LIBRARIES
UNIVERSITY OF WISCONSIN–MADISON

Sections 1-6, Appendix 1-2. Volume I

Foley and Lardner
Rhinelander, Wisconsin: Nicolet Minerals Company, [s.d.]

https://digital.library.wisc.edu/1711.dl/VMY7ABIRKC6LQ9D

http://rightsstatements.org/vocab/InC/1.0/

For information on re-use see:
http://digital.library.wisc.edu/1711.dl/Copyright

The libraries provide public access to a wide range of material, including online exhibits, digitized collections, archival finding aids, our catalog, online articles, and a growing range of materials in many media.

When possible, we provide rights information in catalog records, finding aids, and other metadata that accompanies collections or items. However, it is always the user's obligation to evaluate copyright and rights issues in light of their own use.

728 State Street | Madison, Wisconsin 53706 | library.wisc.edu

FOLEY & LARDNER

ATTORNEYS AT LAW

POST OFFICE BOX 1497
MADISON, WISCONSIN 53701-1497
150 EAST GILMAN STREET
MADISON, WISCONSIN 53703-1495
TELEPHONE: (608) 257-5035
FACSIMILE: (608) 258-4258

CHICAGO
DENVER
JACKSONVILLE
LOS ANGELES
MADISON
MILWAUKEE
ORLANDO

SACRAMENTO
SAN DIEGO
SAN FRANCISCO
TALLAHASSEE
TAMPA
WASHINGTON, D.C.
WEST PALM BEACH

WRITER'S DIRECT LINE
(608) 257-5035

EMAIL ADDRESS

CLIENT/MATTER NUMBER
062745-0113

December 23, 1998

Mr. Bill Tans
Wisconsin Department of Natural Resources
Bureau of Integrated Science Services
101 South Webster
P.O. Box 7921
Madison, Wisconsin 53707-7921

TECHNICAL REPORTS CENTER
K.F. WENDT ENGR. LIBRARY
UW - MADISON

Re: Crandon Project - Wis. Stats. §293.50 Compliance Demonstration

Dear Mr. Tans:

Foley & Lardner, on behalf of its client Nicolet Minerals Company (NMC), is pleased to submit the enclosed report titled *Wis. Stats. §293.50 Compliance Demonstration.* This report, prepared by Foley & Lardner and its consultants, is intended as a stand-alone document, although certain of its findings are summarized in the Crandon project *Mine Permit Application.*

As noted in the attached distribution list, NMC has forwarded copies of this report to all appropriate state and federal agencies, to local officials, and to various interested parties. It has also filed with the Wisconsin Department of Natural Resources (WDNR) six duplicate sets of all materials corresponding to the numbered references in Sections 2, 3 and 4 of the report (three sets each in the WDNR's Madison and Rhinelander offices). It is our understanding that the WDNR will be responsible for appropriately distributing the report to its staff members.

The purpose of this report is to demonstrate compliance with Wis. Stats. §293.50, the so-called "mining moratorium" statute. It was prepared in consultation with various local, state and federal regulators, as well as representatives of Canadian provincial, territorial and federal agencies.

ESTABLISHED 1842

A MEMBER OF GLOBALEX WITH MEMBER OFFICES IN BERLIN, BRUSSELS, DRESDEN, FRANKFURT, LONDON, SINGAPORE, STOCKHOLM AND STUTTGART

If you have any questions regarding this submission, please contact this office at (608) 257-5035, or NMC's Director of Public Affairs, Dale Alberts, at (715) 365-1450.

Very truly yours,

FOLEY & LARDNER

Charles G. Curtis
Mark L. Langenfeld

Enclosure

Distribution

No. of Copies	Sent To
4	Mr. Bill Tans Wisconsin Department of Natural Resources Bureau of Integrated Science Services 101 South Webster Street Madison, WI 53707
3	Ms. Char Hauger U.S. Army Corps of Engineers St. Paul District 190 Fifth Street East St. Paul, MN 55101
6	Mr. Archie Wilson Wisconsin Department of Natural Resources 107 Sutliff Avenue Rhinelander, WI 54501
1	Mr. Dale Simon Wisconsin Department of Natural Resources Bureau of Water Regulation and Zoning 101 South Webster Street, 6th Floor Madison, WI 53707
2	Mr. Ed Jepsen Wisconsin Department of Natural Resources Bureau of Air Management 101 South Webster Street, 7th Floor Madison, WI 53707
1	Mr. Paul Luebke Wisconsin Department of Natural Resources Bureau of Watershed Management 101 South Webster Street, 2nd Floor Madison, WI 53707
3	Mr. Larry Lynch Wisconsin Department of Natural Resources Bureau of Waste Management 101 South Webster Street, 3rd Floor Madison, WI 53707

Distribution *(Continued)*

1	Mr. John Pohlman Wisconsin Department of Natural Resources Bureau of Endangered Resources 101 South Webster Street, 4th Floor Madison, WI 53707
1	Mr. Dave Webb Wisconsin Department of Natural Resources Bureau of Watershed Management 101 South Webster Street, 2nd Floor Madison, WI 53707
1	Mr. Dave Johnson Wisconsin Department of Natural Resources Bureau of Drinking Water and Groundwater 101 South Webster Street, 2nd Floor Madison, WI 53707
1	Mr. Christopher Carlson Wisconsin Department of Natural Resources Bureau of Waste Management 101 South Webster Street, 3rd Floor Madison, WI 53707
1	Dr. John Barko U.S. Army Corps of Engineers Waterways Experiment Station CEWES-EP-L 3909 Halls Falls Ferry Road Vicksburg, MS 39180-6199
1	Ainsworth, Town of Ms. Audrey Viola, Clerk N10446 Hwy 55 Pearson, WI 54462
1	Antigo, City of Mr. Miles R. Stanke, Mayor Antigo City Hall 700 Edison Street Antigo, WI 54409-1955
1	Brown County Library 515 Pine Street Green Bay, WI 54301

Distribution *(Continued)*

1	Crandon, City of Mr. Vernon Kincaid, Mayor 601 West Washington Street Crandon, WI 54520
1	Crandon Public Library Ms. Karen Guth 104 South Lake Avenue Crandon, WI 54520
1	Crandon School District HWY 8 West Crandon, WI 54520
1	Crandon, Town of Mr. Rich Huber, Town Chairman Route 2 Box 1367 Crandon, WI 54520
1	Forest County Board Ms. Dora James, Clerk County Clerk Office 200 East Madison Street Crandon, WI 54520
1	Forest County Potawatomi Mr. Philip Shopodock, Chairman P. O. Box 340 Crandon, WI 54520-0340
1	Horsley & Witten, Inc. Mr. Daniel Santos Sextant Hill Unit 1 90 Route 6A Sandwich, MA 02563
1	Langlade County Clerk Ms. Kathryn Jacob 800 Clermont Street Antigo, WI 54409
1	Lincoln, Town of Ms. Sandra Carter, Clerk Route 2, P.O. Box 9 Crandon, WI 54520-0009

Distribution *(Continued)*

1	Madison Public Library 201 West Mifflin Street Madison, WI 53703
1	Marathon County Public Library Ms. Phyllis Christensen 300 North 1st Street Wausau, WI 54403
1	Menominee Tribe Apesanahkwat, Chairman P.O. Box 910 Keshena, WI 54135
1	Milwaukee Public Library Documents Workroom 814 West Wisconsin Avenue Milwaukee, WI 53233
1	Nashville, Town of Ms. Joanne Tacopina, Clerk 9347 Pickerel Lake Road Pickerel, WI 54465
1	Nicolet College Learning Resource Center Ms. Maureen McCloskey, Librarian P.O. Box 518, Hwy G Lake Julia Campus Rhinelander, WI 54501
1	Public Service Commission Mr. Ken Rineer 610 North Whitney Way Madison, WI 53704
1	Oneida County Board of Supervisors Mr. Robert Bruso, Clerk 1 Courthouse Square, P.O. Box 400 Rhinelander, WI 54501
1	Rhinelander Public Library 106 North Stevens Rhinelander, WI 54501

Distribution *(Continued)*

1	Sokaogon Chippewa Community Mr. Charlie Fox, Chairman Mole Lake Band Route 1, P.O. Box 625 Crandon, WI 54520-0625
1	State Historical Society of Wisconsin Mr. Richard Dexter, Chief, Compliance Section 816 State Street Madison, WI 53706
1	Tomahawk Public Library Ms. Paula Steuernagel, Head Librarian 300 West Lincoln Avenue Tomahawk, WI 54487
1	USEPA Mr. Dan Cozza 77 West Jackson WS-15J Chicago, IL 60604-3507
1	U.S. Department of the Interior Fish and Wildlife Service Ms. Janet M. Smith, Field Supervisor Green Bay Field Office 1015 Challenger Court Green Bay, WI 54311-8331
1	U.S. Department of the Interior Bureau of Indian Affairs Mr. Robert Jaeger Branch of Natural Resources 615 West Main Street Ashland, WI 54806-0273
2	U.S. Geological Survey Mr. James Krohelski Water Resources Division 8505 Research Way Middleton, WI 53562-3581
1	University of Wisconsin-Madison Engineering Library 215 North Randall Avenue Madison, WI 53706

Distribution *(Continued)*

1	University of Wisconsin-Madison Mr. John Coleman B102 Steenbock Library 550 Babcock Drive Madison, WI 53706
1	University of Wisconsin-Milwaukee Dr. Douglas Cherkauer 1740 Stoneway Court Richfield, WI 53076
1	University of Wisconsin-Stevens Point Library-Learning Resources Center 2100 Main Stevens Point, WI 54481
1	Wisconsin Department of Revenue Mr. Ron Ruechert 125 South Webster Madison, WI 53707
1	Wisconsin Geological & Natural History Survey Mr. Kenneth Bradbury 3817 Mineral Point Road Madison, WI 53705
1	Wisconsin Geological & Natural History Survey Mr. Tom Evans 3817 Mineral Point Road, Room 108 Madison, WI 53705

WIS. STATS. §293.50

COMPLIANCE DEMONSTRATION

NICOLET MINERALS COMPANY

7 North Brown Street
Third Floor
Rhinelander, WI 54501-3161

(715) 365-1450

104 West Madison Street
P.O. Box 336
Crandon, WI 54520-0336

(715) 478-3393

Executive Summary

In this submission, Nicolet Minerals Company ["NMC"] provides the Wisconsin Department of Natural Resources ["WDNR"] with the information the WDNR needs to make the evidentiary determinations required by the newly enacted 1997 Wisconsin Act 171, codified at Wis. Stats. § 293.50. This law evolved during a three-year legislative process into a series of evidentiary determinations that must be made by the WDNR before it may issue a mining permit under Wis. Stats. § 293.49 "for the mining of a sulfide ore body." Id. § 293.50(2). The purpose of these determinations is to verify that one or more sulfide mining operations have been undertaken elsewhere in the United States or Canada in full compliance with pertinent environmental laws, and without causing any "significant environmental pollution." Id. § 293.50(2m)(b) (emphasis added).

The new law, which is reprinted in full at Appendix 1.1, requires the WDNR to make two key determinations before issuing a mining permit:

- "that a mining operation has operated in a sulfide ore body which, together with the host rock, has a net acid generating potential in the United States or Canada for at least 10 years without the pollution of groundwater or surface water from acid drainage at the tailings site or at the mine site or from the release of heavy metals," Id. § 293.50(2)(a); and

- "that a mining operation that operated in a sulfide ore body which, together with the host rock, has a net acid generating potential in the United States or Canada has been closed for at least 10 years without the pollution of groundwater or surface water from acid drainage at the tailings site or at the mine site or from the release of heavy metals," Id. § 293.50(2)(b).

A candidate mine may not be considered if (a) it has been listed on the Superfund's National Priorities List (NPL), or if its operator is no longer in business and has no successor responsible for potential environmental liabilities, id. § 293.50 (2m)(a); or (b) it has caused "significant environmental pollution" from acid drainage or the release of heavy metals, Id. § 293.50(2m)(b) (emphasis added).

This submission describes three mining operations – two in the United States and one in Canada – that meet the specific criteria included in this new statute. These examples of sulfide mines represent both large and small operations, both underground and open pit mining methods, and a variety of geologic and geographic settings. The law requires one example of an "operating" mine and one example of a "closed" mine. Two of the three mines in this submission meet the "operating" criteria, and two of them meet the "closure" criteria.

The three mines analyzed at length in this submission are as follows:

The **McLaughlin mine**, located some 70 miles north of San Francisco, California, is owned and operated by Homestake Mining Company of that city. This open pit gold operation began operations in 1983, and is still producing today. **It is offered here as an example of a mine that meets the new law's "operating" criteria**. From the outset, Homestake has employed mine design features, environmental controls, and monitoring methods to minimize the risk of releases of acid drainage or heavy metals to the environment. Those efforts have proven exceptionally effective and have drawn widespread praise. Even the mining industry's harshest critics have pointed to the McLaughlin mine as proof that hardrock mines can be both profitable and environmentally responsible. The Sierra Club has also commended Homestake "for its efforts to establish an environmentally sound mining operation" at the McLaughlin site.

The **Cullaton Lake mine**, located in Canada's Northwest Territories some 416 kilometers northwest of Churchill, Manitoba, is presently owned by Homestake Canada Inc., of Vancouver. This underground gold mine was developed and operated between 1976 and 1985, and has been closed ever since. **It is offered here as a candidate meeting the new statute's "closure" criteria**. The mine closure and reclamation measures implemented at this site have effectively prevented the development or release of acid drainage, or the release of heavy metals. Monitoring reports show no "significant pollution" of water resources during either the operating or closure phases of the Cullaton Lake mine.

The **Sacaton mine** is located about 3 miles west of Casa Grande, Arizona, and is owned and was operated by ASARCO, of New York, New York. This open pit porphyry copper mine operated from 1972 until its closure in 1984, and has been closed since. **It is offered here as a candidate meeting both the new statute's "operating" and "closure" criteria**. The mine is located in a predominantly agricultural region, although the Casa Grande area has seen intensified residential development in recent years. The mine has an excellent environmental track record and has never – during operations or since closure – been cited for (or been the subject of a formal proceeding, action, order or corrective action agreement relating to) a release of acid drainage or heavy metals. Moreover, relevant data reveal absolutely no incident (again, during operations or since closure) of "significant environmental pollution" from any such release.

It is important to note that the 10-year operating and closure criteria imposed by the new statute necessarily require a lengthy retrospective on the mining industry. Consequently, certain of these mining operations may not have employed all of the state-of-the-art technology and environmental controls that NMC will be using in its Crandon Project. Thus, while these candidates satisfy the statute's specific criteria, it is important to underscore that substantial technical strides have been made since they first began operating. Hence, direct comparisons between these mining operations and NMC's proposed Crandon Project must be carefully drawn and may, in many cases, be altogether inappropriate. The inherent differences between all mines' mineralogies and their individual geologic and geographic settings warrant similar caution.

There are many other mines in the United States, Canada, and elsewhere in the world that meet the new law's underlying concern – the desire for proof and reassurance that a modern sulfide mine can be operated and reclaimed in a sensitive environment, meet stringent environmental safeguards, and be a good long-term citizen and neighbor. This submission summarizes some of these additional modern operations, including mines that are successfully using technologies that NMC is proposing for its Crandon Project. While those mines may not meet one or more of the new law's specific criteria, these operations nonetheless provide valuable additional evidence that modern sulfide mining can be undertaken in an environmentally responsible manner.

WIS. STATS. §293.50
COMPLIANCE DEMONSTRATION

TABLE OF CONTENTS

Page

Executive Summary i

1.0 INTRODUCTION AND SUMMARY OF THE ANALYSIS 1-1
- 1.1 Organization of Submission 1-1
- 1.2 The Requirements of Wis. Stats. §293.50 1-2
- 1.3 Summary of the Analysis 1-6

2.0 THE MCLAUGHLIN MINE - LOWER LAKE, CALIFORNIA 2-1
- 2.1 Introduction 2-1
  - 2.1.1 Project Overview 2-1
  - 2.1.2 Information Reviewed 2-3
  - 2.1.3 Agency Contacts 2-4
- 2.2 Geologic Criteria 2-4
  - 2.2.1 Sulfide Ore Body 2-4
  - 2.2.2 Net Acid Generating Potential 2-5
- 2.3 Ten-Year Operating Criteria 2-6
  - 2.3.1 Tailings 2-6
  - 2.3.2 Mine, Ore Storage, and Waste Rock Facilities 2-7
- 2.4 Ten-Year Closure Criteria 2-8
- 2.5 Responsible Party Criteria 2-8
- 2.6 No Significant Environmental Pollution 2-9
  - 2.6.1 Water Quality 2-9
  - 2.6.2 Aquatic Ecology 2-10
  - 2.6.3 Analysis 2-10
- 2.7 Assessment of Technology 2-11
  - 2.7.1 Pollution Prevention/Containment 2-11
  - 2.7.2 Reclamation 2-13
  - 2.7.3 Stewardship 2-14
- 2.8 References 2-16

3.0 THE CULLATON LAKE MINE - N.W.T., CANADA 3-1
- 3.1 Introduction 3-1
  - 3.1.1 Project Overview 3-1
  - 3.1.2 Information Reviewed 3-3
  - 3.1.3 Agency Contacts 3-3
- 3.2 Geologic Criteria 3-4
  - 3.2.1 Sulfide Ore Body 3-4
  - 3.2.2 Net Acid Generating Potential 3-5

3.3 Ten-Year Operating Criteria 3-6
3.4 Ten-Year Closure Criteria 3-6
3.5 Responsible Party Criteria 3-7
3.6 No Significant Environmental Pollution 3-7
3.6.1 Water Quality 3-7
3.6.2 Analysis 3-8
3.7 Assessment of Technology 3-9
3.8 References 3-10

4.0 THE SACATON MINE - CASA GRANDE, ARIZONA 4-1
4.1 Introduction 4-1
4.1.1 Project Overview 4-1
4.1.2 Information Reviewed 4-3
4.1.3 Agency Contacts 4-3
4.2 Geologic Criteria 4-3
4.2.1 Sulfide Ore Body 4-3
4.2.2 Net Acid Generating Potential 4-4
4.3 Ten-Year Operating and Ten-Year Closure Criteria 4-5
4.4 Responsible Party Criteria 4-8
4.5 No Significant Environmental Pollution 4-9
4.6 Assessment of Technology 4-10
4.7 References 4-12

5.0 OTHER RELEVANT FACTORS IN EVALUATING THE ENVIRONMENTAL PERFORMANCE OF MODERN MINES 5-1
5.1 Appropriate and Proven Technology 5-1
5.2 Environmental Technologies and Accomplishments at Other Mines 5-3

6.0 RESERVATION OF RIGHTS 6-1

Figures

Table 1-1 Summary of Candidates' Compliance with Wis. Stats. §293.50... Follows p. 1-6
Figure 2-1 McLaughlin Mine Location Map ..... Follows p. 2-1
Figure 2-2 McLaughlin Mine Overall Site Plan ..... Follows p. 2-2
Figure 2-3 McLaughlin Mine Site Plan ..... Follows p. 2-2
Figure 2-4 McLaughlin Mine - Mine & Waste Rock Operation ..... Follows p. 2-7
Figure 3-1 Location Map for Cullaton Lake Mine ..... Follows p. 3-1
Figure 3-2 Topographical Map of Cullaton Lake Mine ..... Follows p. 3-1
Figure 3-3 Overall Site Plan of Cullaton Lake Mine ..... Follows p. 3-1
Figure 4-1 Location Map of ASARCO Inc. Sacaton Unit ..... Follows p. 4-1
Figure 4-2 Facility Site Map - Sacaton Mine ..... Follows p. 4-2

{ SAVEDATE \@ "M/d/yy h:mm am/pm" * MERGEFORMAT }

Appendices

Appendix 1: Introduction and Summary of the Analysis
Appendix 2: McLaughlin Mine
Appendix 3: Cullaton Lake Mine
Appendix 4: Sacaton Mine

SECTION 1

INTRODUCTION AND SUMMARY OF THE ANALYSIS

1.0 INTRODUCTION AND SUMMARY OF THE ANALYSIS

Wisconsin's so-called mining "moratorium" took effect on May 7, 1998, over four years into the Crandon Project permitting process. See 1997 Wisconsin Act 171, codified at Wis. Stats. § 293.50. This law evolved during a three-year legislative process into a series of evidentiary determinations that must be made by the Wisconsin Department of Natural Resources ["Department" or "WDNR"] before it may issue a mining permit under Wis. Stats. § 293.49 "for the mining of a sulfide ore body." Id. § 293.50(2). The purpose of these determinations is to verify that one or more sulfide mining operations have been undertaken elsewhere in the United States or Canada in full compliance with pertinent environmental laws, and without causing any "significant environmental pollution." Id. § 293.50(2m)(b) (emphasis added).

In this submission, Nicolet Minerals Company ["NMC"] provides the WDNR with the information necessary to make these newly required determinations. NMC describes three mining operations – two in the United States and one in Canada – that meet the specific criteria included in the new statute.

1.1 Organization of Submission

Section 1.2 reviews the specific requirements of Wis. Stats. § 293.50. Section 1.3 summarizes the candidate mines evaluated in this submission.

Sections 2 through 4 present a detailed overview and analysis of the three candidate mines for consideration by the WDNR. Section 2 examines the McLaughlin mine in California (which meets the new statute's "operating" criterion); Section 3 examines the Cullaton Lake mine in the Northwest Territories, Canada (which meets the "closed" criterion); and Section 4 examines the Sacaton mine in Arizona (which meets both the "operating" and "closed" criteria).

The analysis for each mine is organized around the specific requirements of Wis. Stats. § 293.50, as reviewed in Section 1.2. Each analysis describes the government files that have been reviewed and identifies appropriate agency contacts. Each analysis provides a list of references and all regulatory documents relied upon in the review. Selected documents are reprinted in the appendices that accompany this report. Complete sets of the regulatory documents reviewed for these analyses have been copied and organized, and are being separately filed with the WDNR for its review and consideration. Three complete sets of these documents are being submitted to the WDNR's Madison office, and an additional three complete sets are being submitted to the WDNR's Rhinelander office.

NMC believes there are many other mines that meet the new law's underlying concern – the desire for proof and reassurance that a modern sulfide mine can be operated and reclaimed in a sensitive environment, meet stringent environmental safeguards, and be a good long-term citizen and neighbor. Section 5 summarizes some of these modern operations, including mines that are successfully using technologies that NMC has proposed for its Crandon Project. While they may not meet one or more of the new law's specific criteria,

these operations provide valuable additional evidence that modern sulfide mining can be undertaken in an environmentally responsible manner.

NMC has not limited its search for the best mining technologies to North American operations, even though that is the narrow focus of the new statute. Rather, NMC will use advanced – but proven – environmental protection technologies for mining and waste disposal that will unquestionably make the Crandon Project one of the safest and most advanced mines in the world, one that can meet an exacting array of standards and requirements that is imposed on no other industry or human endeavor in the State of Wisconsin or anywhere else. To the extent that the WDNR seeks to draw inferences from other mining operations in determining whether the Crandon Project should be allowed to proceed, NMC respectfully requests that that the modern mining industry (as represented by the examples of Section 5 be examined in its totality.

Section 6 reserves NMC's continuing underlying objections with respect to newly enacted Wis. Stats. § 293.50.

1.2 The Requirements of Wis. Stats. §293.50

As finally enacted, Wis. Stats. § 293.50 contains five key requirements, each of which is discussed in this subsection. (The complete enactment is reprinted in Appendix 1.1, and an analysis of the statute's legislative history appears in Appendix 1.2.) The examination of each candidate mine in Sections 2 through 4 is organized around these five key requirements.

1.2.1 Geologic Criteria

Under the statute, each candidate mine must have "operated in a sulfide ore body which, together with the host rock, has a net acid generating potential." Wis. Stats. §§ 293.50(2)(a)-(b). The ultimate wording of this provision was in direct response to recommendations from the WDNR during the legislative process; the immediate purpose was to exclude southwestern Wisconsin's historic lead-zinc sulfide mining district from consideration.[1] The underlying intent of this provision is, in the WDNR's words, "clear": to ensure that the "focus" of the moratorium inquiry is "on mines that are capable of producing environmentally damaging levels of acid mine waste, regardless of whether the acid waste comes from mine drainage, or acid generated in waste rock piles or from tailings disposal sites."[2]

It must be underscored that this is the only common point required between the proposed Crandon mine (the obvious focus of the new law) and the comparison mines – that they all involve a sulfide mineral deposit with net acid generating potential. It was repeatedly

---

[1] See Testimony of Howard S. Druckenmiller, May 12, 1997, Ladysmith, Wisconsin, pp. 1-2; July 8, 1997 Wisconsin Legislative Council Staff Memorandum from William Ford to Representative Marc Duff, pp. 3-4. See also the legislative history analysis in Appendix 1.2.

[2] Druckenmiller Testimony, note 1, above.

noted during the legislative process that there are many other factors that influence potential environmental impacts, such as size and location of the ore body, the nature of the operation, and the hydrology and other environmental characteristics of the surrounding area. But no such other points of comparison were written into the legislation.

The Legislature also chose not to require that the technologies and environmental control techniques used in the Crandon Project and the comparison mines be similar. The WDNR specifically recommended that the bill be reoriented so as to focus on the specific proposed technologies, and to require examples of other operations that have successfully used those technologies. An amendment that would have refocused the legislation toward this inquiry was introduced, but ultimately was rejected in the Assembly.[3] While the focus of the new statute's inquiry is not on similarity of technology and environmental controls, Section 5 of this document describes mines that have successfully used one or more of the technologies being proposed for the Crandon Project. Additionally, as part of the ongoing permitting process, NMC will continue to provide the WDNR with further updated information demonstrating the rigor and safety of its proposals.

1.2.2 Ten-Year Operating Criteria

Under the statute, at least one of the candidate mines must have operated "for at least 10 years without the pollution of groundwater or surface water from acid drainage at the tailings site or at the mine site or from the release of heavy metals." Wis. Stats. § 293.50(2)(a). As discussed in Appendix 1.2, early versions of the legislation contained no definition of "pollution," which led to conflicting interpretations of the bill's meaning. The proposal failed to obtain a majority until it had been amended to provide a specific definition of this term. This amendment provided that

> "'Pollution' means degradation that results in any violation of any environmental law as determined by an administrative proceeding, civil action, criminal action or other legal proceeding. For purposes of this paragraph [defining 'pollution'], issuance of an order or acceptance of an agreement requiring corrective action or a stipulated fine, forfeiture or other penalty is considered a determination of a violation, regardless of whether there is a finding or admission of liability." Wis. Stats. § 293.50(1)(a) (emphasis added).

The interplay of the "operating" criteria and the definition of "pollution," requires the WDNR to determine whether, (1) during a 10-year period of mining operations, there was any (2) "degradation" of either groundwater or surface water, (3) caused by "acid drainage at the tailings site or at the mine site or from the release of heavy metals," (4) "that result[ed] in any violation of any environmental law," (5) "as determined by an administrative

---

[3] See, e.g., Assembly Substitute Amendment 2 to 1997 Senate Bill 3. See also June 6, 1997 letter from WDNR Secretary George E. Meyer to Rep. Marc Duff (with attachments).

proceeding, civil action, criminal action or other legal proceeding." Id. §§ 293.50(1)(a), 293.50(2)(a). The statute also requires that any "order ... requiring corrective action," "agreement requiring corrective action," or "stipulated fine, forfeiture or other penalty" arising from circumstances satisfying points (1) through (4), above, is to be considered as an actual "determination of a violation" and, therefore, disqualifying.

This is a harsh and unprecedented standard by which to judge any industry or human activity. This is especially so for mining, given the scale of the industry and the settings in which it must operate. This standard has resulted in the exclusion of some excellent mining operations on the basis of fairly minor and isolated problems which led to routine administrative penalties and stipulated corrective actions. To reiterate, no other industry is judged upon such a standard. The 10-year operating requirement has also excluded other mines with exemplary records that have not yet operated for a full 10 years.

In accordance with the extensive legislative history on this issue, NMC must "submit information from the state [and/or other jurisdictions] in which the mine was located showing that the mine had not violated the environmental laws of that state [and/or other jurisdictions] in place" during at least 10 years of its operation.[4] NMC has done so for each candidate operating mine, and has set forth the specific information reviewed and agency officials contacted in connection with this inquiry.

1.2.3 Ten-Year Closure Criteria

At least one of the candidate mines must have been closed "for at least 10 years without the pollution of groundwater or surface water from acid drainage at the tailings site or at the mine site or from the release of heavy metals." Wis. Stats. § 293.50(2)(b). This criterion employs the same definition of "pollution" used in applying the "operating" criterion, and NMC has followed the same approach in demonstrating compliance with this requirement. Again, this criterion has resulted in the elimination of several excellent operations due to minor violations that were remedied without any significant harm, or because they have been closed for fewer than 10 years.

Some Crandon Project opponents have argued that the new law requires the identification of a mine that has met both the "operating" and the "closed" criteria. Although one of the mines analyzed in this submission meets both of these criteria, the statute on its face allows different mines to be considered for the operating and closure requirements. The statute's plain words provide that two distinct "conditions" must be met before the WDNR issues a mining permit: (1) the WDNR must determine "that a mining operation has operated" for 10 years without pollution, and (2) the WDNR must determine "that a mining operation ... has been closed for at least 10 years" without pollution. Nowhere does the statute say that the same mining operation must meet both criteria. To the contrary, after saying that "a mining operation" must be found that has operated without pollution, the statute then says that "a mining operation" must also be found that has been closed for 10 years without pollution – not the mining operation that was relied upon for the operations test. Moreover, subsection (2m) twice provides that "[t]he department may not base its determination under sub. (2)(a) or (b)"

---

[4] See WDNR, "Issues Regarding Senate Bill 3," p. 2 (May 1997).

unless certain conditions are met – a reference to the operating or closed requirements. This reinforces the conclusion that the statute allows consideration of mines that meet the operating or closed criteria, even if they do not meet both.

1.2.4 Responsible Party Criteria

A candidate mine is excluded from consideration under the new statute if either of the following criteria in § 293.50(2m)(a) apply:

- It "has been listed on the national priorities list under 42 USC 9605(a)(8)(B)" [the so-called Superfund law]; or
- It is a "mining operation for which the operator is no longer in business and has no successor that may be liable for any contamination from the mining operation and for which there are no other persons that may be liable for any contamination from the mining operation" (a so-called "orphan mine").

1.2.5 No Significant Environmental Pollution

Finally, Wis. Stats. § 293.50(2m)(b) provides as follows (emphasis added):

> "The department may not base its determination under sub. (2)(a) or (b) on a mining operation unless the department determines, based on relevant data from groundwater or surface water monitoring, that the mining operation has not caused significant environmental pollution, as defined in s. 293.01(4), from acid drainage at the tailings site or at the mine site or from the release of heavy metals."

Section 293.01(4), referred to in the provision quoted above, defines "environmental pollution" to mean:

> "the contaminating or rendering unclean or impure the air, land or waters of the state, or making the same injurious to public health, harmful for commercial or recreational use, or deleterious to fish, bird, animal or plant life."

To be excluded from consideration, a candidate mine must have caused a "significant" measure of these harms. Wisconsin law defines "significant harm" as an impact that is "substantially offensive, seriously annoying, or intolerable." Wis. J I-Civil 1920 (1995) (emphasis added). See also Wis. Admin. Code § NR 150.02(25), defining "significant effects" as "considerable and important impacts." Thus, to be excluded under the new statute, a candidate operation must have caused a substantial degree of contamination or other injury considered to be "substantially offensive, seriously annoying, or intolerable." This necessarily requires the exercise of judgment on the WDNR's part, and should be guided by the same

standards of "reason, precedent, and fairness" articulated by the Department throughout the legislative process.[5]

1.3 Summary of the Analysis

As noted in Section 1.1 above, this submission contains a detailed analysis of three candidate mines: the McLaughlin mine in California, the Cullaton Lake mine in Canada, and the Sacaton mine in Arizona. These examples of sulfide mines represent both large and small facilities, both underground and open pit operations, and a variety of geologic and geographic settings. Together these mines represent a compelling case, not only for compliance with the new statutory criteria (see Table 1-1), but for the proposition that sulfide mining has been and can be undertaken without undue risk to the environment or human health.

The **McLaughlin mine**, analyzed in Section 2, is offered here as a mine meeting the new law's "operating" criteria. It is owned and operated by Homestake Mining Company of San Francisco, California. This open pit gold operation opened in 1985 in the Coast Range of California, some 70 miles north of San Francisco, and is still producing today. By the time operations cease in late 2002 or early 2003, it will have produced nearly 4 million ounces of gold.

The McLaughlin mine extracts ore from a large hot-spring type deposit characterized by the predominance of pyritic and sulfidic mineralization within complex volcanic and metasedimentary formations. From the outset, Homestake employed mine design features, environmental controls and monitoring methods to minimize the risk of releases of acid drainage or heavy metals to the environment. The success of those efforts is fully borne out in the thorough and extensive file of environmental reports compiled by the numerous agencies having jurisdiction over the mine (which is situated on both federal and private lands in three adjacent counties).[6]

The **Cullaton Lake mine**, analyzed in Section 3, is offered as a candidate meeting the statute's "closed" criteria. It is presently owned by Homestake Canada Inc., of Vancouver, Canada. This underground gold mine and its associated facilities are located some 416 km northwest of Churchill, Manitoba, in the Northwest Territories. The mine was developed and operated between late 1976 and September 1985, producing approximately 100,000 ounces of gold, and has been closed ever since.

The gold resource at Cullaton Lake was accompanied by substantial sulfide mineralization, and the mill tailings and a portion of the mine's waste rock demonstrate a net acid generating potential. Nonetheless, the mine closure and reclamation measures

---

[5] Druckenmiller Testimony, note 1, p. 1-2.

[6] It is worth noting that, after reviewing Homestake's permitting documents, the Sierra Club's review committee voted unanimously not to oppose the McLaughlin mine. Instead, it "commended" Homestake "for its efforts to establish an environmentally sound mining operation" at the McLaughlin site, noting that "[s]uch cooperation from a large mining company is noteworthy and deserves due recognition." (See Section 2.1.1, below.)

Table 1-1

SUMMARY OF CANDIDATES' COMPLIANCE WITH WIS. STATS. §293.50

Mine	STATUTORY CRITERIA					
	"Sulfide ore body" w/NAGP (secs. 293.50 (1) (b), (2) (a) & (b))	≥ 10 Years Operating/ Closed (sec. 293.50(2) (a)/(b))	No "pollution" of groundwater or surface water from acid drainage or release of heavy metals (secs. 293.50 (2)(a)&(b))	Not listed on NPL (sec. 293.50 (2m) (a))	Operator still in Business/Responsible Successor (sec. 293.50(2m)(a))	"No significant environmental pollution" from acid drainage or release of heavy metals (sec. 293.50 (2m)(b))
McLaughlin Mine, California	✓	15 yrs. / N/A	✓	✓	✓	✓
Cullaton Lake Mine, N.W.T., Canada	✓	N/A / 13 yrs.	✓	✓	✓	✓
Sacaton Mine, Arizona	✓	12 yrs. / 14.5 yrs.	✓	✓	✓	✓

implemented at this site have effectively prevented the development or release of acidic runoff or heavy metals. Territorial records indicate the mine has a good environmental track record and disclose absolutely no instance of disqualifying proceedings, actions, citations, orders or corrective action agreements during the closure period. Similarly, monitoring reports show no "significant pollution" of water resources during either the operating or closure phases of the Cullaton Lake mine.

The **Sacaton mine**, analyzed in Section 4, is offered as a candidate meeting both the statute's "operating" and "closed" criteria. It is located near Casa Grande, Arizona, and is owned and was operated by ASARCO, Inc., of New York, New York. This open pit porphyry copper mine was worked continuously from 1972 until closure in March 1984, producing approximately 33 million tons of copper ore and smaller amounts of other metals. The mine is located in a predominantly agricultural region, although the Casa Grande area has seen intensified residential development in recent years.

The Sacaton deposit is composed of both hypogene and supergene sulfide mineralization of intrusive igneous rocks. During operations and imediately after closure, water in the mine tested moderately to strongly acidic. Then and now, local native groundwater showed neutral pHs. This mine has an excellent environmental record and has never -- during operations or since closure -- been cited for (or been the subject of a formal proceeding, action, order or corrective action agreement relating to) a release of acid drainage or heavy metals. Furthermore, there is absolutely no record of any incident (again, during operations or since closure) of "significant environmental pollution" from such releases from this mine.

It is important to note that the 10-year operating and closure criteria imposed by this statute necessarily require a lengthy retrospective on the mining industry. Consequently, certain of these mining operations did not employ all the state-of-the-art mining methods or environmental controls now available to NMC. Thus, while those candidates nonetheless satisfy the applicable statutory criteria, it is important to note that substantial technical strides have been made since those mines last operated and/or have been closed. Hence, direct comparisons between those mining operations and NMC's proposed Crandon Project must be carefully drawn and may, in many cases, be altogether inappropriate. The inherent differences between all mines' mineralogies and their individual geologic and geographic settings warrant similar caution.

Section 5 of this submission briefly describes a number of other North American mining operations which employ modern mining and environmental protection methods and technologies. This information is, in a very practical sense, equally or more pertinent to the Department's inquiry regarding the proposed Crandon Project because it

> "support[s] the department's review of the national experience with mining waste disposal technologies to assure citizens through the mine permit process, that there is technology

available which would allow a mine to meet all the stringent environmental standards we have in this state."[7]

Such mines, while excluded from consideration by a strict reading of newly enacted § 293.50, nonetheless provide further evidence that the technology proposed for the Crandon mine "has been demonstrated to be effective." [8]

[7] Druckenmiller Testimony, note 1, p. 1-2.

[8] See May 22, 1997 Memorandum from Larry Lynch to George Meyer.

SECTION 2

McLAUGHLIN MINE

LOWER LAKE, CALIFORNIA

2.0 THE MCLAUGHLIN MINE - LOWER LAKE, CALIFORNIA

2.1 Introduction

The McLaughlin mine is an example of an operating mine using modern environmental control technologies to meet the criteria listed in Wis. Stats. § 293.50:

- § 293.50(2)(a) - Sulfide ore body with net acid generating potential: Yes. The McLaughlin deposit contains sulfides of iron, arsenic, silver, antimony and mercury. Acidic leachate from the low-grade ore stockpile and waste rock is collected and controlled.

- § 293.50(2)(a) - Has operated at least 10 years without pollution of groundwater or surface water from acid drainage or the release of heavy metals: Yes. The McLaughlin mine has been in continuous operation since 1983; there is still gold production at the facility. No corrective action orders, notices of violation or other enforcement or compliance actions have been issued or undertaken with respect to acid drainage or the release of heavy metals.

- § 293.50(2)(b) - Has been closed at least 10 years without pollution of groundwater or surface water from acid drainage or the release of heavy metals: Not Applicable. The McLaughlin mine continues to operate in compliance with all pertinent environmental permits.

- § 293.50(2m)(a) - Not listed on the NPL: Yes. This site is not (and has not been) so listed.

- § 293.50(2m)(a) - Operator or successor still in business: Yes. The McLaughlin mine is owned and operated by Homestake Mining Company, which is still in business.

- § 293.50(2m)(b) - Significant environmental pollution: None. Based on extensive hydrological, biological and chemical testing, there is no record of significant environmental pollution.

2.1.1 Project Overview

First discovered in 1978, the McLaughlin mine began construction in September 1983, and continues in production from stockpiled ore today The mine is scheduled to complete production of nearly four million ounces of gold in late 2002 or early 2003 (McL-1). Located in the Coast Range of California, 70 air miles north of San Francisco (Figure 2-1; McL-1), the mine is acknowledged internationally for its innovative treatment of

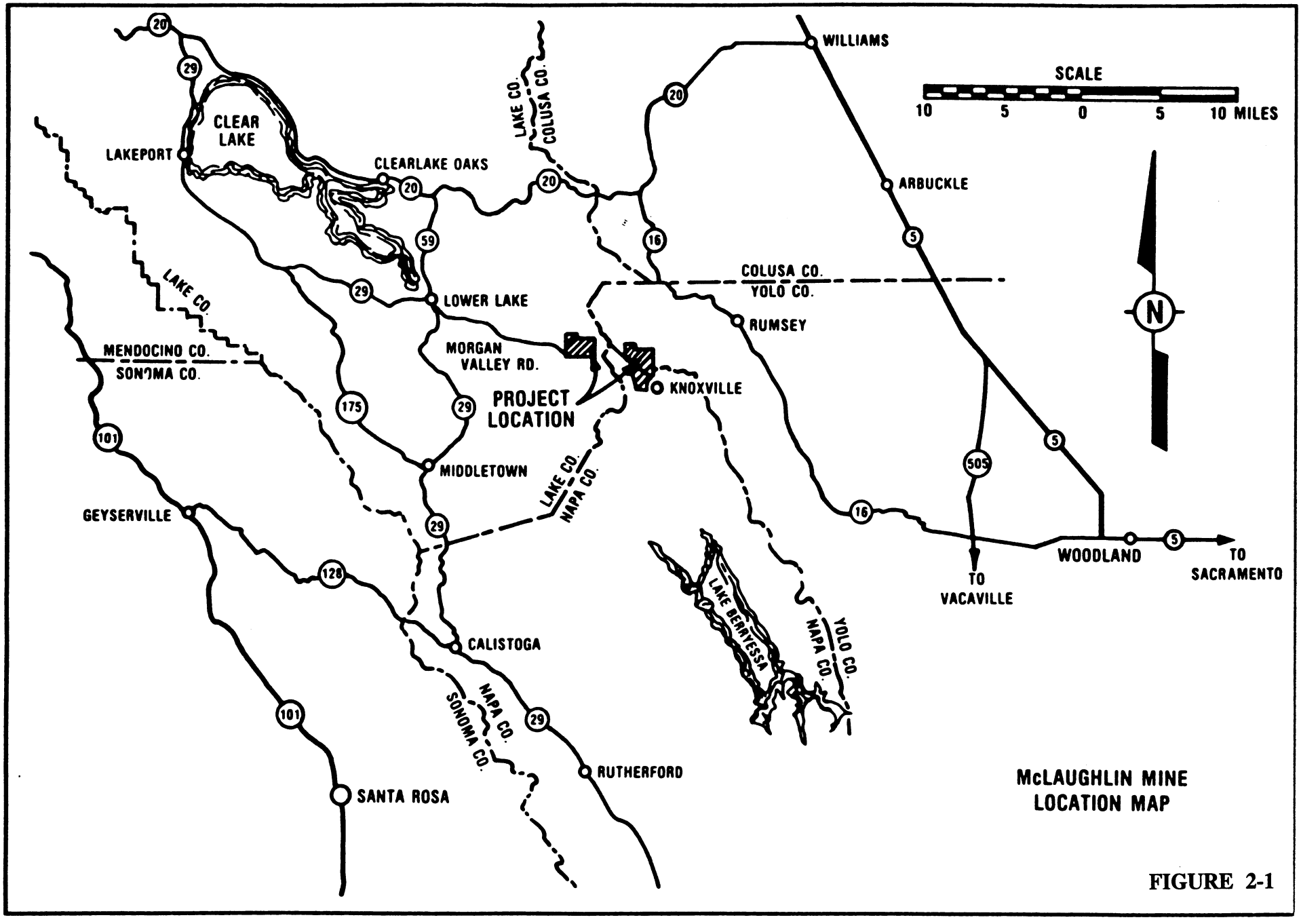

SCALE
10 5 0 5 10 MILES
N
CLEAR LAKE
LAKEPORT
CLEARLAKE OAKS
LOWER LAKE
LAKE CO.
COLUSA CO.
WILLIAMS
ARBUCKLE
COLUSA CO.
YOLO CO.
RUMSEY
MENDOCINO CO.
SONOMA CO.
MORGAN VALLEY RD.
PROJECT LOCATION
KNOXVILLE
MIDDLETOWN
LAKE CO.
NAPA CO.
GEYSERVILLE
CALISTOGA
LAKE BERRYESSA
YOLO CO.
NAPA CO.
NAPA CO.
SONOMA CO.
RUTHERFORD
SANTA ROSA
TO VACAVILLE
WOODLAND
TO SACRAMENTO
McLAUGHLIN MINE
LOCATION MAP

FIGURE 2-1

sulfide gold ores (McL-1, McL-2 [Appendix 2]).[9] In addition, the McLaughlin mine has won numerous awards recognizing its sound environmental management (McL-1, McL-2 [Appendix 2]).

The McLaughlin mine has in particular been an innovator in the management and disposal of waste rock with acid generating potential, preventing acid drainage through the identification, separate mining, and the selective placement and encapsulation of high sulfide wastes within the disposal units (see discussion at pp. 2-5 to 2-7; McL-2 [Appendix 2], McL-3 [Appendix 2], McL-7 [Appendix 2]).

Ores are crushed and ground in Napa County adjacent to the mine pit and then pumped through a five-mile-long slurry line to the gold recovery facility in Lake County. Tailings are deposited in an impoundment located adjacent to the recovery plant (Figures 2-2, 2-3; McL-1). Gold is recovered using traditional carbon-in-pulp technology (McL-1).

Situated on both federal and private lands in three counties, three different regional air basins, two Fish and Game Regions, and with facilities located in portions of two watersheds, the mine is subject to the regulatory oversight of more than a dozen federal, state and local agencies. Before pouring its first bar of McLaughlin gold, Homestake had to obtain 327 permits (McL-2 [Appendix 2]). The company's approach to the permitting process and its associated public participation was commended by the local chapter of the Sierra Club. The Club elected to not oppose the approval of the mine permits (McL-6 [Appendix 2], McL-7).[10]

The permits require that the mine conduct and document an extensive and comprehensive environmental monitoring program covering pre-construction, construction and

---

[9] Reference notations followed by "[Appendix 2]" are included in the Appendix for this Section, which is bound with this report. All other numbered references are separately filed.

[10] That endorsement was described by the Honorable Vic Fazio (D. Ca.) in the Congressman's testimony delivered in the U.S. House of Representatives on June 29, 1984 (McL-6 [Appendix 2]):

> "As demonstrated by a recent letter to the Yolo County Planning Commission written by the chairman of the Yolano Group of the Mother Lode Chapter of the Sierra Club, environmentalists have also recognized Homestake's dedication and commitment to ensuring that the McLaughlin mine is built and operated in the most environmentally safe manner possible. Wrote Ada Merhoff, the conservation chair of the Yolano Group:
>
> > 'We would be remiss if we did not publically state our feeling that Homestake Mining Co. is to be commended for its willingness to accommodate the particular concerns of the interested public, and for its efforts to establish an environmentally sound mining operation here. Such cooperation from a large mining company is noteworthy and deserves due recognition.'"

