline, motor do	32,751	4,998	NA	United Arab Emirates 4,879.
Mineral jelly and wax do	31	--		
Kerosene and jet fuel do	1,418	1,604	--	Netherlands 543; United Arab Emirates 481; West Germany 233.
Distillate fuel oil do	129,826	132,482	--	United Arab Emirates 132,363.
Lubricants do	164,472	171,864	3,283	Singapore 64,057; United Kingdom 39,879; United Arab Emirates 33,621.

NA Not available.
[1]Table prepared by Virginia A. Woodson.
[2]May include platinum-group metals.

QATAR[10]

Oil accounted for over 90% of export earnings and over 80% of revenues for the Government of Qatar. Therefore, the decline of the price of oil during the past few years had been the cause of steadily declining oil revenues and a slowing in the pace of economic development. Qatar finished 1985 with a surplus of $1 billion, but a deficit of $192 million was projected for 1986. Oil reserves of 3.3 billion barrels were relatively small and were expected to last only about 30 years. Qatar ranked third worldwide for gas reserves, after the Soviet Union and Iran. Gas reserves in the North Field offshore reservoir were 150 to 400 trillion cubic feet. The life of this nearly 3,000-square-mile field was expected to be as much as 200 years.

The Bunduq offshore oilfield, owned 50-50 by Qatar and the United Arab Emirates, was producing 22,000 bbl/d in October 1985 after installation of secondary recovery facilities. It was shut down between October 1979 and late 1984.

In June, Qatar and Standard Oil Co. of Ohio agreed to a 25-year oil and gas exploration program in an offshore tract east of Qatar.

The North Field development project was expected to begin in mid-1986 and to be completed by 1995 for $10 billion. The first stage of the three-stage project should provide 500 million cubic feet per day for domestic consumption. The Qatar General Petroleum Corp. contracted with Bechtel Inc. of the United States for basic engineering design of the first phase and announced plans to open an office in London to carry out technical and commercial feasibility studies for Qatari gas. The second stage would be a liquid natural gas (LNG) plant producing at a rate of 1.1 billion cubic feet per day of LNG for export mainly to Japan, Australia, and Asia. Finally, a pipeline would be built to transport 0.5 to 1 billion cubic feet of gas to Kuwait and Turkey, and perhaps to Europe, at a cost of $450 million.

Flaring of associated gas had not been done for many years and two NGL plants were operating in 1985. Combined daily capacities were 2,370 tons of propane, 1,750 tons of butane, 1,750 tons of natural gasoline, and 2,495 tons of ethane-rich gas for petrochemical feedstock. There was a slight increase in the annual production rates during 1985: propane, 407,220 tons; butane, 282,665 tons; and natural gasoline, 224,803 tons.

Qatar had an advanced industrial sector that comprised fertilizer, petrochemical, and steel plants, all in Umm Said, but the competitiveness of Qatar's products was uneven. The Qatar Fertilizer Co. achieved production record highs in 1984, and a net profit of $172 million[11] was made on 631,760 tons of ammonia and 374,020 tons of urea. However, profits declined in 1985 by 37%, despite increases in both production and exports, because of falling prices for ammonia and urea. Production in 1985 of ammonia and urea was 640,000 tons and 744,000 tons, respectively. The two ammonia plants were operating at 108% of their 900-ton-per-day design capacity, and two urea plants were producing at 113% of their 100,000-ton-per-day capacity. Urea exports of 703,000 tons went mainly to India, China, and the United States, and about 192,000 tons of ammonia was exported. The Qatar Petrochemical Co. commissioned the $55 million ethane recovery unit in December 1985 that would produce 280,000 tons of ethane, 160,000 tons of polyethylene, and 4,600 tons of sulfur, provided a feedstock flow rate of 300,000 bbl/d could be maintained from the nearby plants.

Qatar Steel Co. had a production record in 1985 of 504,000 tons of rolled steel, an increase over 488,000 tons produced in 1984.

The Qatar National Cement Co. (QNCC) reported an 8.5% decrease in sales between 1984 and 1985, but a 49% increase in profits. QNCC had a 59% share of the local market. Price cutting to compete against lower priced imports was expected to cut profitability. In 1985, a 20,000-ton-per-year hydrated lime plant was commissioned.

Table 4.—Qatar: Imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1981	1982	Sources, 1982: United States	Sources, 1982: Other (principal)
METALS				
Aluminum: Metal including alloys:				
Unwrought	179	658	2	Malta 110; Greece 95; Bahrain 90.
Semimanufactures	2,386	1,851	25	Bahrain 485; Belgium-Luxembourg 253.
Copper: Metal including alloys, semimanufactures	803	722	7	United Kingdom 550; Australia 26.
Iron and steel: Metal:				
Scrap	244,756	614,677	--	Sweden 304,983; Brazil 275,074.
Pig iron, cast iron, related materials	375,207	245	--	France 165; United Kingdom 80.
Steel, primary forms	1,833	1,250	2	United Arab Emirates 506; Kuwait 382; United Kingdom 58.
Semimanufactures:				
Bars, rods, angles, shapes, sections	18,341	34,579	120	Japan 24,685; United Kingdom 3,845.
Universals, plates, sheets	8,021	14,653	8	Japan 10,667; United Kingdom 1,740.
Hoop and strip	254	89	1	Japan 85.
Wire	7,049	1,583	1	United Arab Emirates 881; Italy 235; United Kingdom 166.
Tubes, pipes, fittings	65,866	55,311	1,835	Japan 21,082; United Kingdom 10,231; France 7,869.
Castings and forgings, rough	4,804	1,169	4	Japan 1,069.

See footnotes at end of table.

Table 4.—Qatar: Imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1981	1982	Sources, 1982: United States	Sources, 1982: Other (principal)
INDUSTRIAL MINERALS				
Abrasives, n.e.s.: Grinding and polishing wheels and stones	713	769	1	Netherlands 302; West Germany 228; Italy 164.
Cement	344,679	510,483	--	Japan 180,152; Republic of Korea 125,861; Belgium-Luxembourg 107,029.
Clays, crude	325	88	13	Netherlands 58; United Kingdom 17.
Diamond: Gem, not set or strung value, thousands	$608	$53	--	All from Hong Kong.
Fertilizer materials:				
Crude, n.e.s	92	3,280	12	Pakistan 3,131.
Manufactured: Unspecified and mixed	430	2,502	18	Pakistan 2,196; Netherlands 191.
Lime	648	395	--	Bahrain 228; Belgium-Luxembourg 109.
Precious and semiprecious stones other than diamond: Natural value, thousands	$280	$16	--	India $12; Brazil $4.
Salt and brine	3,232	2,377	--	Netherlands 996; China 732; Egypt 300.
Stone, sand and gravel:				
Dimension stone: Worked	7,628	4,264	--	Italy 2,337; Lebanon 479; India 449.
Unspecified	5,258	14,714	14	United Arab Emirates 6,187; Saudi Arabia 2,097; Iran 1,521.
Other: Crude	266	769	--	Belgium-Luxembourg 443; Netherlands 289.
MINERAL FUELS AND RELATED MATERIALS				
Petroleum refinery products:				
Liquefied petroleum gas 42-gallon barrels	1,728	3,457	464	Belgium-Luxembourg 800; Japan 522; Netherlands 61.
Gasoline, motor do.	--	136	128	United Kingdom 8.
Kerosene and jet fuel do.	--	163	--	Japan 155; Italy 8.
Distillate fuel oil do.	127	194	--	All from United Kingdom.
Lubricants do.	85,897	71,736	6,237	United Kingdom 28,203; Netherlands 13,181; United Arab Emirates 8,078.
Residual fuel oil do.	1,565	--		

[1]Table prepared by Virginia A. Woodson.

SYRIA[12]

Syria continued to play a major role in the politics of the Middle East, specifically with respect to the Palestinian issue. As a consequence, Syria spent heavily in the military sector at a time when its export revenues were declining because of falling oil prices, reductions in Arab foreign aid, and rapidly increasing domestic consumption of oil products. Syria depended upon oil revenues for about one-half of its export earnings. Total exports declined from $2 billion in 1982 to an estimated $1.6 billion in 1985, and oil exports declined from $1.1 billion to $0.8 billion during the same period. Domestic consumption of oil products rose from 121,000 to 140,000 bbl/d between 1983 and 1985. Foreign aid decreased from $1.8 billion in 1981 to about $0.8 billion in 1985. To combat this problem, imports continued to decline from $5 billion in 1981 to an estimated $2.5 billion in 1985. Also, most of the minerals budget was allocated to oil and gas exploration, with mining expenditures reduced.

There was some benefit from the falling price of oil, however, because Syria needed imported oil for its refineries, its own oil being too heavy for this use. Syria continued to receive aid from the Kuwait-based Arab Fund for Economic and Social Development, the Islamic Bank, the Saudi Fund for Development, and the International Bank for Reconstruction and Development. The largest creditor was the Soviet Union, which lent an estimated total of $13 billion worth of military hardware. Iran also agreed in 1985 to give 1 ton of crude oil free and 5 tons of oil at a $2.50 per barrel discount. This was a costly arrangement, however, because of the aid not received from anti-Iran Arab countries and the transit fees lost by closing the pipelines from Iraq. Iran stopped shipments in late 1985 because apparently Syria was unable to pay accrued interest amounting to $65 million from a 1983 agreement. Syria was making spot purchases and getting oil assistance from Kuwait until the problem was resolved.

Syria's proven oil reserves were officially estimated at 1.44 billion barrels, a 25-year supply that did not include the reserves of the recently discovered Al-Thayyem Field. Six major oilfields contained most of the oil and much of the gas that was oil associated.

Syria was producing an estimated 161,700 bbl/d of oil, some of which was blended with low-sulfur imports to provide 210,000 bbl/d to the Baniyas and Homs refineries; the rest was exported. Development continued on Al-Thayyem Oilfield 7 miles south of Dau al-Zur in northwestern Syria. Contrary to earlier production estimates, the field was expected by the Government to have an initial commercial production in early 1986 of 35,000 bbl/d, and a potential of 50,000 bbl/d. Production reached 20,000 bbl/d by November 1985, and the oil was being trucked 67 miles to Al Risafah and then pumped to the Homs refinery via pipeline. A new 58-mile, 30-inch spur line was to be completed in early 1986 that would link the field with the main pipeline leading to the Homs refinery and/or export. The light crude of 32° to 36° API with a low-sulfur content would be ideal for blending with the typical Syrian heavy crude oil for refining purposes.