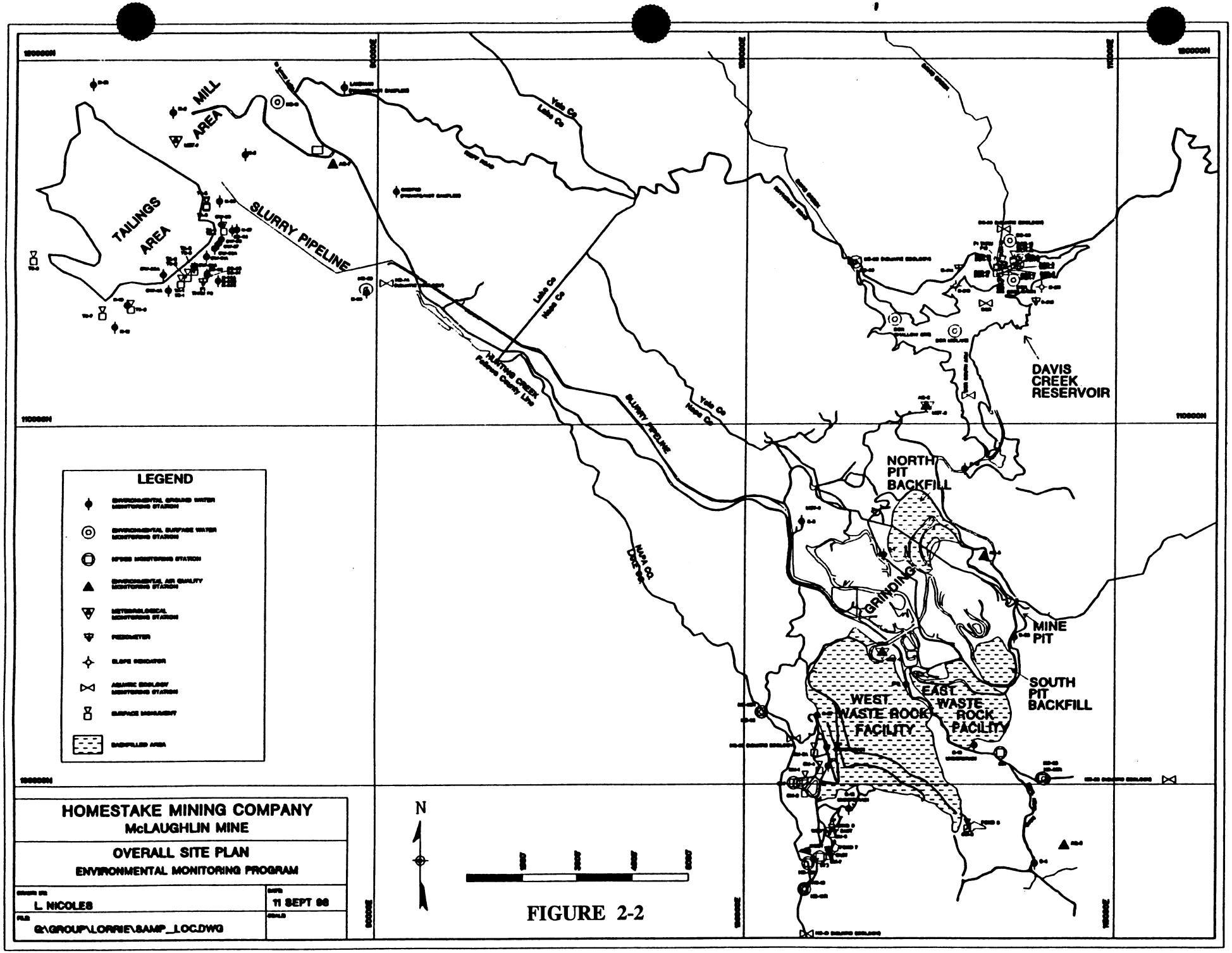
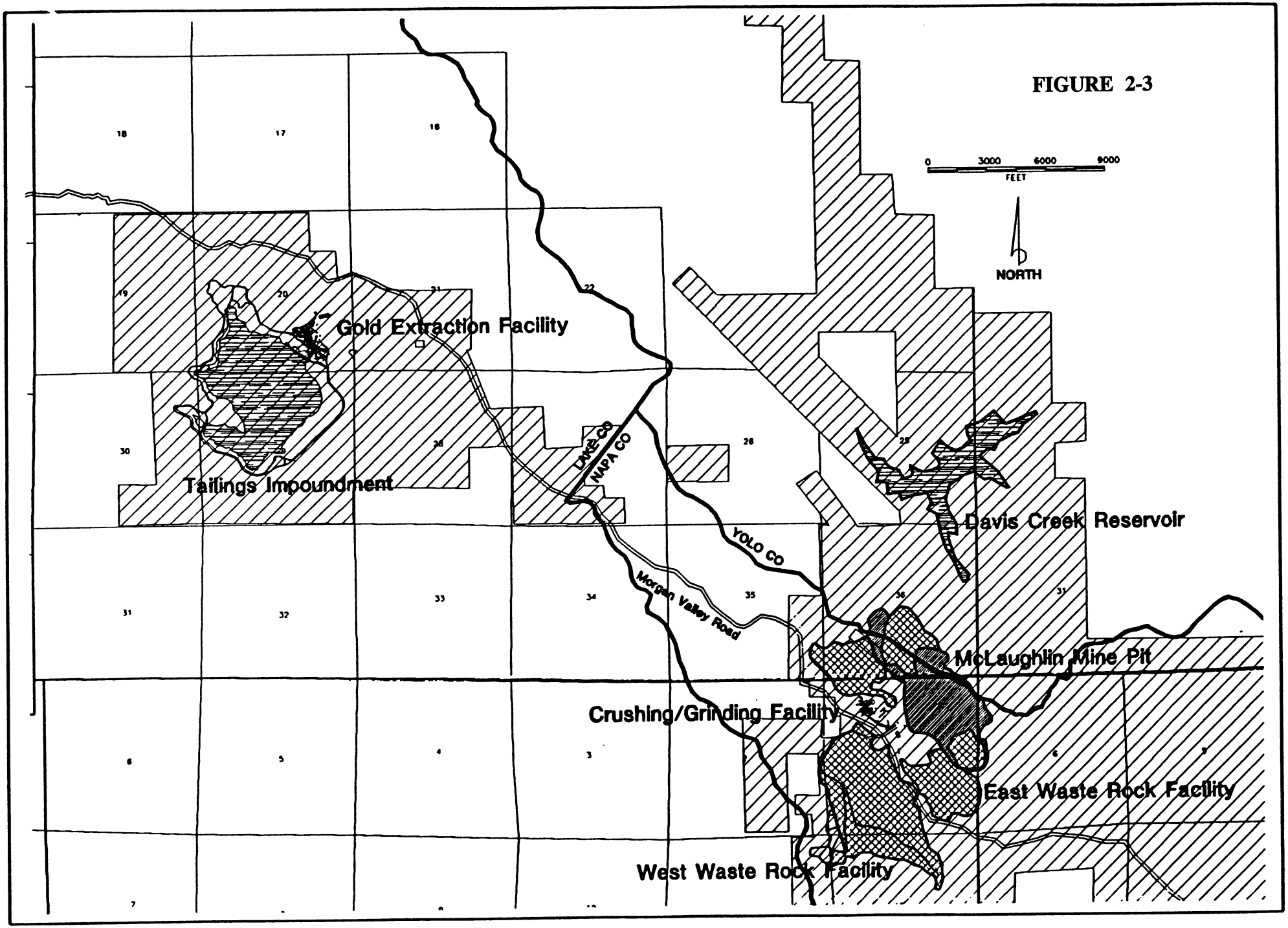

MILL AREA
TAILINGS AREA
SLURRY PIPELINE
DAVIS CREEK RESERVOIR
NORTH PIT BACKFILL
GRINDING
MINE PIT
SOUTH PIT BACKFILL
WEST WASTE ROCK FACILITY
EAST WASTE ROCK FACILITY
LEGEND
HOMESTAKE MINING COMPANY
McLAUGHLIN MINE
OVERALL SITE PLAN
ENVIRONMENTAL MONITORING PROGRAM
L. NICOLES
11 SEPT 98
G:\GROUP\LORRIE\SAMP_LOC.DWG
N

FIGURE 2-2


FIGURE 2-3
0 3000 6000 9000
FEET
NORTH
Gold Extraction Facility
Tailings Impoundment
LAKE CO
NAPA CO
YOLO CO
Davis Creek Reservoir
Morgan Valley Road
McLaughlin Mine Pit
Crushing/Grinding Facility
East Waste Rock Facility
West Waste Rock Facility

operating periods (McL-81). Environmental monitoring results are reported annually to all regulatory agencies and the public, and are reviewed in a yearly public hearing by the Napa County Planning Commission acting as the lead environmental agency on behalf of all of the regulatory authorities (personal communication, Sylvia Tooth, Napa County).

Throughout its existence, the mine has also been subject to the special scrutiny of the Solano Irrigation District. The District provides domestic, industrial and agricultural water supplies to the north-east San Francisco Bay Metropolitan Area from Lake Berryessa, a major 1.6 million acre-foot freshwater reservoir situated 18 miles downstream from the mine's tailings and waste rock disposal facilities (McL-8 [Appendix 2]).

In addition to the periodic analysis of ground and surface water samples, the mine contracts with scientists from the University of California to conduct extensive, semiannual aquatic ecology studies of the downstream watersheds (Figure 2-2, McL-9 to McL-20 [Appendix 2]). Both the chemical and biological monitoring demonstrate that downstream areas remain ecologically unchanged from pre-mine conditions (McL-9 to McL-20, McL-21 [all in Appendix 2]).

2.1.2 Information Reviewed

The Central Valley Regional Water Quality Control Board administrative record for the McLaughlin mine was determined to contain the information most pertinent to this inquiry, and was fully reviewed. This agency issues permits called "Board Orders." The McLaughlin mine has two Board Orders: an NPDES permit and a Waste Discharge Requirement (WDR). The record includes all project permit applications and support documents, public hearing records, issued NPDES Permits and WDRs, the approved Monitoring Manual, the Quarterly and Annual Environmental Monitoring Reports, inspection reports, and correspondence. (Executive summaries of Homestake's Annual Environmental Monitoring Reports are included in McL-9 through McL-20 [Appendix 2]. The full reports are not filed with this submission because of their bulk, but are available for inspection upon request.)

The Napa County Conservation, Development and Planning Department (the lead environmental agency for the project) reviews of the McLaughlin Annual Environmental Monitoring Reports are filed as McL-9 through McL-20 [Appendix 2]. In addition, public documents issued by Homestake Mining Company, the professional literature, the press and other publications were obtained and reviewed. Were there any enforcement action, administrative proceeding, or mandated corrective action relating to a release of acid drainage or heavy metals, that would be reflected in this record. None is present.

2.1.3 Agency Contacts

The following key individuals were contacted to obtain information for this submission:

NAME	AGENCY	PHONE	ADDRESS
Steve Rosenbaum Area Representative	Regional Water Quality Control Board, Central Valley Region	916-255-3131	3443 Routier Road Sacramento, CA 95827
Sylvia Tooth, Supervising Planner	Napa County, Conservation, Development and Planning Department	707-253-4416	1195 Third Street Napa, CA 94559

2.2 Geologic Criteria

2.2.1 Sulfide Ore Body

The McLaughlin deposit is a large hot spring-type gold deposit located in the northern Coast Ranges of California at the faulted lithologic contact between the Coast Range ophiolite and the Great Valley sequence. The ophiolite, forming the footwall of the Stony Creek fault, is composed of tabular blocks of basalt and metasedimentary rocks in a matrix of serpentinite. The tectonic interleaving of the various rock units in the footwall preceded formation of the deposit. The Coast Range ophiolite is structurally overlain by the Upper Jurassic Knoxville Formation, the basal formation of the Great Valley sequence, which forms the hanging wall of the Stony Creek fault. The Knoxville Formation is composed dominantly of mudstone, siltstone, fine-grained graywacke, and minor conglomerate. Clear Lake volcanic rocks in the McLaughlin mine area are basaltic andesite in composition forming flows, agglomerate blankets, and hypabyssal intrusions that filled a west-trending valley approximately parallel to the structural grain in the ophiolite (McL-22).

Hydrothermal activity at the McLaughlin paleo-hot spring is loosely dated as late Pliocene or Pleistocene in age. Precious metal-bearing veins were deposited from ascending, boiling fluids along with significant concentrations of the sulfides of iron, arsenic, mercury, silver and antimony (McL-23). Base metal sulfides are restricted to the deeper portions of the deposit and the overall base metal content of the McLaughlin hydrothermal system is relatively low (McL-24).

Early metallurgical testing revealed the highly refractory nature of the McLaughlin ore. Without some means to oxidize the sulfidic matrix encapsulating the gold particles, gold recoveries were restricted to less than 40 percent. Ultimately, pressure oxidation (or autoclaving) was selected for the treatment of high grade ores because it proved to be both environmentally and economically superior (McL-2 [Appendix 2]). In the presence of pure oxygen, the sulfides are converted, under elevated pressure and temperature within specially engineered pressure vessels, to sulfates. In the presence of water, the sulfates form sulfuric acid. This pressure oxidation process enhances gold recovery and accelerates acid production. The acid is then recycled into the process. Excess acid is neutralized using lime (McL-1).

Stockpiled low-grade ores undergo natural oxidation and are processed by direct cyanidation. Air and water penetration of the stockpiles is enhanced to promote sulfide conversion to sulfuric acid. Acid leachate is contained, used as process water and neutralized, or evaporated in the mine's approved waste disposal facilities.

2.2.2 Net Acid Generating Potential

Technical studies performed for the McLaughlin mine predicted that development of the mine would result in an acceptable increase in sulfate and total dissolved solids ("TDS") due to stormwater runoff, and those consequences were discussed in the Environmental Impact Statement for the then proposed project (see, e.g., McL-12 [Appendix 2]). Initial testing of McLaughlin mine waste rock conducted in 1981 and 1982, using then state-of-the-art waste characterization protocols, predicted that the material would, on balance, be non-acid generating. Early warning monitoring of waste dump underdrains, however, detected higher than expected levels of acid formation (McL-9 to McL-20). Reevaluation of the waste characteristics resulted in significant revisions to the mine operating plan in order to prevent acid drainage (McL-3, McL-4).

The initial evaluation was found to significantly underestimate the acid formation potential of the waste rock, because the composite samples tested masked or minimized acid potential, while the static testing of uniformly ground samples over-estimated the neutralizing potential of the waste. Consequently, these early results were not predictive of how the waste rock would behave in the field. Subsequent column leach testing established that the waste rock had a net acid generation potential and that special management measures were required to minimize or prevent formation of acid rock drainage (McL-6 [Appendix 2], McL-7 [Appendix 2]).

Selective mining and encapsulated placement of sulfidic waste rock has successfully minimized acid leachate formation. Residual seepage is intercepted and pumped to the process circuit for reuse, or evaporated in an approved waste unit (McL-9 to McL-20). Some of the acid generating waste rock is encapsulated with non-acid generating waste rock in the pit. This encapsulation management technique for acid generating waste rock is described in the Waste Discharge Requirement (Board Order No. 94-315) for the project as follows (McL-25 [Appendix 2]):

> "Waste rock placed in the mine pit will consist of both acid forming waste rock and non-acid forming waste rocks. These rock types will be randomly discharged from the pit bottom to about 1700 feet MSL. Groundwater levels in the pit are expected to stabilize at this elevation following cessation of mining activities, thereby minimizing waste rock oxidation in the lower portion of the waste piles. Above 1700 feet MSL, acid forming waste rock will be placed in thick lifts separated by layers of non-acid forming rock. At final grade, the waste rock areas above 1700 feet MSL will be covered with a layered cap consisting of compacted clay, non-acid forming rock and topsoil. This encapsulation and reclamation strategy is used in the East and Main Waste Rock

Disposal Areas to minimize oxidation and acid generation within the waste rock. Final elevation for the waste rock units will be near 1900 feet MSL in the north pit and 1940 feet MSL in the south pit."

It should also be noted that without pressure oxidation (autoclaving), the McLaughlin tailings would be acid generating. (See Section 2.7.1, below.) The sulfide oxidation achieved by this metallurgical treatment eliminates any residual acid generation potential, and immobilizes trace heavy metals in relatively insoluble complexes such as jarosite and oxide minerals (McL-4 [Appendix 2]).

2.3 Ten-Year Operating Criteria

Construction of the project began in September 1983, with pre-mine stripping and segregation of low-grade ores. Gold was produced at the site beginning in March 1985 (McL-1).

Groundwater protection at the McLaughlin mine is mandated by California's Porter Cologne Act. The Act requires the filing and approval of a Waste Discharge Report that demonstrates that the beneficial uses of the waters of the State will not be impaired should the project proceed (McL-25 [Appendix 2]). California Administrative Code Chapter 27 sets forth the implementing regulations and includes specific requirements for the disposal of mine wastes. In the case of the McLaughlin mine, these wastes include tailings and waste rock.

Surface water at the McLaughlin mine is regulated pursuant to an NPDES Permit issued by the Central Valley Region of the California Water Quality Control Board (the Clean Water Act is a state delegated program in California) (McL-26 [Appendix 2]). Annual rainfall averages 24 inches, with wet years exceeding 45. Because this site is in a net evaporation zone, the tailings impoundment is designed and operated as a zero-discharge facility. Stormwater runoff from active mining and processing areas is also contained without discharge under design flow conditions (McL-2 [Appendix 2], McL-4 [Appendix 2]).

2.3.1 Tailings

The release of acid and heavy metals from the McLaughlin tailings is prevented by the use of optimal site selection (geologic containment), the choice of a favorable metallurgical process (oxidation of the sulfides followed by neutralization of any excess acid with lime), and aggressive water conservation (maximum recycling). In addition, the five-hundred-and-fifty-acre, zero-discharge tailings disposal facility provides backup (tertiary) containment for the mine's process (gold recovery) plant (McL-4 [Appendix 2]).

The success of these measures is demonstrated by the groundwater monitoring of the N-series wells surrounding the tailings impoundment, as well as downstream surface water and aquatic ecology monitoring (McL-81, McL-9 to McL-20 [Appendix 2]). Over thirteen years of monitoring confirms that there has been no release of acid or heavy metals to either ground or surface water. In addition, downstream aquatic ecology remains unchanged from pre-mine conditions.

2.3.2 Mine, Ore Storage, and Waste Rock Facilities

Pollution prevention engineering has similarly been applied to the design, construction and operation of the McLaughlin mine's other components (Figure 2-4; McL-4 [Appendix 2]). The now-idle mine pit (approximately one mile long, one-half mile wide, and 1000 feet deep) has been demonstrated to be hydrologically isolated from usable groundwater and surface water. Low-grade ore is stockpiled on clay-lined pads until processed. Storm water run-off and resulting leachate from the low-grade ore are collected and used for process water or evaporated in an approved mine waste disposal unit (McL-25 [Appendix 2]).

Acid generating waste rock was placed in fifty-foot lifts and encapsulated with low permeability clays to limit infiltration of air and water and, thus, minimize the formation of acid leachate (McL-3 [Appendix 2]). The individual cells were progressively closed and revegetated to minimize the onset of bacterially accelerated acid formation (McL-4 [Appendix 2]). The limited amounts of leachate formed there are collected, monitored (McL-9 to McL-20 [Appendix 2]), and recycled in the process circuit or pumped to an authorized, zero-discharge waste disposal unit and evaporated (McL-25 [Appendix 2]).

During operation, storm water from active dump surfaces was collected in sediment control ponds, settled, its quality monitored, and then either released to the downstream watershed pursuant to the mine's NPDES permit or pumped back to the process circuit for use. Storm water run-off from reclaimed surfaces is released to the downstream watershed pursuant to the mine's NPDES permit (McL-26 [Appendix 2]). NPDES monitoring confirms that there has been no release of acid or heavy metals to the downstream watershed as a result of acid drainage (McL-9 to McL-20 [Appendix 2]). While several releases of sediment and accompanying metals have occurred during severe storm events, more than ten years of environmental monitoring has shown that downstream aquatic ecology remains unchanged from pre-mine conditions (McL-9 to McL-20, McL-21 [all in Appendix 2]).

Review of the Central Valley Regional Water Quality Control Board files indicates that the mine has reported all upsets and potential releases, regardless of their consequence. These have included minor ore slurry releases and occasional, but infrequent, transient exceedances of permit limits resulting from temporary upset conditions that overwhelmed capacity at waste dump leachate containment or pumpback facilities during extreme rainfall events (McL-47 to McL-70 [Appendix 2]).

Slurry (ground ore and water) releases were largely contained within the slurry line secondary containment system. Slurry which sprayed beyond secondary containment was collected and removed to the tailings pond and did not enter any waterway.

Escaped waste dump leachate was of such low volume that receiving waters were not impacted by acid or metals. Transient concentrations of TSS exceeding permit effluent limits had no impact on receiving waters. Because accompanying rainfall amounts exceeded the ten year-24 hour storm volume, the incidences qualified for exemption from the NPDES standards. Nevertheless, Homestake monitored and reported all such occurrences.

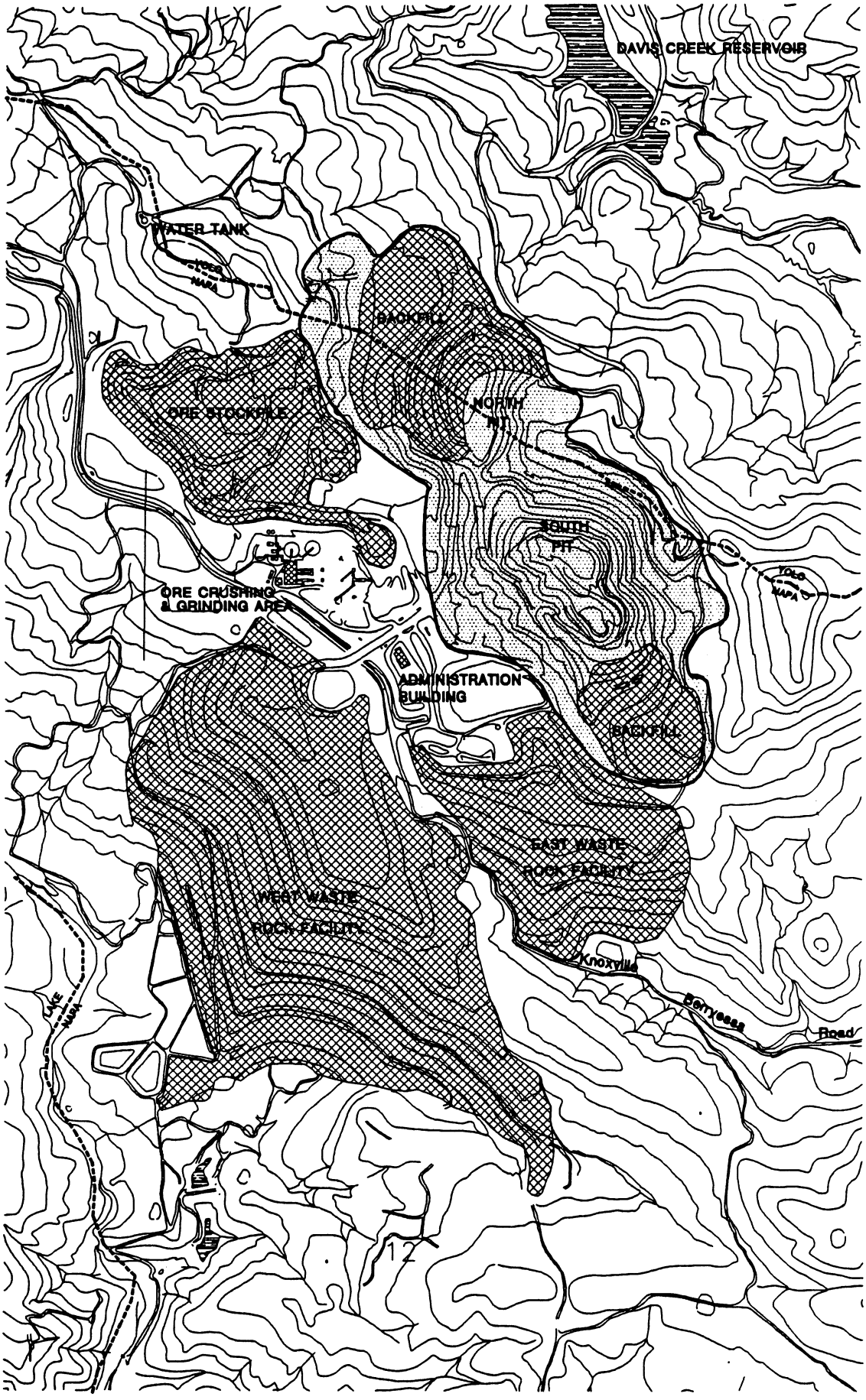

DAVIS CREEK RESERVOIR
WATER TANK
TOLO
NAPA
BACKFILL
ORE STOCKPILE
NORTH PIT
SOUTH PIT
TOLO
NAPA
ORE CRUSHING & GRINDING AREA
ADMINISTRATION BUILDING
BACKFILL
EAST WASTE ROCK FACILITY
WEST WASTE ROCK FACILITY
Knoxville
Berryessa
Road
LAKE
NAPA
North
0
800
1600
Scale in Feet
HOMESTAKE
HOMESTAKE MINING COMPANY
Figure 3
McLAUGHLIN MINE
MINE & WASTE ROCK OPERATION

FIGURE 2-4

The mine's M-1 sediment pond overtopped as the result of an accumulation of 16.3 inches of rainfall during a nine-day period in February of 1986. This storm exceeded the 100-year/24 hour storm volume. Although the discharge qualified for the NPDES storm exemption (exceeding the 10-year/24-hour rainfall event), downstream water quality was monitored for the duration of the discharge. Both the Regional Water Quality Control Board and Napa County, as the lead environmental review agency, concluded that the incident did not constitute a permit violation and caused no environmental harm (McL-46).[11]

In each and every case of upset or potential release, the company has -- on its own initiative -- immediately implemented appropriate repairs or other improvements to minimize the potential for a recurrence. Neither the Regional Board nor any other local, state or federal agency with jurisdiction over the mine has ever found it necessary to issue any corrective action orders, or to initiate other enforcement or compliance actions with regard to he McLaughlin mine or any of its facilities. Inspection reports in the record further confirm compliance (McL-28 to McL-45, McL-71 to McL-78 [all in Appendix 2]).

2.4 Ten-Year Closure Criteria

NOT APPLICABLE

This is an active operation with an exemplary record of no violations of pertinent environmental laws for the past 15 years.

2.5 Responsible Party Criteria

Founded in 1876, Homestake Mining Company has been in continuous existence for 122 years. In addition to the McLaughlin mine, Homestake maintains active gold operations and exploration elsewhere in the United States, Australia and Canada, as well as in Latin America and Europe. The Company currently produces approximately 2.5 million ounces of gold annually from 16 operating mines.

Homestake shares are publicly traded on the New York Stock Exchange, the Australian Stock Exchange and the Basel, Geneva and Zurich Stock Exchanges in Switzerland. The company has received numerous awards for its responsible environmental, health and safety stewardships.

---

[11] It should be noted that the agency correspondence about this event incorrectly states that M-1 was not included in the NPDES permit, that inadequate freeboard was maintained in M-1, and that the discharge was unauthorized. Review of the NPDES permit in effect in 1986 (Board Order No. 85-031, NPDES No. CA0081477) includes a discharge point (004) at M-1. This permit also exempts ponds regulated by the NPDES permit from the three-foot minimum freeboard requirement. The Standard Provisions and Reporting Requirements attachment to the NPDES permit discusses upset events. Apparently the company chose not to challenge the Staff interpretation, insofar as agreement was reached on the outcome of the event and no corrective action order was issued.

The McLaughlin mine is 100 percent owned and operated by Homestake Mining Company, which is headquartered at:

Homestake Mining Company
650 California Street
San Francisco, CA 94108
Phone: 415-981-8150

The McLaughlin mine has never been considered for inclusion on the National Priorities List, and is not so listed (see http//www.epa.gov/superfund).

2.6 No Significant Environmental Pollution

2.6.1 Water Quality

All of the environmental monitoring requirements contained in each of the McLaughlin mine permits are compiled and presented in the mine's Environmental Monitoring Manual (McL-81). Surface and ground water monitoring requirements are those imposed by the Central Valley Regional Water Quality Control Board and contained in the mine's Waste Discharge Report and NPDES Permit. The permits are reviewed and renewed at least once every five years (McL-25, McL-26, McL-27 [all in Appendix 2]).

Samples are analyzed by an independent laboratory and the results compiled and presented in the annual Environmental Monitoring Reports (1984-85 to 1996-97) and the various quarterly data reports. Annual reports include period-of-record data. New results are statistically compared to both pre-operational baseline data and other operational period data.

This statistical comparison is used to identify any new results which lie outside of the range of expected values known as Maximum Likely Concentrations (MLCs). Values exceeding the MLC's trigger further review which includes trend analysis and water type evaluations using Piper and Stiff diagrams. These evaluations serve as an early basis for identifying any potential gradual releases and provide an opportunity to implement remedial containment measures before the potential release might result in water quality impairment requiring an agency response (McL-9 to McL-20 [Appendix 2]).

"Points of compliance" and "constituents of concern" are designated by the Central Valley Regional Water Quality Control Board in the approved Waste Discharge Report and the NPDES Permit (McL-25 [Appendix 2], McL-26 [Appendix 2]). The Board has determined that "[t]he comprehensive hydrogeologic investigations conducted prior to construction of the waste rock units demonstrated that only minor amounts of groundwater underlie the waste rock disposal areas, and that there are no detectable vertical or lateral hydraulic interconnection(s) with groundwater or surface water systems with beneficial uses" (McL-25 [Appendix 2], McL-26 [Appendix 2]). The same finding was made with regard to the mine's tailings disposal facility. Compliance with water quality standards is determined at the nearest point at which waters subject to protection of beneficial uses are found (McL-25 [Appendix 2], McL-26 [Appendix 2]).

Groundwater compliance is determined around the perimeter of the tailings facility at stations N-5, N-8 (A,B,& C), N-9, N-11, and N-12 (Figure 2-2, McL-25 [Appendix 2], McL-27 [Appendix 2]). Mine area station S-10 is the point of compliance between the mine pit and the mine's fresh water reservoir. Additional waste rock underdrain and groundwater stations are located between the waste units and protected waters, and are monitored for early warning purposes, rather than as points of compliance. All surface water stations, excepting background (i.e., upgradient) stations, are designated as points of compliance.

Water quality monitoring results are reviewed annually by all of the responsible agencies. The results are also presented to the public in an annual public hearing convened by the Napa County Planning Commission (McL-9 to McL-20 [Appendix 2]). No corrective action orders, notices of violation, or other enforcement or compliance actions have been issued with regard to the surface or groundwater compliance points at the McLaughlin mine.

2.6.2 Aquatic Ecology

In addition to the extensive and comprehensive water quality monitoring required by the Central Valley Regional Water Quality Control Board, the McLaughlin mine is required to perform systematic aquatic ecology monitoring. The Company contracts with independent scientists from the University of California to conduct this work. Quarterly, and later, biannual monitoring of benthic organisms and fish has been conducted during the pre-operational and operational periods.

Results are reported in the Annual Environmental Monitoring Reports (McL-9 to McL-20 [Appendix 2]). The work demonstrates that there has been no change in the aquatic ecology of the downstream watersheds as a result of operations at the McLaughlin mine (McL-21, McL-9 to McL-20 [all in Appendix 2]).

2.6.3 Analysis

The McLaughlin Mine Environmental Monitoring Program has been used as a model for application at other mines throughout California and the rest of the world (McL-5). Monitoring locations, frequencies and parameters are designed to detect most likely releases and are keyed to site specific climatic, geologic and ecologic conditions.

Quality control/quality assurance procedures are an integral part of the program (McL-81, McL-9 to McL-20 [Appendix 2)]. Sample splits are regularly collected by the staff of the Central Valley Regional Water Quality Control Board and the Solano Irrigation District. Monitoring results are statistically compared to pre-mine conditions and evaluated for trends and shifts that might otherwise be overlooked.

Monitoring reports are widely circulated to all responsible agencies and interested members of the public. Public hearings are held annually to provide an opportunity for public review and to consider improvements or modifications to the monitoring program, as well as to satisfy all concerned that the mine remains in compliance with all regulatory requirements. In addition, the mine manages its extensive non-mined lands to meet

conservation objectives, including enhancing wildlife habitat quality, protecting colonies of threatened species of bats, and preserving sensitive plant populations (McL-79, McL-80, McL-86).

The public record of the environmental performance of the McLaughlin mine is exceptionally comprehensive and detailed. This record consistently supports the conclusion that the mine has not caused any significant pollution of surface water or groundwater. Long term monitoring also demonstrates that the McLaughlin mine and its associated facilities have not adversely impacted the downstream aquatic ecology (McL-21 [Appendix 2]).

The following excerpts from an April 29, 1994 memorandum prepared by the Solano Irrigation District provides information on the McLaughlin mine's compliance history and environmental track record as viewed by a downstream stakeholder (McL-8 [Appendix 2]):

> "The McLaughlin Mine is engineered, constructed and operated in an environmentally state of the art, zero-discharge facility. The mine has achieved an international reputation for sound environmental design and practices. Detailed environmental monitoring proves that the mine has in no way impacted the excellent quality of the water supply.
>
> "Continuous Water Quality Monitoring Station: In addition to the normal periodic stream samples, the program includes an automated, continuous water quality sampling station, located on Hunting Creek, downstream of all of the mine's facilities. This assures that no undetected release can occur between the normal sampling periods.
>
> "Monitoring Results: Since initiated in 1983, the program has resulted in 127,727 water quality analyses from almost 3,953 separate samples. These data show that the quality of Solano's water remains excellent, and that the Mine has in no way degraded that water. Monitoring of aquatic ecology downstream of the project confirms that the streams remain unchanged from pre-mine conditions."

2.7 Assessment of Technology

The McLaughlin mine illustrates the benefits of applying comprehensive planning and sound engineering to the design, construction, operation, reclamation and closure of a mining project. These planning and engineering elements can be generally grouped into three categories: pollution prevention/containment, reclamation and stewardship.

2.7.1 Pollution Prevention/Containment

Planning and engineering for pollution prevention and the containment of mining impacts to the mine site included comprehensive studies of the geologic and climatic conditions specific to the site, and careful evaluation of the constituents and characteristics of

the materials to be mined, processed and disposed of on the mine site. Mechanisms for the transport and potential release of contaminants to the environment were identified and specific features designed and engineered to prevent such release.

Mineral Recovery Process Selection

The geochemistry of ore bodies varies tremendously from site to site. Metallurgical studies are required to determine the feasibility of mineral recovery and to select a preferred mineral recovery technology. These studies can also effectively evaluate the environmental consequences of those technologies.

Homestake selected pressure oxidation (or autoclaving) to process the McLaughlin ore on the basis of both economic and environmental advantages. That process, which is optimal for the McLaughlin mine's particular requirements, immobilizes trace heavy metals, eliminates the potential for acid formation, and reduces the concentration of the residual cyanide in the tailings. Thus, the McLaughlin tailings are nonhazardous according to both state and federal standards, and present no threat to waterfowl or wildlife.

The Crandon Project has undertaken similar studies to arrive at the optimal recovery process for its requirements.

Tailings Disposal

Screening studies identified all potential tailings disposal sites within a ten-mile radius of the ore body. Fatal flaw analysis and field reconnaissance reduced the original thirty four sites to three. The selected sites were subject to detailed field investigations.

The tailings disposal site identified by these investigations is ideal. It provides secure containment for the tailings, protecting downstream water quality and preventing the degradation of surrounding groundwater.

Ongoing monitoring of surrounding ground and surface waters demonstrates that no contaminants have been released from the site. Residual cyanide has remained below a concentration that would pose a threat to waterfowl and wildlife.

Process and Storm Water Management

While the McLaughlin operation takes full advantage of the fact that the regional climate provides substantially more evaporation than rainfall, it still must have an effective means for managing runoff and all other potentially contaminated waters. All process water is discharged to the zero-discharge tailings impoundment and either recycled or evaporated.

Water quality protection in the vicinity of the McLaughlin mine pit is maintained by a collection and containment system that intercepts all storm water flow, as well as all water removed from the mine pit. All water contacting ore, low-grade ore and

unreclaimed waste material is pumped to the grinding circuit and used as process water. This system also provides backup containment for fuel, waste oil, and other bulk materials.

Similarly, the McLaughlin extraction plant is engineered to drain to the tailings pond, thus eliminating the discharge of any storm water from that facility to the downstream watershed and providing backup containment for the entire plant and its contents.

Extensive water quality and aquatic ecology monitoring demonstrates the effectiveness of this zero-discharge design at preventing pollution, preserving surrounding ecosystems, and protecting the beneficial uses of downstream waters.

Waste Rock Management

The exposure of sulfide rich minerals to air and water, coupled with the occurrence of sulfide oxidizing bacteria, may produce an acidic leachate which can dissolve and mobilize heavy metals. At McLaughlin, an active program of selective placement of the waste rock was devised that prevents the formation of significant volumes of acid leachate. This program includes the identification of potentially acid forming waste rock in the pit and its encapsulation within non-acid generating clays in the disposal facility. This isolates the material from air and water and, thereby, minimizes the formation of acid leachate.

Dump under-drains deliver what little leachate is formed to a pumpback system which returns the water to the grinding circuit. Storm water runoff from the active dump surfaces is routed through a series of sediment control ponds, settled and discharged or pumped back for reuse, depending on its quality. Runoff from reclaimed surfaces is discharged. Closure and reclamation of each dump lift occurs at the earliest opportunity.

The McLaughlin acid rock drainage management program has effectively eliminated this source of potential pollution. Downstream water quality and aquatic ecology remain unchanged from pre-mine conditions.

2.7.2 Reclamation

Baseline environmental studies were used to characterize the pre-mining conditions of the mine-site and its surroundings. Both the environmental constraints and opportunities inherent in the site were documented in order that facilities could be optimally planned and located to avoid sensitive areas.

The proposed post-mining land use of the site was established, and the final condition of those areas to be disturbed by the project identified. Facility siting, construction, utilization, and closure plans were established to assure consistency with the closure and reclamation objectives. Reclamation activities were scheduled to occur at the earliest opportunity, assuring the progressive reclamation of the site, minimizing exposed disturbed areas, and accelerating the reestablishment of usable habitat.

Post-Mining Land Use

At the conclusion of mining, the McLaughlin mine will become an approximately 10,000-acre environmental studies field station. An evaluation of post-mining assets revealed that a valuable educational resource would result from the project in the form of the accumulated environmental baseline and monitoring data. In addition, the mine's laboratory, offices, shops and other physical improvements will become available for field station use. The station, to be managed by the University of California, will be available for use by regional public schools and colleges, as well.

Site Reclamation

Physical reclamation of the site is designed to minimize erosion and to stabilize disturbed areas with a permanent, diverse vegetative cover which will support local wildlife populations. Suitable soils from disturbed areas throughout the project have been identified and stockpiled for reclamation use. Priority is assigned to the closure and revegetation of the waste rock and tailings disposal areas. Substantial portions of the mine pit have been backfilled, with the remaining portion reclaimed as a lake or waterbody. The highwall benches will be planted with native trees and shrubs to provide habitat for raptors and other cliff dwellers.

Revegetation

Resoiled areas are hydroseeded using a mix of grasses and clovers naturally occurring in the area. Seeded slopes are mulched with blown straw to protect the seed and prevent erosion until the grasses can become established. Once reclaimed areas have been stabilized, native woody plants are introduced to provide habitat diversity. Reclamation is conducted concurrently with mining, and not deferred to the end of the life of the mine. The reclamation of the site is guaranteed by a twelve-million dollar letter of credit payable to the local, state and federal governments.

2.7.3 Stewardship

The McLaughlin mine utilizes but a small portion of the lands owned and managed by Homestake. Production of the gold resource makes it possible for the company to restore and enhance the wildlife habitat on over 8,500 acres of buffer lands. Contaminants from three abandoned historic mercury mines have been removed and their sites reclaimed. A Contiguous Lands Management Plan provides for the restoration of the property's ecosystems. A program to provide protected roosting habitat for the threatened Townsend's big-eared bat has been implemented. In short, the mining project provides the opportunity and the economic support for the restoration of an area substantially abused, not only by historic mercury mining, but also over-grazing and illegal hunting.

The fresh water reservoir constructed to provide water to process the McLaughlin ore impounds sufficient winter runoff not only to meet the mine's requirements, but also to provide significant new wildlife habitat. Monitoring reveals extensive use of the new reservoir by both resident and migratory waterfowl. A nearby herd of endangered tule

elk have expanded their range to use the reservoir margins. Winter roosting bald eagles are seen daily stalking the waterfowl and golden eagles have begun to establish a nest nearby. Bear and mountain lion, along with more common predators such as bobcats and coyotes, are frequent visitors. Deer populations, and those of many small mammals, have also grown.

2.8 References

(Items shown in bold face are included in Appendix 2. All other listed references have been separately filed with the WDNR.)

Reference No.	File/Publication Source	Type	Title	Author	To	Date	Remarks
McL-1	Homestake Mining Company	Report	McLaughlin Mine, General Information Summary	Homestake Mining Company	Public Document	1997	
McL-2	**Society of Mining Engineers**	**Paper**	**Environmental Management at Homestake's McLaughlin Mine**	**Raymond E. Krauss Homestake Mining Company**	**Society of Mining Engineers Preprint No. 90-23**	**2/1990**	
McL-3	**Colorado Mining Assoc.**	**Paper**	**Acid Mine Drainage at the McLaughlin Mine**	**Tim Janke Homestake Mining Company**	**Conference Presentation**	**9/1989**	
McL-4	**Proceedings: Pollution Prevention in Mining Conference, Snowmass CO**	**Paper**	**Pollution Prevention in Mining, Homestake Mining Company's McLaughlin Mine, A Case Study**	**Raymond E. Krauss Homestake Mining Company**	**Conference Proceedings**	**8/1993**	
McL-5	Society of Mining Engineers	Paper	Environmental Success at Homestake Mining Company's McLaughlin Mine	R.E. Krauss Homestake Mining Company	Society of Mining Engineers Preprint 97-305	2/1997	
McL-6	**Congressional Record**	**Remark**	**Tribute to Homestake Mining Co.**	**Hon. Vic Fazio Congressman**	**House of Representatives**	**6/1984**	
McL-7	Sonora Union Democrat	Article	One Mine Pleased the Sierra Club	Lois Nielsen Sonora Union Democrat	News Article	6/1985	
McL-8	**Solano Irrigation District**	**Memo**	**McLaughlin Mine Tour: Solano Irrigation District/Homestake Mining Company, Water Quality Protection Agreement**	**Brice Bledsoe Solano Irrigation District**	**Solano Irrigation District Directors Managers and Water Users**	**4/29/94**	
McL-9 to McL-20	**Napa County Conservation, Development and Planning Department**	**Staff Reports**	**Review of the Homestake Mining Company, McLaughlin Mine, Annual Environmental Monitoring Reports 1984-85 through 1995-96**	**Napa County Staff**	**Regulatory Agencies and Interested Public**	**5/85 to 2/97**	
McL-21	**Regional Water Quality Control Board**	**Letter Report**	**Hunting Creek Aquatic Ecology Monitoring Program Interim Report, April 1994**	**Dr. Peter G. Connors University of California, Davis**	**Regional Water Quality Control Board**	**4/24/94**	
McL-22	Economic Geology Vol 90, 1995, pp 2156-2181	Journal Article	Origin of the McLaughlin Mine Sheeted Vein Complex: Metal Zoning, Fluid Inclusion, and Isotopic Evidence	Dr. Ross L Sherlock, et al University of Ontario, Waterloo	Economic Geology Publication	1/1995	
McL-23	United States Geologic Survey, MRDS Database	Database	RECNO W700452	Matthew E. Paidakovich United States Geologic Survey	United States Geologic Survey Publication	11/93	
McL-24	United States Geologic Survey	Article	Precious Metal Mineralization in a Fold and Thrust Belt: The McLaughlin Hot Spring Deposit, Northern California	R.M. Tosdal, N.J. Lehrman, et al	Geological Society of Nevada Symposium Publication	9/22/94	
McL-25	**Regional Water Quality Control Board**	**Permit**	**Order No. 94-315, Waste Discharge Requirements for Homestake Mining Company of California, McLaughlin Mine, Lake, Napa and Yolo Counties**	**Regional Water Quality Control Board**	**Homestake Mining Company and Public**	**11/94**	
McL-26	**Regional Water Quality Control Board**	**Permit**	**Order No. 94-159, NPDES No. CA 0081477, Waste Discharge Requirements**	**Regional Water Quality Control Board**	**Homestake Mining Company and Public**	**5/1994**	

Reference No.	File/Publication Source	Type	Title	Author	To	Date	Remarks
			for Homestake Mining Company of California, McLaughlin Mine, Lake, Napa and Yolo Counties				
McL-27	Regional Water Quality Control Board	Permit	Revised Monitoring and Reporting Program No. 94-315, for Homestake Mining Company of California, McLaughlin Mine, Lake, Napa, and Yolo Counties	Regional Water Quality Control Board	Homestake Mining Company and Public	5/1996	
McL-28 to McL-45	Regional Water Quality Control Board	Inspection Reports	California Regional Water Quality Control Board, Central Valley Region, Inspection Reports	Regional Water Quality Control Board	Homestake Mining Company and Public	2/85 - 12/98	
McL-46	Regional Water Quality Control Board	Letter	Homestake Mining Company, McLaughlin Mine - Lake, Napa and Yolo Counties	Greg K. Vaughn Regional Water Quality Control Board	Ray Krauss Homestake Mining Company	6/4/86	
McL-47 to McL-70	Regional Water Quality Control Board	Letters	Homestake Mining Company Upset Notifications and Related Reports	Homestake Mining Company	Regional Water Quality Control Board	5/85 – 7/98	
McL-71 to McL-78	Department of Conservation	Inspection Reports	Surface Mining Inspection Reports 1991-1998	Napa, Lake and Yolo County and BLM Staff	Department of Conservation	10/91 - 4/98	
McL-79	Wildlife Habitat Council	Bulletin	Homestake Mining Company's McLaughlin Mine: A Successful Example of Adaptive, Ecology-Based Habitat Management Planning	Raymond E. Krauss Homestake Mining Company	Habitat Quarterly Volume 1 - Number 1	11/1996	
McL-80	Bat Conservation International	Article	Help for Townsend's Big-Eared Bats in California	Elizabeth D. Pierson	Bat Conservation International	1990	
McL-81	Regional Water Quality Control Board	Report	Homestake Mining Company, McLaughlin Mine, Environmental Monitoring Manual	Homestake Mining Company		3/1997	
McL-82	Lake County Record Bee	Article	The Greening of McLaughlin Mine	Kieth Bowers	News Article	2/1992	
McL-83	Clear Lake Observer	Article	Homestake Gets National Environmental Award		News Article	2/1992	
McL-84	Mining World news	Article	The McLaughlin Mine: Environmental Planning at its Best	G.S. Elliot	News Article	3/1991	
McL-85	Mining Engineering	Article	Reclamation Practices at Homestake's McLaughlin Mine	Raymond E. Krauss		11/1990	
McL-86	High Desert Museum	Paper	The McLaughlin Mine: A 21st Century Model	Raymond E. Krauss	Chiles Award Paper	12/1993	

SECTION 3

CULLATON LAKE MINE

NORTHWEST TERRITORIES, CANADA

3.0 THE CULLATON LAKE MINE - N.W.T., CANADA

3.1 Introduction

The Cullaton Lake mine is an example of a closed mine meeting the criteria listed in Wis. Stats. § 293.50:

- § 293.50(2)(a) - Sulfide ore body with net acid generating potential: Yes. The Cullaton Lake deposit contains substantial sulfide mineralization, and testing of tailings indicates net acid generating potential.

- § 293.50(2)(a) - Has operated for at least 10 years without the pollution of groundwater or surface water from acid drainage or the release of heavy metals: Not Applicable. The Cullaton Lake mine was developed and operated over a span of nine years in compliance with its environmental permits.

- § 293.50(2)(b) - Has been closed at least 10 years without the pollution of groundwater or surface water from acid drainage or the release of heavy metals: Yes. The operation closed in 1985. There are no records of disqualifying post-closure environmental proceedings, violations, actions or orders with respect to acid drainage or the release of heavy metals.

- § 293.50(2m)(a) - Not listed on the NPL: Yes. This Canadian site has not been listed on the NPL or any Canadian equivalent.

- § 293.50(2m)(a) - Operator or successor still in business: Yes. The Cullaton Lake mine is owned by Homestake Canada Inc., which is still in business.

- § 293.50(2m)(b) - Significant environmental pollution: None. Based on annual environmental reports, regulatory inspections and oversight, there is no record of any significant environmental pollution from this mining operation.

3.1.1 Project Overview

The Cullaton Lake Gold Mines Ltd. property (the "Cullaton Lake mine") is located in the southern part of the District of Keewatin in the Northwest Territories. The property is about 250 km west of Arviat, NWT, 416 km northwest of Churchill, Manitoba, and 620 km north of Thompson, Manitoba (Figure 3-1). The site is located southwest of Cullaton Lake and northwest of the Kognak River (Figures 3-2 and 3-3). This general area is at the tree line and is in an area of continuous permafrost, being approximately 100 km north of the southern limit of continuous permafrost (see Johnston, G.H., Permafrost Engineering Design and Construction, John Wiley & Sons [1991]). O'Brien Gold Mines began underground mine development in 1976. After receiving $25 million (C) in loans from Inuit

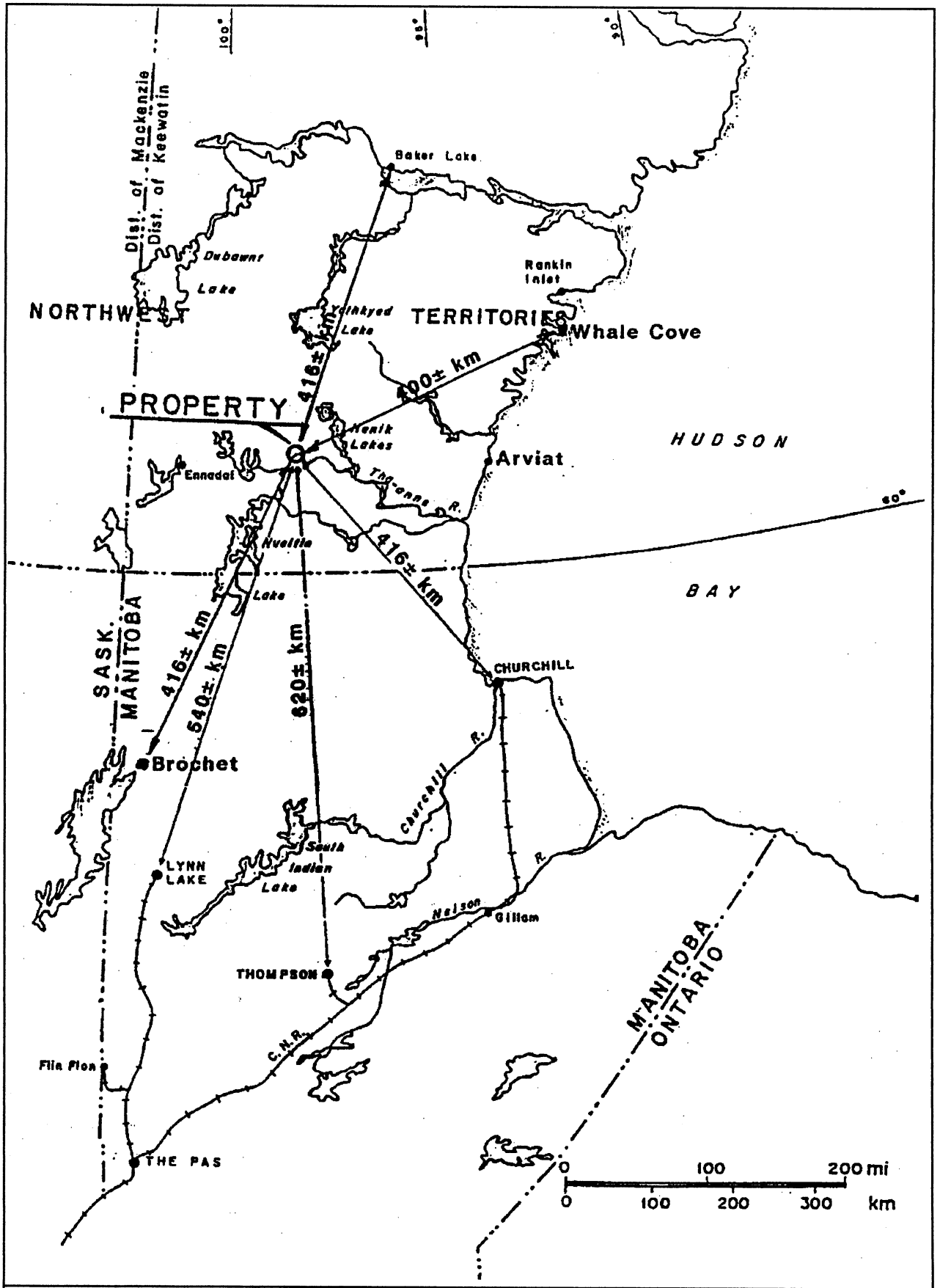


FIGURE 3-1
LOCATION MAP FOR CULLATON LAKE MINE
(from Reg. Doc. C-14)



FIGURE 3-2
TOPOGRAPHICAL MAP OF CULLATON LAKE MINE
(from Reg. Doc. C-14)

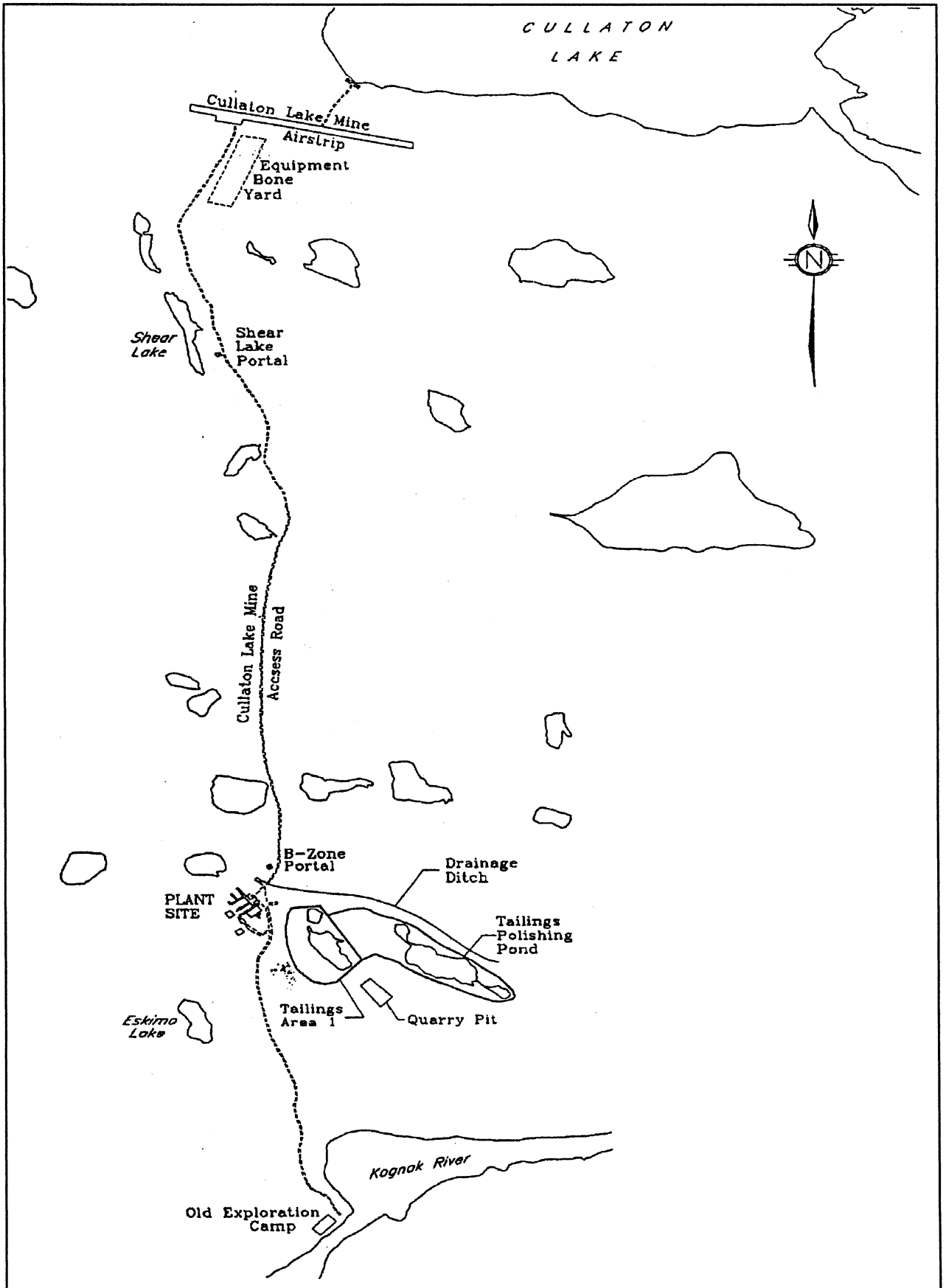


FIGURE 3-3
OVERALL SITE PLAN OF CULLATON LAKE MINE
(from Reg. Doc. C-42)

Development Corporation (later, the Nanusi Corp.), representing some 13,500 Canadian Eskimos, Cullaton Lake Gold Mines Ltd. completed construction of on-site mill facilities. Milling occurred from October 1981 to the end of operations in September 1985, and produced 100,000 ounces of gold. The present owner, Homestake Canada Inc., acquired the property in 1993.

The ore milled at the site came from two distinct ore bodies, namely the B and Shear Zones. A total of 383,000 tonnes of ore was processed at the mill, of which 150,000 tonnes came from the B-Zone, and the balance of 233,000 tonnes from the Shear Zone. The B-Zone is located near the mill site, and the Shear Zone is located approximately 5 km to the north (Figure 3-3). The B-Zone and Shear Zone were developed using conventional underground mining methods. The B-Zone was mined first, and much of the waste rock was used for road and containment dam construction (the remainder being deposited near the B-Zone decline portal). The Shear Zone was mined in the latter years of operations, and waste rock from that portion of the mine was deposited near the Shear Zone decline portal (C-42).

Access to the B-Zone and Shear Zone mine workings was by declines starting at portals in bedrock outcrops. There was no water discharge from the mine workings, either during operation or during the closure period.

During operations, tailings were discharged to Tailings Pond No. 1, with an overflow to an adjacent polishing pond. (This polishing pond is referred to in most of the regulatory documents as Tailings Pond No. 2, even though it was not used for disposal of tailings.) Effluent was decanted from the polishing pond in batches when discharge criteria for cyanide were met, and directed to an area of marshland east of the pond. The effluent eventually reported to the Kognak River about one km east of the discharge point.

In 1985, at the start of the closure period, the water level in Tailings Pond No. 1 was lowered periodically by siphoning water into Tailings Pond No. 2. Each summer from 1985 to 1987, water was discharged in batches from Tailings Pond No. 2 to the downstream marshland. After 1988, discharge from Tailings Pond No. 2 was by gravity overflow. As part of reclamation work in 1992, a permanent discharge spillway was constructed at Tailings Dam No. 2.

To prevent possible generation of acidic leachate, reclamation of the tailings area involved two oxygen-limiting methods: a water cover over the eastern portion of the tailings, and a till/mine-rock cover on the remaining beach of the Shear and B-Zone tailings. The till/mine-rock cover was intended to reduce the oxidation rates in the tailings and, secondarily, to raise the level of permafrost in the tailings (C-7 [Appendix 3]). [12]

Reclamation work was carried out at Tailings Pond No. 1 in 1991/1992. This work consisted of covering the exposed tailings beach (representing 20 percent of the tailings

---

[12] Reference notations followed by "[Appendix 3]" are included in the Appendix for this section, which is bound with this report. All other numbered references are separately filed.

impoundment area) with 1.4 m of mine-rock/till, lowering and flattening the dam, and developing a permanent discharge spillway at elevation 93.3 m. The remaining eighty percent of the tailings impoundment area is permanently flooded by Tailings Pond No. 1. Runoff water from Tailings Pond No. 1 flows over the permanent spillway into Tailings Pond No. 2, from Tailings Pond No. 2 to the marshland, and then to the Kognak River.

Progressive reclamation of the mine site has continued since 1991/1992, with final reclamation to be completed in 1998. All buildings and debris around the drill camp were removed by 1993, and portions of the mill buildings were dismantled in 1995. In 1996, the remaining mill buildings were dismantled. In 1997, the establishment of vegetation was initiated on the soil cover over the tailings in Tailings Pond No. 1.

3.1.2 Information Reviewed

The Cullaton Lake Mine is regulated under Water License N6L2-0940, currently administered by the Nunavut Water Board. Regulatory documents related to this water license are available from the Nunavut Water Board, located in Gjoa Haven, in the eastern portion of Northwest Territories. These files are related to the application, approval and management of water licenses, and include annual company reports on the site water license, and annual inspection summaries by a government inspector. Files at that location were lost in a recent fire (1997), and were replaced with copies of relevant files from other government agencies. Portions of the inspection files (dating back to 1981) of the Water Resources Division, Department of Indian and Northern Affairs (DIAND) that had been received from, or copied to, the Nunavut Water Board, were reviewed in the Yellowknife office of DIAND. Additional records are maintained by the Northwest Territorial government and these records were obtained and reviewed. The documents from the available files are listed in Section 3.8.

All of the documents referred to above are associated with the Nunavut Water Board (a regulatory body established under the Nunavut Land Claims Agreement) or its predecessor, the Northwest Territories Water Board (established under the Northwest Territories Water Act, with members appointed by the Canadian Minister of Indian and Northern Affairs). Federal regulatory documents also exist for the Cullaton Lake mine. The entire federal file has yet to be examined because such records are available only through the Access to Information Act. Formal requests have been made but, due to the lengthy processing time involved, relevant federal documents remain unavailable at the time of this submission. Nonetheless, officials from Environment Canada's Environmental Protection Service have indicated that there are no outstanding environmental issues related to this mine. Thus, we do not expect to find any disqualifying evidence or data in the federal files.

3.1.3 Agency Contacts

The following key individuals were contacted to obtain information for this submission:

NAME	AGENCY	PHONE	ADDRESS
Philippe di Pizzo Executive Director	Nunavut Water Board	867-360-6338	Nunavut Water Board P.O. Box 119 Gjoa Haven, NT X0E 1JO Canada
Neill Thompson Head, Regulatory Affairs	Water Resources Division, Department of Indian and Northern Affairs	867-669-2653	Water Resources Division Department of Indian and Northern Affairs P.O. Box 1500 Yellowknife, NT X1A 2R3 Canada
Rosaline Frith Director, Environmental Assessment Branch	Environmental Protection Service Environment Canada	819-953-1690	Environmental Protection Service Environment Canada 351 Blvd. St. Joseph, 17th Floor Place Vincent Massey Hull, Quebec K1A 0H3 Canada

3.2 Geologic Criteria

3.2.1 Sulfide Ore Body

As noted above, Cullaton Lake has two separate ore bodies identified as the B-Zone and the Shear Zone. Both contain substantial sulfide mineralization. The geology of the B-Zone and Shear Zone deposits is summarized in C-27 [Appendix 3] and C-40 [Appendix 3]. (The geology of the B-Zone gold deposit has also been studied by Charles Page [see Page, Charles, "The Geology of the Cullaton Lake B-Zone Gold Deposit, Northwest Territories," Masters Thesis, University of Waterloo, Ontario (1983)]. The following summary of the geology of the Cullaton Lake gold deposit is based on the above-referenced information.

The Cullaton Lake B-Zone deposit is a gold-bearing iron formation in a turbiditic sedimentary basin which forms part of the Rankin Inlet-Ennadi Archean greenstone belt in the Keewatin District of the Northwest Territories. The belt consists of clastic sediment (turbidites), pillow lavas and iron formations. The B-Zone iron formation consists of four distinct facies, namely carbonate, silicate, oxide and sulfide. The sulfide facies is found within, or bordering, the oxide facies and ranges in thickness from 0.6 to 17.5 m.

Gold mineralization in the B-Zone is confined to the sulfide facies iron formation in the sedimentary sequence, and tends to be strata-bound. Pyrrhotite and pyrite are the dominant sulfides, with lesser amounts of arsenopyrite and chalcopyrite. Sulfide-rich beds of the iron formation are interlaminated with gangue material. Gold (as fine anhedral grains 3

to 80 microns in size) occurs in the sulfide iron formation in three forms: (1) within the gangue material; (2) at sulfide grain boundaries; and (3) as inclusions in sulfides.

The Shear Zone is located in a discontinuous ridge outcrop of orthoquarzite, slate, shale and siltstone. Gold occurs in the fractured and sheared orthoquarzite. Mineralization is found in altered shear and breccia zones, pyritic shears, and impure quartzite containing pyrite and sericite. Typically, the orthoquarzite is composed of 97 percent or more quartz, with only scattered sericite, feldspar and magnetite. Less pure quartzites occurring in the lower part of the unit are commonly sheared and contain sericite and pyrite. A greywacke underlies the orthoquartzites with a conformable contact. The thinly bedded shale, slate and siltstone unit occurs stratigraphically above the orthoquarzite and the contact area is an interbedded transition zone of siltstone and quartzites with strong hematitic staining.

The altered shear zones are extensive and related to the regional structural patterns. Alteration products common to most zones are saponite, limonite, and hematite with occasional chlorite, epidote and sericite. The unaltered shear zones, consisting of closely spaced pyrite-filled fractures, are also gold bearing. A different type of gold mineralization was observed in the impure sheared sericitic quartzite consisting of 5 to 15 percent pyrite (8 percent average), ranging from disseminated to semi-massive in places. A characteristic feature of the gold bearing zones is a pyritic halo extending from 0.5 to 6 m. The pyrite content averages 2 to 3 percent, but can be as much as 15 percent. Generally, the pyritic halo has a low gold content.

3.2.2 Net Acid Generating Potential

A 1991 report prepared by the Canada Centre for Mineral and Energy Technology (CANMET) addresses the acid generation potential of the Cullaton Lake mine's tailings (C-27 [Appendix 3]). The CANMET report is based on a 34-week long kinetic column leaching study in which two columns for each of B- and S[Shear]-Zone tailings (i.e., four columns total) were set up. The column dimensions were 12.5 cm in diameter and 80 cm long. The columns were leached for 34 weeks, with leachate collected and analyzed weekly.

The CANMET study revealed that the column leaching kinetic tests confirmed the results of the static acid-base accounting tests which indicated the tailings are reactive and have a negative net neutralization potential. The study shows that the B-Zone tailings have greater acid generating potential than the S[Shear]-Zone tailings. Conclusions from the CANMET study include the following:

> "The tailings were significantly reactive and oxidized readily. Decommissioning and acid mine drainage control measures should include oxygen and/or moisture retention barriers. Disposal options incorporating permanent saturation under a water cover or permafrost throughout the entire depth of tailings are believed to be suitable and should be further evaluated for their economic feasibility".

Acid-base accounting tests were also performed on samples of Cullaton Lake waste rock to evaluate their acid generating characteristics. While some samples were found to be reactive, the tests showed the waste rocks as a whole were not acid generating. Thus, kinetic leaching tests similar to those for the tailings were not deemed necessary (C-37 [Appendix 3]).

The geochemical data reviewed indicates that the tailings derived from the ore bodies, and some portion of the associated waste rock, have a net acid generating potential. Thus, there was a significant risk of an acid drainage problem at this site without the control and reclamation measures which have been implemented.

3.3 Ten-Year Operating Criteria

NOT APPLICABLE

The Cullaton Lake mine was developed and operated between 1976 and 1985, a period of 9 years.

3.4 Ten-Year Closure Criteria

The Cullaton Lake mine has been closed since 1985, i.e. 13 years to date. The current water license, N6L2-0940, was renewed on September 1, 1995, and is effective until August 31, 1999 (C-7 [Appendix 3]). This license is currently administered by the Nunavut Water Board. That Board's files indicate that the Cullaton Lake mine has had a good environmental record since closure, with no pollution violations as defined by Wisconsin's new statutory criteria. Similarly, there is no record of disqualifying proceedings, actions, citations, orders or corrective action agreements.

As discussed in Section 3.1.2., the owners and operators of the Cullaton Lake mine have submitted Annual Water Licence Reports to the Northwest Territories Water Board since the beginning of operations. The water quality monitoring data summarized in these reports indicate compliance with water quality requirements and show that parameter concentrations have exhibited a stable or decreasing trend since mine closure. In 1993, in response to the stable conditions indicated by seven years of water quality monitoring results, the Water Board authorized a reduction in the frequency of monitoring requirements, and approved an amendment to the monitoring plan, known as the Surveillance Network Program, or SNP (C-42).

DIAND regulatory personnel have inspected the Cullaton Lake mine site on a regular basis, and have routinely collected water samples. The Water Board file includes results from the DIAND inspections and water quality sampling efforts. The DIAND inspection reports indicate that "all discharges were well within licence limits" (see, e.g., the August 17, 1996 inspection report at C-7 [Appendix 3], the October 12, 1995 letter from Nunavut to Homestake regarding the samples collected by the DIAND inspector on August 22, 1995 at C-10 [Appendix 3], and the October 25, 1994 letter from DIAND to Homestake regarding the samples collected by the DIAND inspector on June 21, 1994 and August 9, 1994 at C-12).

As described in the Final Abandonment and Restoration Plan prepared in March 1996 (C-42), there is no evidence of acid generation in the tailings area, in either pore water or pond water. The tailings closure measures have proven to be effective in preventing acid generation in the tailings.

In summary, the available files reviewed for the Cullaton Lake mine do not reflect any pollution violations as defined by Wisconsin's new statutory criteria. Similarly, there is no record of disqualifying proceeds, actions, citations, orders or corrective action agreements.

3.5 Responsible Party Criteria

Corona Corporation purchased Cullaton Lake Gold Mines Ltd. from Royex Gold Mining Corporation in 1988. Homestake Canada Inc. (Homestake) acquired the assets of Corona Corporation in 1993, including the Cullaton Lake mine. Homestake Canada Inc. is currently in business with the following home office address:

Homestake Canada Inc.
P.O. Box 11115
1100 - 1055 West Georgia Street
Vancouver, B.C. V6E 3P3
Phone: 604-684-2345

The Cullaton Lake mine is not on the U.S. National Priorities List (NPL), nor on any Canadian equivalent.

3.6 No Significant Environmental Pollution

3.6.1 Water Quality

Relevant water quality data for evaluation of potential environmental pollution during operation and closure consist primarily of the results of a monitoring program carried out in compliance with the water license for the project. The results of the monitoring program at the Cullaton Lake mine are contained in the annual water license reports submitted with respect to Water License N6L2-0940. Annual reports have been submitted each year in compliance with the water license. The site was also generally inspected and sampled once each summer by a government inspector.

While all annual reports are available for review, those for 1984, 1991, 1995 and 1996 (C-33, C-21, C-10 and C-7, respectively [all in Appendix 3]) are referenced here as representative of the data gathered and reflect the degree of monitoring in effect at various times during operation and closure. Before installation of the permanent spillways in Tailings Dams No. 1 and 2 during the reclamation work, water was released in batches. During this period of batch water release, monitoring of the discharge was typically conducted daily during the summer when effluent was syphoned from the tailings impoundment. This generally occurred over two one-week periods in July and/or August. Monitoring during batch release also included water sampling at the point where the drainage from the tailings

area discharged to the Kognak River. Monitoring was also conducted on any seepages noted, various locations in each of the ponds, and diversion ditches near the tailings impoundment. Since post-closure water discharge was modified from batch release to spillway overflow, semi-annual surface water quality monitoring has been undertaken at six sites, once in the late spring and once again after August 1. This change in monitoring protocol was formally incorporated as part of a water license renewal in 1995.

The 1984 annual report (C-33 [Appendix 3]) shows typical monitoring results applicable to batch water discharge of 45 million gallons of effluent from Pond No. 2 in October and November of 1984. The concentrations of cyanide and metals are in full compliance with the effluent water quality requirements in License N6L2-0940. Those requirements are summarized in the attachments to C-10 [Appendix 3].

The 1991 annual report (C-21 [Appendix 3]) also gives typical monitoring results applicable to batch water discharge of effluent from Pond No. 1 in June and July 1991. With respect to discharge from Pond No. 1, the report indicates that "Water quality [is] stable and very good. Contaminant levels [are] much lower than maximum acceptable levels."

The 1995 and 1996 annual reports (C-10 [Appendix 3] and C-7 [Appendix 3]) give typical monitoring results applicable to gravity overflow of water from the tailings impoundment. Those water quality data show the concentrations to be well within the limits in the water license.

3.6.2 Analysis

A primary issue of concern during the operation of the mine was the control of cyanide used for the extraction of gold from milled ore using a conventional cyanide leach/carbon-in-pulp process. Periodic planned decants from the tailings containment area (Tailings Pond No. 1) and from the polishing pond (Tailings Pond No. 2), in combination with natural degradation, achieved the required effluent quality during operations. After mine closure and mill shutdown, effluent quality has shown continuous improvement from 1986 to 1991 (C-21 [Appendix 3]), with concentrations being far below the licensed discharge limit requirements.

Monitoring of the water quality in the drainage course downstream of the tailings impoundment (at the confluence with the Kognak River) during batch discharge over two one-week periods in 1991 indicated no significant increase in metals during the discharge period (C-21 [Appendix 3]).

None of the several spill incident reports on file (C-41) with the Northwest Territorial government reflect "significant environmental pollution" from releases of acidic drainage or heavy metals, and none of those incidents resulted in enforcement actions or regulatory sanctions.

There are no requirements for groundwater monitoring at the Cullaton Lake mine because the Cullaton Lake mine is in an area of deep and continuous permafrost and, as such, there is no significant large-scale groundwater movement. Therefore, potential impacts

to groundwater would not be expected and, if any were to occur, would be extremely localized.

3.7 Assessment of Technology

The fundamental strategy of eliminating oxidation potential to control acid drainage from the tailings at the Cullaton Lake mine is comparable to that envisioned for the Crandon mine. The technology used at the Cullaton Lake mine prevents (or reduces to an insignificant level) the oxidation of the sulfide tailings by limiting access of oxygen to the tailings. That is achieved by maintaining an oxygen barrier over the tailings in the form of a permanent water cover for 80 percent of the tailings area, and a soil cover over the remaining 20 percent of the tailings area. It is significant to note that one of the key findings of the MEND (Mine Environmental Neutral Drainage) program in Canada was that prevention of oxidation is the best strategy for management of reactive waste materials from new mines. The Crandon project incorporates exactly that fundamental strategy of preventing the oxidation of potentially reactive mine waste materials by removing the pyrite from the tailings and incorporating it in the cemented paste backfill for redeposition in mined-out workings (which ultimately will be permanently reflooded).

3.8 References

(Items shown in boldface are included in Appendix 3. All other listed references have been separately filed with the WDNR.)

Reference No.	File/ Publication Source	Type	Title	Author	To	Date	Remarks
C-1	WRD DIAND	Letter/ Data	Cullaton Lake Water License N6L2-0940	Sharon Meyer, Environmental Analyst, Homestake Canada Inc.	Paul Smith, Water Resources Officer, DIAND, Nunavut District	14-Jul-98	June water sampling program data
C-2	WRD DIAND	Report	Cullaton Lake Gold Mines Ltd. - Annual Water License Report 1997	Homestake Canada Inc.	Nunavut Water Board	23-Feb-98	1997 Report and covering letter.
C-3	WRD DIAND	Letter	Cullaton Lake Water License N6L2-0940	Sharon Meyer, Environmental Analyst, Homestake Canada Inc.	Philippe di Pizzo, Executive Director, Nunavut Water Board	17-Dec-97	Updated and revised work schedule for final reclamation
C-4	WRD DIAND	Letter	Cullaton Lake 1996 Annual Report - Your Letter of December 22, 1997	Sharon Meyer, Environmental Analyst, Homestake Canada Inc.	Paul Smith, Water Resources Officer, DIAND, Nunavut District	13-Jan-98	Comments on DIAND compliance report with respect to the 1996 Annual Report
C-5	WRD DIAND	Cover Letter	Review of the 1996 Annual Report and 1996 Compliance Report	Paul Smith, Water Resources Officer, DIAND, Nunavut District	Sharon Meyer, Environmental Analyst, Homestake Canada Inc.	22-Dec-97	Data collection deficiencies notes
C-6	**WRD DIAND**	**Attached Report**	**1996 Compliance Report on Conditions of License Number N6L2-0940**	**Paul Smith, Water Resources Officer, DIAND, Nunavut District**	**Sharon Meyer, Environmental Analyst, Homestake Canada Inc.**	**18-Dec-97**	
C-7	**WRD DIAND**	**Report**	**Cullaton Lake Gold Mines Ltd. - Annual Water License Report 1996**	**Sharon Meyer, Environmental Analyst, Homestake Canada Inc.**	**Philippe di Pizzo, Executive Director, Nunavut Water Board**	**10-Mar-97**	
C-8	WRD DIAND	Cover Letter	Inspection Report - Water License N6L2-0940 Analytical Water Results - August 17, 1996	Paul Smith, Water Resources Officer, DIAND, Nunavut District	Sharon Meyer, Environmental Analyst, Homestake Canada Inc.	14-Nov-96	
C-9	WRD DIAND	Attached Report	1996 Inspection Report on Conditions of License Number N6L2-0940	Paul Smith, Water Resources Officer, DIAND, Nunavut District	Sharon Meyer, Environmental Analyst, Homestake Canada Inc.	04-Nov-96	
C-10	**WRD DIAND**	**Report**	**Cullaton Lake Gold Mines Ltd. - Annual Water License Report 1995**	**Sharon Meyer, Environmental Analyst, Homestake Canada Inc.**	**Gordon Wray, Chairman, NWT Water Board**	**27-Mar-96**	
C-11	WRD DIAND	Letter Report	Cullaton Lake, Homestake Canada Ltd. - August 22, 1995 Inspection Report - NWT Water Act- Water License N6L3-0940	Dan Elliott, A/District Manager, Nunavut District, DIAND	W. Napier, Director, Environmental Affairs, Homestake Canada Ltd.	11-Sep-95	

Reference No.	File/ Publication Source	Type	Title	Author	To	Date	Remarks
C-12	WRD DIAND	Report	Cullaton Lake Gold Mines Ltd. - Annual Water License Report 1994	W. Napier, Manager, Environmental Affairs, Homestake Canada Ltd.	Gordon Wray, Chairman, NWT Water Board	23-Feb-95	
C-13	WRD DIAND	Letter Report	Cullaton Lake, Homestake Canada Ltd. - August 09, 1994 Inspection Report - NWT Water Act- Water License N6L3-0940	J.M.A. Theriault, District Manager, Nunavut District DIAND	W. Napier, Director, Environmental Affairs, Homestake Canada Ltd.	13-Aug-94	
C-14	WRD DIAND	Report	Cullaton Lake Gold Mines Ltd. - Annual Water License Report 1993	W. Napier, Manager, Environmental Affairs, Homestake Canada Ltd.	Dave Nickerson, Chairman, NWT Water Board	27-Sep-93	
C-15	WRD DIAND	Letter Report	Water License Inspection - Cullaton Lake Project-Water Register No.: N6L3-0940	Dan Elliott, Water Resources Officer, Northern Affairs Program, DIAND	W. Napier, Director, Environmental Affairs, Homestake Canada Ltd.	16-Aug-93	
C-16	WRD DIAND	Report	Cullaton Lake Gold Mines Ltd. - Annual Water License Report 1992	W. Napier, Manager, Environmental Affairs, Homestake Canada Ltd.	Dave Nickerson, Chairman, NWT Water Board	06-Apr-93	
C-17	WRD DIAND	Cover Letter	Cullaton Lake, International Corona - August 20, 1992 Inspection Report - Northern Inland Water Act - Water License N6L3-0940	W. Napier, Director, Environmental Affairs, International Corona Corp.	Floyd Adlem, Director of Operation, Northern Affairs Program, DIAND	16-Sep-92	
C-18	WRD DIAND	Report	Inspection Report on Corona Corp. Cullaton Lake Gold Mine, August 20, 1992	Dan Elliott, Water Resources Officer, Northern Affairs Program, DIAND, Yellowknife	File	21-Aug-92	
C-19	WRD DIAND	Letter	Cullaton Lake, International Corona June 21, 1994 Inspection Report - NWT Waters Act - Water License N6L3-0940	J.M.A. Theriault, District Manager, Nunavut District DIAND	W. Napier, Director, Environmental Affairs, International Corona Corp.	08-Jul-94	
C-20	WRD DIAND	Report	Industrial Water Use Inspection Report - June 28, 1994	Dan Elliott, Water Resources Officer, Northern Affairs Program, DIAND, Yellowknife	File	28-Jun-94	
C-21	**WRD DIAND**	**Report**	**Cullaton Lake Gold Mine Water License N6L3-0940 : Annual Environment Report 1991**	**Garry Biles, Cullaton Project Manager International Corona Corporation**	**Kevin McDonnel, Head, Regulatory Approvals, Water Resources Division, DIAND, Yellowknife**	**27-Feb-92**	
C-22	WRD DIAND	Report	Inspection Report on Corona Corp. Cullaton Lake Gold Mine, Cullaton Lake, NWT.	Murray W. Swyripa, Water Resource Officer, Northern Affairs Program, DIAND, Rankin Inlet, NWT	File	19-Jul-91	

Reference No.	File/ Publication Source	Type	Title	Author	To	Date	Remarks
C-23	WRD DIAND	Report	Cullaton Lake Gold Mine, Water License N6L3-0940: 1990 Annual Report	Rob McCallum Vice President, Operations, Corona Corporation	Dave Nickerson, Chairman, NWT Water Board	28-Feb-91	
C-24	WRD DIAND	Letter Report	Inspection of Cullaton Lake, June 26, 1990	Scott Mitchell, District Manager, DIAND	Bill Napier, Manager, Environmental Affairs, Corona Corp.	27-Jun-90	
C-25	WRD DIAND	Cover Letter/ Report	Cullaton Lake Mine - Annual Report (for 1989) and Abandonment and Restoration Plan	Rob McCallum Vice President, Operations, Corona Corporation	Dave Nickerson, Chairman, NWT Water Board	19-Feb-90	Attached annual report for 1989 only.
C-26	WRD DIAND	Cover Letter/ Report	Corona Corporation, Cullaton Lake, NWT, Water License No. N6L3-0940: Annual Report for 1988.	R. A. McCallum Vice President, Operations Royex Gold Mining Corporation	Glenn Warner, Chairman, NWT Water Board	07-Mar-89	Attached annual report for 1988.
C-27	**WRD DIAND**	**Report**	**Column Leaching Characteristics of Cullaton Lake B and Shear Zone Tailings: Phase 1 - Room Temperature Leaching**	**N.K. Dave, Elliot Lake Laboratory, Canada Centre for Mineral and Energy Technology, Department of Energy Mines and Resources**		**Sep-91**	
C-28	WRD DIAND	Cover Letter/ Report	Royex Gold Mining Corporation, Cullaton Lake, NWT, Water License No. N6L3-0940: Annual Report for 1987	R. A. McCallum Vice President, Operations Royex Gold Mining Corporation	Glenn Warner, Chairman, NWT Water Board	19-Feb-88	Attached annual report for 1987.
C-29	WRD DIAND	Report	Royex Gold Mining Corporation, Water License No. N6L3-0940: Annual Report for 1986.	Royex Gold Mining Corporation	Submitted to the Northwest Territories Water Board, Yellowknife	27-Feb-87	
C-30	WRD DIAND	Report	Cullaton Lake Gold Mines Ltd., Water License No N6L3-0940: Annual Report for 1995.	Cullaton Lake Gold Mines Ltd.	Submitted to the Northwest Territories Water Board, Yellowknife	20-Feb-86	
C-31	WRD DIAND	Cover Letter/ Report	(September 28, 1995) Inspection Report on Cullaton Lake Gold Mines Limited	R. Soniassy, Regulatory Approval, Water Resources Division, DIAND	J. Burns, Controller, Cullaton Lake Gold Mines Limited	10-Oct-85	Attached Inspection Report from September 28, 1985, dated October 9, 1985
C-32	WRD DIAND	Report	Inspection Report on Cullaton Lake Gold Mine	Peter Kusugak and Peter Bannon, DIAND, Rankin Inlet, NWT	File	22-Jul-85	
C-33	**WRD DIAND**	**Cover Letter/**	**Cullaton Lake Gold Mine 1984 Annual Report**	**D.G. Irwin, Engineering Superintendent, Cullaton Lake**	**Northern Affairs Program, Water Resources Division,**	**26-Feb-85**	**Attached annual report.**

Reference No.	File/ Publication Source	Type	Title	Author	To	Date	Remarks
		Report		**Gold Mines Limited**	**DIAND, Yellowknife**		
C-34	WRD DIAND	Cover Letter/ Report	Water License N6L3-0940: Report on Inspection Carried Out August 23, 1984.	R.H. Kury, Administrator, Inland Waters Section, DIAND	Meredith Armstrong, Mine Manager, Cullaton Lake Gold Mines	06-Sep-84	Attached August 23, 1984 inspection report
C-35	WRD DIAND	Cover Letter/ Report	Water License N6L3-0940, Report of Inspection on May 15, 1984	Peter Kusugak, Assistant District Manager, Rankin Inlet, Keewatin District, and Doug Stendahl, Water Quality Officer, Water Resources Division, Yellowknife	Meredith Armstrong, Mine Manager, Cullaton Lake Gold Mines	23-Aug-84	Attached inspection report
C-36	WRD DIAND	Cover Letter/ Report	1983 Annual Report	Don G. Irwin, Engineering Superintendent, Cullaton Lake Gold Mines Limited	Northern Affairs Program, Water Resources Division, Yellowknife, NWT	04-Apr-83	Duplicate copy of annual report, but data tables not attached.
C-37	WRD DIAND	Report	Environmental Inspection (October 25, 1983) of Cullaton Lake Gold Mines Limited: Water License N6L3-0940	David Milburn, Regional Coordinator, Inland Water Yellowknife, and Peter Kusugak, Acting District Manager, Rankin Inlet	File	Undated	
C-38	WRD DIAND	Cover Letter/ Report	1982 Annual Report to the Northwest Territories Water Board License N6L3-0940	M. Armstrong, Mine Manager, Cullaton Lake Gold Mines Limited	Glenn Warner, Chairman, NWT Water Board	11-Mar-83	
C-39	WRD DIAND	Cover Letter/ Report	1981 Annual Report to the Northwest Territories Water Board: License Number N6L3-0940	J. Edward Hewitt, Mine Manager, Cullaton Lake Gold Mines Limited	Neil Bryant, Area Head, Water Resources Division, DIAND, Yellowknife	24-Jan-82	
C-40	**WRD DIAND**	**Report**	**Column Leaching Characteristics of Cullaton Lake B and Shear Zone Tailings: Phase 2 - Cold Temperature Leaching Final Report**	**V. Clulow, Laurentian University, Tamias Associates, with Canada Centre for Mineral and Energy Technology (CANMET), Elliot Lake Laboratory**	**Homestake Canada Inc.**	**01-Jun-96**	
C-41	**N.W.T. Yellowknife**	**Reports**	**Mine Spills**	**N.W.T., Resources Wildlife and Economic Development**			

Reference No.	File/ Publication Source	Type	Title	Author	To	Date	Remarks
C-42	WRD DIAND	Report	Cullaton Lake Gold Mines Ltd. Final Abandonment and Restoration Plan	Homestake Canada Inc.	Department of Indian Affairs and Northern Development and N.W.T. Water Board	March 1996	

SECTION 4

SACATON MINE

CASA GRANDE, ARIZONA

4.0 THE SACATON MINE - CASA GRANDE, ARIZONA

4.1 Introduction

The Sacaton mine is an example of a mining operation that meets all conditions listed in Wis. Stats. § 293.50:

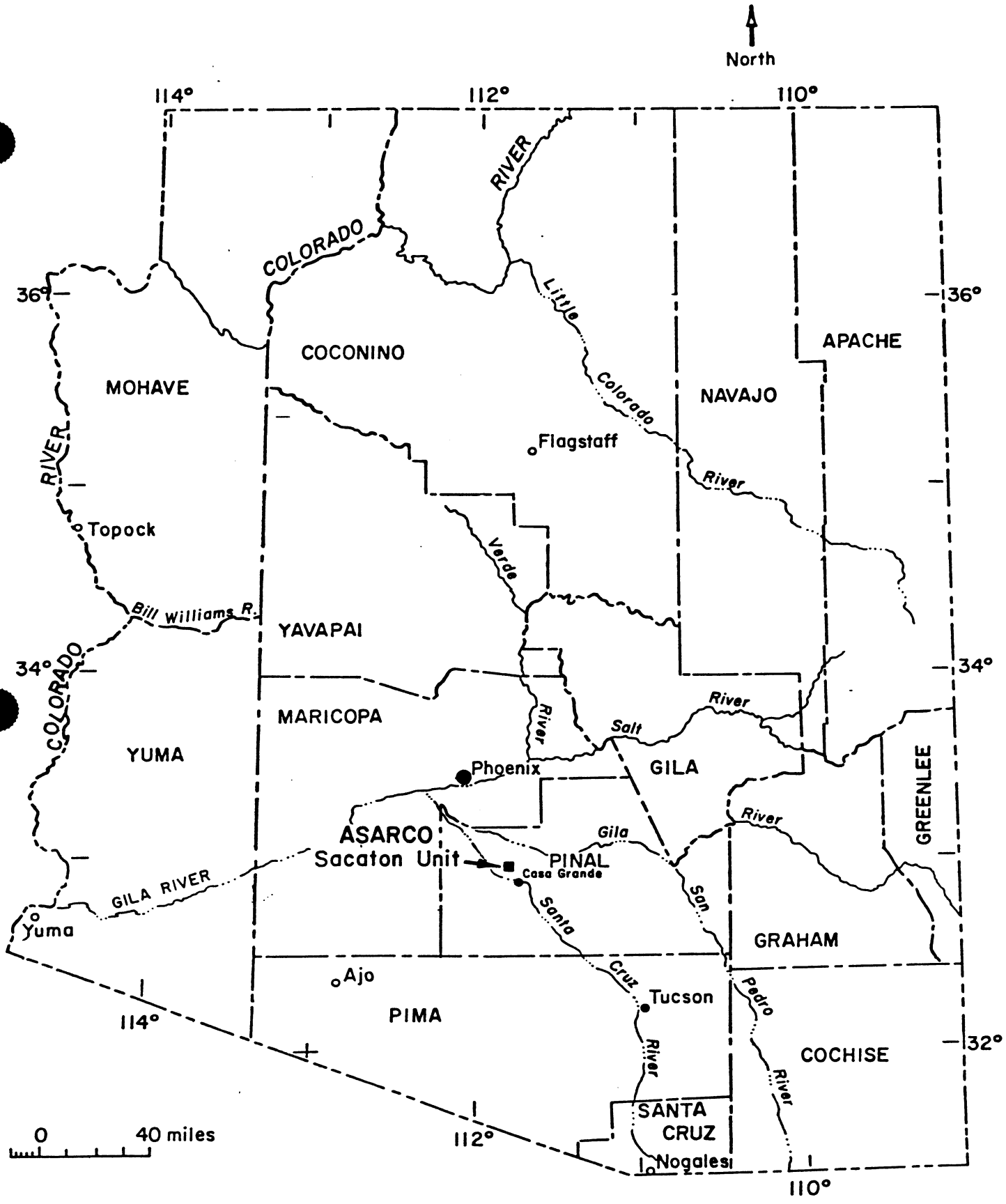
- § 293.50(2)(a) - Sulfide ore body with net acid generating potential: Yes. The mine pit water samples show a pH of 3.8 - 4.1.
- § 293.50(2)(a) - Has operated at least 10 years without the pollution of groundwater or surface water from acid drainage or the release of heavy metals: Yes. The mine operated from 1972 to 1984, a period of 12 years. There were no violations of any applicable environmental laws.
- § 293.50(2)(b) - Has been closed at least 10 years without the pollution of groundwater or surface water from acid drainage or the release of heavy metals: Yes. The operation closed in 1984; it has been closed more than 14 years. There have been no post-closure violations of any applicable environmental laws.
- § 293.50(2m)(a) - Not listed on the NPL: Yes. This site is not (and has not been) so listed.
- § 293.50(2m)(a) - Operator or successor still in business: Yes. ASARCO, Inc., owns the mine and was its operator. ASARCO is still in business.
- § 293.50(2m)(b) - Significant environmental pollution: None. Hydrological information demonstrates there has been no significant pollution of groundwater or surface water associated with this mine.

4.1.1 Project Overview

The ASARCO Sacaton mine is an open pit sulfide porphyry copper mine that operated from initial construction in 1972 until March 1984, when it was closed due to depletion of economic ore reserves. Although referred to by ASARCO as the Sacaton "Unit," it is a discrete and geographically separate mine which was separately permitted. The term "Unit" refers only to the mine's role as a part of ASARCO's overall Arizona operations. The following descriptive information generally is taken from reference AS-40 [Appendix 4] [13] and other public domain documents, as noted.

The mine is located approximately three air miles west of Casa Grande, Arizona, in Pinal County, and approximately 45 miles south-southeast of Phoenix (Figure 4-

[13] Reference notations followed by "[Appendix 4]" included in the Appendix for this Section, which is bound with this report. All other numbered references are separately filed.