Estimates of Syria's gas reserves range from 1.3 to 2.2 trillion cubic feet. Marathon Oil Co. of the United States completed its third wildcat well as a gas producer, Ash-Shaer No. 1 in the Homs block, about 94 miles northeast of Damascus. Two drillstem tests on the 9,060-foot well yielded a potential of 3.19 million cubic feet of gas per day with 27 billion bbl/d of 62.2° API condensate, and 15.35 million cubic feet per day of gas with 304 billion bbl/d of 62° API condensate.

The sixth expansion project on the 45.9-million-barrel-per-year Homs refinery was due for completion by late 1985 by the Czechoslovak firm Technoexport at a cost of $143 million. Under construction were an isomerization unit (850,000 barrels per year), a hydrogenation unit (4.1 million barrels per year), a catalytic reformer (3.2 million barrels per year), two steam and power generation units (3,230 tons per hour of steam and 66 megawatts of electricity), a cold water pumping station, a desalination unit, a second sulfur recovery unit, improved gas flaring and antipollution systems, and a renovated flue gas recovery unit. Technoexport was also building a new gas treatment plant at Ibeisa that was expected to be finished in March 1986. Romania's Industrialexport was contracted to expand the Baniyas refinery and will be paid in part with cotton and phosphate rock.

Although agriculture contributed only about 16% of national income, it provides employment for nearly one-half of the labor force. In addition to extensive land reclamation and irrigation projects, Syria's agricultural potential was enhanced by the development of an indigenous fertilizer industry based on Syrian phosphate rock from mines in the Ghadir-al Hamal region of the Palmyrides. The Homs facilities have made Syria self-sufficient in both nitrogen and phosphate pentoxide. However, Syria continued to experience declines in both domestic and foreign markets for its triple superphosphate, urea, and phosphate rock output. Syria's phosphate rock was of low quality and was only marginally commercial on the world's export markets. The main problem was the lack of sufficient water for washing and the removal of impurities. A Yugoslav export agency agreed to a 5-year contract for 300,000 tons of phosphate annually, valued at $8.7 million. Romania, Syria's single largest phosphate customer, took 322,000 tons in 1984 and about 379,000 tons in 1985. Yugoslavia took 201,000 tons in 1984 and 146,000 tons in 1985, Bulgaria took 101,000 tons in 1985 compared with 109,000 tons in 1984. Increased marketing efforts produced sales in Czechoslovakia, France, Malaysia, and Turkey. There were reports of plans to expand phosphate rock output for exports to the Soviet Union.

PEOPLE'S DEMOCRATIC REPUBLIC OF YEMEN[13]

The minerals sector of the economy of the People's Democratic Republic of Yemen (PDRY) consisted of oil refining, cement manufacturing, and salt extraction. Economic development was advanced by opening the country to companies in Brazil, the Federal Republic of Germany, Italy, Kuwait, Spain, and the United Kingdom.

Oil exploration activity increased during 1985 as Technoexport of the U.S.S.R. drilled its third and fourth wells on the Shabwah concession. Drilling also continued on the Haurin-Ghayada and the Balhalf concessions, but Italy's state-owned Azienda Generali Italiana Petroli S.p.A. ended its exploration program.

Italy's Technipetrol completed the installation at the Aden refinery of a 10,000-bbl/d vacuum distillation unit to process the atmospheric residue (fuel oil) at a rate of 15,000 bbl/d, a 10,000-bbl/d asphalt plant, facilities that would increase production of liquefied petroleum gas (LPG) from 20,000 to 60,000 bbl/d, and LPG storage tanks. The refinery had two distillation units, each of 85,000-bbl/d capacity, producing bunker fuel, gasoline, and kerosene. By yearend 1985, the refinery was processing oil at the rate of 10,000 bbl/d for local consumption, 20,000 bbl/d for the U.S.S.R., 50,000 bbl/d for Iran, and 10,000 bbl/d for Kuwait.

In December, the Lebanese-owned Consolidated Construction Co. agreed to rehabilitate four berths and upgrade berth No. 4 at the Aden refinery harbor, and to dredge canals from the outer harbor to the oil port.

The major mineral discovery of 1985 was by a team from the U.S.S.R. that reported a large gold find in the Medden area of eastern Hadramaut.

Progress continued toward the establishment of the first cement works in the PDRY to be built by Creusot Loire Entreprise (CLE) Groupe Technip of France and financed by the French Government for nearly $40 million. The dry-process plant to be built at Batais, 50 miles east of Aden, would begin with an annual production of 350,000 tons and would have an ancillary 16-megawatt power station.

YEMEN ARAB REPUBLIC[14]

The Yemen Arab Republic (YAR) experienced budget and current account deficits, unexpected slow annual growth of less than 3%, annual inflation of about 20%, decreasing financial reserves, the declining value of its currency against the U.S. dollar, hard currency shortages, and declining foreign exchange earnings. Development became dependent on external financing as the Government cut spending, severely restricted imports, sought foreign aid, and encouraged private sector development. There was some optimism, however, as development of the oil industry in eastern YAR progressed. The importance of oil to the YAR was emphasized by the creation of a Petroleum and Mineral Resources Ministry.

The Yemen Hunt Oil Co. (YHOC) discovered oil in mid-1984 in the Ma'rib-Jawf region, in a field later named Alif, 112 miles northeast of Sanaa and adjacent to the Saudi Arabian border. Reserves were estimated by YHOC at between 300 and 400 million barrels. Production capacity of the Alif Field could reach 100,000 bbl/d of light 39° to 40° API crude. Nine development wells were drilled, of which five produced oil and one produced gas. Three other prospects, on which nine wells were drilled, were the gas-bearing Lam structure, 6 miles west of Alif; the Mem structure, 19 miles northeast of Alif; and the Yar structure, 1 mile northeast of Ma'rib. The development program comprised 28 producing and 9 injection wells, a gathering network, a 10,000-bbl/d refinery, a 155-mile pipeline to the Red Sea port of Al Salif, and an export terminal. The pipeline would eventually have a capacity of 400,000 bbl/d. Loading at the terminal would be done through single-buoy moorings. Costs of field development and the transportation system may total over $500 million.

YHOC gave Foster Wheeler U.S.A. Corp. the contract for installation of the gathering, processing, and transportation facilities. The $19 million modular refinery, which had a 10,000-bbl/d pipe still and a 2,500-bbl/d catalytic reformer, was designed and built by PetroFac Inc. of Texas, and was to be constructed during 1986 near Ma'rib. The refinery should satisfy 70% of domestic requirements of 22,000 bbl/d. The units would produce LPG, gasoline, diesel oil, and residue. YHOC was commissioned to study the feasibility of a permanent refinery near Sana.

Exxon Corp. acquired 49% of YHOC's total interest in the Ma'rib-Jawf concession (Alif block) that contains the Alif Field, and YHOC was to remain the operator. The Alif block adjoined an 8,500-square-mile block held by Exxon under another production-sharing agreement with the Government. YHOC also held an offshore area adjacent to the Tihama Province. Other companies that operated in the YAR were British Petroleum Ltd. within 8,500 square miles on the Tihania coastal plain, and Compagnie Française des Pétroles S.A. (CFP)-TOTAL of France within 3,500 square miles of onshore-offshore ground in the Khwakhah region of the South Tihama Plain.

Completion of a $7.3 million gypsum mine and a processing facility was expected in 1986 by the Yemeni Co. for Gypsum Industry and the Arab Mining Co. The facility was begun in 1983 and would produce 85,000 tons per year of various gypsum products.

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[3]Prepared by Charles L. Kimbell.

[4]Mining Journal (London). Mining Annual Review 1986. P. 369.

[5]Prepared by Michael D. Fenton.

[6]Prepared by Michael D. Fenton.

[7]Where necessary, values have been converted from Lebanese pounds (LL) to U.S. dollars at the rate of LL18.1=US$1.00. The Lebanese pound was drastically devalued in 1985.

[8]Prepared by Michael D. Fenton.

[9]Where necessary, values have been converted from Omani riyals (ORls) to U.S. dollars at the rate of ORls3.64=US$1.00.

[10]Prepared by Michael D. Fenton.

[11]Where necessary, values have been converted from Qatari riyals (QRls) to U.S. dollars at the rate of QRls3.64=US$1.00.

[12]Prepared by Michael D. Fenton.

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The Mineral Industry of Other Areas of South America

By Pablo Velasco and H. Robert Ensminger

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ECUADOR[1]

The Ecuadorean mineral sector and overall economy have retained their traditional dependence upon the production and export of hydrocarbon products. Exports of crude oil and its products accounted for 62% of the country's export earnings in 1985.

Ecuador's major mineral commodities produced and exported were cement, gold, limestone, liquefied natural gas, liquefied petroleum gas, natural gas, natural gasoline, crude petroleum and condensate, raw steel, semimanufactured steel products, and sulfur.

Production of crude oil increased almost 8% compared with that of 1984. The average daily output of crude oil was 280,589 barrels per day (bbl/d), up from 260,041 bbl/d in 1984. Exports of crude petroleum increased almost 46% from 42.4 million barrels in 1984 to 61.6 million barrels in 1985. The average price per barrel of crude was $25.91. The United States continued to be Ecuador's most important trading partner. Exports of crude oil to the United States reached 22 million barrels, or 35% of the total crude oil exported, followed by the Republic of Korea with 33% and Puerto Rico, Panama, Taiwan, and others was the remaining 32%. Corporación Estatál Petrolera Ecuatoriana (CEPE), the state oil company, imported 5 million barrels of petroleum refined products in 1985, 16% more than in 1984. Imports originated from the United States, Argentina, Peru, and Mexico. Ecuador's gross domestic product (GDP) grew 3.2% compared with 4.1% in 1984, largely reflecting the increases of output in agriculture and petroleum. Private consumption grew 3.5% over that of 1984 while public consumption declined 2.5% from that of 1984 as a result of the Government's tight monetary policy and efforts to resolve the budget deficit. The inflation rate declined slightly.

The recent external debt rescheduling agreement with international banks has provided the country with the extra time needed for the economy to be systematically developed. Almost 84% of Ecuador's petroleum output was produced by CEPE-TEXACO, an operation jointly owned by CEPE (62.5%) and Texaco Inc. (37.5%). Most of this came from the northern part of the Oriente region oilfields: Shushufindi, Sacha, Auca, and Cononaco.

The second largest producer of petroleum was CEPE-Oriente with 14%, followed by CEPE-City Investing Co., 1.5%, and CEPE-Peninsula, 0.5%. Major international companies initiated exploration activities to search for more oil in the eastern jungle region and in the western coastal plains. The blocks granted to these companies under the new oil risk contract law in the eastern region were Block 15 to Occidental Petroleum Corp. (200,000 hectares), which initiated drilling operations in the Palmeras and Limoncocha concession where they struck oil; Block 7, to British Petroleum C.A.; Block 8 to Exxon-Hispanoil C.A.; and Block 26 to Conoco del Ecuador C.A. Each block contained 200,000 hectares, and exploration drilling was scheduled to start during 1986. In the coastal plains, the consortium Texaco-Pecten was granted Block 6, and Blocks 1 and 2 offshore concessions went to BELCO Petroleum Corp.

The Ecuadorean mineral sector has been very active recently owing to the urgent necessity to develop its natural resources other than petroleum, the reopening and rehabilitation of old polymetallic mines, and the discovery of new mineral deposits, mainly precious metals. In addition, the implementation of new mining legislation by the Government has motivated foreign investors to develop several properties. The Government announced that Ecuador has already discovered more than 1,200 new mineral deposits. Government officials indicated that with adequate investment and technology the country could become a major mineral producer of the same magnitude as the Republic of South Africa.

At present, most mining activity is small scale and is concentrated in the industrial mineral sector where gypsum, kaolin, and limestone are produced to feed the country's four cement plants. However, production is about to began in the metallic mineral deposits of Escuaba, Molleturo, San Bartolomé, and Portovelo Mines where polymetallic and precious metals will be exploited. Among the metallic minerals, gold has been the most promising. Most of the gold production in 1985 was from Nambija, Portovelo-Zaruma, and Ponce Enriques as well as from numerous gold placer deposits throughout the country. At the Nambija deposit, in southern Ecuador, gold exploration and development indicated values as high as 6 and 7 troy ounces of gold per ton of gold-bearing gravel, with reserves of several tons of gold.

In an effort to become less dependent on oil revenues, the new Government launched a major drive to exploit the nation's mineral resources with the introduction of a new mining law promulgated on August 22, which offered far greater incentives than the previous "Ley de Fomento Minero" introduced in 1974.

Contract procedures have been simplified, and the contractors have more guarantees to move into the exploitation phase if the exploration delineates ore reserves. Direct exploitation without the need for a prior exploration contract is also permitted, and mining contracts have been extended to run for 30 years as opposed to 20 years under the old law. The maximum surface area allowed for exploration was reduced from 30,000 hectares to 10,000 hectares; the maximum area for prospecting is 50,000 hectares, and that for exploitation is 5,000 hectares.

No contracts are necessary for areas smaller than the maximum areas allowed for prospecting and exploration. The new law includes provisions for technical and economic arbitration and allows the mining entrepreneur to remove all his property assets on expiration of the contract. The old and new mining laws differ most on the issue of taxation. To prevent the hoarding of the vast areas granted for prospecting and exploration, the new law states that the monthly and annual payment for surface rights will be linked to a monthly minimum wage index of 2% per hectare for prospecting and 4% per hectare for exploration. Royalty payments have been reduced from 16% to 1%, and there is now a provision for the amortization of investments. All state mining ventures will be the responsibility of a new agency, Instituto Ecuatoriano de Minería (INEMIN), which replaced the former Dirección General de Geología y Minas.

On September 25, the Government of Ecuador announced that INEMIN had approved 71 risk exploration-exploitation contracts under the new mining law; such contracts will become effective after being approved by the attorney general and controller general. Fifty-six of the new contracts were awarded to domestic enterprises, 11 to joint venture companies, and 4 to foreign firms.

The Government expects a significant increase in foreign and domestic mining investment to flow from the adoption of the new mining law. The approval of the first batch of contracts under this law increased by almost 40% the number of mining contracts in force.

One of the first foreign companies attracted to Ecuador was Armeno Resources of Canada, which has been examining the San Bartolomé lead-zinc-silver mine in Azuay Province, about 350 kilometers south of Quito. The deposit has indicated reserves of 90,000 tons of ore averaging 0.7% lead, 2% zinc, and 7 to 10 grams of silver per ton. Initial exploration suggested that reserves could be tripled. The El Erivan deposit adjacent to San Bartolomé Mine is to be explored further in 1986 to determine whether an expansion of the presently proposed operation at San Bartolomé is justified. Armeno Resources envisage an annual production of 0.8 million ounce of silver, 750 tons of zinc, and 250 tons of lead.

Compañía Minera Ecuatoriana S.A. (COMINECSA) began gold placer mining in the Rio Amarillo near the town of Portovelo in El Oro Province. COMINECSA is 50% owned by Canadian investors and is the second foreign mining investment under the new mining law, COMINECSA has spent $500,000 thus far, and its operation still is in a prototype stage. A 150-ton-per-hour Ross Box is in operation, which yields 47 grams of gold per ton of gold-bearing gravel washed through the Ross Box. Following encouraging preliminary exploration results at the Rio Cachabi gold placer deposit in Ecuador, Northgane Minerals Ltd. of Canada plans to accelerate exploration activities in the area. The company hopes to prove enough gold reserves to justify early mine development. Preliminary estimates indicate that the property contains 5 million cubic meters of gold-bearing gravel, which could support a mining operation for at least 8 years at a rate of 900 kilograms of gold per year.

Osborne and Chappel Gold Fields of Canada acquired a 50% interest in Los Lilenes S.A.'s gold placer deposits in Ecuador. Officials indicated that engineering has been started on the design of the initial gold dredge to be installed at the Los Lilenes concession and on establishing the necessary infrastructure. The company announced that negotiations with the Government were under way to secure the rights of an exploration-exploitation contract to pave the way for production. Large areas were drilled at Los Lilenes to determine the reserves, which were estimated to contain 80 million cubic meters of gold-bearing gravel with a total gold content of 640,000 troy ounces. The company indicated that there is a potential for the installation of two dredges in Brazil and three in Ecuador over the next 5 years.

Empresa Minera Unificada S.A. (EMUSA) of Bolivia was negotiating with the Government for the rights to mine a sizable gold deposit in Ecuador. EMUSA's officials indicated that prospecting and exploration stages were completed and that the company was waiting for Government approval to begin dredging operations by the end of 1986.

In the southern Province of El Oro, the Government would like to attract private sector participation in the dormant Portovelo copper-zinc-gold-silver mine. There are indicated reserves of about 250,000 tons of ore grading 1.09% copper, 1.74% zinc, 6.8 grams of gold per ton, and 63 grams of silver per ton, and the Government wishes to retain a stake of up to 20%.

Another inactive mine needing new investment is La Plata. Closed since 1981, the mine has indicated reserves of about 233,000 tons of ore grading 4.77% copper, 2.35% zinc, 2.8 grams of gold per ton, and 43 grams of silver per ton.

In the northwestern part of the country, in a sector known as Rio Junín, in Imbabura Province, a potentially major copper-molybdenum discovery was made in 1984. Drilling encountered mineralization over an area of 3 square kilometers, and INEMIN claims that the ore there contains up to 12% copper, 2.5 grams of gold per ton, 33 grams of silver per ton, and significant amounts of molybdenum.

In southern Ecuador in the Nambija Cordillera of the Zamora Province, close to the border with Peru, there was increased activity in gold exploration and development. More than 12,000 independent miners were exploiting an extremely rich skarn-type deposit averaging 15.5 grams of gold per ton of material. Gold output from Nambija represented two-thirds of the country's total production, which was 9,000 kilograms valued at $81.8 million. In order to introduce mechanized mining methods to the area, the Government is proposing combined operations with the two miners' cooperatives in the area. The Government would own 40% of the operation and the cooperatives the balance. Total gold production in Ecuador in 1985 was 9,000 kilograms valued at $81.8 million. The Nambija Mine produced 6,000 kilograms, followed by Portovelo and Ponce, 1,200 kilograms; Zamora, 800 kilograms; and others, 1,000 kilograms.

Table 1.—Other Areas of South America: Production of mineral commodities[1]

Country and commodity	1981	1982	1983	1984[p]	1985[e]
ECUADOR[2]					
Cadmium, mine output, metal content[e] kilograms	400	300	350	300	300
Cement, hydraulic thousand metric tons	[r]1,238	[r]1,585	1,445	1,484	1,400
Clays: Kaolin metric tons	3,000	4,104	1,000	1,000	2,000
Copper, mine output, metal content do	825	[r]25	8	180	100
Gas, natural:					
Gross million cubic feet	16,000	13,816	17,008	18,111	[3]21,495
Marketable do	1,700	1,158	2,568	4,769	[3]4,583
Gold, mine output, metal content troy ounces	[r]1,286	[r]1,601	608	1,000	[3]1,000
Gypsum (for cement) metric tons	2,000	2,000	2,000	2,000	2,000
Iron and steel:					
Steel, crude do	27,686	27,768	22,768	18,143	17,500
Semimanufactures do	110,348	146,026	150,755	138,611	130,500
Lead concentrate, metal content do	200	235	225	200	200
Natural gas liquids:					
Natural gasoline thousand 42-gallon barrels	30	45	108	178	[3]229
Liquefied petroleum gas do	[r]733	[r]763	643	1,077	[3]591
Total do	763	[r]808	751	1,255	[3]820
Petroleum:					
Crude do	76,797	77,106	86,341	94,915	[3]102,415
Refinery products:					
Gasoline do	7,802	8,232	6,109	7,850	[3]7,630
Jet fuel do	1,118	1,065	907	1,045	[3]1,124
Kerosene do	2,205	2,531	2,059	2,279	[3]2,127
Distillate fuel oil do	5,046	5,221	5,792	10,077	[3]13,646
Residual fuel oil do	14,614	14,491	11,067	9,295	[3]4,111
Lubricants do	300	320	228	283	[3]291
Liquefied petroleum gas do	733	646	382	580	[3]703
Unspecified do	417	460	430	575	[3]718
Refinery fuel and losses do	346	1,043	548	514	[3]1,089
Total do	32,581	34,009	27,522	32,498	[3]31,439
Silica metric tons	41,000	12,919	7,000	7,000	10,000
Silver, mine output, metal content troy ounces	[r]32,146	10,076	3,138	[r][e]2,400	2,000
Stone, sand and gravel:					
Limestone (for cement manufacture) thousand metric tons	2,391	1,200	1,500	1,600	3,000
Marble metric tons	2,000	23	6,200	5,000	4,000
Sulfur:[e]					
Native do	2,000	4,500	5,000	5,000	4,000
Byproduct:					
From petroleum do	5,000	5,000	5,000	5,000	5,000
From natural gas do	5,000	5,000	5,000	5,000	5,000
Total do	12,000	14,500	15,000	15,000	14,000
Zinc, mine output, metal content do	742	[r]47	15	100	100
FRENCH GUIANA					
Gold, mine output, metal content[e] troy ounces	4,000	[r]5,231	[r]8,038	[3]10,127	12,000
Stone, sand and gravel[e] metric tons	320,000	400,000	400,000	400,000	400,000
GUYANA[2]					
Aluminum:					
Bauxite, dry equivalent, gross weight thousand metric tons	2,396	1,783	1,087	1,333	1,675
Alumina do	170	73	--	--	--
Diamond:[e]					
Gem thousand carats	4	4	[r]5	[r]6	4
Industrial stones do	6	7	5	[r]8	7
Total do	10	11	[3]10	[r]14	11
Gold, mine output, metal content troy ounces	19,262	7,347	4,607	11,131	[3]10,323
PARAGUAY					
Cement, hydraulic thousand metric tons	156	111	153	109	[3]46
Clays:					
Kaolin metric tons	70,000	55,000	45,000	50,000	[3]60,000
Other thousand metric tons	2,400	2,100	1,600	1,700	[3]1,750
Gypsum metric tons	10,000	6,500	4,000	6,000	[3]2,500
Lime do	[r]57,100	53,700	73,891	85,000	[3]80,270

See footnotes at end of table.