Location map of ASARCO Incorporated
Sacaton Unit

Figure 4-1

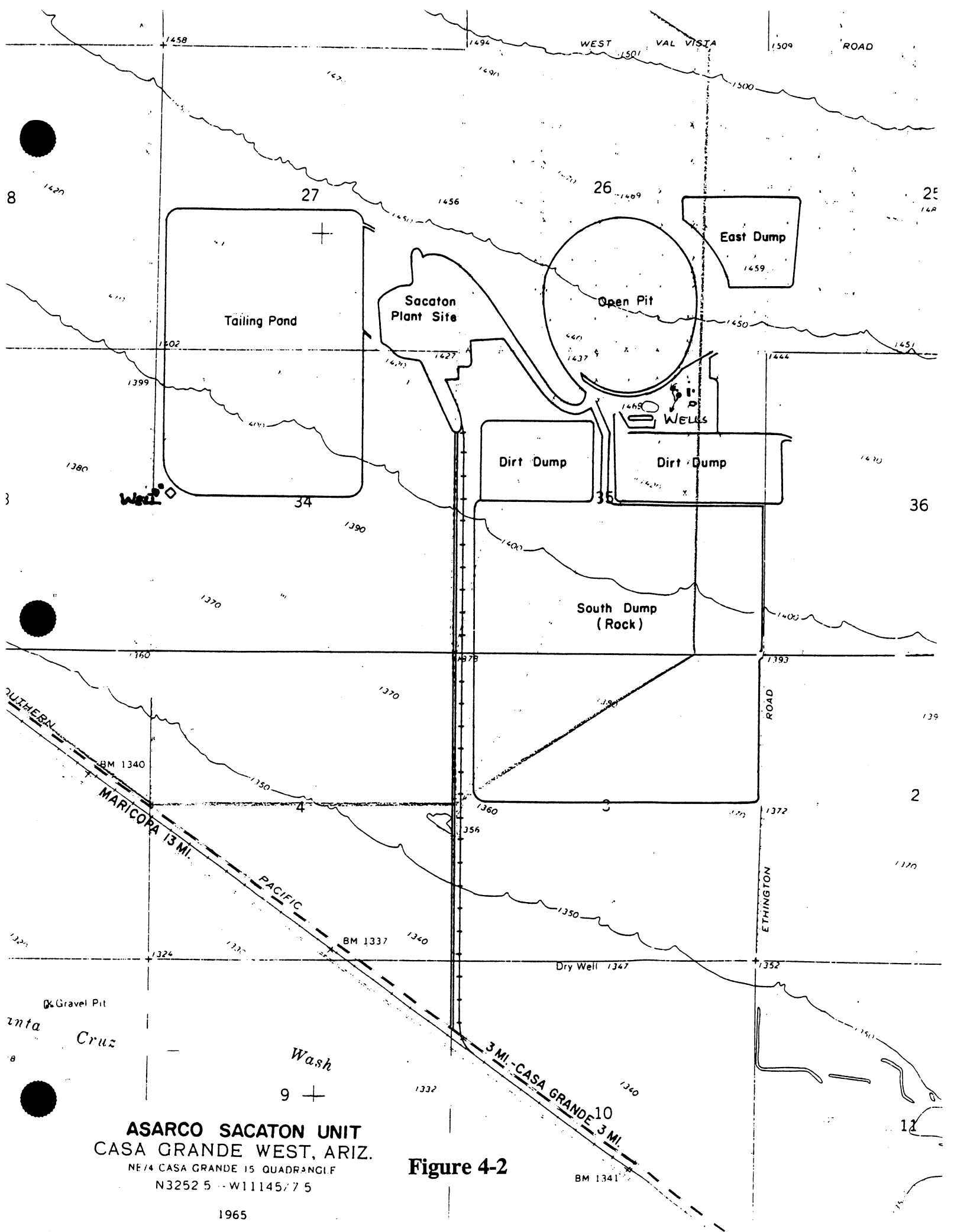
1). Ecologically, the site lies within the Sonoran Desert Section of the Basin and Range Lowlands Province of Arizona in the lower Santa Cruz Basin. As such, the area is characterized by broad, level valley plains, gently sloping pediments, and widely separated mountain ranges. Elevations at the mine vary from approximately 1360 feet msl to 1460 feet msl. Soils at the mine are Typic Natragids-Casa Grande Series, which originated from old, mixed alluvium and are classified as coarse loam in texture. Soils have very low levels of available plant nutrients. Climate at the mine is typical of the Sonoran Desert: temperatures ranging from 19° F to 117° F, with average annual precipitation of 8.6 inches, falling primarily in high-intensity, short-duration events. The mine site contains no surface water resources. Storm run-off waters from the site are drained toward the Santa Cruz River by minor tributaries to the Santa Rosa and Brawley washes. Groundwater flows generally are to the south and southwest and toward the open pit, which acts as a local sump (AS-10 [Appendix 4]).

The land areas south, southeast, and southwest of the mine support large-scale agricultural production, particularly cotton. Agriculture is the principal industry in the vicinity of the mine, although residential encroachment and development is now widespread in and around Casa Grande, a close distance to the east-southeast. Several large light-industrial facilities (including a Frito-Lay plant) have been constructed near the mine since it closed.

The Sacaton open-pit mine is roughly circular, and approximately 3,000 feet in diameter and 980 feet deep (AS-40 [Appendix 4]). During operation, the Sacaton mine consisted of the pit, crushing facilities and coarse ore stockpile, a flotation mill, a tailings disposal facility (TDF) that covered approximately 300 acres, a return water impoundment, an overburden dump, and a waste rock dump that covered approximately 500 acres. Ore reserves at the beginning of operations were estimated to be 33 million tons, and production from the open pit was approximately 11,000 tons per day (AS-42 [Appendix 4]). Although copper was the principal product from the mine, minor amounts of gold, silver, lead, zinc, and molybdenum also were produced.

Concentrates were sent by rail to the ASARCO smelter in El Paso, Texas. During the operating period, ASARCO sank a shaft just east of the pit in an attempt to access deeper ore reserves. Development of the underground mine was suspended, but the headframe remains at the site. Over the 15 years since mine closure, equipment and rolling stock have been removed from the site, the tailings disposal facility embankments have been covered with previously salvaged and stockpiled desert alluvial soil material and revegetated. Additional ASARCO mineral exploration on and around the site has occurred, and site security also has been maintained by full-time security employees.

A facility site map is included as Figure 4-2.



ASARCO SACATON UNIT
CASA GRANDE WEST, ARIZ.
NE/4 CASA GRANDE 15 QUADRANGLE
N32525 - W111457 5
1965

Figure 4-2

4.1.2 Information Reviewed

All pertinent documents on file at the Arizona Department of Environmental Quality (ADEQ)[14] were examined. Because this mine was developed and closed before the enactment of Arizona's Aquifer Protection Permit regulations, those files do not contain the quantity of data typical for more recently permitted mines.

4.1.3 Agency Contacts

The following key individuals were contacted to obtain information for this submission:

NAME	AGENCY	PHONE	ADDRESS
Joanne Williams	Arizona Department of Environmental Quality ("ADEQ")	602-207-4700	3033 N. Central Ave. Phoenix, AZ 85012
Lowell Carty	Arizona Department of Environmental Quality, Superfund Unit	602-207-2300	3033 N. Central Ave. Phoenix, AZ 85012
Pamala Whitfield	Arizona Department of Environmental Quality Superfund Unit	602-207-4457	3033 N. Central Ave. Phoenix, AZ 85012
Nyal Niemuth	Arizona Department of Mines and Mineral Resources	602-255-3795	1502 W. Washington Phoenix, AZ 85012
Bill Hawes	Arizona Mine Inspector	602-542-5971	1700 W. Washington Phoenix, AZ 85012

4.2 Geologic Criteria

4.2.1 Sulfide Ore Body

ASARCO geologists first discovered the Sacaton mineral deposit in the early 1960s while examining an outcrop of leached capping composed of granite cut by several thin monzonite porphyry dikes (AS-40 [Appendix 4], AS-41, AS-42 [Appendix 4], AS-43). The nature of this original find indicated the likely presence of a porphyry copper-type ore body. Following this lead, ASARCO initiated a drilling program which defined copper mineralization zones. The zones were separated by the steeply dipping Sacaton fault. The

[14] Prior to 1987, the ADEQ was known as the Arizona Department of Health Services (ADHS).

west zone contained the ore body which was ultimately accessed through the open pit. The deeper east zone was the target of the shaft referenced in Section 4.1.1.

The Oracle granite is intruded by monzonite and quartz monzonite porphyries within the ore bodies. These porphyries occur as monolithic breccias and mixed breccias as well as thin, well-defined dikes and large poorly defined dike-like intrusive masses. An irregular, pre-mineral breccia with fragments of granite intermixed within the porphyries occupied the center of the mined-out west ore body.

The Sacaton ore bodies exhibit extensive hydrothermal alteration. Alteration minerals include sericite, quartz, chlorite, biotite, and undifferentiated clays. The strongest alteration is coincident with the most intense sulfide mineralization.

As stated in AS-42:

> "Hypogene sulfide mineralization (as pyrite, chalcopyrite, and molybdenite) occurs in veinlets, disseminations, and breccia cavity fillings. All pre-mineral rock types are mineralized. The total sulfide content varies from 1.5 percent to 4.0 percent by volume. The best hypogene mineralization occurs in an arcuate-shaped zone which underlies ore grade supergene mineralization. Within this zone the copper content averages over 0.40 percent as chalcopyrite and the pyrite ratio varies from 1:1 to 3:1.
>
> "Supergene sulfides (chalcocite and minor covellite) occur as replacements of chalcopyrite and pyrite. Supergene mineralization in the west ore body (mined out) is irregular in thickness, configuration, grade, and continuity. The supergene blanket has a gentle to moderate northerly dip and varies in thickness from less than 50 feet on the margins to over 500 feet."

4.2.2 Net Acid Generating Potential

The Sacaton mine was permitted, operated, and closed prior to enactment of the Arizona APP regulations in 1986, which require Arizona mining companies to obtain waste characterization data. Although the records and documents available for Sacaton, therefore, reflect little quantitative laboratory waste characterization data related specifically to acid rock drainage (ARD), they do offer extensive geological information which indicate the deposit has net acid generating potential (NAGP).

The most conclusive direct evidence of NAGP at the mine are data from analysis of water from the open pit, both during operations and two years following closure. When these data are compared with extensive groundwater monitoring beginning with background data collected in 1972, it is evident that the deposit has NAGP. Background groundwater quality and groundwater quality through operations and well into the closed period at Sacaton show pH ranges from 7.7 to 8.8 and specific conductivities in the 3400 to 6700 range, typical of regional groundwater quality in that part of Arizona (AS-22

[Appendix 4], AS-40 [Appendix 4]). Water quality in the open pit, however, is moderately to strongly acidic. A sample collected on July 10, 1979, during the operating period, had a pH of 3.8 and specific conductivity of 10,830 (AS-40 [Appendix 4]). Another sample collected on April 3, 1986, two years following closure, showed a pH of 4.1 and specific conductivity of 10,300 (AS-22 [Appendix 4]).

4.3 Ten-Year Operating and Ten-Year Closure Criteria

The Sacaton mine started construction in 1972 and operated until March 1984. The mine has been closed since then.

Mine planning and engineering were initiated in the late 1960s and early 1970s. The principal permit regulating Arizona mining, the Aquifer Protection Permit (APP), was established by rule under the Arizona Environmental Quality Act of 1986 (Arizona Revised Statutes, Title 49). Mining operations that were closed prior to 1986, including the Sacaton mine, were expressly grandfathered and are not subject to APP regulation (AS-6). Thus, the public information records on file with the Arizona Department of Environmental Quality/Mining Unit (ADEQ) are somewhat limited compared to more recently permitted mines.

The mine is located immediately adjacent to an important agricultural district and within sight of the city of Casa Grande, however, and was scrutinized closely during consideration of the site for conversion to a municipal landfill. Thus, had it caused any release of acid drainage or heavy metals to surface water or groundwater during its operational phase or since closure, it is implausible that ADEQ (then ADHS) personnel would not have made notations to that effect in the record. None were found.

ASARCO's mine planning included forethought for environmental considerations which were voluntary at the time, but would be requirements in today's regulatory climate. Early environmental considerations included installation of a groundwater monitoring well and analysis of groundwater quality prior to and during operations, analysis of pit water quality, design of the process water containment system and the tailings water return system to minimize seepage and percolation, revegetation planning and concurrent revegetation activities, and operation of the mine as a responsible corporate neighbor of Casa Grande (the mine employed approximately 400 people from the local area). In addition, in 1980, the mine conducted a comprehensive environmental assessment and hydrological study of the site and its environs in support of a Hazardous Waste Permit Application (AS-40 [Appendix 4]), which was required at that time by the State of Arizona. (This plan to designate and license mines as hazardous waste facilities was later discontinued.)

The TDF was designed to accept a slurry of 50 percent solids from the mill. Once in the TDF, solids settled and water was decanted through a decantation tower and underflow pipeline, and pumped back to the mill for reuse. According to the mine's Notice of Disposal (AS-39 [Appendix 4]), the decant system "...was installed to reclaim all water possible to protect the groundwater. Before operations began, a monitor well was drilled downstream of the disposal area so the effect of tailing water percolation could be evaluated."

AS-39 goes on to describe this monitor well which "...was drilled about 400' SW of the SW corner of the tailing dam...cased to a total depth of 400' with 8 5/8" casing, with perforations 155' to 400'. Alluvial gravel and clayey silt 0-135', conglomerate 135-400'." The static groundwater level was encountered at 201 feet.

A comparison of analytical data generated from the well in 1973 and from the tailing reclaim water in 1983 documents that the reclaim water was of much higher quality than the baseline groundwater (AS-39 [Appendix 4]). Sodium, sulfate, chloride, and total dissolved solids (TDS) levels in the reclaim water were significantly lower than background groundwater. Likewise, zinc, manganese, arsenic, total chromium, and lead were lower in the tailing reclaim water than in native groundwater.

The groundwater monitoring program at the mine began with analysis of groundwater prior to start of operations to determine background water quality. Beginning in 1975, groundwater was sampled biannually, once in January or February, and again in June or July. As stated in the report entitled, "Geology and Hydrology of ASARCO Sacaton Mine Unit, Pinal County, Arizona," Water Development Corporation, October 1980 (included as part of AS-40 [Appendix 4]):

> "Comparison with the values (of the monitoring well) to the analyses of Casa Grande Ridge water and bedrock water (see Table 7 of report), and with samples from other wells completed in the Gasline conglomerate along the Casa Grande Ridge indicates the results of this sample are very representative of water along the ridge.
>
> "The results of the biannual sampling indicates an overall improvement in water quality. Comparison of latest available analyses with the original analysis shows a decrease of 290 ppm in the sodium content, a decrease of 415 ppm in the bicarbonate, a 198 ppm decrease in chloride and the TDS content decreased from over 3000 ppm to approximately 2450 ppm, a decrease of 550 ppm.
>
> "The water quality of the pond reclaim water is in fact of better quality than the native groundwater (see Table 8 of report), and seepage from the pond area would serve to improve local groundwater. The gradual improvement in water quality in the pond area is anticipated to continue at a very slow rate due to the comparatively small input from the pond area compared to the large volume of water stored in the conglomerate.
>
> . . .
>
> "The existing monitoring well is sited properly with respect to the position of the tailings pond. The data show that the monitor

well is functioning satisfactorily as a means of evaluating the pond seepage."

The mine has been officially closed since March 29, 1984 (AS-5, AS-6, and others). In 1985, ASARCO determined that the closed facility might have ongoing value as a non-hazardous solid waste landfill for the greater Phoenix area. Accordingly, ASARCO submitted a landfill permit application to the ADEQ (then the Arizona Department of Health Services [ADHS]) (AS-38). Submittal of that application initiated a lengthy permitting and public review process. Information pertaining to the landfill permit is combined with the mining information in the public files at the ADEQ (AS-9 through AS-38). While the ADEQ believed that the landfill was permittable, local public opposition, including that from local governments, persuaded ASARCO to drop the landfill idea in late 1987 and prior to submittal of additional quantitative hydrological data.

There is no surface water resource on, or even near, the mine site. According to the Water Development Corporation report included in AS-40:

> "Prior to development of the mine facilities, the area now occupied by the mine was crossed by a few poorly developed drainage (surface water) courses. The area drained by these features included approximately 3.5 square miles on the southern flank of the Sacaton Mountains. Given the small area drained by these features, and the low regional precipitation, these drainage features provide no dependable source of surface water, and very little flood potential. These features have been diverted around the mine facilities."

Considerable data relative to groundwater was developed during the operational period of the mine and during the preliminary phase of permitting the site as a landfill following cessation of mining. According to information contained in the report entitled, "Groundwater Quality Protection Permit Application Proposal, ASARCO Sacaton Pit, Pinal County, Arizona," Errol L. Montgomery & Associates, Inc., 1986 (AS-35 [Appendix 4]):

> "Site conditions that would minimize impact on groundwater at the proposed landfill (the Sacaton pit) include: dry climate; easily controlled ephemeral surface water runoff; dewatered conditions in unconsolidated rocks and low permeability conditions in the underlying consolidated rocks penetrated by the pit; small groundwater inflow from the pit walls; an upward hydraulic gradient in the groundwater system below the mine pit; and naturally occurring poor chemical quality of groundwater.
>
> . . .
>
> "The mine pit penetrates the alluvial deposits, the conglomerates, and the top of the intrusive igneous rocks. A deep mine shaft located a few hundred feet southeast from the pit encountered

> nearly dry conditions from surface to a depth of 1235 feet, which is about 200 feet below the bottom of the mine pit. Reports indicate that small amounts of groundwater seep from the pit walls [estimated at 2 to 32 gallons per minute, as noted in AS-10]. Tests indicate low permeability for the alluvial deposits and conglomerates. Permeability of the intrusive igneous rocks is low.
>
> "The mine pit occurs over the Casa Grande Ridge, a bedrock high which extends south from the Sacaton Mountains. In the mine pit area, the contact between the basement rock complex and the overlying rock units is a low-angle, shaley fault zone, which is believed to function, together with overlying rocks, as a confining unit to groundwater flow. Two boreholes drilled downward from the base of the shaft, when the shaft was at a depth of 1224 feet, encountered groundwater. [Soon thereafter, this shaft produced artesian flows and filled with about 800,000 gallons of groundwater (AS-10).] Shut-in pressures on the boreholes were approximately 350 to 400 pounds per square inch (809 to 924 feet of head)."

(These high pressures imply strong upward head on the water in the pit, precluding any downward migration of contaminants.)

The information and data available relative to site geo-hydrological conditions demonstrate that the pit acts as a hydrologic sump, intercepting groundwater from the surrounding conglomerate and mineralized igneous rocks (AS-10 [Appendix 4]). Since there is no outflow from the pit, the water level is maintained by evaporation.

There are no records of any violations of applicable environmental laws, or of related enforcement or compliance actions, orders or agreements relating to acid drainage or the release of heavy metals either during the 12 years of operations or during the 14.5 years since the mine has been closed. Likewise, there is no historical information of any releases to the environment of acid drainage or heavy metals during either the period of operation or of closure.

4.4 Responsible Party Criteria

The mine was and is wholly owned by:

ASARCO, Inc.
180 Maiden Lane
New York, New York 10038
(212) 510-2014

Arizona operations, active and closed, are managed from ASARCO's office in Tucson, Arizona:

ASARCO, Inc.
Copper Operations
P.O. Box 5747
Tucson, Arizona 85703
(520) 798-7700

ASARCO, Inc. is a large and diversified mining and smelting company, which has been in operation in Arizona since the turn of the century.

The Sacaton mine is not, nor has it been, a Superfund site listed on the National Priorities List (NPL). The site was assigned a CERCLA Information System (CERCLIS) EPA identification number (AZD068397728) in 1980, when all large mining sites in Arizona were being classified by the Environmental Protection Agency (EPA). After a preliminary investigation, however, the site was removed from the CERCLIS in late 1986.

4.5 No Significant Environmental Pollution

As discussed previously, regional groundwater generally is of naturally poor quality (AS-22 [Appendix 4]). Groundwater data from the groundwater monitoring well located downgradient of the tailings disposal facility (Figure 4-2) demonstrate that groundwater quality during operations actually improved over the background data collected in 1973 prior to operations (AS-40 [Appendix 4]).

The Hexcel Corporation ("Hexcel") in Casa Grande, Arizona, maintained a 2.5-acre industrial waste disposal site located approximately 0.75 mile directly south of the mine (ASH-1 [Appendix 4]). In 1982, this site was found by the state to contain soil contaminated by chromium wastes (ASH-2). Since 1982, the site has been fully remediated under a Consent Order between Hexcel, the Arizona State Land Department ("ASLD"), and ADEQ (ASH-2). Although neither Hexcel nor this site is associated with either ASARCO or the Sacaton mine, it is helpful to understand why the Hexcel site is mentioned in mine-related files.

In 1967, Hexcel acquired a state lease to utilize a small constructed pond on this site to dispose of liquid chromium wastes (ASH-1, ASH-2, and ASH-3). Hexcel ceased disposal activities at this site in 1972 (ASH-10). In 1972, ASARCO leased surrounding lands

from the state as part of the Sacaton mine site development (ASH-11 [Appendix 4]). In obtaining this lease, ASARCO completed a legal lease exchange with Hexcel, wherein the small Hexcel site was incorporated into the larger ASARCO lease in exchange for certain considerations (Id.). In 1981, the ASLD severed the Hexcel site from the ASARCO leases. This lease arrangement was ASARCO's only tie to the site. As stated in ASH-11, "ASARCO never associated itself with the disposal or release of any hazardous substances on or from the site (Hexcel)."

In early 1992, a groundwater monitoring well on the Hexcel site revealed traces of chromium, selenium, and arsenic. There was (and is) no evidence that those contaminants were in any way related to the mine. Nonetheless, the Remedial Projects Unit (RPU) of ADEQ inquired of the ADEQ APP supervisor as to whether an APP existed for the Sacaton mine and, if so, whether groundwater information was available, since the mine was located nearby and generally upgradient of the Hexcel site (AS-7). The ADEQ APP supervisor responded that the mine did not have (nor was it required to have) an APP since it was considered officially closed on March 29, 1984, prior to inception of the APP program (AS-6 [Appendix 4]).

The record reveals no further internal or external correspondence regarding this matter. However, the 1992 report (ASH-5 [Appendix 4]) on groundwater monitoring at the Hexcel site (which raised this issue) also stated, "Montgomery and Associates identified five wells or mineral boreholes in the region in which arsenic levels in the groundwater were equal to or greater than ADEQ's MCL for drinking water (1986)." This citation (data presented in AS-22 [Appendix 4]) is the regional groundwater study performed for ASARCO during the initial permitting process for the proposed use of the Sacaton pit as a landfill. ASH-5 goes on to state, "The lateral extent of elevated levels of arsenic in the groundwater indicates that the arsenic does not have a local source." Both the Hexcel report (ASH-5 [Appendix 4]) and the Montgomery and Associates data (AS-22) conclude that regional native groundwater is highly mineralized.

The Sacaton mine has caused no significant environmental pollution from acid drainage or heavy metals release. The public records located at the Arizona DEQ, Mining Unit, provide no evidence whatsoever of any significant environmental pollution *of any type* from the mine either during operations or since the mine closed.

4.6 Assessment of Technology

From the perspective of environmental technology, the Sacaton mine was advanced for the time in which it was designed and operated. Although the mine was developed and operated prior to enactment of Arizona's major environmental legislation (Arizona Environmental Quality Act of 1986), ASARCO voluntarily incorporated then state-of-the-art environmental safeguards into the operation. Many of those elements are still considered standard concepts in planning, permitting, developing, and operating mines in the 1990s. To a larger and more sophisticated extent, many of those same concepts and technologies are also incorporated into the Crandon mine design. The environmental technologies used at Sacaton included:

- Groundwater monitoring down-gradient of the tailings impoundment;
- Collection and analysis of groundwater quality data prior to and during operations;
- Collection and analysis of pit water quality data;
- Diversion of run-on surface water around or away from facility components;
- Design of the tailings water return and the process water containment systems to minimize seepage and percolation, and to protect groundwater by incorporating steel in concrete piping and soil sealants over compacted soil bases;
- Use of bentonite to seal settling ponds and basins;
- Preparation of emergency spill response planning;
- Preparation of a mine site reclamation plan prior to the promulgation of reclamation legislation by the State of Arizona; and
- Concurrent and post-closure reclamation of the tailings impoundment embankments, waste rock disposal areas, and other sites by placement of growth media and the reestablishment of compatible vegetation, including trees and shrubs.

These methods and technologies have worked successfully for the Sacaton mine, as evidenced by the fact that during the operation period, and to date since closure, there have been no incidents of pollution of surface waters or groundwater attributable to the mine.

4.7 References (Items shown in boldface are included in Appendix 4. All other listed references have been separately filed with the WDNR.)

Ref. No.	File/ Publication Source	Type	Title	Author	To	Date	Remarks
AS-1	ADEQ	Site Map	ASARCO Sacaton Unit	ASARCO/USGS	File	unk.	Site map on USGS Casa Grande West Quad
AS-2	ADEQ	Memo	Agency notice	Chet Oakley, Geologist AZ State Land Dept.	Multiple agencies	01/17/97	Clarification regarding request to renew State Mining Lease No. 11-35917 adjacent to Sacaton Unit.
AS-3	ADEQ	Memo	ASARCO Sacaton Mine	Dennis Turner	Jean Metzler, ADEQ	01/17/97	Hand written instructions for filing Sacaton info.
AS-4	ADEQ	Memo/Lease Application	Agency notice	Chet Oakley, Geologist AZ State Land Dept.	ADEQ	01/13/97	Notice and ASARCO application to renew State Mining Lease No. 11-35917. Request for comments.
AS-5	ADEQ	ADEQ Form	APP Program Facility Change	ADEQ	File	07/08/94	Change to activation of file. Info. on facility status and closed date.
AS-6	ADEQ	Memo	ASARCO Sacaton Unit	Roger Kennett, ADEQ	Lowell Carty, ADEQ	02/09/92	Response to AS-7 memo stating that Sacaton closed 3/29/84, is considered a closed facility and is exempt from APP program.
AS-7	ADEQ	Memo	Status of ASARCO Sacaton	Lowell Carty, ADEQ	Roger Kennett, ADEQ	01/24/92	Request for status and info regarding Sacaton and APP Permit.
AS-8	ADEQ	Invoice	APP Annual Registration Fee Inv.	ADEQ	ASARCO Sacaton	12/13/91	APP Fee invoice. Returned w/0 payment as exempt - ceased operations prior to 1986 (date on which APPs required).
AS-9	ADEQ	Memo	ASARCO Sacaton - Landfill	Rob Larson, ADEQ	Debra Daniel, ADEQ	08/03/87	Request for comments re: landfill proposal report.
AS-10	**ADEQ**	**Letter**	**ASARCO Sacaton Open Pit Mine**	**Errol L. Montgomery**	**Rob Larson, ADEQ**	**07/30/87**	**Response to ADEQ request regarding grownwater monitoring wells and monitoring program for landfill proposal.**
AS-11	ADEQ	Letter	Draft: Sacaton Open Pit Mine	Errol L. Montgomery	Rob Larson, ADEQ	07/14/87	Draft of AS-10 letter. No new information.
AS-12	ADEQ	Letter	ASARCO Sacaton Open Pit Mine	Rob Larson, ADHS	Verle C. Martz, ASARCO	03/20/87	ADHS position that landfill proposal was permittable based on ASARCO preliminary report on hydrogeologic conditions.
AS-13	ADEQ	Memo	ASARCO Sacaton Open Pit Mine	John Robertson, ADHS	Rob Larson, ADHS	03/02/87	Internal ADHS (ADEQ) review of ASARCO preliminary report on hydrogeologic conditions relative to landfill permitt application.
AS-14	ADEQ	Letter	Opposition to ASARCO landfill Proposal at Sacaton.	Casa Grande Brand of American Association of University Women	Licensing Div., ADHS	02/12/87	General letter in opposition to ASARCO proposal to use the Sacaton pit for a solid waste landfill.
AS-15	ADEQ	Agenda	Public forum format	Rob Larson, ADHS notes	Public audience	01/20/87	Agenda and notes for presentation at a public meeting.
AS-16	ADEQ	Memo	Casa Grande City Council Meeting	Rob Larson, ADHS	Debra Daniels, ADHS	01/06/87	Internal memo regarding request of Casa Grande City Council.
AS-17	ADEQ	Memo	Sacaton Unit; Open Pit Landfill	Rob Larson, ADHS	Skip Hellerud, ADHS	12/31/86	Internal ADHS status report on landfill proposal permit application.
AS-18	ADEQ	Memo	ASARCO Sacaton	Norm Weiss, ADHS	Chuck Anders, ADHS	12/30/86	Internal memo regarding briefing of Senator Alan Stephens.
AS-19	ADEQ	Newspaper	Hole Hog: Pit May become Landfill	Phyllis Gillespie, Arizona Republic	Public	12/29/86	Newspaper article regarding the ARASCO landfill proposal.
AS-20	ADEQ	Letter	ASARCO landfill proposal	Jean Simmons	Rob Larson, ADHS	12/19/86	Letter in opposition to landfill proposal.
AS-21	ADEQ	Memo	Landfill permit application meeting	Rob Larson, ADHS	Debra Daniel/Barry Abbott, ADHS	12/01/86	Agenda for ASARCO landfill permit application meeting.
AS-22	**ADEQ**	**Letter**	**ASARCO submittal of hydro repts.**	**T.E. Scartaccini, ASARCO**	**A.O. Hellerud, ADHS**	**11/24/86**	**Submittal of ASARCO hydrogeological reports. GW quality data attached to this letter in ADEQ file.**
AS-23	ADEQ	Memo	Casa Grande City Council Meeting	Rob Larson, ADHS	Debra Daniel, ADHS	11/19/86	Internal memo regarding scheduling of Casa Grande meeting.
AS-24	ADEQ	Letter	ASARCO	A. Thomas Cole, Cole & O'Neil, attorneys	Pat Nowack, ADHS	11/17/86	Payment for copies of documents.

Ref. No.	File/ Publication Source	Type	Title	Author	To	Date	Remarks
AS-25	ADEQ	Letter	Request for documents clarification	A. Thomas Cole, Cole & O'Neil, attorneys	Pat Nowack, ADHS	11/10/86	Clarification regarding request for landfill related documents.
AS-26	ADEQ	Memo	Casa Grande City Council Meeting	Rob Larson, ADHS	Debra Daniels, ADHS	10/23/86	Scheduling of Casa Grande City Council meeting.
AS-27	ADEQ	Letter	Sacaton Unit, Open Pit Landfill	Rob Larson, ADHS	City of Casa Grande	10/10/86	Letter of explanation of landfill status and permitting process.
AS-28	ADEQ	letter	Casa Grande Council Resolution	Jimmie Kerr, Mayor	ADHS	09/25/86	Letter and City Council Resolution in opposition to landfill prop.
AS-29	ADEQ	Memo	Sacaton Unit, Open Pit Landfill	Rob Larson, ADHS	Chuck Anders, ADHS	09/17/86	Internal memo discussing status report of landfill permit.
AS-30	ADEQ	Draft letter	Sacaton Unit, Open Pit Landfill	Rob Larson, ADHS	City of Casa Grande	09/03/86	Draft letter re: status of landfill and permit process to Casa Grande.
AS-31	ADEQ	Letter	ASARCO Sacaton Mine/Landfill	William Baker, esq. Ellis, Baker, Lynch...	Lloyd Novick, ADHS	08/21/86	Maricopa-Stanfield I&DD opposition to landfill proposal.
AS-32	ADEQ	Letter/memos	Sacaton Unit, Open Pit Landfill	Rob Larson, ADHS	Errol Montgomery	08/20/86	Notice to ASARCO consultant regarding review of reports.
AS-33	ADEQ	Letter/attachs.	Sacaton Unit, Open Pit Landfill	Rob Larson, ADHS	Errol Montgomery	07/28/86	Notice to ASARCO consultant regarding review of NOD.
AS-34	**ADEQ**	**Letter/NOD**	**Notice of Disposal**	**T.E. Scartaccini, ASARCO**	**A.O. Hellerud, ADHS**	**07/23/86**	**Notice of Disposal regarding the landfill proposal to initiate process. Attached is ambient groundwater data and quad map.**
AS-35	**ADEQ**	**Report**	**Groundwater Quality Protection Permit Application Proposal ASARCO Sacaton Pit**	**Errol L. Montgomery & Associates, Inc.**	**ADHS**	**06/16/86**	**Preliminary report on proposal for conducting GW studies.**
AS-36	ADEQ	Memo	ASARCO's Landfill Permit Appl.	A.J. Gordon, ADHS	Arthur O. Hellerud, ADHS	01/22/86	Internal memo re: shortcomings in ASARCO landfill permit appl.
AS-37	ADEQ	Memo	ASARCO Proposal	A.J. Gordon, ADHS	Skip Hellerud, ADHS	10/25/85	Internal memo re: ADHS review of ASARCO landfill proposal.
AS-38	ADEQ	Letter	Proposal for Permit Application	B.K. Malone, ASARCO	Arthur Hellerud, ADHS	10/18/85	ASARCO proposal for landfill permit for Sacaton open pit.
AS-39	**ADEQ**	**Letter/NOD**	**Notice of Disposal - Sacaton Unit**	**T.E. Scartaccini, ASARCO**	**Lyndon Hammon, ADHS**	**01/10/85**	**ASARCO Sacaton Unit Notice of Disposal and pre-mine GW data.**
AS-40	**ADEQ**	**Report/Appl.**	**Hazardous Waste Facility Permit Application to ADHS. Includes rept: Geology and Hydrology of ASARCO Sacaton Mine Unit, Pinal County, Arizona by Sheldon Clark**	**ASARCO Sacaton Unit**	**ADHS**	**10/17/80**	**Permit application relative to site mining operations. Much data. Geology and hydrology data from 1980 included. This is the principal document regarding the mine and mining operation. Also includes facility design/construction drawings.**
AS-41	USGS	CD ROM	Mineral Resources Data System	USGS	n/a	06/01/96	General information for all US mines.
AS-42	**CSM**	**Publication**	**The Sacaton Porphyry Copper Deposit In: Guidebook to the Geology of Central Arizona. 1978. p.83-84.**	**Robert B. Cummings**	**n/a**		**Overview of the geology of the Sacaton Mine site geology.**
AS-43	CSM	Publication	Geology of the Sacaton Porphyry Copper Deposit, Pinal County, Arizona In: Advances in Geology of the Porphyry Copper Deposits, Southwestern North America. 1982. Univ. of Arizona Press. pages 507-521.	Robert B. Cummings	n/a		Definitive description of the Sacaton Mine geology.
ASH-1	**ADEQ**	**Q&A doc.**	**Hexcel Chromium Disposal Site**	**ADEQ**	**n/a**	**02/17/93**	**Questions and answers regarding the Hexcel site.**
ASH-2	ADEQ	Legal doc.	Consent Order	ADEQ	Hexcel Corporation	04/30/95	Consent Order file re: Hexcel cleaning up its disposal site.
ASH-3	ADEQ	Report	Risk Assessment/Hexcel Chromium Site, Casa Grande, Arizona	AZ Dept. Health Services	ADEQ	10/15/92	Human health risk assessment report for Hexcel disposal site.
ASH-4	ADEQ	Report	Summary of Remedial Investigation Documents and Remedial Action Plan Requirements for the Hexcel Corporation	Hydro Geo Chem, Inc.	Hexcel Corporation	12/22/92	Summary of actions at Hexcel site.

Ref. No.	File/ Publication Source	Type	Title	Author	To	Date	Remarks
			Disposal Site near Casa Grande, Arizona				
ASH-5	**ADEQ**	**Report**	**Well Installation and Groundwater Monitoring Results at the Abandoned Chromium Disposal Site, Casa Grande, Arizona**	**Hydro Geo Chem, Inc.**	**Hexcel Corporation**	**10/30/92**	**Groundwater monitoring information and data.**
ASH-6	**ADEQ**	**Report**	**Groundwater Monitoring Results for September 1992 at the Hexcel Abandoned Chromium Disposal Site, Casa, Grande.**	**Hydro Geo Chem, Inc.**	**Hexcel Corporation**	**12/07/92**	**Groundwater monitoring information and data.**
ASH-7	ADEQ	Memo	Possible Imminent Health Threat...	Dean Moss, ADHS	Tibaldo Canez, ADHS	01/30/81	Internal notice of discovery of the site.
ASH-8	ADEQ	Letter Rept.	Prelim. Results of Remediation.	Hydro Geo Chem, Inc.	Ron Miller, ADHS	06/06/85	Short report on preliminary remediation efforts at the site.
ASH-9	ADEQ	Memo	Hexcel Chromium Disposal Site	Dale Anderson, ADHS	Wes Shonerd, ADHS	08/20/85	Regulatory interpretation of Hexcel site.
ASH-10	ADEQ	Legal memo	Hexcel Corporation's Chromium Site	David P. Kimball, III	Hexcel Corporation	05/01/87	Internal legal opinion (to Hexcel) regarding the Hexcel site.
ASH-11	**ADEQ**	**Letter**	**Hexcel Corporation's Chromium Site**	**T.Scartaccini, ASARCO**	**Norm Weiss, ADEQ**	**03/02/88**	**ASARCO position regarding the Hexcel Site.**
ASH-12	ADEQ	Legal memo	ASLD Liability on Hexcel Cleanup...	K.L. Mead, AZ ATG	ASLD	05/18/98	Legal position of Arizona State Land Dept. re: Hexcel Site.
ASH-13	ADEQ	Leases	ASDL State Leases to Hexcel	n/a	n/a	n/a	Copies of ASDL leases to Hexcel.

SECTION 5

OTHER RELEVANT FACTORS IN EVALUATING THE ENVIRONMENTAL PERFORMANCE OF MODERN MINES

5.0 OTHER RELEVANT FACTORS IN EVALUATING THE ENVIRONMENTAL PERFORMANCE OF MODERN MINES

In addition to the criteria contained in Wis. Stats. § 293.50, there are other design, performance and management factors that should be considered in evaluating the environmental track record of modern mines. An evaluation of such factors can provide another way to measure the level of environmental care, awareness, and protection typical of modern mines. Examples of mines that include some or all of these alternative design, performance and management factors are presented in this section. While they may not meet one or more of the specific criteria in § 293.50, the examples listed below illustrate the extent to which today's environmental regulations, coupled with modern environmental protection technology, result in environmentally and socially responsible mining at numerous sites.

5.1 Appropriate and Proven Technology

In evaluating the environmental track record of today's mines (as opposed to those of decades ago), one of the most significant factors that should be examined is whether the mine in question has used appropriate and proven technology to protect the environment. During the legislative debate on § 293.50, the WDNR recognized the importance of evaluating whether the technology proposed for a Wisconsin mine has been proven to be effective at other sites, and recommended an alternate approach to refocus the legislation on a demonstration of proven and appropriate technology. In making this recommendation, the WDNR explained the alternative's purpose to ensure "that no mining project should be approved until the technology has been demonstrated to be effective."[15] Another bill under consideration at the time, AB 236, also would have required mining companies to provide proof that the technology being proposed for a Wisconsin mine had a proven track record of success. See also Section 1.2, above.

During a legislative hearing on May 12, 1997 in Ladysmith, Executive Assistant Howard Druckenmiller (testifying on behalf of WDNR Secretary George Meyer) explained the agency's preference for a law that would require a demonstration of technology performance:

> "As I testified on AB 236, we feel that a better approach to mining regulation would be to support the Department's review of the national experience with mining and waste disposal technologies, and to assure citizens through the mine permit process, that there is technology available which would allow a mine to meet all the stringent environmental standards we have in this state before any permit is approved."[16]

---

[15] May 22, 1997 internal WDNR Correspondence/Memorandum from Larry Lynch to George Meyer, submitted by the WDNR to the Assembly Committee on the Environment.

[16] Druckenmiller Testimony, see note 5, Section 1.2.1.

The WDNR's alternate approach would have shifted the focus of the legislation away from mines developed at some arbitrary point in the past at other locations, and toward the mine under consideration in Wisconsin. As stated in the above-cited internal WDNR memorandum, a technology evaluation requirement would:

> "Have direct relevance to the specific mining proposal under consideration. It does not just require submittal of anecdotal information, which may have no pertinence to the proposed project."[17]

Although the Legislature chose not to include a technology demonstration element in § 293.50, NMC recognizes that the WDNR's recommendation of a technology assessment could provide important information -- in addition to that allowed under the new statute's criteria -- that can and should be used in determining whether the Crandon Project can be safely undertaken. With this in mind, many of the mines described below provide information about the successful application of modern environmental protection technology. Several of the examples cited include environmental protection technologies comparable to those being proposed for the Crandon mine.

The mines discussed in the following paragraphs by no means form an inclusive list of mines that have successfully used appropriate environmental protection technologies and have been managed and operated in an environmentally responsible manner. The following sites were selected to represent a range of commodities produced, mining and mineral processing techniques used, and geographic settings, as well as to demonstrate the effectiveness of relevant environmental protection approaches and technologies. Some of the described operations also demonstrate responses to specific environmental challenges which are instructive as to the effective use of certain technologies proposed for use in the Crandon Project.

Some generalizations can be made regarding these mines. As illustrated by the sites listed in Section 5.2, below, the mines share some or all the following characteristics:

- The extensive use of waste containment (e.g., liners), monitoring, sampling, testing and other environmental protection technologies. In each case, the technology used has been selected to best suit the site-specific environment at the mine site;

- An active and dedicated professional environmental staff on site. These personnel maintain (or maintained) integrated working communications with and support from both the mine managers and corporate environmental directors and managers;

---

[17] May 22, 1997 memo Larry Lynch to George Meyer, note 15, above.

- Excellent relations with surrounding communities based upon communications and planning policies that solicit and respect public input;

- Superior reclamation practices, fish and wildlife habitat preservation and enhancement programs, wetlands protection and enhancement, or other environmentally oriented programs. Typically, these programs go well beyond the letter of regulatory requirements;

- A solid qualitative and quantitative understanding of the environment in which the mine operates (or operated), the ecological relationships within that environment, and the potential impacts of operations on the components of that environment;

- For those sites at which problems have developed, energetic and effective responses to solve the problem(s) using modern environmental monitoring, remediation, and pollution prevention methods and technologies; and

- With respect to the active mining operations, each is strictly regulated by local government, state (or provincial) agencies and, depending upon location and land ownership, the federal government.

5.2 Environmental Technologies and Accomplishments at Other Mines

This section briefly describes the modern technologies being used and the environmental accomplishments at a number of mines in the United States and Canada, followed by an explanation of the aspects of these projects that provide information directly applicable to assessing the Crandon mine proposal. Considered in aggregate, the mines described below provide a representative picture of the successful use of effective and appropriate environmental protection approaches and technologies that is particularly relevant in evaluating the proposed mine.

Cannon Mine - Wenatchee, Washington

Owner: Asamera Minerals

Type of Mine/Commodity: Underground/gold

Project Overview: The Cannon mine is located at the intersection of South Miller and Circle Streets in Wenatchee, Washington. This gold mine was developed in 1985, one block south of the Wenatchee city limits. This agricultural community of approximately 40,000, known as "the apple capitol of the world," is about 150 miles east of Seattle. With homes, parks, churches, schools, hospitals, and an equestrian center as its neighbors, the

Cannon mine is a model of environmentally responsible mining in an established urban environment.

The mine, which operated for nine years, is now in the final stages of reclamation, and nearly all traces of this once bustling underground mining and milling project are now gone. All of the millsite buildings have been removed, the area regraded and replanted; the mine portal has been plugged; and the tailings management area has been reclaimed and planted with natural grasses. The local school district has converted the remaining mine buildings into offices and an equipment maintenance facility. As quoted in a July 2, 1996 article entitled "A Promise Kept - Mine Tailings Cleaned Up" in the Wenatchee World, a local official states that the mine has done a good job living up to its promises: "The scale of the (reclamation) work is just amazing. It's been a good project." Nonetheless, the Cannon mine cannot be submitted as an exemplar mine because it operated for nine (rather than ten) years, and because the ore and host rocks do not have net acid generating potential.

Analysis: At least two aspects of the Cannon mine are relevant to the Crandon mine proposal. First, the Cannon mine is an example of the compatibility of mining adjacent to other land uses (in this case, suburban development) and a mine that had an excellent working relationship with the surrounding community. Second, the Cannon mine offers an example of a tailings facility designed, built, and successfully reclaimed with recent technology, as described in an article recently written by personnel with the Washington Department of Natural Resources (Norman and Raforth, 1998). The Cannon mine has an excellent environmental record over its nine-year operating history (1985 - 1994). There have been no environmental problems since closure four years ago.

Stillwater Mine - Nye, Montana

Owner: Stillwater Mining Company

Type of Mine/Commodity: Underground/platinum and palladium

Project Overview: Located in southern Montana on the northern edge of the magnificent Absaroka-Beartooth Wilderness and about 30 miles north of Yellowstone National Park, this platinum-palladium sulfide mine is an excellent example of environmentally responsible mining in an extremely beautiful and sensitive environment. Operating since 1987, the Stillwater mine has maintained a clean environmental record. Providing the only domestic source of these strategic minerals, the Stillwater operation includes an off-site smelter in Columbus, Montana using state-of-the-art pollution control equipment. This underground mine is recognized by regulators, environmental groups, and industry experts for its excellent concurrent reclamation activities, wildlife enhancement projects, community support programs, and responsive environmental management. In addition to its scenic attributes, the area around the mine is also widely known for its recreational opportunities -- the mine is adjacent to the Stillwater River, a Montana Blue Ribbon Trout Fishery. The

Stillwater mine cannot be submitted as an exemplar mine under the new statutory requirements because the ore and host rocks do not have net acid generating potential.

Analysis: There are several aspects of the Stillwater mine that are relevant to an analysis of the Crandon mine proposal. The Stillwater mine demonstrates that mining can occur in a sensitive environmental setting in a manner that fully protects water quality, aquatic resources, wildlife, recreational uses, tourism, and scenic values. Additionally, the Stillwater mine tailings disposal facility is an example of a lined tailings impoundment that protects surface water and groundwater resources. Finally, discretionary efforts at the Stillwater mine to clean up tailings left by historical mining activities and to protect wildlife are typical of the proactive environmental synergies now being achieved at many modern mine sites.

Flambeau Mine - Ladysmith, Wisconsin

Owner: Flambeau Mining Company

Type of Mine/Commodity: Open pit/copper

Project Overview: Located in northern Wisconsin's Rusk County, partially within the city limits of Ladysmith and immediately adjacent to the Flambeau River, this sulfide copper mine complied with all applicable environmental regulations since opening in 1993. Storm water runoff from sulfidic waste material and the operating open pit, along with groundwater infiltration into the pit, were treated in a state-of-the-art water treatment facility that produced mine discharge water which has proven safe at 100-percent concentration (i.e., without dilution) for even the most sensitive aquatic life, and that meets state drinking water safety standards). Examinations of fish, crayfish, macroinvertebrates, and dragonflies; sediment sampling; and habitat characterization both above and below the mine discharge point prove the mine water has not adversely affected river life. Mining was completed in 1997, and site closure is nearing completion. The open pit has been backfilled and the site has been recontoured and revegetated to pre-mining conditions. City officials credit the mine with having created an "economic miracle" for the local community of 4,000 people. Tax revenue from the mine stimulated an economic development boom in Rusk County, where the unemployment rate fell from 15.3 percent just prior to the mine opening to 4.0 percent in October 1996. During operation, the Flambeau mine was one of Rusk County's top tourist attractions, with over 30,000 people per year visiting the mine's information center.

Analysis: Although Wisconsin's own Flambeau mine cannot be used as an example mine to satisfy the new permit requirements because it operated for fewer than 10 years and has just recently been closed, a great deal of valuable information can be obtained from an examination of its design and operation. Because this mine was developed in a regional and climatic setting similar to the proposed Crandon mine site, and the deposit is a volcanogenic massive sulfide ore body like that at Crandon, there are many aspects of the Flambeau mine that are directly relevant and comparable to the proposed Crandon mine.

First and foremost, the Flambeau mine provides useful information regarding the effective use of modern environmental technology at a massive sulfide deposit with geologic characteristics similar to the Crandon ore body. Many of the environmental protection technologies successfully used at Flambeau are similar to those proposed for the Crandon mine. For example, the Flambeau mine employed detailed waste characterization studies to evaluate the acid generating potential of mined materials, and used modern waste containment and liner technologies to prevent adverse impacts to the environment that could have occurred had the acid-generating materials not been properly managed. The Flambeau mine's state-of-the-art water treatment facility produced water that fully protected the most sensitive aquatic life species. A barrier to groundwater migration was placed in the pillar between the Flambeau River and the open pit. A slurry wall was used, consisting of clay grout to seal flows which might otherwise have entered the mine. This effective grouting method is similar to that proposed for reducing inflow to the Crandon mine.

Flambeau Mining Company played an active and positive role in the community of Ladysmith, and contributed to many projects that directly benefited the community. As such, the Flambeau mine serves as an important example of good corporate citizenship. The reclamation work underway at the Flambeau mine site substantiates that a massive sulfide mine can be successfully reclaimed to a beneficial post-mining use that is compatible with the surrounding community. Finally, the stellar environmental track record at Flambeau also attests to the strengths and comprehensive nature of Wisconsin's existing mining laws and regulations.