Table 1.—Other Areas of South America: Production of mineral commodities[1] —Continued

Country and commodity	1981	1982	1983	1984[p]	1985[e]
PARAGUAY—Continued					
Petroleum refinery products:					
Gasoline ____ thousand 42-gallon barrels__	799	698	434	327	[3]506
Jet fuel ____do____	132	69	88	18	[3]115
Kerosene ____do____	176	88	201	88	[3]58
Distillate fuel oil ____do____	1,931	698	705	512	[3]623
Residual fuel oil ____do____	384	277	202	149	[3]223
Liquefied petroleum gas ____do____	37	35	81	35	[3]47
Refinery fuel and losses ____do____	735	404	339	167	[3]229
Total ____do____	4,194	2,269	2,050	1,296	[3]1,801
Pigments, mineral: Natural, ocher _ metric tons__	200	120	180	250	[3]260
Sand including glass sand thousand metric tons__	2,650	2,300	1,602	1,624	[3]1,741
Stone:					
Dimension ____do____	248	108	71	62	[3]65
Crushed and broken:					
Limestone (for cement and lime)__do____	335	270	350	175	[3]180
Other ____do____	[e]3,600	2,500	1,500	1,730	[3]1,850
Talc, soapstone, pyrophyllite ____ metric tons__	150	150	120	150	[3]120
SURINAME					
Aluminum:					
Bauxite, gross weight thousand metric tons__	4,006	[r]4,205	3,400	3,454	3,000
Alumina ____do____	1,165	1,055	1,129	1,208	1,000
Metal, primary[4] ____do____	[r]41	[r]43	34	23	23
Cement, hydraulic ____do____	71	72	74	50	50
Clays: Common:[e] ____ metric tons__	110,000	100,000	100,000	100,000	100,000
Gold, mine output, metal content__troy ounces__	823	599	482	322	500
Sand and gravel:[e]					
Sand, common ____ thousand metric tons__	150	150	150	150	NA
Gravel ____do____	70	70	20	20	NA
Stone, crushed and broken ____do____	52	50	50	46	NA
URUGUAY					
Aluminum, secondary ____ metric tons__	30	21	24	31	20
Barite ____do____	30	80	3	10	15
Cement, hydraulic ____ thousand metric tons__	742	659	401	334	[3]314
Clays, unspecified ____ metric tons__	[e]300,000	278,821	152,155	70,936	150,000
Coke, gashouse[e] ____do____	12,000	12,000	10,000	10,000	8,000
Corundum[e] ____do____	220	45	50	50	40
Feldspar ____do____	[e]2,500	838	1,129	1,950	1,000
Fluorspar ____do____	(5)	(5)	(5)	(5)	--
Gas, manufactured ____ million cubic feet__	(5)	(5)	(5)	(5)	--
Gem stones, semiprecious:					
Agate ____ metric tons__	180	94	53	108	90
Amethyst ____do____	30	21	24	21	20
Gypsum ____do____	--	122,284	151,832	74,091	100,000
Iron and steel:					
Ferroalloys: Electric-furnace ferrosilicon crust do____	158	--	250	162	160
Steel, crude ____do____	15,139	28,019	45,674	47,930	[3]45,144
Semimanufactures ____do____	49,264	37,553	33,602	47,221	[3]41,367
Lime ____ thousand metric tons__	[e]50	14	10	8	[3]9
Petroleum refinery products:					
Gasoline ____ thousand 42-gallon barrels__	1,768	1,901	1,570	1,643	[3]1,649
Jet fuel ____do____	210	231	191	152	[3]184
Kerosene ____do____	861	804	642	572	[3]452
Distillate fuel oil ____do____	3,514	3,600	3,181	3,348	[3]2,992
Residual fuel oil ____do____	5,387	4,732	2,975	2,725	[3]2,301
Lubricants ____do____	46	50	41	46	--
Liquefied petroleum gas ____do____	396	445	415	482	[3]498
Unspecified ____do____	221	318	206	251	[3]189
Refinery fuel and losses ____do____	200	401	-288	-151	-386
Total ____do____	12,603	12,482	8,933	9,068	[3]7,879
Sand and gravel:					
Sand:					
Common ____ thousand metric tons__	[e]2,000	2,042	1,598	1,391	1,500
Glass ____ metric tons__	(5)	(5)	(5)	(5)	--
Gravel ____ thousand metric tons__	[e]350	506	439	237	500

See footnotes at end of table.

Table 1.—Other Areas of South America: Production of mineral commodities[1] —Continued

Country and commodity	1981	1982	1983	1984[p]	1985[e]
URUGUAY —Continued					
Stone:					
Dimension ------ thousand metric tons--	10	9	9	10	8
Crushed and broken:					
Alum schist ---------- metric tons--	[e]11,000	6,320	3,234	9,977	8,000
Dolomite ----- thousand metric tons--	15	[4]14	3	4	3
Limestone ---------------do----	[e]1,250	1,098	757	666	700
Marble ---------------do----	[e]4	[e]5	4	4	4
Marl -------------- metric tons--	[e]11,000	11,480	7,269	4,257	7,000
Quartz ---------------do----	[e]10	627	481	150	300
Other including ballast thousand metric tons--	[e]1,400	2,171	1,908	1,969	1,900
Sulfur, elemental, byproduct[e] ---- metric tons--	2,000	2,000	2,000	2,000	2,000
Talc, soapstone, pyrophyllite --------do----	[e]1,700	1,145	685	1,658	1,000
Tuff: Tufa ---------------do----	--	--	2,444	4,347	3,500

[e]Estimated. [p]Preliminary. [r]Revised. NA Not available.
[1]Includes data available through mid-June 1985.
[2]In addition to the commodities listed, a variety of crude construction materials (common clays, sand and gravel, and stone) undoubtedly were also produced, but output was not reported, and available information was inadequate to make reliable estimates of output levels.
[3]Reported figure.
[4]Data represent exports.
[5]Revised to zero.

FRENCH GUIANA[2]

The mineral industry comprised a small portion of the overall industry of French Guiana in 1985. Placer gold deposits were mined at a number of remote sites in the interior. Most of the placer gold deposits were initially exploited in the late 1800's. The preponderance of placer gold mining was done by small independent miners, some financed by foreign investors. Some gold dredging was done by Soremine, the French-owned gold dredging operation, with some assistance from a Canadian company, Pinto Malarctic Gold Mines. Stone products, including sand and gravel, were quarried in the central coastal region for domestic consumption only.

French Guiana's economy in 1985 was much more positive than the economies of its two neighbors, Guyana and Suriname. Its status as an Overseas Metropolitan Department of France very likely contributed significantly to its economic stability.

Geological studies of the eastern French Guiana region of the Guiana Shield have indicated considerable mineral deposits in the Precambrian host rocks. Among the minerals present were bauxite, chromite, copper, diamond, gold, iron, manganese, molybdenum, tungsten, and uranium.

French Guiana's electric power generating capacity in 1984 was 31 megawatts. Total electric energy produced was 138 million kilowatt hours, which averaged out to 1,725 kilowatt hours per capita.

Table 2.—French Guiana: Exports and reexports of mineral commodities[1]

Commodity	1983	1984	Destinations, 1984: United States	Destinations, 1984: Other (principal)
Aluminum: Metal including alloys, scrap metric tons	--	4	--	All to France.
Clays, crude do.	--	1	1	
Copper: Metal including alloys, scrap do.	--	52	--	Do.
Fertilizer materials: Manufactured, unspecified do.	--	844	--	Saint Lucia 400; Dominica 300; Guadeloupe 144.
Iron and steel: Metal:				
Scrap do.	--	20	--	All to Brazil.
Semimanufactures:				
Rails and accessories value, thousands	$5	$7	--	All to Martinique.
Tubes, pipes, fittings metric tons	10	--		
Castings and forgings, rough value, thousands	--	$1	--	All to Guyana.
Petroleum refinery products: Distillate fuel oil 42-gallon barrels	119	--		
Precious and semiprecious stones other than diamond: Natural value, thousands	$2	--		
Salt and brine do.	--	$2	--	All to France.
Silver: Waste and sweepings do.	--	$3	--	Do.
Tin: Metal including alloys, semimanufactures do.	$1	--		
Other metals: Ores and concentrates do.	$1	$19	$19	
Other industrial minerals: Crude do.	$15	--		

[1]Table prepared by H. D. Willis.

Table 3.—French Guiana: Imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS				
Alkaline-earth metals	(2)	--		
Aluminum:				
Oxides and hydroxides	--	2	--	All from France.
Metal including alloys, semimanufactures	59	104	6	France 75; Switzerland 18.
Copper: Metal including alloys, semimanufactures	31	39	--	All from France.
Iron and steel: Metal:				
Scrap	--	4	--	Do.
Ferroalloys, unspecified	1	--		
Semimanufactures:				
Bars, rods, angles, shapes, sections	2,814	2,570	--	France 1,303; Belgium-Luxembourg 1,201; West Germany 66.
Universals, plates, sheets	2,579	2,472	--	France 2,285; Belgium-Luxembourg 115.
Hoop and strip	3	11	--	All from France.
Rails and accessories	212	8	--	Do.
Wire	66	39	--	France 38; Belgium-Luxembourg 1.
Tubes, pipes, fittings	785	482	--	France 451; Spain 23; West Germany 6.
Castings and forgings, rough	33	27	--	All from France.
Lead:				
Oxides	1	2	--	Do.
Metal including alloys, semimanufactures	3	--		
Mercury value, thousands	$5	$6	$1	France $4; West Germany $1.
Silver:				
Waste and sweepings do.	$1	--		
Metal including alloys, unwrought and partly wrought do.	$1	$1	--	All from France.
Tin: Metal including alloys, semimanufactures do.	$2	$2	--	Do.
Zinc: Metal including alloys, semimanufactures	3	1	--	Do.

See footnotes at end of table.

Table 3.—French Guiana: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	Sources, 1984: United States	Sources, 1984: Other (principal)
METALS —Continued				
Other:				
Ores and concentrates	20	20	--	All from France.
Ashes and residues	--	20	--	Do.
Base metals including alloys, all forms value, thousands	$8	$6	--	Do.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.: Grinding and polishing wheels and stones	5	6	--	Do.
Cement	39,901	36,692	--	France 16,169; Martinique 14,448; Cuba 6,020.
Chalk	2	--		
Clays, crude	605	--		
Diamond: Gem, not set or strung value, thousands	$11	$5	--	All from France.
Diatomite and other infusorial earth	3	--		
Fertilizer materials:				
Crude, n.e.s	4	41	--	Do.
Manufactured:				
Ammonia	3	2	--	Do.
Nitrogenous	172	350	54	France 170; Mexico 108.
Potassic	17	2	--	All from France.
Unspecified and mixed	2,069	1,300	--	France 892; Martinique 388.
Lime	711	1,105	--	Martinique 1,037; France 68.
Precious and semiprecious stones other than diamond: Natural value, thousands	$35	$35	$1	Brazil $20; France $12.
Salt and brine	368	396	--	France 150; West Germany 141; Netherlands 56.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	1	1	--	All from France.
Sulfate, manufactured	142	174	--	Do.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	--	2	--	Do.
Worked	9	79	--	France 37; Brazil 21; Italy 21.
Dolomite, chiefly refractory-grade	78	120	--	All from France.
Gravel and crushed rock	3	--		
Sand other than metal-bearing	20	--		
Sulfur:				
Elemental: Crude including native and byproduct	(2)	--		
Sulfuric acid	14	15	--	Do.
Other:				
Crude	48	12	--	Do.
Slag and dross, not metal-bearing	189	--		
MINERAL FUELS AND RELATED MATERIALS				
Carbon black	1	2	--	Do.
Coal excluding briquets	--	2	--	Do.
Petroleum refinery products:				
Liquefied petroleum gas 42-gallon barrels	22,168	13,340	--	Trinidad and Tobago 13,154; France 186.
Gasoline do	212,576	145,104	--	Trinidad and Tobago 144,857; France 247.
Mineral jelly and wax do	16	8	--	All from France.
Kerosene and jet fuel do	132,223	113,840	--	Trinidad and Tobago 113,793; France 47.
Distillate fuel oil do	534,800	364,563	--	Trinidad and Tobago 305,420; Netherlands Antilles 59,143.
Lubricants do	11,683	12,187	119	France 7,917; Jamaica 3,332.
Residual fuel oil do	105,827	163,909	--	Trinidad and Tobago 163,883; France 26.
Bitumen and other residues do	12	2,248	--	All from Netherlands Antilles.
Bituminous mixtures do	267	242	--	All from France.

[1]Table prepared by H. D. Willis.
[2]Less than 1/2 unit.

GUYANA[3]

Guyana's bauxite production for 1985 increased an estimated 26% over that of 1984; however, the industry continued to show a financial loss in its operations. Diamond and gold production decreased from those of 1984. The Government has decided to step up efforts to stamp out diamond and gold smuggling, and as a result, boost its foreign reserves. It will allow miners to operate foreign currency accounts in locally based commercial banks. As a result, this new incentive should facilitate a substantial increase in production and, more importantly, official declarations of proceeds. The Guyanese Government was considering reactivation of a manganese mine that operated from 1960 to 1968. The Government reportedly is awaiting the results of a study by a North Korean company on gold, iron ore, and manganese deposits in northwestern Guyana, which could lead to reviving the processing plant.

Guyana contains two sedimentary basins that have hydrocarbon potential, the Takutu Basin and the Guyana Basin. The Takutu Basin, an intracontinental rift basin that extends into Brazil, has tested positively for hydrocarbons. The Guyana Basin, a coastal and offshore sedimentary basin, had nine wells drilled in the offshore portion. Oil seepages have been reported along the coast, and promising hydrocarbon shows have been encountered in both offshore and onshore wells. It is anticipated that a round of petroleum exploration licensing will begin in 1986.

Reynolds Aluminum International Service Inc. signed a technical and marketing agreement with the Bauxite Industry Development Co. Ltd., the state holding company for marketing, sale, and shipment of bauxite products. Under the agreement, Reynolds will provide technical assistance for Guyana Mining Enterprise Ltd.'s (Guymine) bauxite operations in marketing its bauxite product line and in developing and marketing new products.

Representatives of eight foreign companies involved in the utilization of bauxite visited Guyana in midyear to tour the bauxite operations and hold discussions with officials of Guymine. The visitors represented companies from Canada, Colombia, Mexico, the United States, and Venezuela. Among the items of discussion were a planned production increase and a search for new markets.

In June, Guyana and North Korea finalized a joint venture project for gold mining operations in the Essequibo region, with North Korea to provide equipment for the project. Guyana was to sign a barter agreement with the U.S.S.R. in January 1986, covering the period 1986-93. Guyana will exchange bauxite for machinery, commercial aircraft, and other items.

PARAGUAY[4]

The mineral industry of Paraguay continued to be limited to the production on a small scale of a few industrial mineral commodites including cement, construction materials, and petroleum products. Paraguay's principal economic activity was in agriculture, ranching, forestry, and to a very minor extent mining. These comprised the primary sectors and accounted for one-third of GDP. Agriculture accounted for 20% of the country's GDP, ranching, 7%; forestry, 3%; industry, 16%; construction, 7%; and mining, 0.4%.

About 90% of the industrial output was consumed domestically and consisted of alcoholic and nonalcoholic beverages, apparel, cement, construction materials, foodstuffs, leather products, lumber products, petroleum products, and textiles.

The GDP for 1985 was approximately $2.5 billion using a market rate of exchange. Per capita income was estimated at $890. Real GDP rose about 4% in 1985 over that of 1984, in the second year of recovery from a deep economic slide. Prior to the economic slump, the Paraguayan economy had been experiencing the hemisphere's most rapid rates of economic growth, with real GDP increasing 10.8% annually from 1976 to 1981.

Paraguay remains under balance of payments pressure, with deficits averaging $100 million per year for 1984-85. Total foreign debt was estimated at $2,150 million by yearend 1984.

Although there was increased output in 1985, declining investment, adverse monetary and foreign exchange developments, and deteriorating business sentiment darkened the economic outlook. Fueled by monetary expansion and depreciating currency in the free market, inflation was about 30% to 45% depending on the reference index. Unemployment, although not surveyed, remained high in urban areas without any prospect of abating soon because economic activity still was relatively depressed.

Paraquay was almost self-sufficient in cement production and prepared a cement plan to achieve that goal. The plan includes the modernization of an existing plant at Vallemi with capacity of 420,000 tons per year, and building a new 600,000-ton-per-year plant in the same location. In addition, Paraguay inaugurated a 700,000-ton-per-year portland cement plant at Villeta on June 10, 1985.

Brazil's Belgo-Mineira S.A. will assist in commissioning the No. 1 blast furnace at Aceros del Paraguay S.A. (Acepar) in the second half of 1986. A cooperative agreement was signed between Acepar and Belgo-Mineira and Paul Wurth do Brasil S.A. (both part of Belgium-Luxembourg's ARBED Group), which supplied equipment for the charcoal blast furnace.

Acepar is Paraguay's first steelmaker, and the plant was originally scheduled to start production at yearend 1984. The steel plant has two 87,500-ton-per-year charcoal blast furnaces, two 15-ton Linz-Donawitz converters (180,000 tons per year), two twin-strand continuous casters (240,000 tons per year), and a 150,000-ton-per-year semicontinuous bar and rod mill. Under the agreement, Belgo-Mineira will train Acepar's staff both at its Joa Monevade plant and at Acepar's plant at Villa Hayes on the Paraguayan River.

Paraguay and Argentina, in principle, remained committed to reactivate the construction of the multibillion-dollar Yacyreta hydroelectric plant, which has been held back in view of Argentina's inability to finance the project.

In mid-June, an Inter-American Development Bank mission visited Buenos Aires to discuss a $60 million loan for the northern gas pipeline. They also discussed the latest budget estimates, timetable, and financing for Yacyreta, the second major hydroelectric project on the Paraná River and the first project Paraguay has undertaken with Argentina. It is roughly one-third to one-half the scale of Itaipú in terms of generating capacity, employment required during construction, and cost.

Itaipú, also on the Paraná River, is Paraguay's first and the world's largest hydroelectric project and was officially inaugurated October 25, 1984, by the Governments of Brazil and Paraguay. When completed by 1990, Itaipú will have a 12,600-megawatt capacity. Total investment in the project is expected to be $15.3 billion (1983 dollars). Financing has been provided by Brazil's state-run electric power holding company Electrico Brasileiro S.A., Brazilian financial institutions, and international lenders.

The construction of a third binational (Argentina-Paraguay) hydroelectric power at Corpus, also on the Paraná River, previously reported to have been shelved, has been reactivated under a new name, Itacua.

Although considerable advances have been made in the development of the country's hydroelectric power, Paraguayan energy requirements continue to heavily depend on oil and natural gas imports, with current consumption of oil estimated to be between 11,000 bbl/d and 12,000 bbl/d. Shortages of supply have been aggravated by delays in deliveries of crude from Argentina. In Paraguay, limited exploration has had disappointing results, although Piper Oil Co. has reported reserves of 9.4 billion barrels of oil and 310 billion cubic meters of natural gas in the Cuenca Curupayty.

Since the discovery of oil in the Pirity Basin at Palmar Largo in Argentina, attention has been focused on petroleum prospecting and exploration in the Paraguayan Chaco region into which the Pirity Basin extends.

The Government of Paraguay issued a decree converting Occidental Petroleum's hydrocarbon prospecting permit to an exploration concession, which covered an area of 3 million hectares in the Paraguayan Chaco region, which includes a portion of the Pirity Basin. In October, the Anschutz Corp. of the United States began exploration drilling on the Paraguayan side of the same basin in a concession previously granted to Chesapeake International Corp.