Borealis Mine - Mineral County, Nevada

Owner: Echo Bay Mines

Type of Mine/Commodity: Open pit/gold

Project Overview: Mining at this gold heap leach mine commenced in 1981 and ceased in 1990. Concurrent reclamation activities, including backfilling of mined out pits, started in 1985. The leach heaps have been rinsed, recontoured, and revegetated. The Nevada state regulatory agency and the U.S. Forest Service (USFS) consider the heap closure efforts completely successful. The USFS has released the reclamation bond except for a residual amount to monitor revegetation success. Reclamation at this site also received an award from the USFS.

Analysis: The Borealis mine provides evidence of the effective use of geomembrane liners to protect groundwater. This mine is also an excellent example of successful reclamation of a heap leach facility and an open-pit mine. The Borealis mine operated for nine years and mainly produced oxide (i.e., non-sulfide) ore. Therefore it cannot be used as an example mine under the new statutory requirements, even though it might have

posed many environmental risks but for the successful use of modern technology and sound management practices.

McDermitt Mine - Humboldt County, Nevada

Owner: Placer Dome

Type of Mine/Commodity: Open pit/mercury

Project Overview: The McDermitt mine is an excellent example of a completely closed sulfide mine in Nevada. The ore at this mercury mine was cinnabar, a mercury sulfide (HgS) mineral. Closure activities at this site, especially the closure and removal of the mill buildings, are well documented. Information from water supply wells located down-gradient from the reclaimed mine indicates that the mine has not impacted groundwater quality. The Nevada Division of Environmental Protection considers the McDermitt mine to be a successfully closed mine.

Analysis: Reclamation of the McDermitt mine provides useful information about the complete removal of a mineral processing facility using modern site rehabilitation methods. This extensive facility closure and removal effort demonstrates that sites used for mineral processing can be returned to their original condition. Because the mercury sulfide ore at the McDermitt mine does not have a net acid generating potential, however, this mine cannot be used to satisfy the new statutory criteria.

Louvicourt Mine – Val d'Or, Quebec

Owner: Joint Venture of Aur Louvicourt, Teck Corporation and Novicourt

Type of Mine/Commodity: Underground/copper, zinc, silver, gold

Project Overview: The Louvicourt mine is located 20 km east of Val d'Or, Quebec. The ore body, with reserves of 27 million tonnes, was discovered in 1989 and operation started in May 1994 at 4,000 tonnes per day. The basic approach to design of waste management facilities was to reduce uncertainties and to maximize protection of the environment. The sulfide tailings from the operation have a net acid generating potential and are handled using two separate technologies. About 60 percent of the tailings are returned to the underground openings using paste fill technology. The paste fill, including about 4.5 percent cementitious (slag/cement) materials by weight of tailings, is delivered at a slurry paste consistency into the underground openings where it hardens into a solid mass. The remaining 40 percent of the tailings are placed in a man-made reservoir on the surface, where they will be maintained permanently under water to prevent oxidation of sulfide minerals. The dams forming the man-made reservoir are designed and constructed to minimize seepage

losses by using low permeability core zones and cement grouting of the underlying bedrock. The Louvicourt mine cannot be submitted as a mine meeting the new statutory requirements because it has not yet been in operation for ten years.

Analysis: The Louvicourt mine uses paste fill technology. That process involves the mixing of sulfide tailings (retaining an appropriate amount of water) with cementitious materials to form a mix of paste consistency which is delivered to underground mine openings where the mix cures and hardens. The hardened mix serves the dual purpose of encapsulating the sulfide tailings particles (to limit oxidation during operations) and facilitating on-going mining.

Paste fill is a proven mining technology, enabling reuse of tailings for mine support and water control. Because the tailings are contained in a very low-oxygen environment, the risk of acid formation is minimized. For both the Louvicourt mine and the proposed Crandon mine, the pyritic tailings in the hardened paste backfill will be further protected from possible oxidation after the mine is allowed to permanently flood when operations cease.

The Louvicourt mine also successfully uses cement grouting to reduce the hydraulic conductivity of fractured bedrock. The same technology will be used to reduce inflow to the Crandon mine.

Eskay Creek Mine - British Columbia, Canada

Owner: Homestake Canada Inc./ Prime Resources Group Inc.

Type of Mine/Commodity: Underground/gold, silver, zinc and copper

Project Overview: Located in a remote area of northwestern British Columbia near the Unuk River and the Alaskan border, Eskay Creek mine area was originally explored in 1932. The ore body was discovered in 1988, with the first ore being shipped in January of 1995. The initial ore was of such high grade that it was trucked without concentrating directly to port and railhead for shipment to out-of-province smelters. Additional underground exploration has supported the recent development of an on-site mill for processing lower grade ore by conventional flotation.

Development of the initial underground exploration decline produced potentially acid-generating waste rock, which was stored on the surface on pads of alkaline rock. Observation and monitoring of this waste rock indicated the onset of acid generation within a few years after placement on the pads. Detailed examination, excavation, and relocation of this small waste rock pile to a nearby, non-fish bearing, alpine lake was undertaken as part of the mine's support for the joint government/industry research program (MEND), which addresses research into acid drainage prediction, prevention, treatment and control. As a result, a waste management plan was developed for the full-scale operation which incorporates several state-

of-the-art techniques of minimizing environmental impacts from acid drainage. Both waste rock generated by the 400-ton/day mine, and tailings filter cake generated in the mill, are stored under water to minimize acid generation and metal leaching. Filtering of the tailings cake is conducted to enhance the internal recycle of mill process water as well as to provide a transportable tailings product. Excess mill process water and mine water are collected and treated to remove suspended solids and soluble metals prior to release to discharge. Acid drainage in the underground workings is minimized through rapid backfill of the underground workings using a mix of cement and locally available alluvial gravel with no acid generating potential. Use of a cement/tailings mixture is currently under study. Closure plans call for flooding the majority of the underground workings to minimize long-term oxidation and metal leaching.

The mine has worked to set high environmental standards and benefit the local indigenous community. In 1998, the mine won a British Columbia annual reclamation award for the revegetation and restoration of the surface exploration camp, located in a high alpine meadow above the mine. Haulage and infrastructure services are contracted to the Tahltan Nation Development Corporation.

Analysis: The Eskay Creek mine cannot be used as a example mine to satisfy Wisconsin's new statutory requirements because it has operated for fewer than 10 years. The mine demonstrates, however, that a massive sulfide ore body can be successfully mined by underground methods, with control of acid drainage and metal leaching during operation through rapid backfilling of mined areas with cementitious fill. The application of state-of-the-art technology for the underwater containment of potentially acid generating tailings and waste rock also demonstrates the ability to manage mining wastes with negligible impact to a sensitive environment. Further, the Eskay Creek mine demonstrates the ability of a mining operation to benefit local inhabitants in remote communities through the cooperative development of mutually beneficial contracting and training opportunities.

Elliot Lake Uranium Mining Area - Elliot Lake, Ontario

Owner: Rio Algom, Ltd.

Type of Mine/Commodity: Underground/ uranium

Project Overview: Uranium mining in the Elliot Lake area began in the summer of 1953 with the encouragement of the United States Atomic Energy Commission. By 1957, there were eleven uranium mines operating in the area. Several mining companies operated in the area, working underground mines located below the water table and often working below streams, rivers and lakes. By 1965, only two mines were still in production, one operated by Rio Algom Ltd. and one by Denison Mines, Ltd. Rio Algom had acquired eight of the mines in the region, and immediately began remediating environmental problems caused by previous owners. During operation of underground mines with water inflows, and in the course of restoration of the Serpent River ecosystem, Rio Algom gained vast experience in environmental controls and remediation methods.

For example, water treatment plants were built to treat water leaving the closed mine sites. Tailings disposal areas at three mines have been closed by construction of perimeter dams and dikes to ensure tailings remain in place; water covers the entire exposed tailings area to prevent acid generation, gamma radiation and radon gas emissions. In addition to acid rock drainage prevention techniques, the technologies used for tailings containment include low permeability dams, bedrock grout curtains, fresh water diversion channels, effluent treatment plants, capping, revegetation, wetlands development and maintenance, and collection and treatment of any residual acid rock drainage. Extensive groundwater, surface water, air quality and ecosystem monitoring also assures that these facilities remain effective. Extensive telemetry enables constant monitoring, even in adverse weather conditions.

During mine operation, pumping, diversion, grouting and construction of watertight bulkheads controlled water within the underground mines. Grouting specialists from South Africa assisted in solving the engineering challenge of underground grouting in an environment with high pore pressures due to natural cracks and fissures. The successful use of these methods in the Elliot Lake mines demonstrates the effectiveness of these technologies.

An independent review panel has been supervising the ongoing decommissioning of waste management units in the Elliot Lake mining district since 1993. A combination of vigilant monitoring, financial assurances, continuing research, and effective care and maintenance programs make the current closure activities consistent with modern day mining practices. As an added safeguard, a non-profit organization has been formed to focus on matters related to the impact of the tailings facilities on the conservation of the Serpent River Basin environment. The board of the corporation includes representatives from local government, the Serpent River First Nation and the research community. The non-profit organization is supported by both Rio Algom and Denison Mines Ltd.

Analysis: All of the experience at Elliot Lake provides the basis for sound environmental practices at the Crandon Project. Rio Algom has applied modern remediation practices to mines closed before the company acquired them. Sometimes specific environmental control technologies, e.g., effluent treatment plants, were applied after environmental problems had been identified. Nevertheless, the design, construction, operation, control and monitoring associated with these plants provides a good basis for demonstrating the effectiveness of those technologies and Rio Algom's applications of them.

One such technology specifically applicable to the Crandon Project is grouting to prevent water inflows into the mine. Grouting of naturally occurring fractures has long been recognized as an effective method of reducing the permeability pathways through dam foundations in glacial areas or across mine pillars. In the case of Elliot Lake, grouting of areas of high hydraulic conductivity in an underground setting presented a much larger challenge than had the problem been addressed by conventional surface grouting methods. Rio Algom's direct and extensive experience with these grouting methods will ensure good water control in the Crandon operation.

The company's continuous research into appropriate environmental controls for the Elliot Lake mines also ensures its familiarity and proficiency with effective management controls and environmental technologies.

Thompson Creek Mine - Clayton, Idaho

Owner: Thompson Creek Mining Company

Type of Mine/Commodity: Open pit/molybdenum

Project Overview: The Thompson Creek mine operates on private and public lands 35 miles southwest of Clayton, Idaho, and has been producing concentrate since 1983. The open pit produces molybdenum disulfide ore, which is initially processed by conventional flotation techniques to produce a molybdenum concentrate and tailings. Acid-forming minerals, primarily pyrite compounds, are removed from the tailings through the flotation process. A relatively small volume of pyrite concentrates is produced, with a large volume of relatively inert tailings. The potentially acid-forming tailings are disposed of in a manner that prevents oxidation and acid generation. During winter operations, the entire tailings stream is discharged into the impoundment. For the remainder of the year, the concentrated pyrite is contained in a permanent subaqueous environment by deposition within the impoundment slimes. The inert tailings are used for construction and capping.

Approximately 21 percent of the mine waste rock is potentially acid generating. The separation and special handling of this waste rock minimizes the potential for acid rock drainage. There is extensive surface water monitoring of the various streams around the mine site. There have been no violations of the mine's NPDES permit.

Analysis: Thompson Creek mine effectively uses two proven technologies proposed for the Crandon mine: (1) encapsulation of waste rock; and (2) separation and encapsulation of pyritic tailings. Its environmental protection practices provide a model for other mines for the prevention of acid rock drainage. Mine waste rock and tailings have been properly characterized as to potential for acid rock drainage, and a plan for identification and segregation of reactive waste rock has been effectively implemented.

The U.S. Forest Service has independently evaluated the technologies and environmental management programs used at Thompson Creek for handling tailings. That agency concluded that the pyrite separation equipment in use at Thompson Creek provides effective separation of the pyrite into a 13 percent concentrate that can be pumped to the tailings impoundment for final disposal. The flotation method used for pyrite reduction is a standard technology in the mining industry; thus, it will be effective for the Crandon operation as well. The Forest Service is completing its evaluation of the disposal technologies for the pyritic tails at Thompson Creek, and is expected to make a decision within the next several months. In its environmental analysis, however, it is clear that the agency has determined that pyrite separation is the best applicable technology for controlling acid mine drainage.

ZCA Mines Inc. Balmat Operations - Balmat, New York

Owner: Zinc Corporation of America (ZCA)

Type of Mine/Commodity: Underground/zinc and lead

Project Overview: ZCA Balmat operations are located in upstate New York near the borders of Canada and the Adirondack Park. Nearby communities include Balmat, Gouverneur, and Watertown, 45 miles to the west. Mining began in the area in the 18th century. The Balmat-Edwards Mining District was formed in 1914 when the Edwards Mine was placed into production. In 1929, St. Joe Minerals consolidated district mines and operated them until 1986, when ZCA assumed control. The district has operated continuously since 1914. A flotation mill processes zinc and lead sulfide ores and produces concentrates which are shipped off-site for smelting. Over the years, tailings have been deposited in three impoundments, two now closed and reclaimed, and one active.

The Balmat operations are located in a "northwoods" environment similar to northern Wisconsin near the boundary of the Adirondack Park. Local lakes, streams and rivers receiving drainage from the site are well known fisheries and recreational areas. Reclamation activities on the two closed tailing impoundments since the early 1980s have returned them to excellent functional wildlife habitats, including sport fisheries in the retained water pools. The operation has a superior reputation and excellent relations with the adjacent local communities. It is closely regulated by the New York Department of Conservation (DEC) and has received no notices of violation or compliance orders. The Balmat operation is not submitted as a mine meeting Wisconsin's new statutory requirements because certain carbonate host rocks largely neutralize the acidity generated by oxidizing sulfide wastes.

Analysis: The Balmat operation is one of the finest examples of environmentally responsible mining in North America. It has operated continuously for more that 80 years, includes closed and reclaimed tailings impoundments, is located in an area of recreational and environmental sensitivity near a major park, and operates in climatic conditions very similar to northern Wisconsin. This mine has not been submitted as a candidate under the new statute only because it does not show definitive net acid generating potential. However, the operation employs numerous environmental protection technologies which are instructive with respect to the Crandon mine proposal.

Balmat maintains three active NPDES permits to discharge mine waters. Process contact waters are treated in a state-of-the-art computerized treatment system to reduce total suspended solids prior to discharge. Discharge waters and storm waters are routed through uniquely constructed open-water wetlands for additional polishing. These natural appearing wetlands provide high quality fish and wildlife habitat in addition to water quality enhancement.

ZCA has reclaimed its No. 2 tailings impoundment using standard and accepted cover and seed technology. The result has been to return a 100+ acre mine waste site (which includes sulfide waste) into high quality, multi-tiered wildlife habitat which is used for wildlife

viewing and hunting. A retained water pool on one segment of the site supports an outstanding recreational fishery.

In addition to the technology employed by ZCA, the operation has extremely good relations with local communities. ZCA holds the county and the local communities in high esteem, a respect that is returned by those entities. The Balmat operations have been a continuous employer and an important component of these communities since before World War I. The mine voluntarily maintains non-mine roads and winter access to residences around the site.

Sleeper Mine - Humboldt County, Nevada

Owner: Kinross Gold USA, Inc.

Type of Mine/Commodity: Open pit/gold

Project Overview: The Sleeper mine is located in the Awakening Mining District, 28 miles north, northwest of Winnemucca, Nevada. The mine began production in 1985 and was closed in late 1996, following depletion of its reserves. While the ore primarily was oxide, there was a significant sulfide component in both the waste and the ore toward the end of the mine's life. During the last several years of mining, substantial sulfide material was extracted. Sulfides were readily visible in the final pit. Operations consisted of mining from two open pits (ultimately joined into a single large pit), a grinding mill, carbon-in-pulp cyanide mill circuit, an adjacent tailings impoundment of approximately 200 acres, and a heap leaching facility for lower-grade ore.

During its production period, the mine operated without any environmental problems and without any violations of surface water or groundwater laws or regulations. The mine maintained very high environmental standards, and enjoyed excellent regulatory and community relations. The Sleeper mine won the prestigious DuPont-Conoco Environmental Leadership Award in 1992 for its efforts to utilize pit water to create extensive high quality wetlands on an adjacent playa.

Upon closure, Sleeper was faced with two primary environmental challenges: (1) the pit would naturally fill with water to within 40 to 60 feet of the surface over a long period, and (2) reactive sulfide materials exposed in the lower pit walls and in waste rock were potentially acid generating. In consultation with the Nevada Department of Wildlife, Nevada Department of Environmental Protection, and the U.S. Bureau of Land Management (BLM), Sleeper determined that a viable cool-water fishery could be established in the Sleeper pit if reactive sulfide materials could be managed to preclude acid-generation over the long-term. Following characterization and feasibility investigations, Sleeper implemented a plan to deposit sulfide wastes into the bottom of the pit well below the natural water level. Some of these pit waste disposal sites were covered with non-acid generating oxide wastes. Groundwater was then pumped back into the pit from the perimeter dewatering wells, forcing the water level to

rise above the exposed pit wall sulfides much more rapidly than if allowed to occur naturally. Lime was added initially to assist establishment of equilibrium. Monitoring in 1998 indicated a stable, neutral pH and low metals levels in the photic zone of the pit lake. Some species of fish already had begun to colonize the pit lake naturally since no stocking had yet to occur.

Since closure and reclamation in 1997 and 1998, Sleeper continues to be referenced by the state and the BLM as an example of a well-operated, modern mining facility designed for closure using modern closure technologies. This mine is an excellent example of an environmentally responsible operation. However, it is unlikely to meet the new statute's requirement for net acid generating potential, in that it operated in a non-reactive oxide environment for the majority of its production life.

Analysis: Closure and reclamation of Sleeper is closely monitored by the state of Nevada and the BLM. Sub-aqueous disposal of reactive sulfide wastes, while an accepted practice in Canada, is relatively new in the United States. The Sleeper mine is one of the first U.S. mines to implement this technology. Nonetheless, all current indications point to its complete success at this site, and the Sleeper pit soon will be stocked with suitable sport fish species, providing a highly beneficial public use of this closed mine.

With the exception of sub-aqueous deposition of sulfide materials, the principal technologies employed in closure of Sleeper are utilized throughout the modern hardrock industry. Mill facilities and structures have been or will be dismantled and removed from the site when no longer needed in the closure process. The remaining waste rock piles and the spent ore heaps have been (or soon will be) graded and contoured, capped, and revegetated with rangeland grasses and shrubs suitable to the area ecotype. The tailings impoundment is now being dried prior to capping and revegetation. All of these strategies and technologies find direct analogs in the Crandon Project.

SECTION 6

RESERVATION OF RIGHTS

6.0 RESERVATION OF RIGHTS

NMC believes the information in this submission demonstrates that there are, in fact, sulfide mines that satisfy the new "moratorium" statute's narrow and arbitrary criteria. In making this submission, however, NMC specifically reserves its rights to challenge this deeply flawed legislation at the Master Hearing and, if necessary, in the courts.

NMC and its predecessor, Crandon Mining Company, opposed the mining moratorium throughout the legislative process. NMC believed then, and continues to believe, that the requirements of this new enactment (imposed some four years into the Crandon Project permitting process) represent bad science, bad policy, and bad law. The new statute singles out one activity – mining – for the imposition of an unprecedented new requirement: a modern mine can no longer be permitted unless the applicant proves that one or more old mines designed and operated with old technologies and methods under old laws nevertheless satisfied our modern notions of environmental stewardship and protection. Few, if any, human activities could meet this standard, and its targeted application to this one undertaking violates constitutional guarantees of equal protection of the laws.

The new law is also misdirected because it excludes from consideration some of the best examples of modern mining, such as those discussed in Section 5, above. If the WDNR is to judge the proposed Crandon Project on the basis of other mines in other parts of North America, it should consider all of the relevant evidence, including the abundant evidence of modern mines using state-of-the-art technology that are meeting today's tough environmental standards. The fact that some of these mines may not have been operated or closed for a full ten years, or that others may have encountered isolated and minor problems that were quickly and fully remedied, does not provide good cause for completely ignoring them. Again, no other human undertaking has ever been judged under such a harsh standard.

The legislative history and post-enactment developments also show that many mining opponents are hoping to use the new statute to prevent any new mining in Wisconsin in general, and to kill (or at least indefinitely postpone) the Crandon Project in particular. The draft bill was amended during the legislative process so as to exclude examples of safe mines that had been offered by NMC's predecessor, and some mining opponents are likely to attempt to tinker with the statute's standards so as to continue to exclude any candidates offered by NMC. They also are continuing to attempt to use the new law – contrary to its express terms – to impose a discriminatory zero-impact standard upon mining, and to impose other standards that as a practical matter would be impossible for anyone or any industry to meet. No industry could satisfy, or has ever been required to satisfy, such criteria. Among other constitutional

problems, this would also constitute a "taking" of the affected mineral rights within the meaning of the Wisconsin and United States Constitutions.[18]

NMC believes that its objections are likely moot given the existence of mining operations that satisfy the requirements of § 293.50. However, NMC specifically reserves all of these objections and its right to advance them further – as appropriate -- at the Master Hearing or in other legal proceedings.

---

[18] See, e.g., Pennsylvania Coal Co. v. Mahon, 260 U.S. 393 (1922); Florida Rock Enterprises, Inc. v. United States, 18 F.3d 1560 (Fed. Cir. 1994), cert. denied, 513 U.S. 1109 (1995), and 791 F.2d 893 (Fed. Cir. 1986), cert. denied, 479 U.S. 1053 (1987); Whitney Benefits, Inc. v. United States, 926 F.2d 1169 (Fed. Cir.), cert. denied, 502 U.S. 952 (1990); United Nuclear Corp. v. United States, 912 F.2d 1432 (Fed. Cir. 1990); Eastern Minerals International, Inc. v. United States, 36 Fed. Cl. 541 (1996); Bass Enterprises Production Co. v. United States, 35 F.R.D. 615 (Fed. Cl. 1996). See also Miller Brothers v. Michigan DNR, 203 Mich. App. 674, 688-689, 513 N.W.2d 217, appeal denied, 447 Mich. 1038, 527 N.W.2d 513 (1994) (indefinite moratorium on oil and gas development in a newly designated state park constituted a compensable temporary "taking," with "just compensation" to be determined based on "the amount of money [the owners] could have received in interest on the present value of the income stream" had development been allowed to proceed).

APPENDIX 1

INTRODUCTION AND SUMMARY OF THE ANALYSIS

APPENDIX 1.1

1997 Senate Bill 3

Date of enactment: **April 22, 1998**
Date of publication*: **May 6, 1998**

1997 WISCONSIN ACT 171

AN ACT *to amend* 293.49 (1) (a) (intro.); and *to create* 293.50 of the statutes; **relating to:** issuance of metallic mining permits for the mining of sulfide ore bodies.

The people of the state of Wisconsin, represented in senate and assembly, do enact as follows:

SECTION 1. 293.49 (1) (a) (intro.) of the statutes is amended to read:

293.49 (1) (a) (intro.) Except as provided in sub. (2) and s. 293.50 and except with respect to property specified in s. 41.41 (11), within 90 days of the completion of the public hearing record, the department shall issue the mining permit if it finds:

SECTION 2. 293.50 of the statutes is created to read:

293.50 Moratorium on issuance of permits for mining of sulfide ore bodies. (1) In this section:

(a) "Pollution" means degradation that results in any violation of any environmental law as determined by an administrative proceeding, civil action, criminal action or other legal proceeding. For the purpose of this paragraph, issuance of an order or acceptance of an agreement requiring corrective action or a stipulated fine, forfeiture or other penalty is considered a determination of a violation, regardless of whether there is a finding or admission of liability.

(b) "Sulfide ore body" means a mineral deposit in which metals are mixed with sulfide minerals.

(2) Beginning on the effective date of this subsection ..... [revisor inserts date], the department may not issue a permit under s. 293.49 for the mining of a sulfide ore body until all of the following conditions are satisfied:

(a) The department determines, based on information provided by an applicant for a permit under s. 293.49 and verified by the department, that a mining operation has operated in a sulfide ore body which, together with the host rock, has a net acid generating potential in the United States or Canada for at least 10 years without the pollution of groundwater or surface water from acid drainage at the tailings site or at the mine site or from the release of heavy metals.

(b) The department determines, based on information provided by an applicant for a permit under s. 293.49 and verified by the department, that a mining operation that operated in a sulfide ore body which, together with the host rock, has a net acid generating potential in the United States or Canada has been closed for at least 10 years without the pollution of groundwater or surface water from acid drainage at the tailings site or at the mine site or from the release of heavy metals.

(2m) (a) The department may not base its determination under sub. (2) (a) or (b) on any mining operation that has been listed on the national priorities list under 42 USC 9605 (a) (8) (B) or any mining operation for which the operator is no longer in business and has no successor that may be liable for any contamination from the mining operation and for which there are no other persons that

* Section 991.11, WISCONSIN STATUTES 1995–96: Effective date of acts. "Every act and every portion of an act enacted by the legislature over the governor's partial veto which does not expressly prescribe the time when it takes effect shall take effect on the day after its date of publication as designated" by the secretary of state [the date of publication may not be more than 10 working days after the date of enactment].

may be liable for any contamination from the mining operation.

(b) The department may not base its determination under sub. (2) (a) or (b) on a mining operation unless the department determines, based on relevant data from groundwater or surface water monitoring, that the mining operation has not caused significant environmental pollution, as defined in s. 293.01 (4), from acid drainage at the tailings site or at the mine site or from the release of heavy metals.

(3) This section applies without regard to the date of submission of the permit application.

APPENDIX 1.2

Appendix 1.2

The Evolution and Requirements of Wisconsin's New Mining "Moratorium"

The only thing about Wis. Stats. § 293.50 that was not completely rewritten during the legislative process was its title: "Moratorium on issuance of permits for mining of sulfide ore bodies." As finally enacted, however, the new law is not a "moratorium" on mining at all.

As originally conceived in 1995, the moratorium legislation would have "prohibit[ted the [W]DNR from issuing a metallic mining permit for the mining of a sulfide mineral deposit before July 1, 2006."[1] Such a law would clearly have constituted a "taking" with respect to the Crandon Project (and perhaps other mining projects) under the United States and Wisconsin Constitutions, and could not have garnered the political support necessary for enactment. (See Section 6 in the text.) Thus, the bill was revised while in drafting to provide for the two-part "test" that was finally enacted in significantly modified form. In its original form, the legislation would have prohibited the WDNR from granting a mining permit unless it determined that the following two tests had been met:

- "a mining operation has operated in a sulfide ore body in the United States or Canada for at least 10 years without polluting groundwater or surface water from acid drainage at the tailings site or at the mine site or from the release of heavy metals"; and

- "a mining operation that operated in a sulfide ore body in the United States or Canada has been closed for at least 10 years without polluting groundwater or surface water from acid drainage at the tailings site or at the mine site or from the release of heavy metals."[2]

It was demonstrated early on that there are numerous examples of old lead-zinc sulfide mines in southwestern Wisconsin that would satisfy any fair application of both the

---

[1] See handwritten "Analysis" contained in the LRB drafting file for 1995 AB 758. The moratorium's original version, revised before it was introduced as 1995 AB 758, would have provided in its entirety as follows: "**Moratorium on issuance of permits for mining of sulfide minerals**. Beginning on the effective date of this section . . . . [revisor inserts date], and ending on July 1, 2006, the department may not issue a permit under s. 144.85 for the mining of a sulfide mineral deposit. This section applies without regard to the date of submission of the permit application." The unmistakable intent of this approach was to kill the Crandon mine.

[2] See 1995 Assembly Bill 758.

"operating" and "closed" criteria as set forth above.[3] In response, the bill's sponsors quickly amended it yet again to limit acceptable examples to those involving "a sulfide ore body of similar geological characteristics in the United States or Canada."[4] This quoted language eventually evolved into the requirement that a candidate mine must have "operated in a sulfide ore body which, together with the host rock, has a net acid generating potential." Wis. Stats. §§ 293.50(2)(a)-(b). The purpose of this amendment clearly was, in the WDNR's words, to exclude mines like those in southwestern Wisconsin in which "the[ ] ore bodies exist in a limestone host rock which serves to neutralize any acid that may be generated."[5]

Early versions of the legislation contained no definition of "pollution." There was concern that, without further clarification, this ambiguity could be used to argue for a zero-impact standard – that any impacts above background levels caused by a mining operation would constitute "pollution" (even though the impacts may have been perfectly lawful and not have adversely affected human health or the environment). This would have been an impossible standard for any mine to meet, and one that has never been imposed on any other industry, undertaking, or human endeavor.

Because of this flaw, the proposed legislation failed to obtain a majority in the Wisconsin Senate until it had been amended so as to define "pollution" as "degradation that results in any violation of any environmental law."[6] This was a significant improvement, although it was recognized at the time that this definition was still unclear and would "require interpretation by the [W]DNR in any applicable master hearing permit process."[7] In response, the WDNR put the Legislature and public on clear notice of how it would interpret this pollution definition. Howard S. Druckenmiller, Executive Assistant to WDNR Secretary George Meyer, explained on behalf of the Department as follows:

> "First – What is a violation? I am aware that the Senate discussed this issue, and declined to include language that would limit violations to cases that were adjudicated in court. However, we believe that precedent, fairness and reason would require,

---

[3] See, e.g., J.W. Todd and D.W. Struhsacker, Environmentally Responsible Mining: Results and Thoughts Regarding a Survey of North American Metallic Mineral Mines, pp. 3, 9-10 (Society for Mining, Metallurgy, and Exploration, Inc., Preprint No. 97-304, 1997).

[4] See 1997 Senate Bill 3 (emphasis added).

[5] Testimony of Howard S. Druckenmiller, May 12, 1997, Ladysmith, Wisconsin, p. 2. See also July 8, 1997 Wisconsin Legislative Council Staff Memorandum from William Ford to Representative Marc Duff, pp. 3-4.

[6] See Engrossed 1997 SB 3, as adopted by the Wisconsin Senate on March 11, 1997.

[7] See March 13, 1997 Wisconsin Legislative Council Staff Memorandum to Interested Legislators from John Stolzenberg, Staff Scientist, pp. 2-3.

short of adjudication in court, that an alleged violation would have to be formally determined by the agency that has jurisdiction over the environmental laws to which the mine is subject. We also believe this means the agency with jurisdiction has made a final determination that could be administratively challenged or judicially appealed by any party. Otherwise, any allegation that a violation occurred, true or not, could disqualify the subject mine from consideration as an example under this bill.

"The process we use in Wisconsin to enforce environmental law, for example, allows the department to send a 'Notice of Violation' to an individual or a company when we believe there is a violation of an environmental law. This is not an appealable decision. Later in the process, after considering all the facts, we may issue an order, or refer the case to the Attorney General. This is a final determination by the department, and it is appealable. The determination may not be adjudicated or appealed, but the opportunity to do so exists. While different states or provinces may have variations of this procedure, we would look for the point in the enforcement process where the relevant agency has made an appealable determination that a violation has occurred.

"A second question is what environmental laws are relevant? We have to assume that the relevant laws are those on the books of the state or province, or federal law where appropriate, at the time the mine was operating, and/or during the 10 year time frame during closure the Wisconsin applicant chooses. . . ."[8]

The WDNR elaborated on these points in a May 1997 white paper entitled "Issues Regarding Senate Bill 3." The agency explained in relevant part:

"A simple report or chemical analysis that a particular environmental standard has been exceeded is not considered by [W]DNR staff to be a 'violation.' To be considered a violation, there must be an initial determination that a standard was exceeded and then the permittee or regulated entity must have a formal opportunity to contest the finding. A determination that there has been a violation is not made until that opportunity has been provided. . . .

---

[8] Druckenmiller Testimony, note 5, Section 1.2.1 in the text.

"[W]DNR staff do not believe they could be familiar enough with the details of another state's laws to determine whether that state's environmental laws had been 'violated' or not. Wis. DNR staff would have to rely upon the judgement of the responsible agency in the other state for such a determination. In posing the question to an agency in another state, Wis. DNR staff would provide the guidance that a 'violation' should be interpreted as described above. ..."

". . . For historic operations, the only record of compliance of a mine would be in relationship to the environmental laws of that state in place at the time. Therefore, Wis. DNR staff would ask a mining applicant to submit information from the state in which the mine was located showing that the mine had not violated the environmental laws of that state in place at the time."[9]

The WDNR also emphasized that the "pollution" of concern under the proposed legislation was specifically limited in scope. The legislation spoke only of "pollution of groundwater or surface water from acid drainage at the tailings site or at the mine site or from the release of heavy metals." The WDNR advised the Legislature as follows:

" . . . Pollution of groundwater or surface waters at [the] mine site or tailings site would not be of concern for this determination if the pollution were not the result of acid drainage or release of heavy metals. . . . The language in the bill clearly limits the types of pollution that are to be considered. Brines, for example, that were not the result of acid mine drainage and did not contain heavy metals would not be a covered concern with respect to these determinations."[10]

The WDNR's clarifying interpretations during the spring and summer of 1997 prompted two disparate responses. First, several of the original sponsors attempted to amend the bill so as to discard the Senate's narrowing definition of "pollution." Their proposed alternative would have defined that term to mean "degradation that causes groundwater or

---

[9] WDNR, "Issues Regarding Senate Bill 3," pp. 1-2 (May 1997). See also July 8, 1997 Wisconsin Legislative Council Staff Memorandum, note 5, Section 1.2.1 in the text (emphasizing the WDNR's interpretation that there could be no finding of pollution "without the determination by a court, or a determination by the relevant administrative agency with jurisdiction over the mine that could be administratively challenged or judicially appealed;" concluding that this interpretation "appears reasonable" and would receive deference in any subsequent court challenge).

[10] WDNR, "Issues Regarding Senate Bill 3," pp. 3-4 (May 1997).

surface water to be less suitable for human consumption or that causes damage to aquatic or other organisms" – precisely the zero-impact standard that the Senate had already rejected. Their amendment also would have broadened the bill to include not only acid drainage and the release of heavy metals, but "pollution" caused by "sedimentation" or the release of "other contaminants" as well. These proposals received virtually no support, and the amendment died in the Wisconsin Assembly.[11]

Second, an amendment – known as Assembly Amendment 4 to Senate Bill 3 – was introduced and ultimately enacted to codify the WDNR's interpretation of the "pollution" language, while simultaneously closing several perceived "loopholes" created by that interpretation. The WDNR had been sharply criticized for its interpretation by some mining opponents, and a majority of the Legislature decided that it was important to eliminate ambiguity in the definition by expressly adopting the WDNR's common-sense approach based on "precedent, fairness and reason," and thereby eliminate the potential for future inconsistencies in the statute's interpretation and application. The definition, as finally enacted, provides as follows:

> "'Pollution' means degradation that results in any violation of any environmental law as determined by an administrative proceeding, civil action, criminal action or other legal proceeding." Wis. Stats. § 293.50(1)(a) (emphasis added).

The Legislature recognized that regulators and operators sometimes reach negotiated settlements that avoid express findings of a "violation." To ensure that the new law's requirements would not overlook such situations, the definition of "pollution" was further amended to provide as follows:

> "For purposes of this paragraph [defining 'pollution'], issuance of an order or acceptance of an agreement requiring corrective action or a stipulated fine, forfeiture or other penalty is considered a determination of a violation, regardless of whether there is a finding or admission of liability." Id.

Opponents of Assembly Amendment 4 argued that the revised definition of "pollution" would allow reliance on Superfund sites or so-called "orphan mines" – sites for which there are no owners or other successors that can be held liable. To avoid any such possibility, the amendment's sponsors revised it further to provide that "[t]he department may not base its determination on":

- "any mining operation that has been listed on the national priorities list under 42 USC 9605(a)(8)(B)" [the so-called Superfund law]; or

---

[11] See Assembly Amendment 1 to 1997 Senate Bill 3 (introduced September 4, 1997).

- "any mining operation for which the operator is no longer in business and has no successor that may be liable for any contamination from the mining operation and for which there are no other persons that may be liable for any contamination from the mining operation." Wis. Stats. § 293.50(2m)(a).

Nevertheless, there was continuing concern in some circles that, despite the various exceptions to the requirement of an official determination, the amended legislation might allow reliance on old mines that had caused significant pollution.[12] As a result, the Legislature agreed to include the following additional exclusionary criterion:

> "The department may not base its determination [under the new law] on a mining operation unless the department determines, based on relevant data from groundwater or surface water monitoring, that the mining operation has not caused significant environmental pollution, as defined in s. 293.01(4), from acid drainage at the tailings site or at the mine site or from the release of heavy metals." Wis. Stats. § 293.50(2m)(b) (emphasis added).

This amendment represented a bipartisan consensus. Pursuant to that consensus, the WDNR would base its "pollution" inquiry upon whether a candidate mine had violated the relevant environmental laws governing that mine, as determined by the authorities with jurisdiction over that operation. If the proper authorities had found no such violations, the WDNR would still be required to make its own determination, "based on relevant data," as to whether the candidate mine had caused "significant" pollution from acid drainage or the release of heavy metals. Unless any "significant" pollution had been caused from these specific sources, the candidate mine could be accepted. Thus, a candidate mine would be disqualified only on the basis of a genuine problem of "significance," not mere technicalities or problems that have been resolved without causing substantial harm to the surrounding environment.

Section 293.50 was thus significantly amended during the legislative process so as to ensure reasonable standards and procedural safeguards. It is no longer a "moratorium" at all. As thus amended, the legislation drew large bipartisan majorities from both opponents and supporters of mining, as well as the Governor's approval.

---

[12] See, e.g., January 28, 1998 Wisconsin Legislative Council Staff Memorandum from William Ford and John Stolzenberg to Senator Dale Schultz.

APPENDIX 2

McLAUGHLIN MINE

SOCIETY FOR MINING, METALLURGY, AND EXPLORATION, INC.

P.O. BOX 625002 • LITTLETON, COLORADO • 80162-5002

PREPRINT NUMBER

90-23

ENVIRONMENTAL MANAGEMENT AT HOMESTAKE'S MCLAUGHLIN MINE

R. E. Krauss

Homestake Mining Company
Lower Lake, California

For presentation at the SME Annual Meeting
Salt Lake City, Utah - February 26-March 1, 1990

Permission is hereby given to publish with appropriate acknowledgments, excerpts or summaries not to exceed one-fourth of the entire text of the paper. Permission to print in more extended form subsequent to publication by the Society must be obtained from the Executive Director of the Society for Mining, Metallurgy, and Exploration, Inc.

If and when this paper is published by the Society for Mining, Metallurgy, and Exploration, Inc., it may embody certain changes made by agreement between the Technical Publications Committee and the author, so that the form in which it appears is not necessarily that in which it may be published later.

These preprints are available for sale. Mail orders to PREPRINTS, Society for Mining, Metallurgy, and Exploration, Inc., P.O. Box 625002, Littleton, Colorado 80162-5002.

PREPRINT AVAILABILITY LIST IS PUBLISHED PERIODICALLY IN MINING ENGINEERING

ENVIRONMENTAL MANAGEMENT AT HOMESTAKE'S MCLAUGHLIN MINE

Raymond E. Krauss, Environmental Manager
Homestake Mining Company, McLaughlin Mine
Lower Lake, California, U.S.A.

ABSTRACT

The McLaughlin Mine is a world class epithermal gold deposit located in the coastal thrust fault of Northern California, U.S.A. Homestake adopted a proactive strategy in the permitting of the Mine. Extensive environmental baseline studies were undertaken. Engineering and process alternatives were evaluated for environmental impact along with other factors. A unique pressure oxidation process was selected. Screening studies were conducted as a basis for the selection of waste rock and tailings disposal sites. Project engineering and permitting were fast tracked. Construction required eighteen months and the first gold bar was poured in March of 1985, six years after the initial discovery. Project facilities are designed and operated so as to minimize environmental impacts. A comprehensive monitoring program demonstrates permit compliance. Reclamation of the site is ongoing throughout the Mine's twenty year life. Nonmined lands are managed to maximize wildlife habitat value.

CONTEXT

Homestake's McLaughlin Mine is a world class gold deposit situated in the eastern margin of the coastal thrust fault approximately seventy air miles north of San Francisco, California, on the west coast of the United States. Identified as a gold target by Homestake exploration in early 1978 and confirmed by drilling to be a commercial deposit by 1980, the Mine was planned, engineered, permitted, constructed, and brought into production by March of 1985.

The McLaughlin deposit is considered to be one of the best preserved and finest examples of a hot springs type epithermal gold deposit on earth. Occurring along a northwest striking-northeast dipping thrust fault, the upper plate rocks are composed of bedded siltstones, mudstones, and sandstones of the Upper Jurassic (150 million years) and the younger Great Valley Sequence. The lower plate rocks consist chiefly of a serpentinite melange derived from

the Coast Range ophiolite and lesser Franciscan Complex lithologies. The fault zone contains a mixture of both upper and lower plate rocks that have been intensely sheared. The resulting material consists of coherent blocks set in a matrix of flaky fault gouge.

About 2.2 million years ago, the thrust zone was invaded by basaltic magmas resulting in two stages of volcanic activity. The earlier stage involved small but violent eruptions resulting in deposits of volcanic ejecta, small craters, and fragmental intrusives. The second stage resulted in the emplacement of olivine-pyroxene basalt sills, domes and minor flows.

Hydrothermal activity accompanied lithification of shallow magmas. Fluid flow paths were related to both early fault zone permeability and later volcanic vents. All rock types in the deposit are hydrothermally altered and locally host gold-bearing veins. Early silica flooding hardened the poorly indurated materials permitting the development of open fractures as a result of regional strike-slip stress. These open spaces were filled with vein matter, creating a stock work deposit. Surface geysers and hot springs deposited a chalcedonic sinter terrace.

Mercury (as cinnabar) was localized in the shallow parts of the system and was the object of early mining efforts. Native gold occurs as submicroscopic to rare coarse grains in the chalcedony-quartz veins together with silver (as sulfosalts) and a variety of other minerals including stibnite, pyrite, barite, calcite, dolomite and adularia.

The McLaughlin deposit contains twenty million tons of ore at an average grade of 0.152 ounces per ton, or approximately 3,000,000 total ounces of gold.

Historically, a part of the Knoxville District, the deposit was mined for cinnabar for the production of mercury for use in the recovery of gold and silver in the Mother Lode and Comstock Districts. Called then the Manhattan Mine and later the One Shot Mine, the deposit was worked for more than hundred years producing over 76,000 flasks of mercury without any awareness of the presence of economic concentrations of gold. By 1978 the site was largely disturbed and entirely unreclaimed.

Geographically, the Mine sits on a ridge between two watersheds at an elevation of approximately 2,000 feet. This provides the advantage of limiting the water flows that might otherwise need to be diverted around the site. The climate is Mediterranean with the thirty inches of average annual rainfall occurring predominately in the winter months from October through April. Evaporation exceeds rainfall averaging sixty inches per year.

Jurisdictionally, this ridge is also a boundary between two counties and in fact the McLaughlin Mine has facilities located in each of three different counties: Napa, Lake, and Yolo. Each of

these counties is empowered to exercise independent land use authority and requires separate permitting procedures including extensive environmental review with public participation. In addition, the project is subject to the authority of three different Air Quality Management Districts, two State Department of Fish and Game Regions, both a Regional Water Quality Control Board and a State Water Resources Board and the Federal Bureau of Land Management. In total 327 different permits had been obtained before the first gold bar was poured.

Sociologically and economically, the setting is also complex. Northern California is the birthplace of the Sierra Club and the home of much of the American environmental movement. Certainly no project of the scale of the McLaughlin Mine could expect to escape the intense scrutiny of the environmental community.

The local project site is remote and the surrounding area only very sparsely settled. The closest communities are north of the Mine in Lake County, an area whose economy has depended largely on seasonal tourism and agricultural production and whose population is dominated by retirees. The economy of Napa County is dominated by the premium wine grape industry and the population is politically sophisticated and relatively affluent. Yolo County, on the edge of California's great Central Valley, is also largely an agriculturally based economy dominated by field crops and orchards with the addition of a major academic community, the University of California at Davis.

Politically, California was characterized as "anti-business" in the late 1970's and early 1980's, primarily as a consequence of the unsuccessful effort of a major petrochemical company to permit a large plastics facility proposed for a site along the Sacramento River northeast of San Francisco. Faced with seemingly unending and ever changing requirements for technical studies and environmental investigations, the company finally abandoned the attempt and relocated the facility to Texas. The State Legislature responded with a series of bills that were intended to streamline and clarify the permitting process, but there were still many in 1981 who believed that the McLaughlin Mine would never be permitted.

PERMITTING PHILOSOPHY

Homestake adopted a "proactive" strategy in the permitting of the McLaughlin Mine. By proactive we mean anticipatory action; the seeking out of the regulators and the community members and the potential adversaries and the offering to them of the opportunity to participate; to see the site, to ask their questions, to offer suggestions, and to become involved in the evolution of the project.

This permitting approach is founded on three basic premises. First, the project environmental, design and engineering work needs to be technologically sound, even technologically impeccable. Nothing erodes public confidence in a project more quickly than technical error. And even a single error renders the entire body of work suspect.

Second, the regulatory staff needs to become involved in the project at the very earliest stages of site selection and design. Early interaction provides the opportunity for truly productive educational exchange; for the operator to learn of the procedural constraints and informational requirements of the regulator and for the regulator to gain some understanding of the technologies of the project and its economic limitations.

Third, all of the "interests at stake" must be honored, both real interests and perceived interests. Ultimately the approval of a major project is a political decision, and a political decision depends upon a political consensus. In such a system, no decision maker is going to approve a project at the expense of his office. Project approval thus requires the demonstration of a sufficient or "critical mass" consensus within the affected communities before approvals will be granted.

In the case of Homestake's McLaughlin Mine, each of these premises was incorporated into the permitting process. Technical documents were prepared by qualified professionals, each with substantial experience in his field. Local expertise was employed whenever available to assure familiarity with site specific circumstances. All technical documents were subject to critical review before distribution.

Regulatory agencies were notified of plans and intentions at the earliest possible moment and the responsible individuals contacted. Site visits were organized, questions answered, and relevant literature provided. Opportunities to visit other gold mines were offered, as many of the regulators had no prior experience with similar projects. In many instances regulatory staff actually became participants in the planning and siting and engineering process. For example, at the very beginning of the site screening and evaluation process for waste disposal sites, staff of the Regional Water Quality Control Board was invited to review the work programs, the drilling plans and the site evaluation procedures to determine in advance that the work would in fact provide the information needed to review and approve the facilities.

Approaches to the regulatory agencies were always from the bottom up. Never once was it found necessary or desirable to ask agency managers to impose direction upon agency staff to solve problems or disagreements. Higher authority was only evoked at the request of the staff. And ultimately every proposal put before a

decision making body went forward with the support and the endorsement of the staff involved.

The benefit of early interaction with the regulatory authorities becomes even more clear upon examination of the opposite approach. If substantial engineering has been accomplished prior to agency contact, the project proponent is by necessity in a position of defending the expenditure for the work accomplished to date. Changes and revisions cost money and time and are therefore resisted. Polarization often results.

Developing a critical mass consensus in favor of a project is a demanding and time consuming task. Beginning with the earliest stages of exploration, Homestake developed a project slide show and offered presentations to civic organizations and service clubs. Environmental groups were contacted and invited to visit the site and to discuss the project. Neighboring ranchers were feted to barbecues and picnics. Project documents were made available to all interested parties and a periodic newsletter produced. By the end of the permitting process over 7,500 names were on the newsletter mailing list.