Royal Dutch/Shell is expected to obtain 35% participation in the hydrocarbon concession that Occidental Petroleum now has, pending approval by the Paraguayan Congress. The royalty provisions of that contract are the same as those applied to the Anschutz and Chesapeake concessions: 20% of daily production up to 5,000 bbl/d; 25% of 5,000 to 10,000 bbl/d; and 32% of production in excess of 10,000 bbl/d. These royalty provisions represent a substantial increase over the 10%, 12%, and 15%, respectively, specified in Paraguay's Hydrocarbon Law

675 of 1960.

The Government of Paraguay's royalties on any petroleum discovery will be about double the amount envisioned in the 1960 law; moreover, the petroleum companies would pay a 40% tax on their local profits. Two U.S. consortiums maintain active exploration on concession rights in eastern Paraguay. In late 1984, the Government granted 8.3 billion hectares in hydrocarbon exploration concessions to Superior Oil Co. in an area known as the Paraná Basin along the Paraná River. The concession is across the border from where Brazil's Petroleo Brasileiro S.A. is reported to have drilled numerous successful exploration wells.

Superior Oil was bought out by Mobil Oil Corp., a company that has not demonstrated the same degree of interest in petroleum exploration in the Paraná Basin. Mobil has retained 20% interest in the concession, and as of September 1985, turned the 20% share over to Adams Resources and Energy Inc. of Houston, Texas. The new operator assumed the same terms and therefore would be expected to initiate exploration drilling in late 1986.

SURINAME[5]

Suriname's aluminum and bauxite markets both suffered substantial losses in 1985. NV Billiton Maatschappij Suriname and Suriname Aluminum Co. (SURALCO), the two major companies responsible for the bulk of the country's export revenues, recorded losses of $37.8 million and $20.3 million, respectively. The losses were due essentially to structural overcapacity, and as a consequence both the bauxite and aluminum industries have suffered. High production costs were another factor in the companies' losses. The domestic alumina production costs were $160 to $170 per ton compared with $90 per ton in Australia, the world's largest exporter. In November, the Aluminum Co. of America (United States), the parent company of SURALCO, announced a work force reduction of 13%. Three hundred and fifty people would be laid off at the smelter and 150 at the mines.

Suriname contains other mineralization of importance, in particular its alluvial and primary gold deposits. Gold placers have been in operation for many years. Gold has also been discovered in gold-bearing quartz veins and in gold-bearing pyrites. In 1985, the Government began drafting new legislation aimed at attracting investors and diversifying the country's mineral sector, which for years has been heavily dependent on the bauxite-aluminum industry. Suriname produced an estimated 1.13 million barrels of crude petroleum in 1985, approximately the same as in 1984. In June, NV Staatsolie Maatschappij Suriname signed a tentative service contract for the exploration and production of offshore oil with Suriname Petroleum Corp. (SPC), a subsidiary of Energy World Trade Inc. (United States), SURALCO, Austra-Tex Oil Co. (Australia and United States), and Northern Michigan Exploration Co. (United States). The initial drilling program, to get under way before yearend, called for at least five wells. More wells are required later to retain block acreage. At yearend, Suriname's estimated proved reserves were 1 million barrels.

In June, the state oil company signed a $5 million loan agreement with Algemene Bank Nederland, Houston, Texas. The Government money will be spent to purchase foreign goods and services necessary for the expansion of the Tambaredjo Oilfield in the Saramacca District.

In November, four members of the Libyan Economic Mission met with Government officials to discuss technical and economic cooperation between Libya and Suriname. Surinamese exports of rice and timber were discussed as well as joint investments in agriculture, fisheries, and industry.

The Ministry of Resources and Energy signed an agreement in July to purchase electricity from SURALCO, which in turn, will sell the electricity to the Energy Co. Suriname, a Government company, which will distribute it to the consumers.

URUGUAY[6]

The mineral industry was of minor importance to Uruguay's economy and continued to be concentrated mainly in the industrial mineral sector including cement, construction materials, iron and steel products, and petroleum products for domestic consumption, and was of minor consequence to Latin America and the world economy. Real

GDP fell steadily from 1982 to 1984, but grew by an estimated 1.9% in 1985 over that of 1984. However, the only sectors actually showing recovery were agriculture and the fishing industry, while the construction industry suffered a severe decline. Moreover, inflation reached 83% in 1985 compared with that of 1984, largely as a result of a large public sector deficit, which in the absence of external resources had to be financed by the Central Bank. Unemployment remained high, standing at 12.7% in November 1985.

The Government prepared an economic program that was approved by the International Monetary Fund, designed to alleviate inflationary pressure and revive private sector activity. Industry, together with the small-mining sector, contributed one-fifth of the GDP.

Very few mineral resources were being exploited, and efforts were made to stimulate exploration. These included a detection of high-quality granite, marble, and semiprecious stone deposits; a survey of uranium deposits and titanium-bearing sands; possible development of ilmenite deposits in Rocha Province; and an exploitation contract for the 45-million-ton Valentine's iron ore deposit. As part of a new mining initiative, the owners of the Valencia dolomite property in Lavalleja Province requested that the Government reactivate the mine because it represents an important source of revenue for the country. The company claimed that about $75 million has been lost since the Government closed down the operations in 1975. Company sources indicated that production could be brought to 30,000 tons per year within a few months and would provide earnings of $7.5 million per year as well as jobs for over 200 people. Brazil's Departmento Nacional da Produção Mineral (DNPM) estimates that illicit sales accounted for more than one-half of Brazil's overall gold output in 1985, and that substantial quantities found their way across Uruguayan, Paraguayan, and Bolivian borders.

Reportedly, officials from DNPM stated that Uruguay sold 30 tons of gold to the United States in 1985, an increase of 6% compared with sales in 1984. This is surprising since there is no gold mining in Uruguay. Uruguay has no known gas fields or oil fields. Most of the energy requirements are supplied by hydroelectric power, and Argentina's state oil company, Yacimientos Petrolíferos Fiscales, has begun a series of exploratory drillings and underground surveys in the northeast under a geological mineral cooperation agreement. Uruguay imported 7.9 million barrels of crude oil in 1985, mainly from Nigeria and Iran, and smaller quantities from the U.S.S.R. and Mexico; volume declined 13% and value 14% compared with those of 1984.

Uruguay's traditional exports were affected by markedly weak demand and a deterioration in international prices in 1985, as well as by internal strikes. As a result, the value of exports declined to an estimated $835 million compared with $924 million in 1984. Uruguay's main export markets in 1985 were the United States, followed by Brazil and Argentina.

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[1]By Pablo Velasco, physical scientist, Division of International Minerals.

[2]By H. R. Ensminger, physical scientist, Division of International Minerals.

[3]By H. R. Ensminger, physical scientist, Division of International Minerals.

[4]By Pablo Velasco, physical scientist, Division of International Minerals.

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The Mineral Industry of Other South Pacific Islands

By Travis Q. Lyday[1]

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FIJI

Fiji has been an independent country within the British Commonwealth of Nations since 1970. It consists of an archipelago of more than 300 islands ranging from tiny coral atolls, cays, and rugged coral limestone islets, to the larger mountainous islands of Kandavu, Taveuni, Vanua Levu, and Viti Levu of volcanic origin. The islands of Fiji straddle the 180° meridian about 1,800 kilometers south of the Equator in the part of the southern Pacific Ocean known as Melanesia.

The production of gold and silver from the Emperor Mine at Vatukoula on the island of Viti Levu, the main island of Fiji, remained Fiji's only metallic mineral producer. Mining began at the Vatukoula site in 1933, producing 124 million troy ounces of gold and 147 thousand troy ounces of silver by yearend 1985.

The Vatukoula joint venture, comprised of Emperor Gold Mining Co. Ltd. (80%) and Western Mining Corp. (Fiji) Ltd. (20%), with Western Mining as the operator, announced in midyear an expansion program to increase underground mine production by increasing crushing and milling capacity and replacing the existing roaster. The $22 million[2] upgrading, to be spread over a 2- to 3-year period, was expected to permit an increase in gold production to about 100,000 troy ounces per year. Almost 55% of the ore produced during 1985 came from underground workings. In addition, the two companies, in a joint venture named Tavua, decided in midyear to sink an exploratory shaft to the 380-meter level on their 50-50-owned Nasomo Prospect, 2 kilometers south of the Vatukoula workings. Previous drilling at the site intersected gold mineralization, and the shaft, along with a crosscut to be advanced from the Vatukoula Mine, will be used to conduct underground drilling and to obtain bulk samples for metallurgical testing. The project was estimated to take 2 years at a cost of $19 million. Should the results of this testing be sufficiently encouraging, an estimated additional $15 million was budgeted to complete the shaft, build milling facilities, and develop a mine to commence production by 1988.

Placer Pacific Pty. Ltd., a subsidiary of Placer Development Ltd. of Canada, was granted a special prospecting license for the entire island of Vanua Levu in 1985, adding the remainder of the island to the company's license for the northeastern part of the island, which was granted in 1984. Placer Pacific's exploration programs in 1985 consisted of analyzing for 17 elements, including gold. Although the results of the program were encouraging, the license area was reduced by 80% late in the year. Placer Pacific was negotiating at yearend for a special prospecting license for a large part of Viti Levu.

Metallgesellschaft AG and Degussa AG, both of the Federal Republic of Germany, completed their study begun in 1984 on the possibility of re-treating tailings from the Vatukoula Mine. Both companies withdrew from the project upon completing their report. The tailings were estimated to contain 300,000 troy ounces of gold and 550,000 troy ounces of silver.

The Waisoi and other porphyry copper deposits at Namosi, northwest of the capital city of Suva, became open to application for prospecting and developing after the exploration companies holding the expired license failed to reach an accord with the Government on the future development of the deposits. Previous work, conducted by subsidiaries CRA Ltd. of Australia, Anglo American Corp. of South Africa Ltd., and Preussag AG of the Federal Republic of Germany, outlined three porphyry copper systems in the area. Waisoi, the largest, indicated 500 million tons of ore containing 0.49% copper, 0.16 gram of gold per ton, and 1.0 gram of silver per ton, with some recoverable molybdenum. The smaller deposits contained up to 1% copper.

A joint venture between the Australian firms Newmont Pty. Ltd. and Anglo-Pacific Exploration Ltd. conducted a diamond drilling program at Mount Kasi in southwestern Vanua Levu in which 14 holes were drilled. The program was designed to identify the source of stream boulders that carried extremely high gold values. Mount Kasi was the site of an early mine where 266,200 tons of ore containing 60 troy ounces of gold and 4,400 troy ounces of silver was extracted from 1932 to 1946. Several marble occurrences on Viti Levu, ranging up to 100 million tons in size, were being evaluated by the Government in a drilling program at yearend.

Active mining in Fiji, besides the Vatukoula Mine, continued to be limited to quarries for stone and crushed gravel, limestone for cement and lime production, and coral and river sand mining. These common construction materials were produced for domestic consumption.

Four petroleum exploration licenses were held by a group of independent oil companies, consisting of J. Thomas Stoen Inc., Mobley International Inc., Pacific Energy and Minerals Ltd., and R. G. Barry Inc., covering approximately a 16,000-square-kilometer area of Bligh Water. Pacific Energy and Minerals had a controlling interest in all four licenses. The licenses covered about one-half of the shallow-water area, which was considered to be the most likely to have oil-bearing strata. There was only Government-sponsored interest in three deep-water prospects having long-term potential.

Table 1.—Other South Pacific Islands: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Area and commodity	1981	1982	1983	1984	1985[p]
FIJI					
Cement, hydraulic	92,000	88,089	109,900	97,900	93,200
Gold, mine output, metal content troy ounces	30,833	45,750	40,124	48,515	59,961
Lime[2]	4,270	3,811	[e]2,500	[e]2,500	3,261
Silver, mine output, metal content troy ounces	8,391	18,519	13,021	15,207	14,757
Stone, sand and gravel:					
Coral sand for cement manufacture	93,514	99,895	[e]95,000	[e]95,000	[e]126,500
River sand for cement manufacture	27,307	29,773	[e]28,000	[e]25,000	[e]40,000
River sand and gravel, n.e.s.[e] cubic meters	375,000	380,000	375,000	350,000	1,200,000
Quarried stone[e] do	210,000	230,000	225,000	225,000	105,030
NAURU[3]					
Phosphate rock thousand tons	1,480	1,359	1,684	1,358	1,508

See footnotes at end of table.

Table 1.—Other South Pacific Islands: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Area and commodity	1981	1982	1983	1984	1985[p]
NEW CALEDONIA					
Cement	50,154	53,191	e60,000	e60,000	e60,000
Chromite, gross weight	4,270	49,825	91,380	84,152	78,820
Cobalt, mine output:					
Content by analysis[4]	2,789	2,133	1,540	2,006	2,541
Recovered[5]	369	271	r e400	r e500	e675
Nickel:					
Ore:					
Gross weight thousand tons	3,984	r3,050	2,200	2,866	3,630
Metal content[6]	78,090	60,101	46,162	57,300	e71,148
Metallurgical products:					
Ferronickel:					
Gross weight	109,679	108,606	r e84,700	r e113,700	e141,800
Metal content (nickel plus cobalt)	27,989	28,006	21,717	29,158	36,385
Nickel matte:					
Gross weight	20,648	9,700	r e6,200	7,600	e11,300
Metal content (nickel plus cobalt)	15,380	7,144	4,578	5,462	8,736
Stone, sand and gravel:					
Stone:					
Crude (unspecified) cubic meters	19,422	19,600	e19,000	e20,000	e20,000
Crushed do.	83,000	91,000	e90,000	e90,000	e90,000
Sand do.	75,802	e59,000	e60,000	e60,000	e60,000
Silica (for metallurgical use) do.	24,650	15,240	e15,000	e15,000	e15,000
PAPUA NEW GUINEA[3]					
Copper, mine output, metal content	165,420	170,004	201,876	164,447	175,048
Gold, mine output, metal content troy ounces	540,325	589,258	579,407	e835,000	1,186,618
Silver, mine output, metal content do.	1,362,804	1,387,399	1,524,360	1,427,491	1,482,533
SOLOMON ISLANDS[3]					
Gold do.	1,050	1,318	e1,100	2,572	e3,000
Silver do.	150	169	e250	--	--

[e]Estimated. [p]Preliminary. [r]Revised.

[1]Table includes data available through July 22, 1986.

[2]Produced from an unreported amount of domestically quarried limestone.

[3]In addition to the commodities listed, crude construction materials (common clays, sand and gravel, and stone) are produced, but output is not reported quantitatively, and available general information is inadequate to make reliable estimates of output levels.

[4]Cobalt content of nickel ores computed assuming average cobalt content to be 0.07% since 1975.

[5]Cobalt actually recovered for use as cobalt; excludes cobalt content of nickel-cobalt alloys and/or included in ferronickel.

[6]Nickel-cobalt content of ore produced as reported by New Caledonia's Mines Service. Of the total, about 97.323% is nickel; the balance is cobalt (based on average nickel-cobalt ratio in metallurgical products for 1880-1972).

NAURU

The Micronesian Republic of Nauru consists of a single raised coral island of 21 square kilometers, 42 kilometers south of the Equator in the southern Pacific Ocean. Nauru has been an independent republic since 1968 and is an associate member of the British Commonwealth of Nations.

The economy of the country has been based on the mining of the world's highest grade of phosphate rock. The Nauruan phosphate rock had an 84% bone phosphate of lime (BPL), or tricalcium phosphate (38.5% phosphorus pentoxide or P_2O_5) guaranteed, with rock treated in the calcination plant as high as 91% BPL (41.7% P_2O_5) and averaging 89% BPL (40.7% P_2O_5). The phosphate was mined and marketed by the Nauru Phosphate Corp., incorporated in 1969, which assumed full control of the industry from the British Phosphate Commissioners in 1970. The corporation is an agency of the Government of Nauru.

Production of phosphate rock from the centrally located surface mine on the island, removed from deposits interdigitated with evenly spaced dolomitized coral limestone pillars using clamshell buckets, increased 11% in 1985. All production was exported to Australia (61.3%), New Zealand (22.5%), the Philippines (15.2%), and the Republic of Korea (1.0%).

NEW CALEDONIA

The French Territory of New Caledonia and Dependencies is an overseas territory of France consisting of about 25 islands in the southern Pacific Ocean. The largest and most important island, New Caledonia—the largest island in the South Pacific after New Zealand and from which the territory takes its name—comprises about 90% of the territory's land area. Besides the island of New Caledonia, the Territory of New Caledonia and Dependencies includes the Belep Islands, the Chesterfield Islands, the Huon Islands, the Isle of Pines, the Loyalty Islands, and Walpole Island.

The mining industry of the territory consisted predominantly of two commodities: nickeliferous laterite ore for the production of various ferronickel products, and high-quality chromite ore for the production of concentrates. The territory's nickel laterite reserves, rich by world standards with an average grade in excess of 2.4% nickel, comprised an estimated 20% to 25% of world nickel reserves, second only to Cuba. Proven yearend chromite reserves were estimated at 300,000 tons grading 33% chromic oxide (Cr_2O_3).

Nickel ore production by LeNickel-SLN, the restructured wholly owned corporate subsidiary formed from New Caledonia's nickel operations of France's Société Métallurgique le Nickel on January 1, was severely down from the previous year owing to political violence associated with the Kanak separatist movement. Production of ferronickel from the Doniambo smelter at Noumea, however, maintained production throughout the year and eventually far exceeded 1984 production. Damaged equipment and facilities and road blocks of ore haulage trucks caused by the separatist unrest shut down the Camp des Sapins Mine at Thio and the Meaba Mine at Kouaoua in January. These mines were operating at 100% capacity by March, as was the Le Plateau Mine, also at Thio, which had been closed since the outbreak of violence late in 1984. However, separatist activity again closed the mines for a week in August, but without additional damage to plant and equipment.

The Doniambo smelter was able to maintain continuous production during the year owing to healthy stockpiles of nickel ore and by purchasing ore from the several small independent miners on the island. The Nepoui and Poro Mines remained closed throughout the year.

Chromite ore production from the underground Tiebaghi Mine consisted of refractory-grade (low-silica, high-grade fines), high-grade lumpy, and high-grade fines. The mine was operated by Cromical S.A. and owned by Canada's Inco Metals Co. (55%) in partnership with two French companies, Banque de Paris et Pay-Bas (22.5%) and Dong Triew Co. (22.5%).

The territory was well endowed with resources other than chromite and nickel. Reportedly, there were significant deposits of antimony, copper, gold, iron ore, lead-zinc, manganese, and phosphate, but none were being mined commercially.

PAPUA NEW GUINEA

Papua New Guinea is in the southwest Pacific Ocean and has been an independent parliamentary state within the British Commonwealth of Nations since 1975. The country includes the eastern half of the New Guinean mainland; the Bismarck Archipelago, comprised of the main islands of Manus, New Ireland, and New Britain; the northern most Solomon Islands of Bougainville and Buka; and the islands to the east of the New Guinean mainland, the Trobriand, Woodlark, D'Entrecasteaux, and Louisiade Island groups.

The Papua New Guinean Government, holding a 20% equity, ordered its Australian and U.S. partners, The Broken Hill Pty. Co. Ltd. (BHP), and Amoco Minerals Co. (Standard Oil Co., Indiana), respectively, to cease operations on February 28 at the $1.4 billion[3] Ok Tedi copper-gold-silver mine on Mount Fubilan in the Star Mountains, 25 kilometers from the Irian Jaya border in the Western Province. The mine began producing gold in May 1984 with a rated capacity of 700,000 troy ounces per year, and was scheduled to begin copper production in 1986 when the gold cap would be depleted. However, the Government became increasingly concerned that the mine would be abandoned by the partners (BHP, 30%; Amoco, 30%; Kupferexplorationsgesellschaft mbH, 20%, a consortium of Metallgesellschaft and Degussa, (7.5% each), and the state-owned West German Development Co. (5%); and the Papua New Guinean Government, 20%) when the gold cap was depleted. The Government contended that plant development, including a tailings pond and a hydroelectric powerplant, for copper production should have been started if copper mining were to start as scheduled in 1986. The mining ban lasted 3 weeks, during which the Government reduced its shareholding to 16.5%. After extensive negotiations, Ok Tedi Mining Ltd. (OTML), the operator of the mine, was allowed to resume operations. The outcome of the dispute was that the Government agreed to a debt reduction by investing an additional $9.2 million and by bringing its equity share in the project back to 20% in exchange for OTML agreeing to increase copper mining to 60,000 tons of ore per day by the end of 1988, 2 years ahead of the revised schedule, along with a deferment of up to 4 years on construction of the permanent tailings dam.