Rumors and misinformation flourish in a vacuum of real information. Filling that void with understandable, credible information is critical to successful permitting. And the same level of effort needs to be expended on the seemingly unreasonable assertions and objections as on the reasonable. Responses to real interests at stake are perhaps more easily formulated. The downstream water users or the neighboring ranchers are usually looking for technically based assurances that the project will not cause them some personal loss or damage.

The perceived interest is often an emotionally held opinion or feeling that the project will wreck some unspecified damage on the landscape and is therefore unacceptable. Responses to perceived concerns are often best formulated by independent but credible third parties. In the case of the McLaughlin Mine, project staff became involved in the local universities and colleges as lecturers and field trip leaders. The academic community thus informed was in a position to offer reasoned responses to perceived concerns.

Ultimately the body of objectors to the McLaughlin Project was reduced to some apparently irreducible minimum number of individuals who firmly held the opinion that mining was simply not an acceptable use of the landscape.

Homestake's relationship with a local chapter of the Sierra Club is perhaps most illustrative of this process. Club members at first responded to the project in a predictably skeptical manner. Offered the opportunity to learn about the Mine proposal and to critically examine the project's environmental consequences, the group undertook an extensive and rigorous independent review.

Provided with relevant project documents including site evaluation studies and engineering reports, club members consulted with technical experts in whom they shared confidence. After weeks of consideration, the group concluded that the project proposal was indeed environmentally sound and deserved consideration on its merits.

The Sierra Club members then expanded their inquiry to consider the benefits of the project, the uses of the resource, the degree to which their lives were dependent on or enhanced by the availability of gold, and the full range of consequences of project denial. The group concluded that gold was indeed a necessary and desirable commodity in their lives and that to oppose the McLaughlin Mine was to in effect endorse the production of the resource in a manner that might have less desirable environmental and social consequences. At a public hearing the Club officially took the position that they had conducted an extensive review and concluded that they would not oppose the project.

ENVIRONMENTAL BASELINE STUDIES

Early in 1980, as soon as target exploration had confirmed an economic deposit, environmental baseline studies were initiated. Aerial photography was flown and base maps prepared. A consulting firm was selected as the primary contractor for the preparation of environmental studies and local subcontractors retained. An engineering firm specializing in mine waste management was hired to undertake waste site screening studies and a water rights expert to assist in securing the necessary water supply.

Geologic investigations were undertaken to establish regional and local seismicity and to determine maximum likely and maximum credible ground accelerations at the site as required for facilities engineering. Field studies were necessary to identify local faults and to determine their status. Faulting in the vicinity of potential dam sites was particularly critical and numerous regulatory agencies had to be satisfied that fault displacement would not threaten the integrity of any dam nor, in the case of the tailings impoundment, provide a conduit for release. Slope stability evaluations were an important input to site screening and selection studies as a consequence of the relatively young and active geology of the California Coast Range and the rugged and variable topography.

Soils over the ten thousand acre study area were mapped and evaluated for engineering properties and for reclamation suitability. Vegetative communities were mapped and their successional status determined. Serpentine derived soils were found to provide habitat for several varieties of plants thought to be rare or threatened. Additional surveys were undertaken to establish the true status of these plants. Local botanists from area colleges and native plant societies were enlisted in the

effort and over 35,000 acres were ultimately studied. Timing of this work was critical as the plants could only be identified when in bloom and some species were biennials blooming only every second year. Eventually the plants were found to be more abundant than originally thought, allowing some populations to be disturbed. Even so, facilities were sited to avoid "sensitive" plant populations whenever possible.

Wildlife populations were similarly studied, both through field surveys and review of known habitat associations. Presence or lack of potentially occurring rare and endangered species had to be determined. This included helicopter searches for active raptor nests. Diversity and abundance indices were developed for each habitat type and the habitats were ranked by relative sensitivity to disturbance.

Aquatic ecology baseline conditions were documented including the abundance and diversity of benthic populations and fish and the heavy metal concentrations in fish flesh and benthic tissues. Stream sediment metals concentrations were similarly studied.

Surface water quality stations were established in each of the three downstream watersheds and regular sampling schedules established in order to accumulate sufficient data to allow a statistically adequate description of baseline water quality and flow conditions. This ultimately proved difficult because the range of natural variability is extreme in the upper reaches of Coastal Range watersheds where rainfall is seasonal and variation from one year to the next quite wide. Much of the year, preproject water quality at most stations was found to fail U.S. Environmental Protection Agency drinking water standards for some parameters.

Groundwater quality was found to be less variable than surface water quality and variation in groundwater levels more predictable. In the highly mineralized geology of the district, it was not surprising that most groundwater samples failed drinking water standards. Outside of the silicified ore body, ground conditions were found highly unsuitable for the storage of groundwater and the vast majority of test holes were found dry or required weeks to recharge after evacuation of the initial well volume.

Air quality and meteorological stations were constructed and equipped to provide documentation of background air quality conditions and appropriate meteorological data for air quality modeling. Total suspended particulate levels were monitored each sixth day according to an E.P.A. established sampling schedule and protocol at each of two stations for a one year period. Additional sampling was conducted to establish background PM 10 levels (inhalable particulates less than ten microns in size) and to determine background heavy metal, SO_x and NO_x concentrations. Meteorological parameters included wind speed, wind direction, temperature, relative humidity, insolation, rainfall, and

evaporation. This data base also proved useful for water balance and water supply studies.

Archaeological and historical resource inventories were also required and reconnaissance surveys were conducted over the entire ten thousand acres as well as the access and power line corridors. Dozens of identified sites were catalogued and ranked for sensitivity and level of additional investigation required. Facilities were sited to accomplish maximum avoidance. Those sites which could not be avoided were scheduled for additional investigation and information recovery.

Noise levels within the project area and along the access roads were recorded to provide a basis for comparison to project noise levels.

Socioeconomic circumstances in the communities surrounding the project site were investigated and documented including regional setting and land use, demography, employment and work force, housing, traffic and circulation, education, health care, emergency services, water and sewer, and fiscal considerations.

These comprehensive environmental baseline studies served a dual purpose. They provided Homestake with the information necessary to site, design and engineer the McLaughlin Mine facilities and, they provided the regulatory agencies the information required for the environmental impact determinations and permit evaluations.

Conduct of the baseline studies was complicated by the ever changing scope of the project. As the initial indications of an eight million ton ore body gave way to a twenty million ton deposit, larger waste facilities became mandatory and the studies expanded from hundreds of acres to thousands and from one watershed to three.

METALLURGICAL STUDIES AND PROCESS ALTERNATIVES

Early in exploration, ore samples were accumulated for evaluation by Homestake's metallurgical team. It was quickly determined that the ore was not free milling and that gravity concentration alone would not be feasible. Conventional cyanidation test results were very disappointing; recoveries were erratic and generally low. Alternative lixiviants such as thiourea or acid cuprous chloride were tested but without success. Some flotation work was conducted, again with poor results. Heap leaching methods were not even tried in light of the poor conventional cyanidation results. Amalgamation with mercury was not considered environmental, acceptable and was not tried.

Thus metallurgical work became focused on the evaluation of the combination of oxidation followed by cyanidation. Three

oxidation processes were tested: chemical, roasting, and pressure oxidation. Test programs were structured to provide environmental data along with the metallurgical results. Pilot test tailings were accumulated and tested according to both U.S. Environmental Protection Agency and State of California protocols for leachable trace metals and cyanide residues. Chemical oxidation using chlorine was quickly eliminated as test results were not successful even at high levels of reagent addition.

Pressure oxidation was ultimately selected on the basis of both economic and environmental advantages. Gold recoveries proved higher with pressure oxidation and capital and operating costs lower. The high fuel consumption necessary to dewater wet ground ore slurry and to obtain the required 550 degree Celsius roasting temperature could be avoided along with the associated fuel truck traffic. Sulfur dioxide, arsenic, and mercury emissions resulting from roasting could be eliminated and the costs of an acid plant and scrubbing devices avoided. The truck traffic required to transport the 63,000 tons per year of sulfuric acid produced could also be eliminated. Even with state of the art sulfur dioxide emissions abatement using an acid plant operating at 99.6 percent efficiency, it was calculated that roasting would result in the release of over 330 tons of sulfur dioxide to the atmosphere each year.

Pressure oxidation also had the serendipitous result of producing tailings that were nonhazardous according to the criteria established by the E.P.A. and the California Department of Health Services. In addition to eliminating the acid potential from the waste, pressure oxidation was found to tie up the trace heavy metals as jarosites and other relatively insoluble complexes. Consequently, disposal site construction costs were reduced and hazardous waste disposal fees and taxes of approximately $1,000,000 per year avoided.

Choice of the pressure oxidation alternative was not without substantial risk. The technology was unproven as applied to gold ores, complicating the engineering process and adding an element of uncertainty as the pilot plant was scaled up to full size. In retrospect it has been concluded that the choice was appropriate, as very little difficulty was experienced in the start-up and operation of the autoclave units. Gold recoveries approach 95% and the unit availability is higher than predicted. Homestake's pioneering work in adapted pressure oxidation to gold ores is now being followed elsewhere. Similar facilities have been constructed in the state of Utah and in Brazil and another is under construction in Nevada.

WASTE FACILITIES SITING

Screening studies for available waste disposal sites for both waste rock and tailings were initiated early in the exploration

process. As exploration continued to demonstrate an ever larger ore body, the scope of these studies grew. First level screening identified all potential tailings sites within a ten mile radius of the ore body. Potential waste rock sites were limited to the vicinity of the pit by haulage economics.

Some thirty-four potential tailings sites were identified through the regional screening process. The regional screening criteria applied excluded areas with excessively steep topography, areas with large drainage basins and high flood potential, areas with known adverse geologic conditions such as landslides or active faulting, and areas in which existing land use was incompatible with tailings disposal.

Each of these thirty-four sites was then subjected to a fatal flaw analysis. Ten of the sites were eliminated because of inadequate capacity to store 30 million tons of tailings, three sites were eliminated because the required embankments would have been excessively high, seven sites were not technically feasible to develop, and six sites were eliminated for environmental reasons. A field reconnaissance was then conducted for each of the eight sites that remained after the fatal flaw screening.

The field reconnaissances provided a basis for a qualitative rating of the candidate sites considering such factors as public visibility, surrounding land use, potential operational feasibility, and relative disposal cost. The eight sites were thus ranked on the basis of the site reconnaissances and other available information and three sites selected for field investigations.

Field investigations consisted of detailed surficial geologic mapping, exploratory drilling, excavation of test pits, and in situ permeability testing. The data developed by the field investigations became the basis for the selection of the primary tailings site. The favorable characteristics of this site included a very low foundation and basin permeability, high groundwater in the surrounding ridges providing a hydraulic barrier to lateral migration, the requirement for a relatively small embankment that could be constructed in stages, the availability of local borrow material for embankment construction, low public visibility, little to no underlying groundwater of very poor quality, a small upstream watershed facilitating water management and flood control, a large shallow impoundment configuration allowing thin layer deposition and rapid consolidation of tailings, ample space downstream to collect seepage, to monitor groundwater quality and to provide cutoff if ever necessary, and the availability of local materials for eventual closure and reclamation.

A similar study of the area surrounding the Mine was made to identify potential areas for waste rock disposal. A 1.25 mile radius was selected as the study area because of cost considerations in hauling the waste rock. The screening process

identified a suitable site with adequate capacity for the expected 160 million tons of waste rock. Other site characteristics included a small upstream catchment minimizing the requirement for diversions and facilitating sediment and erosion control, stable underlying geologic formations, compatible surrounding land use, and topography that allows periodic reclamation of portions of the dump during operations.

PROCESS FACILITIES SITING

Choice of waste disposal sites dictated the location of process facilities. Crushing and grinding plants were placed adjacent to the pit to minimize haul distance. Because the primary tailings site was some five miles from the ore body, alternative means of ore transport were intensely studied. Truck haulage, conveying and slurry pumping were each evaluated for capital and operating costs and for environmental impacts. The slurry pumping alternative was ultimately selected on the basis of least cost, both capital and operating, as well as least environmental impact.

Extensive deliberation over the location of the extraction plant finally resulted in the selection of a site on the ridge adjacent to the tailings disposal facility. Although this site had the disadvantage of splitting the operation into two complexes, it eliminated the requirement to pump tailings and their associated cyanide residues a significant distance and placed the process plant within the drainage of the tailings impoundment which thus could provide backup containment in the event of breaches of the plant's secondary containment systems. In addition, spoils from the excavation of the plant site served as shell material for the tailings embankment.

PROJECT ENGINEERING

Early on the decision was made to fast track the project engineering and permitting in order to bring the ore body into production at the earliest possible time. With the finalization of the project's feasibility report and the approval of that report by Homestake's Board of Directors, management of the project transferred from the exploration group to the operations group.

A primary engineering contractor was selected to work closely with Homestake's engineering group. Data from the metallurgical group was rapidly accumulated and a process flow sheet approved. Bulk sampling was undertaken by the exploration group to provide adequate samples for crushing and grinding studies and final autoclave pilot test work as well as to develop information on ore continuity. Mine planning progressed and a computerized block model was developed. Final engineering studies were completed for the tailings disposal site and an embankment design prepared. Studies on several alternate water supply reservoir sites remained active as property negotiations for the primary site had not

concluded. Detailed evaluations of soils and foundation conditions for the chosen facilities locations were completed and hydrological calculations undertaken to develop criteria for diversion ditches, sediment ponds, and erosion control facilities. Waste unit closure and site reclamation plans were prepared using the data developed in the environmental baseline studies. The environmental impacts of the final facilities arrangement were evaluated and compared to the various alternatives that had been considered and rejected, and documentation of the entire planning process was prepared for submittal to the regulatory agencies.

PROJECT SCHEDULING AND INTEGRATION

A project task force including representatives of each of the various working groups was assembled. Meeting regularly, the task force developed project schedules and assumed responsibility for the coordination and integration of the individual activities. Long lead time items were anticipated and scheduled accordingly. Pressure to avoid delay was dictated by project economics. The McLaughlin Mine produces revenues at the approximate rate of $10,000 per hour. Each day of delay was thus a day of lost opportunity to generate one quarter of a million dollars of revenue and its value was diminished by the present value lost. In addition, the rate of inflation at that time was between fifteen and twenty percent per year. Thus, a year's delay in bringing the project on-line could have increased the project capital cost by as much as twenty percent.

On occasion, the requirements of one of the task force groups would be out of phase with others. The goal of a 95% confidence level in engineering decisions prior to permitting was established and this was generally accomplished. Some permitting agencies required engineering detail that was out of phase with the normal engineering schedule. For example, air quality permit applications needed to include manufacturer and model number for air emission abatement devices well in advance of their selection. Changes in engineering design for some segments of the project occurred as late as the construction period requiring permit amendments and adjustments.

PERMITTING

A detailed permitting schedule was required as processing times of up to eighteen months for some regulatory procedures were possible. Environmental studies needed to be completed and approved before most permitting could begin. One of the local governments was found to lack the State mandated ordinance necessary to approve mining projects and reclamation plans. Encouragement and assistance to adopt the required ordinance was provided.

Coordination of the permitting processes of the three local governments and the Federal Bureau of Land Management was essential if the schedule was to be met. A Memorandum of Understanding was negotiated among the four agencies. This M.O.U. provided for a common environmental review process which simultaneously met the requirements of the National Environmental Policy Act (N.E.P.A.) and the California Environmental Quality Act (C.E.Q.A.). A supervisory committee was established which consisted of a county supervisor and the planning director from each of the three counties and the Regional and Resource Area Directors of the Bureau of Land Management. This committee, named the Environmental Data Advisory Committee (E.D.A.C.), initially undertook a review of the environmental baseline data to determine its adequacy for the preparation of the joint Environmental Impact Report/Environmental Impact Statement. The E.D.A.C. hired a Project Director and selected Napa County as the lead agency for C.E.Q.A. and the Bureau of Land Management for N.E.P.A. Requests for proposals were circulated to a number of consulting firms for the preparation of the joint E.I.R./E.I.S. A company was selected and a contract prepared and approved. Homestake was required to pay the cost of the entire process.

Each of the regulatory agencies with jurisdiction over the project received a copy of the Project Description/Environmental Assessment. This document, prepared by Homestake and its primary environmental contractor, contained a detailed description of each component of the project along with an assessment of the project's environmental impacts. Also included were discussions of the various alternate facility locations and the process alternatives considered and the bases for final selections.

The intent was to submit a fully mitigated project proposal and thus expedite the permit process. Each project impact was matched with a measure designed to eliminate or reduce to the maximum feasible extent the impact. Because the mitigation proposals reflected understandings reached in prior consultation with the agencies, the measures were largely accepted and the application expeditiously moved forward.

The initial project permit application was found complete by Napa County in October of 1982, triggering the E.I.R./E.I.S. process. The environmental document was certified in July of 1983 and sufficient project approvals were in hand to begin construction by September of 1983. Final permits from Napa and Lake Counties were issued by the end of 1983. This is generally acknowledged as a record time for the permitting of a major industrial project in the State of California.

Despite the cooperation among the jurisdictions for the preparation of the project environmental documents, each insisted upon exercising its permitting authority independently. Yolo County permits were finally issued in the spring of 1984. This

delay and the resulting uncertainty necessitated continued consideration of a number of alternative fresh water reservoir locations and ultimately delayed the construction of the water reservoir dam one full season.

Yolo County was the only jurisdiction where any public opposition to the project was encountered. This was ironic in that the only project facility to be located in the Yolo County watershed was the fresh water reservoir. All of the potentially water quality impacting waste units and process facilities were destined for the watersheds of Lake and Napa Counties. A small group of Yolo County citizens residing some ten miles east of the Mine remain antagonistic to the Mine to this day. Their objections prompted appeals of each permit decision thus delaying the process.

In response, Homestake found it necessary to demonstrate a constituency of supporters for the project in Yolo County. An office was opened in the County seat and efforts to inform the public redoubled. Presentations to local civic and service clubs became more frequent and environmental organizations were provided with project information. Ultimately it became clear that the opposition was in fact limited to a very few individuals, most of whom were simply philosophically opposed to mining under any circumstances.

Permitting by the state and regional agencies proceeded simultaneously with that of the counties and the B.L.M. The Regional Water Quality Control Board issued waste discharge standards and approved an N.P.D.E.S. (National Pollutant Discharge Elimination System) Permit. Water rights were approved by the State Water Resources Control Board and the necessary air quality permits issued by each of the three Air Quality Management Districts with jurisdiction over the project.

An application was submitted to the State Department of Health Services seeking classification of the McLaughlin tailings as a nonhazardous waste. This application was approved subject to the submittal of operations data confirming the test results obtained from the analysis of the pilot test tailings samples.

Appeals of the Waste Discharge Standards and the Bay Area Air Quality Management District Authority to Construct by the Yolo County project opponents required substantial additional effort but were ultimately resolved in Homestake's favor without any delay to the project construction schedule.

Perhaps the most formidable threat to the successful permitting of the McLaughlin Mine was mounted, not by any environmental organization, but by the irrigation district holding the downstream water rights. The Solano Irrigation District, operators of a 1,600,000 acre foot reservoir providing water supply for agricultural, residential and industrial uses, contracted for

an independent technical review of the project engineering and an evaluation of the potential threat to downstream water quality. The independent review team concluded that the McLaughlin Mine engineering was indeed state of the art and that the project posed no real threat to water quality.

Nevertheless, the District remained concerned that the public might perceive such a threat and proposed a number of measures to offset that potential. Foremost among these was a comprehensive monitoring program which would demonstrate clearly that no adverse impact to water quality had occurred. A continuous monitoring station was agreed upon for installation downstream of all project facilities on Hunting Creek. These and other detailed provisions were included in an agreement between Homestake and the District.

CONSTRUCTION

Construction of the Mine facilities was begun with the improvement of the eighteen mile access road, the premine stripping program, the construction of the low grade storage pads, and the excavation of the crushing and grinding and process sites in September of 1983, and was essentially complete with the pouring of the first gold bar on March 4, 1985. The total program involved moving in excess of twelve million tons of material, construction of three major dams and a half dozen minor ones, laying of miles of pipe, erection of tons of steel and the installation of equipment and instrumentation and control systems. Peak construction employment exceeded 1,400 with over 55% drawn from the local work force. Regulatory inspections were continuous with at least one agency representative on-site on most days and several agencies represented on many days. The opening of the tailings dam key trench brought thirteen geologists to the site representing six different agencies.

PROJECT DESIGN AND OPERATION

Gold bearing ore is mined by open pit methods beginning with the removal and stockpiling of topsoil for use in later reclamation. Rock is drilled and blasted and loaded by front end loaders into eighty-five ton haul trucks. An average of 5,600 tons of ore is mined each day, five days a week, along with some 45,000 tons of waste rock and low grade ore. The latter is stockpiled for future processing. The ultimate pit will extend over a mile in length and 2,000 feet in width with a depth of 750 to 800 feet.

Mine area air emissions (primarily fugitive dust) triggered by such activities as drilling, blasting, hauling, wind erosion, and crushing and grinding are controlled by wet and dry scrubber systems, water sprays, and a haul road program involving frequent water applications, wind screens, speed limits, and the use of magnesium chloride as a dust suppressant during summer months.

Storm water runoff from the mine area, the crushing and grinding area, and the low grade storage pads is routed to a large sediment pond and from there pumped to the grinding circuit for use as process water. This eliminates any storm water discharges from these facilities.

The waste rock dumps are constructed at an overall slope of four horizontal to one vertical to assure seismic stability. Final interbench faces are graded to a 2.5 to 1 slope to facilitate reclamation. Underdrains were provided to maintain stability and to collect any leachate formed. Acid-base accounting indicated that the waste rock on average has net alkalinity and that acid leachate should not be a problem so long as an adequate system of waste rock classification and managed placement is implemented.

Surrounding runoff is diverted around the waste rock site and direct storm runoff is routed through a series of seven sediment ponds to allow solids to settle. Accumulated sediments are eventually retrieved and returned to the dumps for reclamation purposes. Reclamation is progressive with some of the lower benches constructed and reclaimed during the early years of the Mine's operation.

Operation of the dump is intended to minimize exposed disturbed surfaces at any one time and to thus reduce erosion. This also allows distribution of reclamation costs more evenly over the life of the Mine.

Run-of-the-mine ore is stockpiled on a pad in front of the crusher and fed to the crusher in lots of identified grade and sulfur content. Crushed to eight inch minus, the ore is fed to the grinding circuit at the average rate of 3,200 tons per day where it is ground in a wet process to 80% minus 200 mesh. The resulting slurry is thickened to approximately 50% solids and pumped in an eight inch diameter buried slurry line the five miles to the process plant.

At the process plant the ore slurry is initially acidified using sulfuric acid produced in the autoclaves and recovered downstream. This breaks down the carbonates in the ore and dissolves from the slurry the acid soluble constituents. The acidified slurry is then thickened and pumped to the autoclaves where it is oxidized using pure oxygen produced in an on-site oxygen plant. Steam is used to bring the reaction up to temperature, but once initiated, the exothermic reaction is self sustaining so long as an adequate sulfur content is maintained. Operating at approximately 350 pounds per square inch and at about 400 degrees Fahrenheit, the continuous process oxidizes the sulfide matrix encapsulating the microscopic gold particles, liberating them for recovery in the cyanide leach circuit.

The oxidized slurry is then washed and the recovered acid returned to the preoxidation circuit. The washed slurry is neutralized using milk of lime and the gold extracted in a traditional cyanide leach, carbon in pulp circuit. Dore' gold is produced consisting of approximately 85% gold and 15 % silver. The traces of mercury reporting along with the gold and silver are recovered in a special retort prior to the induction furnace. Annual gold production averages 200,000 ounces.

The tailings disposal facility is a zero discharge facility, taking advantage of the climatic excess of evaporation over rainfall. The unlined facility depends upon the exceptionally low foundation permeabilities and a carefully constructed zoned earth fill dam to contain the nonhazardous tailings. Upstream runoff is diverted around the facility and the impoundment is designed to contain the volume of the probable maximum flood or the 1,000 year 72 hour storm, even should the diversion system fail. The dam's internal drain system routes any seepage to a collection sump where it can be pumped back to the impoundment.

The fresh water supply for the Mine is provided by a reservoir constructed on Davis Creek in Yolo County. The 6,000 acre foot reservoir captures winter runoff from the approximately ten square mile upstream watershed. The facility was modeled against historic hydrological data to assure that the Mine would have sufficient water to maintain operations through the droughts of record. Average annual fresh water usage is just under 1,000 acre feet with an additional 600 acre feet lost to evaporation. Average annual runoff is 5,000 acre feet, thus the reservoir should fill and spill in the average year.

Roughly two thirds of the Mine's water demand is met by recycle from tailings. Although residual cyanide levels are low, averaging ten parts per million total cyanide and one part per million free, the recycle water is returned to the acid side of the circuit to kill any cyanide residue.

The overflow from the preoxidation thickener is routed to a precipitation circuit where it is neutralized with milk of lime, precipitating predominately magnesium and iron, but also the other acid soluble trace metals washed from the autoclaved slurry.

This provides a number of benefits in addition to the treatment of water for recycle to grinding. The precipitation thickener underflow is commingled with the C.I.P. tails, complexing residual cyanide with iron and providing hydroxides to buffer the tailings from any change in Ph. In addition, soluble trace metals are removed from the ore prior to cyanidation thus reducing cyanide consumption.

ENVIRONMENTAL MONITORING

The environmental data collection programs initiated during baseline studies have been continued and augmented to provide early indication of any adverse changes in the local environment. Monitoring programs include air quality, meteorology, surface water quality, ground water quality, aquatic ecology, reclamation success, sensitive plants, wildlife, geotechnical performance of dams and structures, cultural resources, noise, and socioeconomics.

Air quality monitoring includes both ambient monitoring and source monitoring. A network of five sample stations has been installed around the mine pit. High volume samplers, some equipped with size selective inlets, sample for total suspended particulates (TSP) and inhalable and respirable particulates (PM-10). Filters from the mine area stations are composited monthly and analyzed for arsenic and mercury by atomic absorption spectrometry. Airborne asbestos is sampled using specially designed equipment and sample filters are analyzed using electron microscopy. One ambient air monitoring station is also located in the process area. Mercury vapor sampling is conducted here using a Jerome gold film type mercury monitor. In addition, a Pixie sampler collects elemental particulates less than 0.25 microns in size by impaction on a paraffin coated mylar disc. Proton induced x-ray emission analysis of these filters displays elemental concentrations in the nanogram per cubic meter range.

Source monitoring of each emission point in the process plant is conducted periodically using an E.P.A. approved, Method 5, isokinetic sample train. Points monitored include the induction furnace, the carbon regeneration kiln, the electrowin scrubber stack and the autoclave stacks. Each of these emission points is controlled by an abatement device, so abatement efficiency as well as emissions levels are evaluated. In addition, a two year program has been completed which sampled hydrogen cyanide emissions from the tailings pond.

Meteorological data is collected using a Campbell Scientific Micrologger Model 21X. The micrologger converts signals from the various sensors into hourly and daily meteorological reports. The device is configured to sample every ten seconds, record and analyze data every hour and transmit via modem to a personal computer daily. A cassette tape back-up recorder collects data for annual archival. The micrologger monitors wind speed, wind direction, temperature, relative humidity, solar intensity, evaporation, precipitation, and barometric pressure. Computations processed by the micrologger include minimum, maximum, averages, standard deviation of horizontal wind direction, vector wind speed average, and weighted wind direction frequency distributions.

Air quality monitoring has demonstrated that the Mine operates well within Federal and State air quality standards. No violations

of any ambient standards have been recorded. Dust from the mine does not contain unusually elevated heavy metals and asbestos emissions have been practically nondetectable. Process area emissions are also well within the applicable limits. Hydrogen cyanide emissions from tailings have been only occasionally detectable and mercury and other metals levels found to be at background levels.

Surface water quality monitoring involves a network of twelve stream stations, three fresh water reservoir stations, and several sediment pond stations. Sampling frequency was initially biweekly for the first three months of operations, monthly for the following two years and is now reduced to quarterly. Samples are analyzed by a contract laboratory for the full range of general minerals and metals. Both total and filtered samples are collected and analyzed for each station. Data is returned to the Mine on disc and entered into the computerized water quality data base for statistical evaluation and trend analysis.

In addition to the routine quarterly sampling at the stream stations, a continuous monitoring station has been established on Hunting Creek downstream of all project facilities. The station consists of a concrete weir and instrument house. A continuous flow monitoring device is installed at this station along with an Isco sampler which composite samples on either a time or flow basis. The composited samples are retrieved twice a week and analyzed for a limited list of parameters. This station is intended to provide data demonstrating that no unusual project discharges have occurred between the normal sampling periods.

Groundwater quality monitoring includes a series of nine wells and three underdrains around and downstream of the waste rock dump and twelve wells around and downstream of the tailings impoundment. In addition, five wells have been installed in the tailings dam foundation and are monitored for water levels and a limited set of parameters. Frequencies and parameters are the same as for surface samples. The wells are equipped with permanently installed positive displacement sampling pumps which are activated using compressed nitrogen. Most wells have only very limited recharge so it is impossible to evacuate the usual three well volumes prior to sampling. Wells are pumped dry and then sampled upon recharge, generally after several days.

Analysis of water quality data has demonstrated no change in the quality of the surface waters downstream of the project. No evidence of any migration from the tailings facility has been detected around the impoundment, downstream of the impoundment, under the dam, or in the dam drain system.

The waste dump area underdrains and downstream groundwater stations are beginning to exhibit a trend of increasing sulfate along with a parallel increase in calcium levels indicating sulfide

oxidation in the dump material along with in-dump neutralization. The trend is of sufficient concern to trigger additional analysis and a reevaluation of the waste rock types and the waste placement and management criteria.

Aquatic ecology monitoring is conducted in each of the three downstream watersheds, even though the biological populations are not unique or particularly sensitive. The program is intended to provide back up to the water quality monitoring program by taking advantage of the ability of aquatic organisms to respond to a change in their environment or a disturbance or the presence of low levels of contaminants which are not measured by chemical monitoring. The program is conducted by independent contractors from the area's universities.

Several stations in each watershed are sampled for benthic macroinvertebrates, fish and stream sediments. The benthic macroinvertebrates are classified as to genus and species where possible and the population diversity and abundance characterized. Tissue samples are analyzed for accumulated heavy metals.

Fish populations are limited to two species of minnows, the California roach and the Sacramento sucker, the only species tolerant of the low summer flows and the accompanying elevated temperatures and total dissolved solids levels. Fish populations are evaluated for abundance, age distribution and size and fish flesh samples are analyzed for heavy metals.

Stream sediments are analyzed for heavy metals as well as characterized as to substrate particle size and fine sediment accumulation.

A special monitoring and research program has been established on the Davis Creek fresh water reservoir. The program was initially established to provide an opportunity for a local university to study the ecology and limnology of a newly established water body. Early data indicated a substantial and rapid accumulation of mercury in the flesh of the fish planted in the reservoir for monitoring purposes. This bioaccumulation was occurring despite relatively low total mercury levels in the reservoir sediments. The source of the mercury has been demonstrated to be either naturally occurring cinnabar eroded from the upstream watershed or residues from the historic Reid Mine, a mercury mine located immediately upstream of the reservoir. Interest in the phenomena has increased and two additional university researchers have been funded by the Electric Power Research Institute to conduct studies at the reservoir.

The remainder of the aquatic ecology monitoring program has detected nothing unusual in the downstream watersheds.

Vegetation monitoring consists of two programs, one for sensitive plants and one for revegetation success. Sensitive plant monitoring is conducted annually by the Napa Chapter of the California Native Plant Society. Known and mapped populations are surveyed each blooming season for new disturbance or signs of stress which might be attributed to mining operations. The monitoring effort has actually resulted in the location of additional populations of sensitive plants not known to be present in the project area. No new disturbance or stress has been observed.

Reclamation success monitoring is conducted by an independent expert who determines percent cover and species composition of revegetated areas. Areas are monitored for several years following seeding in order to establish successional sequence and to provide data for adjustments in the specified seed mix. Compliance with established performance standards for percent cover must be met and appropriate documentation provided to the regulatory agencies.

Reclamation success at the McLaughlin Mine has been superior with good erosion control achieved in the first year and performance standards met or exceeded in most all cases.

Wildlife monitoring is conducted on a systematic basis around the tailings pond and the freshwater reservoir. The surveys are conducted on a monthly basis and track and scat data are accumulated as well as actual sightings. Elsewhere on the project site, wildlife monitoring is conducted on a less formal basis with Mine employees encouraged to submit sighting reports to the Environmental Department. These data are compiled and reported on an annual basis.

Wildlife in the Mine area remains abundant and diverse. The tailings impoundment has not proven to be a threat to wildlife and occasional duck sightings and numerous tracks around the perimeter attest to the nonhazardous character of the contained water. The fresh water reservoir has introduced a new habitat type in an otherwise seasonally arid location and thus encouraged the development of a rich and diverse community. In addition to water fowl the reservoir attracts many deer and small mammals as well as a full range of predators including mountain lion, bear, coyote, fox, and numerous raptors.

Geological and geotechnical monitoring is conducted to assure the continued integrity of the project's dams and other civil engineering structures. The program consists of periodic visual inspections of all such structures, periodic checks of a series of survey monuments, recording of water levels in the numerous piezometers in the dams, and reading of inclinometers installed in potential slide areas upstream of the fresh water reservoir. No difficulties with these structures have been encountered.

Each of the various monitoring programs includes a quality control, quality assurance element and substantial documentation must be maintained for review by the various regulatory agencies upon demand. In addition, response plans have been prepared for each program to be implemented in the event that monitoring detects any changes which might be adverse to the environment.

RECLAMATION

California law requires the designation of a postmining land use for a mine site and the preparation and approval of a reclamation plan prior to the initiation of mining. The McLaughlin Mine reclamation plan provides for the conversion of the approximately 10,000 acre site to an environmental studies field station at the conclusion of mining. This decision was based on an evaluation of postmining assets which revealed that a valuable educational resource will result from the project in the form of accumulated environmental data. Between three and four million dollars were expended for the environmental baseline studies and the comprehensive monitoring program will produce another twenty plus years of useful data including aerial photography updated on an annual basis, hydrologic and sediment transport models, surface and groundwater data, aquatic ecology, wildlife, vegetation and sensitive plant surveys and more. In addition, remaining project facilities will include various physical improvements such as roads, parking, power supply, telephones, water supply, sewage treatment facilities, offices, shops, and a modern laboratory. The field station will be made available for the use of the regional public schools, colleges and universities.

Physical reclamation of the site is designed to minimize erosion, to stabilize disturbed areas with a permanent, diverse vegetative cover, and to maximize productive postmining land use. Suitable soils from disturbed areas throughout the project have been stockpiled for reclamation use. Over one million cubic yards of soil were stripped from the tailings basin for use in closure of that facility. The soils from the fresh water reservoir were similarly stockpiled to resoil the waste rock dumps should that be necessary to establish adequate vegetative cover. In addition, the soils from the low grade pad areas and the process plant site were also salvaged.

The mine pit will be fenced to provide for public safety and the upper benches resoiled and revegetated to minimize visual impact. The fresh water reservoir will remain and be maintained at the maximum normal pool elevation to provide long-term wildlife benefits. Other facilities including the processing plant, grinding mills and crusher will be removed and their areas resoiled and revegetated. Sediment ponds and other hydrological control structures will remain and will be reclaimed as wetland habitat.

The revegetation of disturbed areas involves both the establishment of grasses for immediate erosion control and a woody plant program for habitat diversity. Grasses are seeded using mixes developed and tested on the site, one for serpentine derived soils and one for normal soils. The seed is applied along with a time release fertilizer by hydroseeder. Blown straw mulch is then applied followed by a tackifier to hold the straw in place. This methodology has produced excellent results.

Woody plants are propagated from seeds or slips collected on the site so that the plants are genetically adapted to the local microclimate. One year old plants are transplanted back to the site into specially prepared individual enclosures to prevent damage by rodents and deer. Success rates range from 60 to 90%. Generally woody plant success is higher when the grasses are less vigorous as the plants compete for water and nutrients. Test plots have been followed for several years on both serpentine and nonserpentine soils and a procedures manual is now in preparation.

A financial guarantee for the reclamation of the site is provided by a Financial Assurances Agreement between Homestake and a Trust consisting of the three counties, the Bureau of Land Management, and the Regional Water Quality Control Board. The cost of site closure in each of the years of operation has been calculated and that amount is payable to the Trust in the event that the Company defaults on its reclamation commitment. The calculated amount is guaranteed by a renewable letter of credit payable to the Trust. Failure by the Company to renew the letter prior to its expiration each year causes the bank to pay the calculated amount for that year to the Trust. An agreement among the trusties provides for the expenditure of the paid funds by each. In addition, the agreement allows for the Regional Water Quality Control Board to draw down a portion of the guaranteed funds to clean up a pollution occurrence in the event that the Company fails to implement a required cleanup.

CONTIGUOUS LANDS MANAGEMENT PLAN

A plan for the management of the approximately 7,500 acres of Homestake owned nonmined lands in the project area has been prepared. The plan was conceived in discussions among the California Department of Fish and Game, the State Water Resources Control Board, and Homestake Mining Company in 1981. These 7,500 acres had been acquired along with the 1,200 acres required for the mining operations. Diverse in habitat and rich in wildlife despite historic overuse, the potential benefits to be derived from the appropriate management of these lands were manifest.

The environmental data base developed for project design and permitting was used as a basis for the plan. The plan consists of several integrated elements including a fire hazard reduction program, a reservoir shoreline development program, a sensitive

plant restoration program, a pasture use program, a habitat restoration and improvement program and an education and research program.

The Contiguous Lands Management Plan attempts a departure from traditional, prescriptive resource management planning in its extensive incorporation of monitoring feedback as input to management decisions. The initial management thrust is to eliminate or minimize human intervention in the natural successional processes and to systematically collect data on the consequences of this approach. Decisions to intervene are based on this feedback. The plan is thus more of a road map than a prescription, providing an organizational framework for future management decisions.

Rather than waiting until the end of the twenty-plus year Mine life, Homestake has elected to initiate the development of the post mining land use of the site as an environmental studies research station now. The Contiguous Lands Management Plan provides an organized basis for the involvement of the regional academic community.

CONCLUSION

Homestake's McLaughlin Mine occurs at a threshold of historic change in the mining industry, change from 19th century disregard for the environmental consequences of mineral production to the late 20th century's preoccupation with environmental restrictions. Despite this emphasis, the McLaughlin Mine moved from initial discovery to production in a period of just over six years.

Environmental costs were contained within acceptable limits. Total preconstruction environmental expenditures for the project including baseline studies, environmental documents, waste facility siting studies, permitting costs, legal fees, and public relations costs were less than 2% of the $284 million capital cost of the Mine. These expenditures should be viewed in light of the potentially avoided costs of project delays that might have resulted from protracted permitting or litigation.

The permitting and environmental management of the McLaughlin Mine is not unique in the mining industry, and more examples of proactive, responsive, environmental management appear each year. The success of the approach is not a function of dollars spent. The expenditure of 2% to 4% of the total project capital budget for environmental design and permitting is typical of projects of a wide range of sizes. The approach is successful because it is responsive to the social and political context of today. It recognizes the public demand for technically sound engineering and environmental design, the benefits of early and thorough

involvement of the regulatory community in the evolution of a project, and the legitimacy of all of the interests at stake in the environmental consequences of a project.

Acid Mine Drainage at the McLaughlin Mine

by Tim Janke

Introduction

Homestake Mining Company's McLaughlin Mine is located in the Coast Range of northern California, about 70 air miles north of San Francisco. Discovered in 1978 and brought into production in 1985, the open pit gold mine will ultimately develop an ore reserve of 26 million tons containing 3.3 million ounces of gold.

The epithermal ore deposit is geologically young, resulting in a very limited oxide ore resource. The predominance of the ore body is sulfitic and highly refractory in nature. The autoclave oxidation process developed to treat this ore was an industry first and has proven very successful.

The young geologic age of the McLaughlin ore deposit has also limited the extent of oxidation of the waste rock removed from the pit. Much of this waste is also sulfitic and if not correctly handled when disposed of in the waste dump can oxidize and create sulfuric acid. Ground or meteoric water moving through the waste dump could then transport the acid and low-pH solubilized metals out of the dump in what is commonly called acid mine drainage.

Beginning with the original project environmental impact assessment and continuing through five years of mine operations, plans for preventing acid mine drainage at McLaughlin have been formulated and modified as needed. This paper will discuss the elements of Homestake's waste control plan stemming from that work and experience.

Original Waste Assessment

During the original environmental assessment, the potential for acid mine drainage was addressed through drill core testing. These samples, representing 7 identified rock types were tested for

acid producing and acid neutralizing potentials. Only one of the samples was identified as a net acid producer. Additionally, this rock type was estimated to constitute only eight percent of the waste rock to be excavated from the pit. The test work indicated that due to this minimal amount of acid-producing rock and its commingling with acid neutralizing rock in the dump, acid mine drainage at McLaughlin was unlikely to occur.

Early Dump Construction

During the first three years of mine operation, 1985 through 1987, waste rock was randomly placed into the waste dump. It was assumed that the resultant mixing of the waste rock would be adequate to prevent the formation of acid mine drainage. Monitoring of dump underdrain seepage and surface runoff during 1987 indicated otherwise. Depressed pH and sulfide oxidation product enrichment of these waters indicated that all of the acid formed within the waste rock due to sulfide oxidation was not being neutralized within the dump.

To eliminate the possibility of discharge of sub-quality water from the project site, collection sumps were installed to collect underdrain seepage and surface water runoff from the dump. Pumps and pipelines were also installed to allow consumption of the collected water within the mill circuit. Work then began to determine why the original leachate water quality expectations were not met.

Problem Investigation

First, the amount of acid producing rock was found to be greater that originally estimated. A review of actual mine production of the previously identified problem rock type, a volcanic agglomerate, showed that it constituted 18% of the mined waste rather than the 8% anticipated. Also, limited mining and dumping areas resulted in a segregated rock type dump. Single rock types would be mined from the pit and added to the dump with very little mixing occurring.

Additionally, it appeared that the drill core sample testing may have overestimated the acid neutralizing capacity of the waste rock. As sulfide particles oxidize, the acid produced is flushed away from the source by water seeping through the dump. When this acid comes in contact with carbonate elsewhere, the sulfate products formed during neutralization encrust the remaining carbonate, preventing its further reaction. In the large rock fragments of the waste dump, much less of the carbonate was available for acid neutralization than in the finely ground samples of drill core originally tested.

Analysis of Acid Generation

One of the first methods employed to better understand waste rock acid leachate chemistry was column leach testing. Samples of four major rock types were gathered and sized to minus two inches. The samples were then loaded into five foot tall by twelve inch diameter test columns and simulated rain water was applied.

Three of the columns produced alkaline solutions, but the fourth, loaded with volcanic agglomerate, produced acidic leachate and much greater levels of contaminants than the other columns. Subsequent column testing identified other acid-producing rock types.

The common denominator in all of the acid producers was sulfide enrichment, regardless of basic rock type. Although waste classification was possible by rock type and sulfide enrichment, only the latter factor was of significance. Low sulfide, non-acid producing waste was to be called Type 1, and high sulfide, acid producing waste Type 2.

With the waste rock separated on a chemical basis, acid mine drainage control planning focussed on the physical properties of the waste type. Type 1 waste was found to typically consist of serpentinite, unaltered mudstone, and fault gouge of mixed source rock. The important physical factor of all was a fine grain size

which could be worked into a clay like consistency with low permeability.

In contrast, the Type 2 waste came from mineralized areas hardened by silicification or adularization. This waste broke into large, durable fragments. When placed in a conventional waste dump, the blocky nature of the Type 2 resulted in a dump highly permeable to both air and water infiltration.

Waste Control Plan

For a waste rock pile to generate acid mine drainage, air must first move through the pile to provide oxygen. After oxidation, water must leach through the dump to flush acid and low pH-solubilized metals out of the dump. Reduction of dump permeability was therefore a key to acid mine drainage control.

The blocky, acid-generating Type 2 waste is now encapsulated in a wrapper of clayey, non acid-producing Type 1 waste. An area to receive waste is first cleared of vegetation and any topsoil removed. A layer of Type 1 waste is then placed and dozer spread. The thickness of this layer varies with conditions, but is generally targeted at five feet.

A fifty foot high lift of Type 2 waste is then placed over the clay. This low dump height was selected to enhance dump compaction. Careful attention is paid to control the gradient of the lift surface to ensure that rain water will flow rapidly off the dump surface rather than puddle and infiltrate the dump cell. If sections of the dump surface do not compact into a tight surface, clay is placed to seal the working surface.

The exterior slope of the Type 2 dump cell is then reduced to 2 1/2 H:1V to facilitate eventual revegetation. Clayey Type 1 waste is then dumped over the reduced slope to provide a ten-foot thickness when reduced. The clay is also plug-dumped over the dump cell surface and dozer spread. If possible, truck traffic is

routed over the spread clay surface to tightly compact it.

This dumping and spreading sequence is repeated for a second lift to form a 100-foot high dump bench. The outer 150-feet of the second lift's surface will form a bench to flatten the dump's overall slope to 4H:1V. This section of dump surface receives a second lift of plug-dumped clay to increase its thickness to 10 feet. Careful attention is paid during the clay spreading process to ensure that the bench and slope capping layers are well tied together, forming a continuous lid over the Type 2 encapsulation pod.

Next, a layer of oxidized waste is spread over the clay surface. This layer not only facilitates revegetation, but also acts as a capillary break to reduce water infiltration into the clay cap. Additionally, a healthy plant and bacteria colony in the oxide layer following revegitation will consume much of the oxygen penetrating the dump reducing the potential for oxidation of sulfide within the encapsulation pod.

Daily Plan Implementation

Waste is classified from visual examinations of blasthole cuttings. A geologist inspects each drill pattern and prepares a waste type map. Although the classification is keyed to sulfide mineral observance, periodic lab analyses are run to "calibrate the eye".

The waste type map is then digitized and merged with the blasthole assay data. The ore control engineer then draws ore blocks based on blasthole assays and waste blocks on the remaining areas using the waste type map as a guide. Waste and ore blocks are delineated in the pit with color-coded pin flags.

The waste dump must have several active dumping faces to accommodate the varying ratios of waste types coming from the pit. Rapid closure of dump cells is desirable to minimize exposure time

for oxidation and infiltration.