Initial copper production was scheduled to begin at the end of 1986 with an ore throughput of 8,000 tons per day, building to 30,000 tons per day by the second half of 1987. The $120 million that OTML will save by postponement of construction of the tailings dam will be diverted to speed construction of the 50-megawatt hydropower station needed to produce cheap power for the mine.

Near yearend, OTML signed agreements to purchase and ship to the minesite two U.S. copper concentrators, one from the Anaconda Minerals Co.'s Carr Fork, Utah, mine for $7 million, and another from Quintana Minerals Corp.'s Copper Flats, New Mexico, mine for $8.5 million, enabling OTML to process 60,000 tons per day of copper ore.

The Ok Tedi deposit has minable reserves of over 400 million tons of ore, including 34 million tons of gold-bearing ore; the gold cap, averaging 1.75 grams of gold per ton and which will provide the necessary cash flow for the first few years of operations; and a secondary enriched copper-gold ore body underlying the leached cap that is estimated to contain 350 million tons of ore grading 0.74% copper, 0.59 gram of gold per ton, and 0.01% molybdenum. Below the copper-gold ore body lies an estimated 25 million tons of primary copper ore grading 1.37% copper. Skarn ore consists of 30 million tons grading 1.17% copper and 1.2 grams of gold per ton.

Bougainville Copper Ltd.'s (BCL) copper-gold-silver mine at Panguna on Bougainville Island in the North Solomons Province became the world's fourth largest copper mine in 1985. Reserves at yearend were estimated to be 625 million tons of ore averaging 0.40% copper and 0.46 gram of gold per ton. BCL was owned by CRA (53.6%), the Papua New Guinean Government (20%), and by public shares (26.4%).

A 13th primary regrind ball mill was installed in midyear for approximately $18 million to offset to some extent the effects of declining ore grades at the mine. Also, BLC was planning the construction of a $30 million preconcentration screening facility to enable greater flexibility in determining the grade of ore, which previously was subeconomic. The average copper grade of ore milled in 1985 fell to 0.42% from 0.46% in 1984. The average gold grade fell to 0.34 gram per ton from 0.50 gram per ton in 1984, and the silver grade dropped to 1.06 grams per ton from 1.28 grams per ton.

Placer Development continued appraising its Panguna gold-silver prospect in the west-central highlands of Enga Province during the year. A mini pilot test program was conducted on 22 tons of ore in Canada, which satisfactorily demonstrated the technical feasibility of recovering the gold and silver from the refractory ore by flotation and pressure oxidation. A program to drive an exploration adit, and an underground drilling program to make a detailed assessment of ore reserves and mining options, was being finalized at yearend and was expected to take 18 months to complete. From drilling carried out in 1985, preliminary estimates of ore reserves were 77 million tons averaging 3.8 grams of gold per ton at a cutoff grade of 1.5 grams per ton. A high-grade subzone within the Zone VII ore body was assessed to have an additional 1.7 million tons of ore averaging 40 grams of gold per ton and 55 grams of silver per ton.

The Porgera joint venture consisted of Placer Development as operator through its wholly owned Placer (PNG) Pty. Ltd., together with the Australian firms Mount Isa Mines Ltd. and Renison Goldfields Consolidated Ltd. (RGC), each holding a one-third interest. The Papua New Guinean Government had the option of taking up to a 10% interest in the project.

City and Suburban Properties Ltd. reached an agreement with Esso P.N.G. Inc., giving City and Suburban Properties the right to earn a 50% interest in Esso's P.N.G.'s claims in Papua New Guinea. Esso P.N.G. will remain the exploration operator, while City and Suburban Properties will provide up to $3 million in funds. The agreement covers 24 prospecting areas on the New Guinean mainland, the Feni Islands of New Ireland Province, Nengmukta on New Britain Island, and Fergusson Island in the D'Entrecasteaux group, Milne Bay Province.

Preliminary reserves at the gold prospect discovered in 1983 on Lihir Island off the northeast coast of New Ireland in the Bismarck Archipelago were estimated, based on 65 diamond drill holes and 165 reverse circulation holes, at 137 million tons grading 2.7 grams of gold per ton. The Lihir Island prospect was a joint venture comprised of Kennecott Explorations (Australia) Ltd. (88%), acting as manager, and Niugini Mining Ltd. of Australia (12%).

RGC purchased New Guinea Goldfields Ltd., which held gold leases at Wau on the New Guinean mainland. In 1985, 242,000 tons of oxidized ore from an open pit was treated to produce 6,000 troy ounces of gold and 4,000 troy ounces of silver. Minor amounts of gold were also recovered from alluvial operations.

Papua New Guinea awarded 11 petroleum prospecting licenses in 1985, and 11 more were pending at yearend. Three wildcat wells were drilled onshore in 1985, and one wildcat was drilled offshore. Seismic surveys included 1,560 line kilometers being shot onshore and 500 line kilometers offshore.

Table 2.—Papua New Guinea: Exports of copper in concentrates, by destination

(Metric tons of copper content)

Destination	1984	1985
China	12,395	9,153
Germany, Federal Republic of	43,316	49,078
Japan	87,249	74,597
Korea, Republic of	8,337	17,656
Spain	15,810	18,228
Total	167,107	168,712

Source: World Metal Statistics, Mar. 1986.

SOLOMON ISLANDS

The Solomon Islands, which became an independent member of the British Commonwealth of Nations in 1978, consists of a double chain of six large volcanic islands and many smaller ones, including those of the Lord Howe, Santa Cruz, Duff, and Reef groups in the South Pacific Ocean. The major island is Guadalcanal, 1,600 kilometers east of Port Moresby, Papua New Guinea. Other major islands of the archipelago are Choiseul, Santa Isabel, New Georgia, Malaita, and San Cristobal.

Although the Solomon Islands has a history of gold mining dating back to the mid-16th century when the islands were named after the legendary gold mines of King Solomon, the country's first large-scale gold mine was opened November 9, 1985, at Mavu on the island of Guadalcanal by Zanex Ltd. (70%), an Australian company, and the indigenous Mavu Gold Development Ltd. (30%) under a joint venture named Zanex Mavu. The mining lease to operate the mine was the first ever granted in the Solomon Islands. The mine, situated on the upper reaches of the Mote Pono River, will recover gold from alluvial gravels thought to have been derived from Gold Ridge, a prominent, albeit minor, gold-producing area upriver. The recoverable grade was expected to average 0.7 gram of gold per ton of ore when the mine plant opened in early 1986.

Cyprus Minerals Australia Co., a subsidiary of Amoco Minerals Australia Co., was assessing the potentially much larger development of the bedrock and eluvium gold deposits at Gold Ridge during the year. The deposits at Gold Ridge were much more extensive than those of Mavu and will require an immense investment to develop. Hence, Cyprus Minerals and the Government of Solomon Islands were proceeding cautiously in its development. Other companies actively conducting exploration programs within the Solomon Islands were Newmont on Vangunm and New Georgia Islands, and Zanex Mavu, Cyprus Minerals, and BHP on Guadalcanal and several of the lesser islands.

Although the minerals sector has historically had only a small role in the nation's economy, small quantities of clays, crushed stone, sand and gravel, and marine shells for lime continued to be produced in addition to the minor amount of alluvial gold won by panning before Mavu came onstream.

In addition to the construction materials and gold actively being mined, there were potential deposits of bauxite on Rennell Island (30 million tons) and Wagina Island (28 million tons) and 10 million tons of phosphate-bearing material on Bellona Atoll.

TONGA

The Kingdom of Tonga, a member of the British Commonwealth of Nations and completely independent from Great Britain since 1970, consists of three main island groups of Polynesia in the southern Pacific Ocean—the southern Tongatapu group, the central Ha'apai group, and the northern Vava'u group—and many smaller islands. Most of the islands are of raised coral with an overlying soil derived from volcanic ash. The remainder of the islands, forming a western chain, are of volcanic origin.

The mineral industry of Tonga remained insignificant, consisting of only the mining of construction materials such as coral reef limestone, crushed stone, and sand and gravel in minor quantities for domestic use. No other mineral resources are known to exist in the archipelago.

The possibility of hydrocarbon discoveries had interested the Tonga Government for a number of years. The search for oil was initiated after natural crude oil seepages were discovered in 1968. The seepages occured in coral limestone on the islands of Tongatapu and 'Eua.

After extensive geological surveys concentrating on 'Eua but extending to most of the islands, a consortium of oil companies, with Tonga Shell N.V. as operator, drilled two wildcat wells in 1971. In 1978, Webb Tonga Inc., after reevaluating and reprocessing Tonga Shell's data, drilled three more wells, all of which proved to be dry.

VANUATU

The Republic of Vanuatu, known until attainment of independence in 1980 as the New Hebrides, is a Y-shaped chain of about 80 volcanic islands and islets spread over a distance of 900 kilometers of Melanesia in the southwest Pacific Ocean.

The Vanuatuan mineral industry remained limited to the production during the year of small quantities of construction materials—coral reef limestone, crushed stone, and sand and gravel. Other than those, mineral exploration had been limited to the mining and concentrating of metallurgical-grade manganese ore from the Forari Mine in eastern Efate Island for export to Japan from 1961 to 1978, and to sporadic but minor alluvial gold prospecting dating back to the 1930's. Exploration has failed to identify economic mineral deposits, but known resources included metallurgical-grade limestone on Espíritu Santo Island; manganese deposits, in addition to that of the Forari Mine (which had 120,000 tons of ore, sufficient for about 3 years of mining, when production ceased) on Efate and Erromango Island; and large deposits of pozzolan, a volcanic ash used in portland cement manufacturing, on some of the islands, most notably Ambrym and Efate. There were many hot springs throughout the islands in which sulfur and barite were being actively deposited.

Although only at a very embryonic stage, exploration for epithermal gold mineralization was beginning to pick up during the year. At the beginning of the year, there were only 2 valid exploration licenses, but by yearend the total was close to 100. United Resources (Vanuatu) Ltd. was the largest holder of exploration licenses, with 28. United Resources built a 25-meter steel-hulled catamaran oceangoing research vessel to use as an exploration base. The vessel was equipped with a helicopter pad, sample preparation facilities, and an assay laboratory, providing the means for rapid sample analysis and enabling exploration on a regional basis. Other firms holding exploration licenses and either having active exploration programs or gearing up for them during the year included Canyon Resources, Mumbil Mines, Jason Mining, Dominion Gold, and Kia Ora Gold Corp. NL.

[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Fijian dollars ($F) to U.S. dollars at the rate of $F1=US$0.8676, the average for 1985.

[3]Where necessary, values have been converted from Papua New Guinean Kina (K) to U.S. dollars at the rate of K1=US$0.9970, the average for 1985.

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