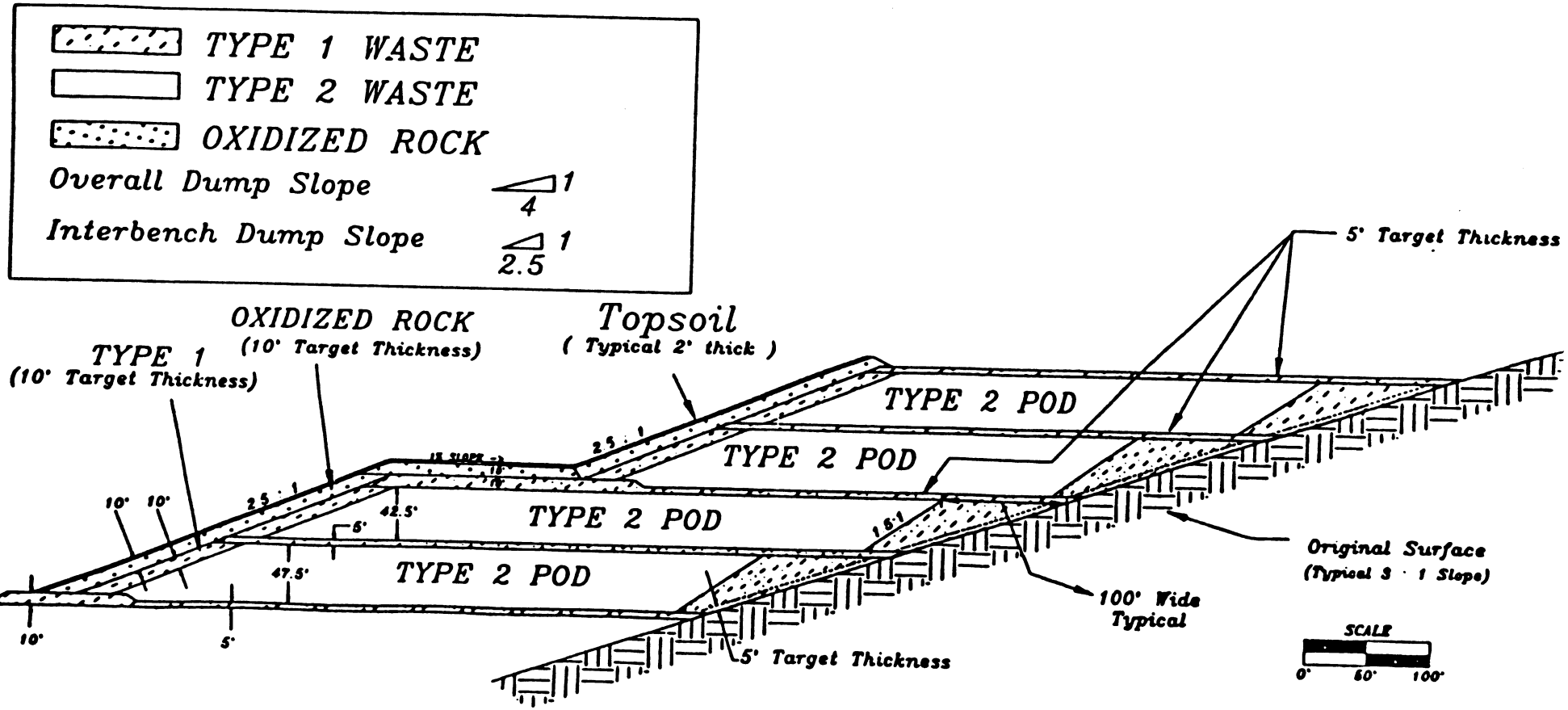
Long Range Mine Planning

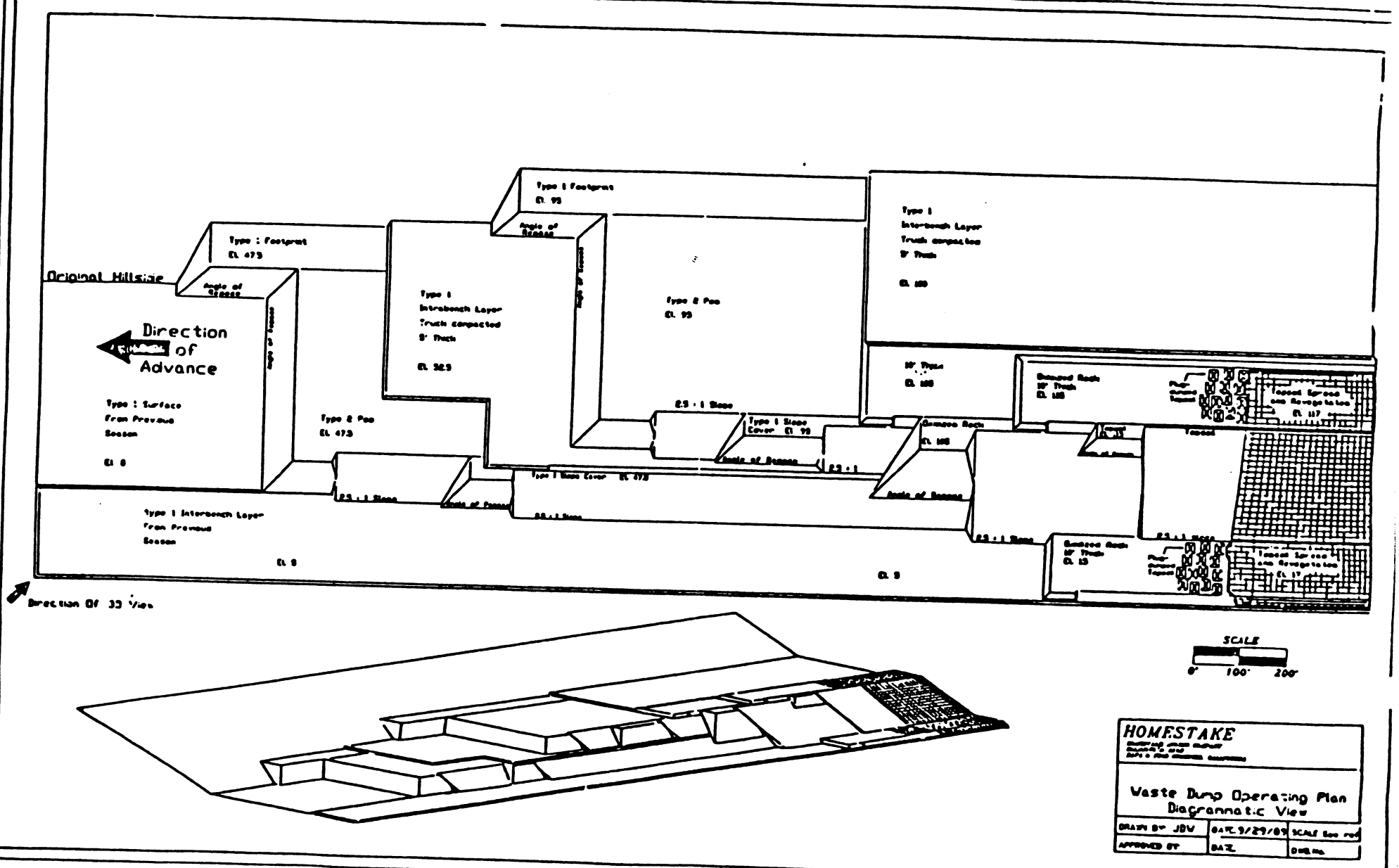
To predict future waste type ratios, a cross-section based block model was created. Long range mine plans can now be reviewed to see if waste dump construction problems will occur.

Program Success

Acid mine drainage problems can take years to materialize, but so far, the indications at McLaughlin are good. The trends observed in 1987 of decreasing leachate pH and increasing contaminant levels have been reversed. Dump cell construction has become routine and all parties involved are committed to the ongoing success of the program.

Site 5 Waste Dump X-Section
Typical 450 Foot Wide Dump Terrace





HOMESTAKE

Waste Dump Operating Plan
Diagrammatic View

DRAWN BY JBV	DATE 3/29/89	SCALE See plot
APPROVED BY	DATE	DWG No.

POLLUTION PREVENTION IN MINING

HOMESTAKE MINING COMPANY'S MCLAUGHLIN MINE

A CASE STUDY

Raymond E. Krauss, Environmental Manager
Homestake Mining Company, McLaughlin Mine
Lower Lake, California, U.S.A.
August 1993

ABSTRACT

Homestake Mining Company has incorporated a number of pollution prevention feature into the design and engineering of the McLaughlin Mine. Examples presented include the selection of the mineral recovery technology, the siting and design of waste management units, secondary containment and storm water management, and acid rock drainage management. Comprehensive environmental monitoring confirms the effectiveness of these features. Regulatory schemes that establish performance rather than prescriptive compliance standards and that provide the opportunity for site specific engineering solutions generate an incentive for the innovation and incorporation of pollution prevention features into mining projects.

1. INTRODUCTION

The concept of "pollution prevention" as applied to mining differs significantly in some respects from its application to other industrial and manufacturing activities. In mining, the chemistry of the ore body is a given. There is no opportunity to substitute new or different "feed stocks" which will result in the same or equivalent product while reducing or eliminating the source of contaminants. It is necessary to handle and manage whatever non economic minerals are contained in the ore such as trace metals or acid generating sulfides. In addition, the bulk of the contaminants associated with mining are naturally occurring substances ubiquitously distributed throughout the landscape.

Nevertheless, innovations in the beneficiation and processing of ores, in the design and engineering of mining projects, and in the management and disposal of mine wastes can result in both the immobilization and containment of contaminants and thus reduce the

impact of mining activities and prevent the pollution of our environmental commons.

The potential for mining activities to discharge contaminants to off site locations such as down stream surface water or off site ground waters should be distinguished from the impacts of managing and containing contaminants on or within the mine site utilizing facilities engineered for that purpose.

Release of contaminants from the mine site needs to be limited to the capacity of the "commons" to assimilate that release. The regulation of such releases is best accomplished by the establishment of performance standards for such releases coupled with the monitoring necessary to assure that performance standards are met or to trigger remedial containment should trends towards exceedance be detected.

Optimizing the management and containment of mining associated contaminants is a highly site specific exercise depending upon the geochemistry of the ore body and the environmental setting of the mine. Such factors as climate, the hydrogeology of the site, the availability of geologic materials suitable for the construction of barriers, and the vigor of area vegetation must all be integrated into the design and engineering of the mine and its facilities with the twin objectives of economic mineral production and pollution prevention.

At McLaughlin, our experience suggests that, insofar as contaminants are managed and contained within the mine site (ie. don't impact the commons beyond their established assimilative capacity) and project costs are not deferred, the engineering and design solutions that optimize economic production also optimize pollution prevention.

This case study presents four examples of pollution prevention at Homestake's McLaughlin Mine: 1. the selection of a mineral recovery technology that not only maximizes the economic recovery of mineral values but also reduces the mobility of contaminants, eliminates the acid potential of the tailings produced, and reduces the consumption of potentially polluting reagents, 2. the selection of waste disposal sites with optimal containment characteristics, 3. the siting and design of facilities that provide appropriate secondary containment and allow for the management of storm water run-on/runoff, and 4. the management of waste rock disposal to prevent the formation of acid rock drainage.

2. THE MCLAUGHLIN MINE SETTING AND BACKGROUND

Discovered in 1978, the McLaughlin Mine poured its first gold bar in March of 1985. Located in the California Coast Range approximately 70 air miles north of San Francisco in the historic Knoxville Quicksilver District, the mine has achieved international

recognition for developing and confirming the mercury hot springs model for the formation of gold ore bodies, as well as for innovating the use of pressure oxidation for the treatment of refractory gold ores and for pioneering effective environmental management and reclamation programs.

Production of the 3.5 million ounce deposit will continue into the next century. In the first six months of 1993, the mine produced 153,500 ounces of gold at a cash cost of $189 per ounce. With an initial capital cost of $284 million, and a total investment of approximately $350 million, total costs for the period were under $300 per ounce.

Situated in three counties and involving both private and Federal Lands, the mine required 327 permits before the first gold bar was poured. In addition to the permits to mine and the reclamation plan approvals of the three counties, the mine required both Federal and State environmental documents, BLM approval of a plan of operations, authorities to construct and permits to operate from each of three regional air quality management districts, and Regional Water Quality Board approvals as well as numerous Department of Fish and Game and other special agency approvals.

A unified environmental monitoring program integrates the requirements of all of the regulatory authorities and includes water quality at twenty surface stations and twenty two ground water wells, aquatic ecology in three watersheds and the mine's fresh water reservoir, ambient air quality at seven stations as well as source testing at the process plant, wildlife populations, sensitive plants, re-vegetation success, and the integrity of civil structures. Quarterly data reports and annual analytical reports are distributed to the regulatory agencies and all other interested parties.

Site reclamation is governed by a Reclamation Plan approved by the three counties and the BLM and provides for the closure and re-vegetation of the waste rock and tailings disposal units, removal of the processing facilities, and the re-soiling and re-vegetation of the areas disturbed by those facilities as well as the low grade stockpile and other disturbed areas. The northerly of the two mine pits will be backfilled and reclaimed to grassland and oak woodland while the south pit will remain. The entire approximately 10,000 acre mine site will be used by the University of California as an Environmental Studies Field Station and incorporated into the University's Natural Reserve System. Implementation of the plan is assured by an approximately $10 million letter of credit payable to the counties, the BLM, and the Water Board.

3. POLLUTION PREVENTION THROUGH THE SELECTION OF MINERAL RECOVERY TECHNOLOGY

The geochemistry of ore bodies varies tremendously from site to site. Metallurgical studies are required to determine the

feasibility of mineral recovery and to determine a preferred mineral recovery technology. These studies can effectively evaluate the environmental consequences of alternative technologies along with the traditional evaluation of recovery effectiveness and capital and operating costs.

Because of the refractory nature of the McLaughlin ore, neither gravity concentration nor direct cyanidation provided meaningful recoveries and it was concluded that a combination of oxidation followed by cyanidation would be required. Test programs evaluating chemical, roasting, and pressure oxidation collected environmental data along with metallurgical results. Potential air emissions were calculated and pilot test tailings were accumulated and tested according to both EPA and State of California protocols for leachable trace metals and biotoxicity.

Pressure oxidation was ultimately selected on the basis of both economic and environmental advantages. Gold recoveries proved higher with pressure oxidation and capital and operating costs lower. The high fuel consumption necessary to dewater wet ground ore slurry and to obtain the required 550 degree Celsius roasting temperature could be avoided along with the associated fuel truck traffic. Sulfur dioxide, arsenic and mercury emissions resulting from roasting could be eliminated and the costs of an acid plant and scrubbing devices avoided. The truck traffic required to transport the 63,000 tons per year of sulfuric acid produced could also be eliminated. Even with state of the art sulfur dioxide emissions abatement using an acid plant operating at 99.6% efficiency, it was calculated that roasting would result in the release of over 330 tons of sulfur dioxide to the atmosphere each year.

Pressure oxidation tailings tested according to both EPA and California leachate extraction protocols release trace metals at concentrations below the "hazardous waste" thresholds. Trace heavy metals are tied up as oxides, in jarosites or other relatively insoluble complexes. Sulfide oxidation eliminates any residual acid generation potential. The separation of acid soluble cyanocides from the ore minimizes cyanide consumption in the process. The availability of high volumes of soluble iron to mix with the leach circuit tailings ties up the bulk of the residual cyanide in relatively nontoxic complexes in the solids, thus eliminating the threat of wildlife toxicity.

Pressure oxidation of the McLaughlin gold ore proves to be the preferred recovery process economically as well as environmentally as it achieves maximum gold recovery at minimum capital and operating unit costs and minimizes the pollution potential of the operation.

4. POLLUTION PREVENTION THROUGH WASTE UNIT SITING AND DESIGN

The siting and design of mine waste disposal units provides the single greatest opportunity at pollution prevention in mining. The selection of disposal sites with optimal containment characteristics is a key element of that process.

At McLaughlin, screening studies of available waste disposal sites for both waste rock and tailings were initiated early during exploration. As drill results continued to expand the ore reserves, the scope of these studies grew. First level screening identified all potential tailings sites within a ten mile radius of the ore body. Potential waste rock sites were limited to the vicinity of the pit by haulage economics.

Regional screening criteria excluded potential tailings sites with excessively steep topography, areas with large drainage basins and high flood potential, areas with known adverse geologic conditions such as landslides or active faulting, and areas in which existing land use was incompatible with tailings disposal.

The thirty four potential sites identified were subject to fatal flaw analysis eliminating ten of the sites because of inadequate capacity, three because the sites necessitated an excessively high embankment, seven because of other technical obstacles, and six because of other environmental sensitivities.

Field reconnaissance of the remaining eight sites provided a basis for a qualitative rating considering such factors as public visibility, surrounding land use, potential operational feasibility, and relative disposal cost. The top three sites were selected for field investigations consisting of detailed surficial geologic mapping, exploratory drilling, excavation of test pits, and in situ permeability testing.

The result of these investigations was a primary site whose favorable characteristics include very low foundation and basin permeability, high groundwater in the surrounding ridges providing a hydraulic barrier to lateral migration, the requirement for a relatively small embankment that could be constructed in stages, the availability of local borrow material for embankment construction, low public visibility, little to no underlying groundwater of very poor quality, a small upstream watershed facilitating water management and flood control, a large shallow impoundment configuration allowing thin layer deposition and rapid consolidation of tailings while maximizing the evaporation of process waters, ample space downstream to collect seepage, to monitor groundwater quality and to provide remedial containment if ever necessary, and the availability of local materials for eventual closure and reclamation.

Although located five miles from the ore body, the characteristics of the primary site along with consideration of the nature of the tailings, allowed the approval of the tailings disposal facility pursuant to the California Water Quality Regulations (California Code of Regulations, Title 23, Division 3, Chapter 15) as an "engineered alternative" to the prescriptive liner and leachate collection system requirements.

More particularly, the tailings are classified as a "Group B" mining waste as defined in Section 2571 (b) (2) (B) of Chapter 15, ie "mining wastes that consist of or contain nonhazardous soluble pollutants of concentrations which exceed water quality objectives for, or could cause degradation of waters of the state."

Chapter 15, Sections 2572 (f) and (g) set forth construction requirements for liners and leachate collection and removal systems at mining waste management units. Section 2570 provides that the Regional Board may grant exemptions from these requirements if a mine waste management unit meets specific criteria, namely that "...the discharger has developed a comprehensive hydro-geologic investigation which demonstrates that: 1. there are only very minor amounts of ground water underlying the area; or 2. the discharge is in compliance with the applicable water quality control plan; and 3. either natural conditions or containment structures will prevent lateral hydraulic interconnection with natural geologic materials containing ground water suitable for agricultural, domestic or municipal beneficial uses. There is no detectable vertical hydraulic interconnection between the natural geologic materials containing such ground water."

The tailings disposal facility includes a zoned earth fill dam with a clay core which extends down into a key trench founded in the very low permeability, non weathered clays beneath the impoundment. The dam's internal chimney and blanket drain system discharges to a return sump for accumulation and return to the impoundment. Runoff from the small watershed area (less than one square mile) upstream of the impoundment is intercepted and diverted around the facility. Top soil from the impoundment area was stripped and stockpiled for closure and reclamation of the disposal unit.

Ongoing monitoring of surrounding ground and surface waters demonstrates that the facility continues to function as designed and that no contaminants have been released from the site. Residual cyanide has remained below a concentration that would be toxic to water fowl and wildlife. From an economic stand point, the additional capital and operating costs of transporting the ore the five miles to the extraction plant located adjacent to the tailings impoundment are offset by the avoided cost of a liner and leachate collection system and the enhanced certainty of pollution prevention provided by the primary site.

5. POLLUTION PREVENTION THROUGH SECONDARY CONTAINMENT AND STORM WATER MANAGEMENT

The release of contaminated water to surface and/or ground water is the single most frequent source of mine related pollution. Contributing factors include errors in determining project water balance, inadequate design criteria for containment facilities, and underestimation of design storm and seasonal precipitation and/or snow melt volumes.

Water quality protection in the vicinity of the McLaughlin Mine is maintained by a collection and containment system that intercepts all storm water flows from the low-grade grade storage pads, the crushing and grinding areas, and the truck shop area as well as all water pumped from the mine pit. Accumulated water is pumped to the grinding circuit and used as process water. Storage volume is sufficient to prevent any discharge from the site. This collection and containment system also provides backup containment for fuel, waste oil, and other bulk materials should some catastrophic event cause failure of both their primary and secondary containment structures.

Similarly, the McLaughlin extraction plant is located so as to drain to the tailings pond, thus eliminating the discharge of any storm water from that facility to the downstream watershed and providing backup containment for the entire plant.

Ultimately, the operation depends upon the fact that the regional climate provides substantial net evaporation which allows the containment and either recycle or evaporation of all potentially contaminated waters. The tailings impoundment is designed to contain the volume of the probable maximum flood (ie. the 1000 year, 72 hour storm event) in addition to the maximum volume of tailings, even should the diversion system fail.

Extensive water quality and aquatic ecology monitoring in each of the three watersheds potentially impacted by the McLaughlin Mine demonstrates the effectiveness of the zero discharge project design at preventing pollution and preserving the quality and the integrity of surrounding ecosystems.

6. POLLUTION PREVENTION THROUGH ACID ROCK DRAINAGE MANAGEMENT

The most persistent pollution potentially resulting from mining is, without a doubt, the occurrence of acid rock drainage. The exposure of sulfide minerals to air and water coupled with the occurrence of sulfide oxidizing bacteria, can produce extremely low pH waters which in turn dissolve and mobilize acid soluble heavy metals. The release of such contaminated water can significantly damage downstream aquatic systems and impair the beneficial uses of impacted waters.

No other aspect of the environmental management of mining has received more attention, or undergone more radical change in the last decade than the prediction and management of acid rock drainage.

Evaluation of the McLaughlin Mine waste rock in 1981 and 1982, using then state of the art techniques, predicted that, because only 8% of the material was determined to have a net acid generating potential, the waste could be randomly dumped into the waste rock disposal facility without the formation of acid leachate.

Early monitoring within the dump suggested otherwise. Using statistical and trend analyses, it was quickly determined that sulfate production was exceeding predicted rates, and although the presence of increased calcium suggested that some in-dump neutralization was occurring, it was not sufficient to match the rate of acid formation.

A reevaluation of the acid generation potential of the McLaughlin waste rock concluded that the earlier predictions were in error and that in fact up to 40% of the material had a net acid potential, and that an active program of selective placement of the waste rock would be necessary to prevent the formation of significant volumes of acid leachate.

A number of sources of error were identified in the initial analysis. First, the selection of the tested samples involved the assembly of what were thought to be representative composites of the various rock types present in the waste material regardless of sulfide content. The testing of such composite samples was found to mask or minimize the acid generating potential of much of the waste. Second, the samples were subjected to a static acid/base balance testing procedure which involved grinding the material to minus 200 mesh, and comparing the total acid potential to the total alkalinity of the sample. Such static testing was determined to be non-representative of the behavior of the waste material in the field where run of the mine material sizes are anything but minus 200 mesh, and where fracture patterns are more likely to selectively expose sulfides than carbonates. In addition, reaction kinetics are likely to favor acid forming reactions over neutralization reactions, and the neutralization products tend to form a scale on the carbonate rich rock which blinds them to further reaction.

Column testing of run of the mine sized material representative of each geologic rock type and classified by relative sulfide mineralization provided more accurate data predictive of the actual behavior of the waste rock in the dump. This data provided the basis for the development of an acid rock drainage management system that includes the identification of potentially acid forming rock in the pit and the selective

placement of such rock in the waste rock disposal facility. Waste rock with a net acid potential is encapsulated within non acid generating clays and thus isolated from air and water which prevents the formation of acid leachate. The system, in effect, mimics the original occurrence of the sulfide rich rock in the mine in a setting that prevents the formation of acid rock drainage.

Mine planning now includes consideration of both ore development and waste management. A life of the mine inventory of waste rock has been completed, and the management plan adjusted to reflect the availability of the various waste types. The dumps are operated with sufficient headings to provide disposal opportunities for each waste type without requiring double handling. Bench heights have been reduced from 100 feet to 50 feet to provide a greater frequency of clay inter barriers and thus reduce the flow of air and water through the dumps.

Acid generating rock is completely surrounded with non acid generating clays, with inter barriers generally five feet in thickness. The criteria for closure has been established at twenty feet to daylight for any acid generating rock. The outer layers generally consist of fifteen feet on non acid generating low permeability clays, three and one half feet of weather oxidized rock and one and one half feet of top soil. The dump is constructed from the bottom up with bench faces reduced from angle of repose to 2.5:1. Closure and reclamation of each lift occurs at the earliest opportunity.

Dump under-drains deliver what dump leachate is formed to a pump back system which returns the water to the grinding circuit for use as process water. Storm water runoff from the active dump surfaces is routed through a series of sediment control ponds from where it can either be released or pumped back to the grinding circuit. Storm water from the reclaimed surfaces is diverted to a clean water system and discharged. All discharges are subject to the provisions of a NPDES permit.

The McLaughlin acid rock drainage management system has effectively minimized this source of potential pollution from the mine. Downstream water quality and aquatic ecology remain unchanged from pre-mine conditions. The cost of implementing the acid rock drainage management system is nominal at approximately two cents per ton of ore placed in the dump. The cost is minimized by careful planning to avoid the need to double handle any waste rock and to utilize only waste required to be moved by the mine plan, and not mine other materials to affect closure. This cost is relatively insignificant when compared to what the cost might be to construct and operate a water treatment plant to treat the discharge from an unmanaged waste rock dump.

The evaluation and planning for new mines now includes consideration of acid rock drainage potential from the exploration

stage forward. Acid generation potential data is collected along with mineral values as the drill core is logged and inventoried. Mine feasibility studies, and planning and engineering exercises integrate waste rock handling requirements throughout.

7. CONCLUSIONS

Innovations in the beneficiation and processing of ore, in the design and engineering of the mine and its facilities, and in the siting and management of the mine waste disposal units have in fact prevented pollution that might otherwise have resulted from the McLaughlin Mine. The Mine's comprehensive environmental monitoring program demonstrates the effectiveness of these features.

Innovation and incorporation of pollution prevention features into the McLaughlin Mine was promoted by the regulatory requirements which establish performance based compliance standards and provide the opportunity for the engineered alternative to the prescriptive standard for the siting, design and management of the mine's waste units.

TRIBUTE TO HOMESTAKE MINING CO.

HON. VIC FAZIO
OF CALIFORNIA
IN THE HOUSE OF REPRESENTATIVES

Friday, June 29, 1984

● Mr. FAZIO. Mr. Speaker, I rise today to commend Homestake Mining Co.'s enlightened approach to the development of the McLaughlin mining project in northern California.

Homestake is to be commended for coordinating its plans to develop the mine with every faction of the affected communities, both in the immediate area and downstream.

Homestake has gone beyond complying with the letter of the law: it has sought to comply with the law's spirit as well. Homestake Mining has been sensitive to the concerns of local environmentalists and has shown a true commitment and understanding of the values of conservation.

As demonstrated by a recent letter to the Yolo County Planning Commission written by the chairman of the Yolano Group of the Mother Lode Chapter of the Sierra Club, environmentalists have also recognized Homestake's dedication and commitment to ensuring that the McLaughlin mine is built and operated in the most environmentally safe manner possible. Wrote Ada Merhoff, the conservation chair of the Yolano Group:

> We would be remiss if we did not publically state our feeling that Homestake Mining Co. is to be commended for its willingness to accommodate the particular concerns of the interested public, and for its efforts to establish an environmentally sound mining operation here. Such cooperation from a large mining company is noteworthy and deserves due credit.

Homestake is an example of the right way to develop mining property. It is an example of the kind of cooperation and responsiveness that I hope will serve as the standard for companies pursuing a similar endeavor in the future.●

DIRECTORS

MARION "MAC" MAGINNIS
PRESIDENT - DIV. #3

ROBERT HANSEN
VICE PRESIDENT - DIV. #5

ALFRED ALONZO
DIV. #1

HAROLD CALIGIURI
DIV. #2

WILLIAM WETZEL
DIV. #4

SOLANO IRRIGATION DISTRICT SINCE 1948

OFFICERS

BRICE BLEDSOE
EXEC. DIRECTOR/SECTY

ROBERT L. ISAAC
MANAGER

JOSEPH B. SUMMERS
DISTRICT ENGINEER

MINASIAN, MINASIAN, MINASIAN, SPRUANCE, BABER, MEITH, SOARES & SEXTON
ATTORNEYS

STEPHEN J. CARBONARO
TREASURER

MEMORANDUM

DATE: April 29, 1994

TO:

Skip Thomson	David Fleming	John Duane
Harold Caligiuri	Steve Huddleston	David Okita
Robert Isaac	Suzanne Butterfield	Barbara Kondylis
Ron Hurlbut		

FROM: Brice Bledsoe

SUBJECT: Homestake-McLaughlin Mine tour

~ ~ ~

SOLANO IRRIGATION DISTRICT/HOMESTAKE MINING COMPANY
WATER QUALITY PROTECTION AGREEMENT

Background: The Solano Irrigation District, in 1982, prior to the permitting of the McLaughlin Mine, sought an agreement with Homestake Mining Company that would:

1. Assure the maintenance of the high quality of the water supply in Lake Berryessa, and

2. Maintain public confidence in the quality of the water supply and the aquatic ecology of Putah Creek.

Solano Irrigation District, as the largest supplier of Berryessa water, took this action on behalf of all of the agencies in Solano County which depend on this water supply. The Solano Irrigation District/Homestake Mining Company, Water Quality Protection Agreement (SID/HMC Agreement) was executed on June 30, 1983, in advance of the construction of the mine's facilities.

Result: The McLaughlin Mine is engineered, constructed and operated as an environmentally state of the art, zero discharge facility. The Mine has achieved an international reputation for sound environmental design and practice. Detailed environmental monitoring proves that the Mine has in no way impacted the excellent quality of the water supply.

Project Review: Prior to entering into the agreement, SID hired Earth Sciences, Inc., a firm of environmental and engineering professionals, to conduct an independent review of all of the Mine's environmental and engineering studies and its construction and operations plans and specifications. Similar to, but more detailed than an Environmental Impact Report, the analysis and mitgation measures assured that the Mine would not become a threat to the quality of Solano's water supply.

Monitoring Program: SID's technical staff and consultants worked with Homestake to develop a comprehensive, detailed, environmental monitoring program that would both assure the protection of Lake Berryessa and Putah Creek water and provide sufficient data to respond to any public concerns regarding the Mine's impact, if any on water quality. SID and Homestake agreed to seek approval of this monitoring program by the Regional Water Quality Control Board and other approval agencies, even though the program was substantially in excess of what would otherwise be required.

Continuous Water Quality Monitoring Station: In addition to the normal periodic stream samples, the program includes an automated, continuous water quality sampling station, located on Hunting Creek, downstream of all of the Mine's facilities. This assures that no undetected release can occur between the normal sampling periods.

Monitoring Results: Since initiated in 1983, the program has resulted in 127,727 water quality analyses from almost 3,953 separate samples. These data show that the quality of Solano's water remains excellent, and that the Mine has in no way degraded that water. Monitoring of aquatic ecology downstream of the project confirms that the streams remain unchanged from pre-mine conditions.

Response Programs: Under the agreement, Homestake has prepared Emergency Response and Spill Prevention plans which assure containment and cleanup preparedness. No events have occurred at Homestake's facilities requiring the implementation of these plans. Although not required by law to do so, Homestake has responded to four minor transport spills involving lime, ammonium nitrate (fertilizer) and other non-toxic materials. In no case has any spilled material entered into any stream or resulted in any water quality impacts.

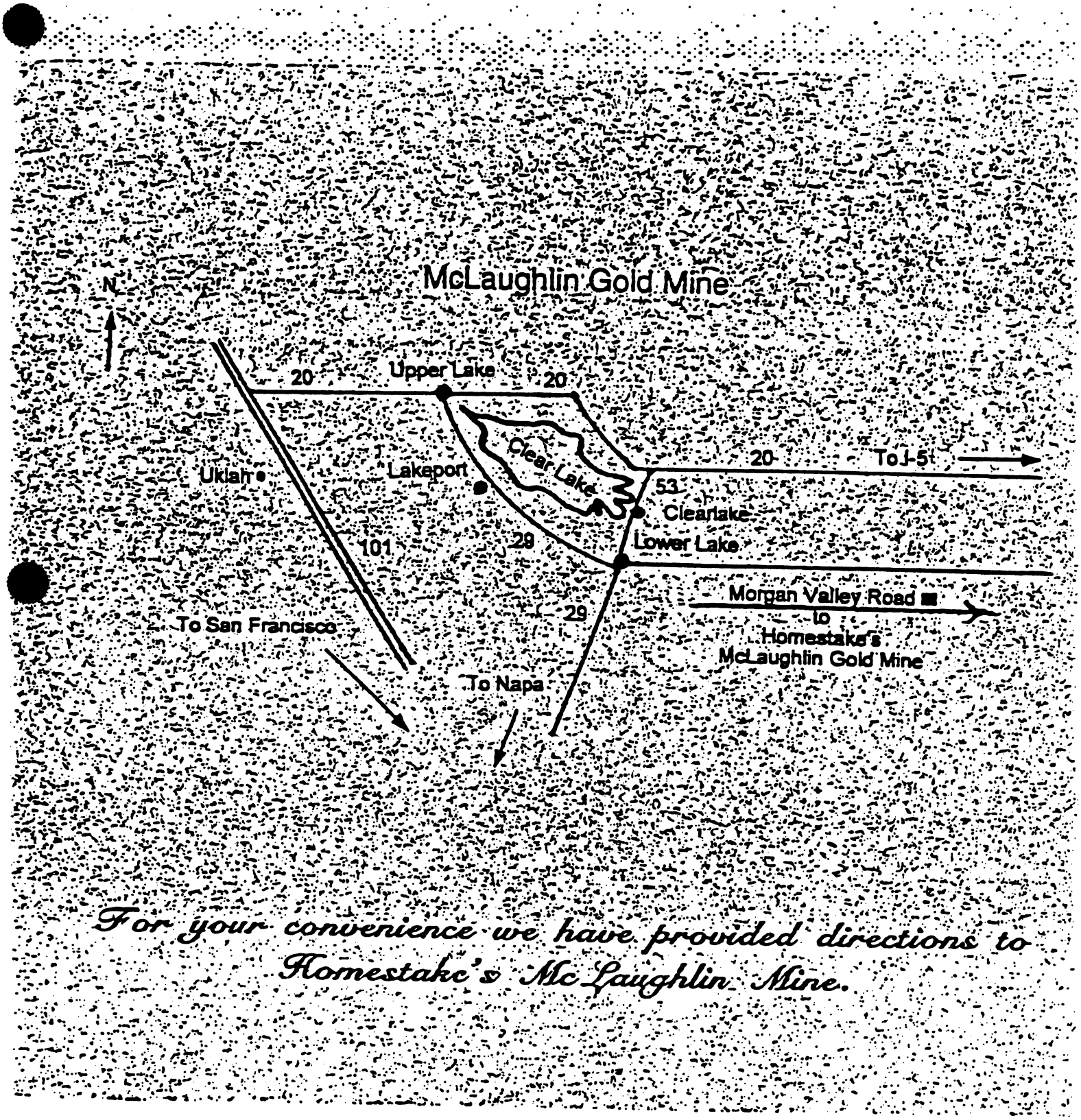
Transport of Hazardous Materials: Under the agreement and its permits, Homestake manages the transport of any fuels, reagents or hazardous materials in a manner that minimizes the possibility of accidental release.

Notification: The agreement requires that SID be notified of any release or potential release, even when there is no threat to water quality.

Cooperation: Homestake notifies SID of any proposed changes in the Mine's facilities, operations or permits so that such changes can be reviewed by the District, and the District's suggestions can be incorporated into the Mine's plans.

Water Quality Expert: The agreement provides for an independent, third party, water quality expert to solve any disagreement between the Mine and the District. No such disagreement has occurred. The water quality expert also inspects the project annually, takes water quality split samples, and provides periodic reports to assure that the terms of the agreement are met, and that the operation continues to protect the quality of the water supply.

Conclusion: In place for more than ten years, the Solano Irrigation District/Homestake Mining Company Agreement continues to serve its purpose to assure the excellent quality of Solano's water supply and the quality of water released downstream to Putah Creek.



For your convenience we have provided directions to Homestake's McLaughlin Mine.

Napa Permit
RF

NAPA COUNTY
CONSERVATION, DEVELOPMENT AND PLANNING DEPARTMENT

DEPARTMENT REPORT

Meeting of February 19, 1997

AGENDA ITEM # 12

OWNER: HOMESTAKE MINING COMPANY

SUBJECT: REVIEW OF THE 1995-1996 ANNUAL ENVIRONMENTAL MONITORING PROGRAM FOR THE McLAUGHLIN GOLD MINE PROJECT

FILE: Use Permit # U-198283, CONDITION # 16

BACKGROUND:

In accordance with Condition # 16 of Homestake's Use Permit/SMARA Permit, the Planning Division has completed the review of the 1995-1996 Annual Monitoring Report submitted by Homestake Mining Company in November 1996.

The Planning Department's Review of the Environmental Monitoring Report is summarized below and Homestake Mining Company's Executive Summary of the Annual Environmental Monitoring Report for 1995-1996 is attached as Attachment A. The full document is on file in the Conservation, Development and Planning Department Library.

OTHER ACTIVITY :

On May 10, 1996, the County Zoning Administrator approved a modification to Condition # 16 (File # 95497-MOD) to streamline the annual environmental monitoring program to coincide with the completion of mining in the south pit scheduled for summer of 1996. The revised monitoring program will be reflected in the 1996-1997 annual monitoring report. Other activity during the 1995-96 FY included 1) a minor modification to the reclamation plan for a small borrow area adjacent to the south pit in Yolo County which was approved by the Yolo Community Development Agency on August 2, 1995. 2) Homestake provided the update of the in-pit waste rock configuartion and the final mine plan as an Addendum to the approved Reclamation Plan on February 8, 1996.

1995-1996 REPORT REVIEW:

The 1995-1996 Annual Monitoring Report represents the thirteenth report submitted by Homestake Mining Company in fulfillment of the requirement to report annually the results of the McLaughlin Mine Environmental Monitoring Program. The objective of the monitoring program is to measure compliance with environmental performance standards recognized in the regulatory permits issued for the project. The monitoring program also requires the assessment of trends indicative of potential impacts attributable to the McLaughlin Project.

Staff sent a request for comments to each of the responsible agencies with jurisdiction over the project to comment on the adequacy of the annual report. Requests were sent to the Central Valley Regional Water Quality Control Board, Lake County Air Quality Management District, Yolo-Solano Air Quality Management District, the Bay Area Air Quality Management District, California Department of Fish and Game (Region 2 and 3), and the U.S. Dept. of Interior Bureau of Land Management. All agencies contacted have indicated that the report adequately addresses the monitoring required by their individual permits. Comments received are attached. Homestake's Executive Summary is attached as Attachment A.

WATER QUALITY

The Water Quality Monitoring Program consists of surface and groundwater monitoring of the hydrologic system surrounding the McLaughlin Mine facilities. The program is designed to monitor ambient or background water quality and regional water quality as well as waters closely adjacent to project facilities. There are nine (9) surface water stations, twenty-two (22) groundwater stations, and three (3) wasterock underdrain stations. Monitoring occurs on a quarterly basis.

Homestake indicated that no changes in surface or groundwater quality were identified during the past monitoring year. The quality of the waters in the vicinity of the processing facility, tailings impoundment, Davis Creek Reservoir, and the mine pit area remain essentially the same as described prior to the project's operation.

NPDES DATA

The collection of NPDES data is required by the Central Valley Regional WQCB Order No. 94-159, NPDES No. CA0081477, to analyze the discharge from sediment control dams and receiving waters. Homestake reports that normal stormwater discharges occurred from Pond 7 of the Waste Rock Sediment Control System in compliance with applicable discharge limits.

OTHER MONITORING

Data summarized include sampling of the cooling pond in March and June, semiannual sediment data for four locations, quarterly composite of samples of the tailings, quarterly domestic well samples, quarterly sampling of the tailings seepage return sump, and quarterly tailings reclaim water sampling for cresol and carbon disulfide.

AIR QUALITY / METEOROLOGY

The Air Quality Monitoring Program is conducted in accordance with the requirements of the Bay Area Air Quality Management District, Lake County Air Quality Management District, and Yolo-Solano Air Pollution Control District. The focus of the air quality monitoring program is on documenting Total Suspended Particulate Concentrations (dust). The program supplies values for particulates and measurements of particulate mercury, particulate arsenic, and asbestos in the air near the mine. In the processing area, the program supplies data on source emissions from process vents, stacks, tanks, and ponds. Meteorological measurements are taken continuously at four locations to assist in the interpretation of the air sampler data.

Total mine average rainfall was 26.16 inches, near the 12 year normal of 26.92 inches. Most of the precipitation occurred during the months of December 1995, January and February 1996.

Homestake reports that compliance was maintained with all ambient air standards and operating permit conditions.

AQUATIC ECOLOGY

The Aquatic Ecology Monitoring Program supplements the chemical water quality monitoring program. Data is collected on benthic macroinvertibrate community structure and diversity, fish community structure and population density, and levels of heavy metals in fish.

Hunting and Knoxville Creeks

Bodega Research Associates performed the annual aquatic ecology monitoring for Hunting and Knoxville Creeks in compliance with the Central Valley Regional Water Quality Control Board Waste Discharge Requirements and Reporting Program # 94-315 and Order # 94-159, NPDES No. CA0081477, Receiving Water Limitation D.13 for aquatic ecology monitoring on Hunting and Knoxville Creeks. Their summary of conclusions indicated that no meaningful trends in trace element concentrations can be identified as resulting from the Homestake mining operations. Changes appeared to relate to annual variation in rainfall and stream hydrology, rather than to changes associated with the Homestake mining operation.

Davis Creek and Davis Creek Reservoir

Davis Creek and Davis Creek Reservoir sampling was conducted by Ecological Research Associates and U.C. Davis under the direction of Dr. Charles Goldman to fulfill the requirements of the Central Valley Regional Water quality Control Board Waste Discharge Requirements and Reporting Program # 94-315.

VEGETATION MONITORING

The Vegetation Monitoring Program includes monitoring of previously reclaimed areas (reclamation success), sensitive plants and the management of contiguous lands. Reclamation research and test plantings to determine most suitable reclamation methods are also included in the program.

Sensitive Plants

In general, Homestake reported that all populations of sensitive plants observed during the 1995-1996 monitoring season were similar to those documented last reporting year. Sensitive plant monitoring was conducted by Biosystems Analysis, Inc. and the Napa Chapter of the California Native Plant Society (CNPS). Six new sites were documented in 1996. On the whole, 13 of 66 numbered sensitive plant occurrence sites were monitored during the 1995-1996 field season for their proximity to existing facilities.

Reclamation Review

Reclamation review was completed by Lorraine Van Kekerix, an independent consultant formerly with Cal Division of Mines and Geology. Revegetation efforts have been successful in establishing plant cover adequate to stabilize disturbed sites and control erosion. Native species from undisturbed sites have started to invade the revegetated areas.

Successful revegetation in the 1995-1996 season was completed on 55 acres of disturbed land, including 22 acres newly revegetated, and the repair of 33 acres due to erosion from heavy 1995 winter runoff. The seed mixes used in the 1994-1995 season were the same mixes used since 1987-88, and are again recommended for the 1995-1996 season. Soil amendments and mulch recommendations that were used since 1985-86 have provided good results and are recommended for the next season.

WILDLIFE

The Wildlife monitoring program includes documentation of wildlife observations by project employees, contractors, researchers, and wildlife us of Davis Creek Reservoir by Ecological Research Associates and an annual aerial helicopter search for raptor nests conducted by Jack Barclay of Garcia & Assoc., and Homekstake personnel.

GEOTECHNICAL MONITORING

The Geotechnical Monitoring Program monitors the integrity of dams and embankments. Structures reviewed include the Tailings Dam, M-1 Dam, Davis Creek Dam, the Waste Rock Sediment Control Facility, and the East Waste Rock Disposal Facility Pond. Inspection of the Davis Creek Dam, Tailings Impoundment, and M-1 dam was conducted by The Division of Dam Safety of the California Department of Water Resources, with all structures performing as designed.

CONTIGUOUS LANDS MANAGEMENT PROGRAM

The Contiguous Lands Management Program (CLMP) was developed as an extension of the mine's Environmental Monitoring Program to manage Homestake's adjacent nonmined lands. Six programs were established within the CLMP's framework. Homestake provided a summary description of the program objectives and work performed and/or programs initiated to date.

The Hazard Reduction Program was designed to reduce the risk of fire resulting from activities on mine property, facilitate reaction to fire, and reduce fuel load and improve habitat quality through prescribed burning. The Shoreline Development Program was developed to assess the natural habitat development over time and for the development of habitat enhancement programs as needed. The Sensitive Plant Restoration Program was developed for monitoring and management of sensitive plant species onsite for ultimate inclusion in the U.C. Reserve System. Pasture Use Management provides for management of pasture lands within the contiguous lands area. The Habitat Restoration and Improvement Program addresses wildlife habitat management practices and includes prescribed burning restoration and development of water resources. The Education and Research Program provides for the facilities and resources necessary to fulfill the postmining use of the property as a research site for regional educational institutions as provided for in the approved reclamation plan.

ANALYSIS of the 1995-1996 Annual Monitoring Report:

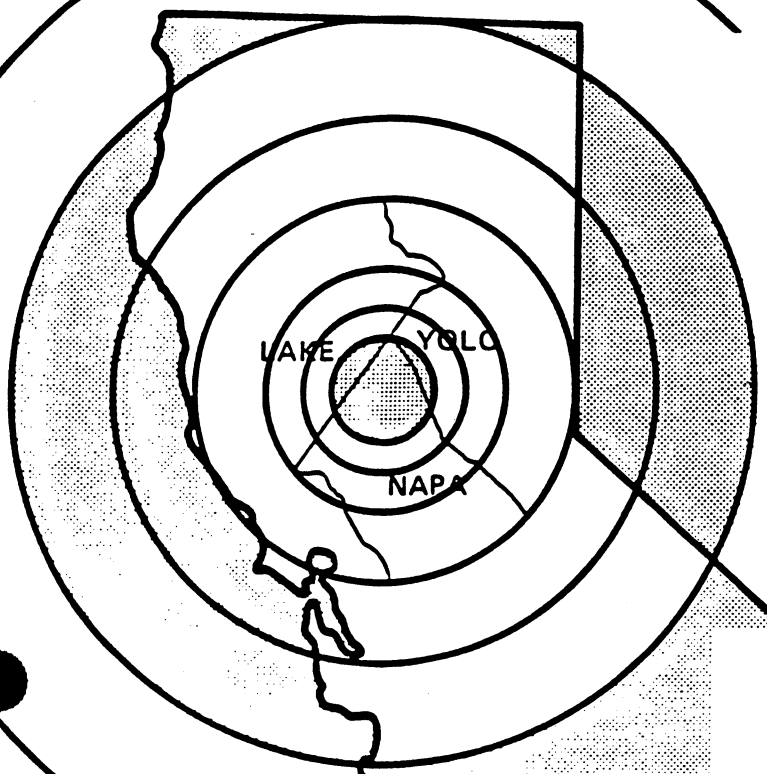
Comments received from various agencies with jurisdiction indicate that the environmental monitoring program is meeting its intent to measure compliance with environmental performance standards recognized in the regulatory permits issued for the project and identify and assess trends indicative of potential impacts attributable to the McLaughlin Project.

RECOMMENDATION:

1. Accept the Department's review of the 1995-1996 Annual Environmental Monitoring Report as adequate.

ATTACHMENT A 1

McLAUGHLIN MINE



HOMESTAKE MINING COMPANY

ANNUAL MONITORING REPORT

JULY 1, 1995 - JUNE 30, 1996



INTRODUCTION

This report is submitted in fulfillment of the requirement to report annually the results of the McLaughlin Mine Environmental Monitoring Program.

Annual Reports have been issued each year, beginning with the 1983-1984 monitoring year, containing report data collected July 1 through June 30 for each respective reporting period. This time period was selected to coincide with the water year, in order to provide complete report coverage for each winter rainy season.

Quarterly data reports have been issued throughout the year summarizing the data collected for each quarter of the monitoring year. This Annual Report does not provide data previously transmitted in the Quarterly Reports, but rather, refers to those documents. The 1995-1996 Annual Report focuses on data review, comparison to appropriate standards and criteria, and trends analysis.

The Annual Monitoring Reports track the Environmental Monitoring Program as described in the approved Environmental Monitoring Manual for the McLaughlin Mine (Revised November 1991). Both the monitoring program and the Annual Reports must be reviewed in total, as successive reports rely in part on previously issued documents. The baseline environmental data and project description are presented in the McLaughlin Project Proposed Gold Mine and Mineral Extraction Facility Environmental Report, Volumes I-III (D'Appolonia, June 1982) and the Project Description and Environmental Assessment (D'Appolonia, September 1982, Revised February 1983). The Annual Reports as issued are not intended to stand alone as either a facility description, or as a description of the details of the Environmental Monitoring Program, but rather to provide the reviewer with an analysis of the data collected during the previous monitoring year. The reviewer is encouraged to reference the supporting documents to provide appropriate background and perspective in reviewing the data presented herein.

An Executive Summary precedes the report and brings forward the conclusions and significant findings for each monitoring discipline.

The report is organized into sections by monitoring subject. Each section includes a summary followed by analysis of the data collected from the period July 1, 1995 through June 30, 1996. Comparisons to compliance standards and EIR/EIS projections as well as recommendations for program modifications are included where appropriate. Previously issued quarterly data reports should be considered as a portion of the Annual Monitoring Report. That data is not repeated herein.

HOMESTAKE MINING COMPANY
McLAUGHLIN MINE
ANNUAL MONITORING REPORT
JULY 1, 1995 – JUNE 30, 1996

EXECUTIVE SUMMARY

Introduction

The Executive Summary lists the findings of the analyses conducted on monitoring data collected during the reporting period of July 1, 1995 through June 30, 1996. The summary is organized in sections by monitoring topic.

1.0 Water Quality

The July 1995 - June 1996 Annual Environmental Monitoring Report, in conjunction with the Quarterly Environmental Monitoring Reports previously submitted throughout the monitoring year, has been prepared in accordance with the requirements of the California Regional Water Quality Control Board, Central Valley Region, Waste Discharge Requirements (WDR), Order No. 94-315 for the McLaughlin Mine. These reports fulfill the annual reporting requirements (due October 30, 1996) and demonstrate conformance with existing plans thereby fulfilling annual notification (due January 15, 1997) per Provision 3 of the current Order.

Water quality in the vicinity of the processing facility, Tailings Impoundment, Davis Creek Reservoir, and the mine pit area remains essentially as it was described prior to the project's operation. No changes in surface water or groundwater compliance points in terms of those elements or compounds which are fundamental to compliance with regulatory requirements have been identified. Analytical emphasis has been on those parameters most likely to be impacted by mining: cyanide, arsenic, boron, chromium, copper, lead, mercury, nickel, and zinc.

Water quality trends associated with sulfide oxidation in the waste rock areas were identified and discussed in the 1986-1987 through 1989-1990 Annual Environmental Monitoring Reports and also predicted in the Environmental Impact Report. The 1995-1996 monitoring data indicate that these trends are continuing. Changes in water quality are apparent for certain parameters associated with sulfide oxidation at specific monitoring stations in the waste rock areas. It should be noted that no significant changes in overall water quality have been observed in Hunting and Knoxville Creeks, particularly with respect to metals concentrations. The waste rock underdrain pump-back systems designed, installed, and operated by Homestake in response to trends identified through initial and ongoing environmental monitoring, have proven effective in recycling flow from the waste rock underdrains to the process circuits.

For the reporting period, only 1% of the 710 water quality data points evaluated for stream monitoring stations and groundwater wells exceeded the statistically derived maximum likely concentrations. No trend changes associated with these "exceedences" have been identified.

2.0 NPDES Data

NPDES data are collected from the discharge of sediment control dams and from receiving waters as required by the California Regional Water Quality Control Board, Central Valley Region, Order No. 94-159, NPDES No. CA081477. The July 1995 - June 1996 Annual Environmental Monitoring Report, in conjunction with the previously distributed Quarterly Monitoring Reports, fulfills the annual reporting requirements (due October 1, 1995).

Normal storm water discharges occurred from Pond 7 of the main Waste Rock Sediment Control system (discharge point 003 and receiving waters HC-05R and HC-10R). No discharge occurred from Pond 1 (discharge point 002) or the East Waste Rock Facility Pond (discharge point 001 and receiving stream station KC-03R). Discharge data have been provided throughout the year in Quarterly Monitoring Reports.

A high-intensity storm event in California in mid-December 1995 resulted in short-term exceedences which were observed at discharge point 003 as previously reported to the Regional Water Quality Control Board, Central Valley Region in accordance with reporting requirements. A copy of a report, submitted by Dolora M. Koontz on January 19, 1996, is provided in its entirety in NPDES section.

NPDES data collected throughout the remainder of the 1995-1996 monitoring year at discharge point 003 (Pond 7) demonstrate compliance with applicable discharge limits. Receiving water quality parameters were also in compliance and remained within the range of natural variability.

3.0 Other

Sampling required in the McLaughlin Project Environmental Monitoring Manual, but not included in the routine sample sets for surface and groundwater, are presented in this section. Data summarized include sampling of the cooling pond in March and June, semiannual sediment sampling data, quarterly composite samples of the tailings, quarterly domestic well sampling, quarterly sampling of the tailings seepage return sump, and quarterly tailings reclaim water sampling for cresol and carbon disulfide. Data has been reported previously in the quarterly monitoring reports with summary conclusions stated here.

- The cooling pond samples (monitoring station CP-01) reflect expected operational values for monitored parameters.

- Sediment data reflect ambient stream conditions. The data is reiterated in Table 3-1

- Tailings samples reflect concentrations expected during operations for total and filtered constituents. The tailings continue to test as nonhazardous. The data is reiterated in Table 3-2.

- Data for the tailings seepage return sump (monitoring station TRS-01) reflect expected operational values for the monitored parameters.

- Tailings reclaim water analyses for cresol and carbon disulfide were initiated in October 1991 as required by the California Regional Water Quality Control Board, Central Valley Region, in response to the start-up of the flotation circuit. The data confirm nondetectable values for these parameters as expected.

4.0 Air Quality and Meteorology

The Air Quality Monitoring Program is conducted in accordance with the requirements of the Bay Area Air Quality Management District, Lake County Air Quality Management District, and Yolo-Solano Air Quality Management District. It is evident that road dust suppression measures, baghouses, scrubbers, and other air quality control measures have been effective in controlling emissions as evidenced by air quality data collected at our compliance monitoring stations.

Total Mine average rainfall for the twelve-month period was 26.16 inches. This was near our twelve year normal of 26.92 inches. Most of the precipitation occurred during the months of December 1995 and January and February 1996.

Compliance was maintained with all ambient air standards and operating permit conditions.

The level of monitoring currently employed under the McLaughlin Mine Air Quality Program is more than sufficient to describe operation conditions and to monitor compliance at the McLaughlin facility.

5.0 Aquatic Ecology

Hunting and Knoxville Creeks

Aquatic ecology monitoring on Hunting and Knoxville Creeks is conducted by Bodega Research Associates. Their report, reproduced in full in the volume entitled

"Annual Monitoring Report, July 1, 1995 - June 30, 1996, Aquatic Ecology," fulfills the requirements of, and demonstrates compliance with, the California Regional Water Quality Control Board, Central Valley Region, Waste Discharge Requirement Monitoring and Reporting Program No. 93-121 and Order No. 94-159, NPDES No. CA0081477, Receiving Water Limitation D.13 for aquatic ecology monitoring on Hunting and Knoxville Creeks. The report Summary of Conclusions is reproduced below:

Summary of Conclusions

The reduced and focused monitoring program for Hunting Creek and Knoxville Creek, implemented in 1986 and refined in 1994 and 1995, has functioned efficiently and productively and should be continued without major alteration in 1996-1997. The cumulative increase in the data base from April sampling at the four primary sites (HC-5, HC-7A, HC-10, KC-3/3A) and from August benthic sampling at HC-7A will make the program more effective each year, as long as a consistent, careful, and appropriate methodology is maintained. This growing data base has become sufficient to detect statistically significant annual changes in the benthic invertebrate communities at each of the sampling stations, as well as to provide further insight into the temporal variability of the invertebrate fauna. These changes in benthic communities relate more to annual variation in rainfall and stream hydrology, through changes in such factors as summer flow conditions, winter scouring or silt accumulation, than to changes associated with the Homestake mining operation.

The 1995-1996 winter was the second successive winter with normal or above normal rainfall. This succession of normal to above normal wet seasons has not occurred at Hunting and Knoxville Creeks since the 1982-1983 and 1983-1984 winters. We have observed similarities between the years 1984 and 1986 in benthic community structure during April, but have seen less correspondence between the benthic communities from August samples in 1993 and 1995 for HC-7A. However, a mayfly taxon that had been generally uncommon at HC-7A in past years was relatively abundant in August, 1995. Continued monitoring will determine whether the invertebrate community will return to a faunal composition similar to that present before the succession of drought years 1987-1992, if rainfall continues at or above normal levels in the future.

California roach populations had been generally declining at all sites during the drought years through 1993, until the 1994 sampling indicated a dramatic recovery at Hunting Creek sites. As we have discussed in previous reports, several different factors associated with the drought may have contributed to the decline. The low, intermittent, or nonexistent summer flows at monitoring sites would have caused higher water temperatures, lower oxygen levels, and higher conductivities. These conditions would decrease survival and reproduction in California roach at all sites, and also may have been responsible for the declines in Sacramento squawfish and Sacramento sucker at HC-10.

Low rainfall during the drought was probably also the cause of increasing emergent and streamside vegetation at all Hunting Creek sites. Increasing vegetation then produced increasing siltation, with resultant changes in habitat that may have altered conditions for California roach. The unusual length of the drought allowed stream vegetation to develop extensive root systems, sufficient to resist in large part the scouring action of the heavier winter flows in recent years. At lower Hunting Creek sites, and at Knoxville Creek, heavy flows in 1993-1996 have carried away much of the accumulated silt, returning the streambed to rockier conditions than in recent years, but an accumulation of sediments added to the streambed at HC-7A during the drought remained in April 1996. The increase in vegetation at this site may also have been influenced by the removal of grazing livestock from the site in 1984, and from a decrease in the available area of the watershed contributing to the stream after isolation of the tailings reservoir. It is not possible to separate these various factors as contributors to the major habitat change at this site. At KC-3A, while silt has been removed from most areas, it was deposited during winter 1995-96 in a large pool at the lower end of the station, potentially reducing summer habitat for roach in that low flow site.

After the 1992-93 heavy rainfall winter, we predicted that higher summer flows in 1993 would lead to enhanced summer survival and higher fish populations in April 1994. This prediction was borne out (Bodega Research Associates 1994): California roach densities recovered to their highest levels in 7 years at Hunting Creek sites, and Sacramento sucker densities rose to their highest levels of the entire 11-year monitoring program. However, after the very high rainfall winter of 1994-95, California roach and Sacramento sucker densities in April 1995 again dropped to near the lowest levels of the entire monitoring program. By April 1996 densities had rebounded strongly at Lower Hunting Creek sites, as predicted in last year's report, but populations remained low at HC-7A and KC-3, where we believe that long-term habitat changes are overriding the effects of annual variability in flow conditions.

At KC-3, the decline in roach populations since 1985, previously confined to the immediate sampling site, gradually spread further downstream, but roach remained present at the alternate collection site, KC-3A, 1.6 miles downstream of KC-3. Concentrations of metals in fish collected at that site do not identify a chemical basis for the population decline, however. Mercury levels, which were high in 1988, have declined over the subsequent eight years; in 1996 they were only 25% of the 1988 levels. The monitoring program should continue to focus on these mercury concentrations in future years, but the long drought is a more probable cause of the roach population decline in Knoxville Creek.

Within the limits of reliability of the laboratory analytical results, no meaningful trends in trace element concentrations can be identified as arising from Homestake mining operations. Concentrations of copper in California roach have begun to suggest an increasing trend in this element at all sites, a possibility that should be monitored closely in future years. A sudden increase in arsenic levels in 1996 is probably a result only of analytical difficulties with this year's samples, but these data will be watched

closely in 1997 also. No other elements show signs of increasing levels. As the database of measured concentrations in fish tissues from the monitoring sites expands each year, the extent of natural biological variability and of analytical variability inherent in the monitoring program will become better defined, and identification of underlying trends will become easier. The archiving of frozen samples of fish tissue each year, added to the monitoring program in 1990, will permit future reanalysis of samples to corroborate any suspected trends.

During the past three seasons, we have initiated several changes in the monitoring program to maintain its power even as some habitat changes have occurred at sites where emergent vegetation has increased. At site HC-7A, two stations are becoming so choked with vegetation that electrofishing is impaired. These stations may eventually need to be dropped from the program. To prepare for this loss, we began supplementing electroshocker sampling at HC-7A with a new station to be estimated visually. This new station consists of a long, open pool, too deep to be effectively electroshocked, but affording easy visual estimates. We will continue to monitor this visual station in subsequent years. We have also added to our monitoring program at Knoxville Creek with establishment of the two new fish population monitoring stations at KC-3A.

Davis Creek and Davis Creek Reservoir

Davis Creek and Davis Creek Reservoir sampling was conducted by Ecological Research Associates and U. C. Davis respectively, under the direction of Dr. Charles Goldman. Reservoir sampling commenced in April 1985, and has continued as specified in the Environmental Monitoring Manual with an additional thirty-six mercury analyses authorized annually. The report, reproduced in full in the volume entitled, "Annual Monitoring Report, July 1, 1995 - June 30, 1996," fulfills the requirements of the California Regional Water Quality Control Board, Central Valley Region, Waste Discharge Requirement Monitoring and Reporting Program No. 94-315 for aquatic ecology monitoring on Davis Creek. The executive summary of that report is reproduced below:

PROJECT SUMMARY

This report was prepared in partial fulfillment of independent contracts initially made in October 1984, and renewed in 1991 between Ecological Research Associates (ERA) and Yolo County, and the University of California-Davis (UCD) and Yolo County. The purpose of these agreements is to aid the County, the Planning Commission, and staff in evaluating surface water and aquatic ecology data collected as part of the Homestake Mining Company (HMC) - McLaughlin Gold Mine Environmental Monitoring Program in the Davis Creek watershed. This 1995-1996 Annual Report has been written to reflect the most recent changes to the Environmental Monitoring

Program (EMP) as it applies to Davis Creek and Davis Creek Reservoir. Based on the 14+ year data base for water quality and biota metals analyses in Davis Creek and the 11+ year data base for Davis Creek Reservoir, we concluded in last year's Annual Report that, "the EMP portion of the program has come to a point where much of the current monitoring effort is no longer necessary for us to assist the County and HMC in evaluating the potential impacts of mining activities on the surface waters in Davis Creek watershed and in developing an operations plan for Davis Creek Reservoir" (ERA 1995). we further recommended significant changes to the EMP which effectively shifted the focus of research and monitoring to mercury biogeochemistry. Following extensive discussion with the Yolo County TRP this past winter, the Yolo County Planning Commission approved this more focused approach and the recommended changes to the EMP.

Issues addressed in this current report reflect these important changes and include:

- *Long-term and seasonal trends in precipitation and flow, and their influence on total suspended solids and mercury concentrations in Davis Creek.*

- *Long-term and seasonal trends in the mercury content of fish (California roach) in Davis Creek. This includes new data on roach-mercury concentrations from additional stations along Davis Creek, a discussion of possible mechanisms explaining the distinct seasonal periodicity [of] the roach-mercury data, and a regional comparison which looks at the mercury content of roach collected from stream impacted by historical mercury mining elsewhere in the California Coastal Range.*

- *Visual observations of aquatic habitat conditions at DC-5 and DC-6.*

- *Concentrations of mercury in Davis Creek Reservoir sediments. This year, in addition to quarterly sampling at the four routine reservoir sampling stations (inlet, mid-lake, dam and south arm), a comprehensive synoptic survey of sediment mercury in the reservoir was again conducted following the winter rains and runoff.*

- *Mercury accumulation by fish in Davis Creek Reservoir.*

Total or cumulative rainfall since 1984-1985 suggests three types of years. Low years are characterized by a cumulative annual rainfall of approximately 20 inches and less. Over the period of record this has occurred in 6 years (1986-1987, 1988-1989, 1989-1990, 1990-1991, 1991-1992, 1993-1994). Intermediate years (20-30 inches) were found in 1984-1985 and 1987-1988. High precipitation years occurred in 1985-1986 (36.23 inches), 1992-1993 (37.21 inches), and 1994-1995 (48.71 inches). Rainfall during 1994-1995 was significantly greater than for any other year with almost one foot (12 inches) more than the next closest year. Minimum summer flows at DC-5 were observed in October with values less than 100 gpm (1 gpm = 0.00223 cfs) and have typically

[been] below 50 gpm. From the period 1982 to 1995, July discharge at DC-5 was less than 100 gpm during 9 years and greater than 100 gpm in 5 years. Maximum annual flows occurred in the winter. Months during which the first significant flows of the season were observed at DC-5 include; October, November, January, February and March . Even with the addition of a first flush sampling, it is difficult to evaluate month-to-month variations in flow and the magnitude of flows on the basis of quarterly sampling. Consequently, this long-term database at DC-5 is not revealing, vis-a-vis, the relationship between precipitation and flow. Since the dam became operational in 1985, peak flows at DC-6 have been most related to reservoir capacity and operations. DCR has spilled over to DC-6 in only five years, 1986 and recently in 1993-1996.

The most striking feature of the total suspended solids (TSS) record at DC-5 has been the strict seasonality characterized by high concentrations during the winter period of high flow. These seasonal peaks were observed in at least 9 of the 14 years of record. While not statistically correlated with flow (i.e. in a predictive fashion), TSS was observed to generally be high at the same time when flow as high. TSS downstream of the reservoir at DC-6, was considerably lower than upstream at DC-5. Total mercury above the 0.2 µg/l limit of detection at DC-5 was measured in only 14 of the 78 samples, i.e. 18 percent. Of these, 3 were less than 0.4 µg/l. As seen for TSS most of the remaining 11 values greater than 0.4 µ[g]/l were associated with high winter flows and clearly transported along with the sediment load. Total Hg data from DC-6 clearly shows that the reservoir has functioned as an effective trap to prevent the downstream transport of mercury. In the nearly 11 years since the reservoir was created, total Hg has been above detection only four times; however, since the 0.2 µg/l limit of detection is much too high for any meaningful interpretation of the dissolved mercury data, the routine water mercury data for Davis Creek has not been particularly informative.

Mercury analysis for roach has been done on 41 individual sampling dates at DC-5 and on 39 dates at DC-6. Over this period, the average mercury concentration in all samples from DC-5 has been 0.35±0.16 mg kg^{-1} (mean±SD) on a wet weight basis. The minimum and maximum individual quarterly measurements are 0.13 mg kg^{-1} and 0.94 mg kg^{-1}, respectively. For the same 12 year period, mean roach mercury concentration at DC-6 has been 31 percent lower at 0.24±0.09 mg kg^{-1}; with a minimum quarterly value of 0.10 mg kg^{-1} and a maximum of 0.41 mg kg^{-1}. These two means are statistically significant at the $p<0.001$ level. Collectively, the long-term roach-Hg monitoring data suggest that, (1) the higher levels at DC-5 were due to the proximity of the abandoned Reed Mine and not from current mining activities, (2) the presence of the reservoir between DC-5 and DC-6 has done nothing to increase mercury levels in downstream fish, (3) the reservoir may have acted to lower mercury bioaccumulation downstream by trapping mercury and preventing its discharge from DC-5 to DC-6, and (4) neither the watershed clean up of the historic retort facility nor the closure of the adit (albeit, inconsistent from year to year depending on subsurface flow) has acted to reduce roach-Hg content at DC-5. We believe that the observed seasonality of mercury content in roach which appears as a peak in concentration in the fall - early winter, results from the accumulation of mercury during the summer period of low flow. From a regional

17

perspective, the data presented above indicates that roach-Hg concentrations found in Davis Creek at DC-5 and DC-6 are reflective of values found in other Coastal Range creeks influenced by drainage from historic mercury mining operations.

This report marks eleven years of uninterrupted monitoring at Davis Creek Reservoir. This monitoring has been conducted by our research group since early 1985, soon after the dam was completed. In this reporting year, precipitation was moderate and distributed relatively evenly across the months of December-May. This was in marked contrast to previous study years, which have largely been characterized by either extreme drought or extreme, concentrated rainfall. In our synoptic survey of newly deposited bottom sediments this year, we found much smaller quantities of general sediment deposition to the reservoir, as compared to similar data from the large storm years of 1993 and 1995. We also found much reduced quantities of mercury in the newly deposited sediment, primarily a function of the lower sediment load. For 1996, we estimate that 41 kilograms of new mercury entered the reservoir, as compared to an estimated 227 kg in 1995 and 193 kg in 1993. In terms of the actual resulting concentration of mercury in the new surficial bottom sediments, the level declined somewhat since 1995 (2.4 ppm lakewide average in 1996 vs. 2.6 ppm in 1995). Both of these levels were considerably lower than the calculated lakewide mean concentration of mercury in surficial sediments following the 1993 storms (5.9 ppm). The fish data are consistent with this finding, with levels of mercury in fish muscle tissue having remained considerably lower throughout the period of 1995-1996, as compared to 1993 and earlier. This was found for all smaller size classes of largemouth bass and bluegill, as well as for juvenile, young-of-year bass. The long-term trend for comparable fish samples indicates that mercury bioavailability at Davis Creek Reservoir continues to drop, in relation to the peak levels seen in 1985-1987.

PROJECT RECOMMENDATIONS

Section 1 - Revised Monitoring Program

1. Carry out revised monitoring and research plan to further investigate mercury biogeochemistry in Davis Creek and Davis Creek Reservoir.

Section 2 - Davis Creek

1. Consider sampling for ultra-trace levels of inorganic and methyl mercury at DC-5.

2. Analyze EMP fish for both methyl and total mercury to assess proportion of total burden which has been incorporated into tissue.

3. When possible, remove stomachs and analyze for total mercury comparing values to those for whole fish concentrations.

4. Consider possibility of expanding monitoring to include additional samples during the winter-spring period when values typically decline from their maximum levels.

5. Measure total and methyl mercury in aufwuchs (periphyton-floc mats) to determine if this material is enriched in biologically available mercury.

Section 3 - Davis Creek Reservoir

1. Continue sampling reservoir fish for mercury at the current schedule, including adult bass and bluegill and young-of-year juvenile bass as available.

2. Continue to sample adult fish from a range of sizes when possible, in order to permit the construction of size vs. mercury concentration curves for use in normalization of data for each collection date.

3. Continue sampling surficial bottom sediments at the existing index stations on a quarterly frequency.

4. Conduct synoptic surveys of new sediment and new mercury deposition in all future years if possible. Utilize enough sampling sites to estimate average new surficial sediment mercury concentrations, in addition to integrated total amounts. Also, utilize sample sites which provide estimates of these parameters for hypolimnetic (seasonally anoxic) strata Vs epilimnetic (aerated) depths.

6.0 Vegetation

The Vegetation Monitoring Program includes monitoring of previously reclaimed areas (reclamation success), sensitive plants and the management of contiguous lands. Reclamation research and test plantings to determine reclamation methods best suited for the site are also an integral part of the program.

In anticipation of the cessation of open pit operations in late June, 1996, both the in-pit and west waste rock facilities were active and nearing final configuration. Final clay and soil placement was underway at these facilities at the close of the 1995-1996 monitoring year. These activities were conducted using a revised configuration as approved by the responsible agencies in the 1994-1995 monitoring year. The basic waste rock management strategy as currently implemented on-site remains unchanged.

There were no construction activities at the site during the monitoring year which were not a part of the routine mining and milling operations. The July 1995 - June 1996 Annual Environmental Monitoring Report fulfills the annual reporting requirements for the 1995-1996 monitoring year (due January 15, 1997) per Provision 10 of the current Waste

Discharge Order issued by the California Regional Water Quality Control Board, Central Valley Region.

In general, all populations of sensitive plants observed during the 1996 monitoring studies were similar in size to those documented in 1996. Six new sites were documented in 1996. On the whole, 13 of 66 numbered sensitive plant occurrence sites were monitored during the 1996 field season. These sites were chosen for their proximity to existing facilities. Many sites were not inventoried since they have not been impacted by the project since 1985.

No new or significant impacts to sensitive plant occurrences were observed in the vicinity of the existing mining project during 1996. The current mine operational procedures continue to completely avoid the remaining known sites.

Sensitive plant monitoring was conducted by Glen Clifton of EcoSystems West Consulting Group, and Joe Callizo of the Napa Chapter of the CNPS. Recommendations made this year, as listed below, will be reviewed and implemented as appropriate:

1. Selected populations should be monitored and inventoried to establish climatic trends and impacts of prolonged drought.
2. There should be continued commitment to quantitatively monitoring the *Thelypodium brachycarpum* population at site 52.

The annual Reclamation review was completed by Lorraine Van Kekerix, an independent consultant, formerly with the California Division of Mines and Geology. Her report provides a review of seed mixes and general reclamation practices as well as an area by area review. In general, revegetation efforts have been successful in establishing plant cover adequate to stabilize disturbed sites and control erosion. Most of the areas revegetated to date are adjacent to undisturbed areas and native species from these undisturbed sites have started to invade the revegetated areas. The 1995-1996 revegetation program was implemented on approximately fifty-five acres. Twenty-two acres were newly revegetated, with the remainder was erosion repair in response to heavy 1995 winter runoff.

7.0 Wildlife

The Wildlife Monitoring Program includes documentation of wildlife observations, wildlife use of Davis Creek Reservoir, and an annual search for golden eagle nests. The Davis Creek Reservoir has added a feature to the area wildlife habitat that did not previously exist. Monitoring indicates wildlife use of the reservoir and resulting beneficial effects.

An aerial helicopter search for raptor nests was conducted on May 7, 1996 by wildlife biologist Jack Barclay of Garcia and Associates, and Homestake personnel. The project area was covered in approximately one hour of flight time. The only active nest that was observed was a red-tailed hawk nest in an oak tree approximately one mile south of the entrance to the Homestake process plant. Golden eagle nest sites identified in previous years were damaged by winter winds in the 1994 and 1995 seasons. Signs of replacement nest construction are not evident. The survey summary report by Jack Barclay can be found in the Wildlife section of this report.

The *Corynorhinus (Plecotus) townsendii* (Townsend's Big-eared Bat) colonies continue to use the protected roost sites prepared for them in 1988 and 1989. The electronic monitoring system, installed at the first protected maternity site in 1988, has provided researchers with continuous data on nightly and seasonal activity patterns as well as data on roost temperature and light levels. The record of activity patterns in addition to visual observations confirm the continued successful use of these sites by the maternity colonies as well as usage by some individuals as hibernacula. Guano traps are providing information on seasonal food source selection.

The approved Continuous Lands Management Plan (CLMP) was developed as an extension of the mine's Environmental Monitoring Program for the management of non-mined lands. In order to better administer the CLMP, six different programs were established within the Plan's framework. Each of these programs is listed in the Wildlife Section.

8.0 Geotechnical

The Geological and Geotechnical Monitoring Program monitors the integrity of embankments and natural or induced slope movement by measuring deformation, pore pressure and phreatic surface.

Inspection of the Davis Creek Dam, Tailings Impoundment, and M-1 Dam was conducted on May 10, 1996 by the California Department of Water Resources, Division of Safety of Dams. All structures were found to be operating as designed. No significant seismic events were experienced in the area in the 1995-1996 monitoring year.

8.0 Environmental Monitoring Plan Program Reductions

The 1994-1995 McLaughlin Mine Annual Monitoring Report provided information on proposed revisions to various environmental monitoring programs currently in effect at the facility and its environs. With the anticipated scale-back in operations at the mine, including the cessation of open pit mining and elimination of certain ore processing systems, a streamlining of the monitoring programs was recommended. The full background to the recommendation may be found in section 9.0

of the 1994-1995 Annual Monitoring Report. Additional information on the proposals and the logic for them are provided in this year's Annual Report is Environmental Monitoring Plan Program Reductions section. This information includes a letter from Dolora M. Koontz (HMC), dated March 4, 1996, to the Napa County Conservation, Development and Planning Department summarizing the proposals. Also included in this report is the agenda for the Napa County Zoning Administrator Meeting of May 10, 1996, which outlines the background and particulars of Homestake's proposal as presented to the Napa County Conservation, Development and Planning Department.

Notice of approval was stated in a letter from the Napa County Conservation, Development and Planning Department, dated March 6, 1996. A copy of this letter is also included in this report. Several items in the proposal will remain in effect due to subsequent review from their respective agencies. Those items remaining in effect in the 1996-1997 monitoring program include:

- PM-10-PIXE (staged impactor) analyses
- Slurry metal analyses
- M-1 Impoundment remains under DSOD jurisdiction

These program items will remain in effect as in previous years until such time as the concerns of the respective agencies are satisfied and approval is granted for their exclusion.

*****

RECOMMENDATIONS

The following recommendations are made for the 1995-1996 monitoring year:

Water Quality

1) Continue to monitor surface and groundwater quality according to the current Water Quality Monitoring Program as approved by the California Regional Water Quality Control Board, Central Valley Region and the Responsible Agencies.

2) Continue to scrutinize data from all monitoring stations associated with the Waste Rock Disposal Facilities for trends.

3) Continue the QA/QC program in its present format.

Air Quality and Meteorology

As discussed in the Air Quality and Meteorology section, PIXE analyses and PM-10 samples collected at AQ-7 have shown to result in exceptionally low measurements of

airborne toxics. While sample analyses result in positive values at exceptionally low concentrations, the interpretation of data near the detection limit will typically carry errors of ± 100 percent or greater. Concentrations measured on unexposed filter blanks often exceed the measured concentration on exposed filters. The resulting data report from the lab may include positive values for particulate metals that can be best described as statistical noise. The concentrations of airborne toxics measured during the past seven years at AQ-7 have remained at or below detection. PIXE sampling has demonstrated that Process activities have not increased airborne toxics in ambient air. For these reasons, we recommend that PIXE sampling be discontinued.

Geotechnical

As recommended in the Annual Monitoring Reports since 1988-1989, the Geotechnical Data Reviews completed by Glasgow Engineering Group, Inc. (formerly D. P. Engineering, Inc.) since 1989-1990, the M-1 Dam should be considered for elimination from the Geotechnical Monitoring Program.

Comments Received



NAPA COUNTY

CONSERVATION — DEVELOPMENT
AND PLANNING DEPARTMENT

1195 THIRD STREET, ROOM 210 • NAPA, CALIFORNIA 94559-3092
AREA CODE 707/253-4416

JEFFREY R. REDDING
Director

RECEIVED

NOV 27 1996

NAPA CO. CONSERVATION
DEVELOPMENT & PLANNING DEPT

PERMIT APPLICATION AND INITIAL STUDY REQUEST FOR COMMENTS

TO: Bureau of Land Management

APPLICATION TITLE: 1995/96 Homestake Annual Monitoring Report FILE #: N/A

RESPONSE REQUEST DATE: 11-20-96 RESPONSE RETURN DATE: 12-20-96

FINAL REQUEST DATE: _____ FINAL RESPONSE DATE: _____

This application (see enclosed project description and/or maps) is being sent to you for your review and comment.

With respect to environmental analysis, the County is assuming Lead Agency status for the project and will be preparing the necessary environmental documents.

We advise us as to which of your permits is required, your environmental concerns, and whether you recommend that a Negative Declaration or an Environmental Impact Report be prepared on this project. Due to the provisions of AB 884, it is essential that we receive your comments within the next 10 days.

Do you have jurisdiction by law over this project ☒ Yes ☐ No
If yes, indicate required permits: 3809 Plan of Operations

Indicate areas of environmental concern and availability of appropriate technical data:
Reclamation, erosion, wildlife protection

Do you recommend: ☒ Negative Declaration ☐ Environmental Impact Report
If the project is approved, recommend conditions-of-approval (use additional page if needed):
None

Have you previously reviewed an application on any portion of this project?
☒ Yes ☐ No

Name of contact person: Renee Snyder Telephone: (707) 468-4000

Response Prepared by: Charles W. Whitcomb
Title: Geologist
Date: 11/23/96

s2.comments2

A7

STATE OF CALIFORNIA - THE RESOURCES AGENCY PETE WILSON, Governor

DEPARTMENT OF FISH AND GAME
POST OFFICE BOX 47
YOUNTVILLE, CALIFORNIA 94599
(707) 944-5500

December 11, 1996

RECEIVED
DEC 13 1996
NAPA CO. CONSERVATION
DEVELOPMENT & PLANNING DEPT

Ms. Therese Garbarino
Napa County
Planning Department
1195 Third Street
Napa, California 94559-3092

Dear Ms. Garbarino:

Homestake McLaughlin Mine
1995-96 Annual Monitoring Report

Department of Fish and Game personnel have reviewed the annual monitoring report and find it complete. We appreciate the extra efforts Homestake has made for both survey of local wildlife and studies as a part of their research station. Their data on bats and other species is adding greatly to our knowledge of local wildlife.

Regarding eagle nesting surveys, we agree that the surveys can be terminated this year with project completion. We also agree with the recommendation that the U. C. Davis wildlife monitoring program be directed toward those species living in or feeding at the Davis Creek reservoir site. The Continuous Lands Management Plan (CLMP) for unmined lands has also been informative and of great interest.

In summary, the Homestake efforts have been commendable. If you have any questions or concerns regarding our comments, please contact Allan Buckmann, Associate Wildlife Biologist, at (707) 944-5537; or Carl Wilcox, Environmental Services Supervisor, at (707) 944-5525.

Sincerely,

Brian Hunter
Regional Manager
Region 3

23

16

NAPA COUNTY

CONSERVATION — DEVELOPMENT AND PLANNING DEPARTMENT

JEFFREY R. REDDING
Director

1195 THIRD STREET, ROOM 210 • NAPA, CALIFORNIA 94559-3092
AREA CODE 707/253-4416

RECEIVED

DEC 5 - 1996

NAPA CO. CONSERVATION DEVELOPMENT & PLANNING DEPT.

PERMIT APPLICATION AND INITIAL STUDY REQUEST FOR COMMENTS

): Lake County Air Quality Management District

PLICATION TITLE: 1995/96 Homestake Annual Monitoring Report FILE #: N/A

SPONSE REQUEST DATE: 11-20-96 RESPONSE RETURN DATE: 12-20-96

NAL REQUEST DATE: _____ FINAL RESPONSE DATE: _____

is application (see enclosed project description and/or maps) is being sent to you for your review and nment.

th respect to environmental analysis, the County is assuming Lead Agency status for the project and will be ing the necessary environmental documents.

ase advise us as to which of your permits is required, your environmental concerns, and whether you ommend that a Negative Declaration or an Environmental Impact Report be prepared on this project. Due he provisions of AB 884, it is essential that we receive your comments within the next 10 days.

Do you have jurisdiction by law over this project ☒ Yes ☐ No

If yes, indicate required permits: EQUIPMENT, GENERAL FACILITY PERMITS FOR PROCESS FACILITIES LOCATED IN LAKE COUNTY. PERMITS FOR AIR EMISSIONS

Indicate areas of environmental concern and availability of appropriate technical data: CRITERIA AND AIR TOXIC EMISSIONS TECHNICAL DATA PROVIDED IN APPLICATIONS FOR DISTRICT PERMITS WITH OPERATIONAL DATA AVAILABLE UPON COMPLETION OF CONSTRUCTION.

Do you recommend: ☐ Negative Declaration ☐ Environmental Impact Report N/A

If the project is approved, recommend conditions-of-approval (use additional page if needed): MAINTAIN EXISTING APPLICABLE DISTRICT PERMITS. Apply for permits or permit modifications, as necessary, for process modifications.

Have you previously reviewed an application on any portion of this project?

☒ Yes ☐ No

Name of contact person: Ross L. KAUPER Telephone: (707) 263-7000

Response Prepared by: ROSS KAUPER

Title: DEPUTY APCO

Date: 11/25/96

Comments:

29

T6

NAPA COUNTY

CONSERVATION — DEVELOPMENT AND PLANNING DEPARTMENT

JEFFREY R. REDDING
Director

1195 THIRD STREET, ROOM 210 • NAPA, CALIFORNIA 94559-3092
AREA CODE 707/253-4416

RECEIVED

DEC 11 1996

NAPA CO. CONSERVATION DEVELOPMENT & PLANNING DEPT

PERMIT APPLICATION AND INITIAL STUDY REQUEST FOR COMMENTS

O: Lake County Planning Dept

PPLICATION TITLE: 1995/96 Homestake Annual Monitoring Report FILE #: N/A

ESPONSE REQUEST DATE: 11-20-96 RESPONSE RETURN DATE: 12-20-96

NAL REQUEST DATE: _____ FINAL RESPONSE DATE: _____

iis application (see enclosed project description and/or maps) is being sent to you for your review and mment.

ith respect to environmental analysis, the County is assuming Lead Agency status for the project and will be eparing the necessary environmental documents.

ase advise us as to which of your permits is required, your environmental concerns, and whether you ommend that a Negative Declaration or an Environmental Impact Report be prepared on this project. Due the provisions of AB 884, it is essential that we receive your comments within the next 10 days.

Do you have jurisdiction by law over this project ☑ Yes ☐ No
If yes, indicate required permits: Use Permit; Reclamation Plan

Indicate areas of environmental concern and availability of appropriate technical data: _____
All CEQA Checklist Items

Do you recommend: ☑ Negative Declaration ☐ Environmental Impact Report
If the project is approved, recommend conditions-of-approval (use additional page if needed): _____
No recommend additional at this time Monitoring Report

Have you previously reviewed an application on any portion of this project?
☑ Yes ☐ No
Name of contact person: Steve Zalusky Telephone: (707) 263-2221

Response Prepared by: Steve Zalusky
Title: Environmental Planner
Date: 12/96

Comments:

30

RECEIVED
NOV 27 1996
NAPA CO. CONSERVATION
DEVELOPMENT & PLANNING DEPT

NAPA COUNTY

DIVISION OF
ENVIRONMENTAL HEALTH

DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

1195 THIRD STREET, ROOM 101 • NAPA, CALIFORNIA 94559-3082
AREA CODE 707/253-4471 • FAX 707/253-4545

MEMORANDUM

TO: Napa County Planning Dept. - Jeffrey Redding, Director

FROM: Department of Environmental Management - Chris Secheli, R.E.H.S.

SUBJECT: Homestake mine monitoring report

DATE: November 25, 1996

FILE # N/A

We have reviewed the above report and have no comments.

COUNTY homestake

31

NAPA COUNTY

CONSERVATION — DEVELOPMENT AND PLANNING DEPARTMENT

JEFFREY R. REDDING
Director

1195 THIRD STREET, ROOM 210 • NAPA, CALIFORNIA 94559-3092
AREA CODE 707/253-4416

RECEIVED

NOV 26 1996

NAPA CO. CONSERVATION DEVELOPMENT & PLANNING DEPT.

PERMIT APPLICATION AND INITIAL STUDY REQUEST FOR COMMENTS

O: Public Works Dept

PPLICATION TITLE: 1995/96 Homestake Annual Monitoring Report FILE #: N/A

ESPONSE REQUEST DATE: 11-20-96 RESPONSE RETURN DATE: 12-20-96

INAL REQUEST DATE: _____ FINAL RESPONSE DATE: _____

his application (see enclosed project description and/or maps) is being sent to you for your review and omment.

ith respect to environmental analysis, the County is assuming Lead Agency status for the project and will be eparing the necessary environmental documents.

ease advise us as to which of your permits is required, your environmental concerns, and whether you commend that a Negative Declaration or an Environmental Impact Report be prepared on this project. Due the provisions of AB 884, it is essential that we receive your comments within the next 10 days.

Do you have jurisdiction by law over this project ☑ Yes ☐ No

If yes, indicate required permits: SEE ATTACHED LETTER

Indicate areas of environmental concern and availability of appropriate technical data: None

Do you recommend: ☐ Negative Declaration ☐ Environmental Impact Report

If the project is approved, recommend conditions-of-approval (use additional page if needed): _____

Have you previously reviewed an application on any portion of this project?

☑ Yes ☐ No

Name of contact person: Eddie Ramos Telephone: 253-4351

Response Prepared by: Eddie Ramos

Title: Civil Engineer

Date: 11/26/96

comments2

37

RECEIVED
NOV 26 1996
NAPA CO. CONSERVATION
DEVELOPMENT & PLANNING DEPT.

PUBLIC WORKS DEPARTMENT
INTER-OFFICE MEMO

November 26, 1996

TO: Terry Garbarino, CDPD

FROM: Larry Bogner, Public Works LARRY B.

SUBJECT: Homestake Mining Company, Annual Monitoring Report

Homestake Mining Company was required to relocate and reconstruct a portion of Knoxville-Berryessa Road as a condition of the permits to operate the mine. This work was memorialized in Agreement No. 2055 between Homestake and the County. Homestake completed the last of the work specified in the Agreement during the past year. Upon our recommendation, the Board of Supervisors acknowledged completion of the work and we recorded a notice of completion on October 17, 1996.

misc:homestak.doc

File YC: RK
Depa Permits PK

NAPA COUNTY

CONSERVATION -- DEVELOPMENT AND PLANNING DEPARTMENT

JEFFREY REDDING
Director

1195 THIRD STREET, ROOM 210 • NAPA, CALIFORNIA 94559-3092
AREA CODE 707/253-4416

March 6, 1996

RECEIVED
MAR 11 1996

Delora M. Koontz
Environmental Engineer, McLaughlin Mine
Homestake Mining Company
26775 Morgan Valley Road
Lower Lake, CA 95457

Dear Ms. Koontz:

At their February 21, 1996 meeting, The Conservation, Development and Planning Commission accepted the Department's review of the 1994-95 Homestake Annual Environmental Monitoring Report, and determined that the report was consistent with Condition #16 of Use permit # U-198283.

If you have any questions, do not hesitate to contact me at (707) 253-4416.

Sincerely,

Therese Garbarino

Therese Garbarino
Planner III

cc: Jeffrey Redding, Director

xc: RK

NAPA COUNTY
CONSERVATION, DEVELOPMENT AND PLANNING DEPARTMENT

DEPARTMENT REPORT

Meeting of February 21, 1995 6

Agenda Item: #7

OWNER: HOMESTAKE MINING COMPANY

SUBJECT: REVIEW OF THE 1994-1995 ANNUAL ENVIRONMENTAL MONITORING PROGRAM FOR THE McLAUGHLIN GOLD MINE PROJECT

FILE: Use Permit # U-198283, CONDITION # 16

BACKGROUND:

In accordance with Condition # 16 of Homestake's Use Permit/SMARA Permit, the Planning Division has prepared this report for the Conservation, Development and Planning Commission as a general summary of the findings presented in the 1994-1995 Annual Monitoring Report submitted by Homestake Mining Company in September 1995.

The Planning Department's Review of the Environmental Monitoring Report is included as Attachment A, and Homestake Mining Company's Executive Summary of the Annual Environmental Monitoring Report for 1994-1995 is attached as Attachment B. The full document is on file in the Conservation, Development and Planning Department Library.

Homestake has included in their 1994-1995 annual report a request to reduce the monitoring program in summer 1996 upon completion of mining in the south pit and the transition to processing of low grade ore from stockpiled material. Processing of low grade ore is scheduled to continue into 2004 with final closure and reclamation extending through several additional years. The proposed changes will streamline the monitoring program while maintaining the overall program objectives by focusing on collecting those data necessary to characterize downstream watershed water quality, air quality, aquatic ecology, and geotechnical integrity, and also continue to detect any trends toward significant or unusual environmental change. Homestake's Environmental Monitoring Plan Proposed Reductions are attached as Attachment C.

Although the request to modify the Environmental Monitoring Program was submitted together with the 1994-1995 annual report, the proposed changes are separate from the 1994-1995 annual review. The changes are proposed to commence in 1996 to coincide with the completion of mining and the transition to processing of stockpiled low grade ores. No additional waste rock will be added to the disposal facility after 1996, and the pit mining will

cease, reducing the scope of the mining project. Therefore staff believes that the proposed monitoring plan reductions can be processed as a minor modification to the original use permit/SMARA permit to be reviewed by the Zoning Administrator once all other agencies with jurisdiction over the project have commented.

Other project activity at the Homestake Mine during the 1994-1995 monitoring year that required review included a modification to the Reclamation Plan to allow for the backfill of up to 20 million tons of waste rock into the south pit, (File # 93544-MOD) which had previously been authorized as backfill into the north pit, and release of the financial security for the East Waste Rock Disposal Facility based on the completion of successful reclamation of the facility. Ten percent of the security will be held until January 1998 to assure continued satisfactory reclamation of the site for a full five years after the last augmented seeding was completed in January 1993.

RECOMMENDATION:

1. Accept the Department's attached review of the 1994-1995 Annual Environmental Monitoring Report (Attachment A) as adequate.

Lake County Air Quality Management District
883 Lakeport Blvd
Lakeport, California 95453
Internet: bobr@pacific.net
Phone: (707) 263-7000
Fax: (707) 263-0421

Robert L. Reynolds
Air Pollution Control Officer

December 13, 1995

RECEIVED
DEC 14 1995
NAPA CO. CONSERVATION
DEVELOPMENT & PLANNING DEPT.

Sylvia Toth
Napa County Conservation - Development and Planning Dept.
1195 Third St., Room 210
Napa, CA 94559-3092

Re: Homestake Mining Company 1994-95 Annual Monitoring Report Comments

Dear Ms. Toth:

District staff has reviewed the above referenced document and pursuant to your letter of December 4, 1995 is providing a summary of our comments and recommendations.

The document provides summary air quality information sufficient to assure staff that the Lake County facility emissions are not causing or significantly contributing to exceeds of the ambient air quality standards and that public health is not being adversely affected in the immediate area. It is our recommendation that the ambient air quality monitoring program be continued and supplemented by annual source emissions testing to assure that the facility continues to operate in compliance with the issued air district permits.

We have recently received applications from Homestake Mining to extensively modify existing and install new equipment to allow for the final phase of low grade ore processing. Upon additional review, we anticipate issuing new modified permits (including revised monitoring requirements), to accommodate a change over to low grade ore cyanide leach processing of the remaining stockpile ore inventory so that reclamation of the ore and waste rock may continue for the remaining project life to the year 2004.

It is anticipated that ambient monitoring requirements will remain consistent with current requirements with possible modifications to address concerns, if any, associated with anticipated process changes. Our initial review indicates that the current monitoring conditions will be largely supplemented by process monitoring, given the assurance that overall facility emissions will remain at or below those presently occurring.

Should you have questions regarding the above, please give me a call at (707) 263-7000.

Sincerely,

Ross L. Kauper, Deputy Air Pollution Control Officer

CC:

Attachments: (0)

2

STATE OF CALIFORNIA - THE RESOURCES AGENCY
PETE WILSON, Governor

DEPARTMENT OF FISH AND GAME
POST OFFICE BOX 47
YOUNTVILLE, CALIFORNIA 94599
(707) 944-5500

RECEIVED
JAN 11 1996
NAPA CO. CONSERVATION
DEVELOPMENT & PLANNING DEPT.

January 10, 1996

Ms. Sylvia G. Toth
Supervising Planner
Napa County Conservation,
Development, and Planning Department
1195 Third Street, Room 210
Napa, California 94559-3092

Dear Ms. Toth:

Homestake McLaughlin Mine
1994-1995 Annual Monitoring Report
Napa County

Department of Fish and Game personnel have reviewed the annual monitoring report for the Homestake McLaughlin Mine and find it complete and well done. We have no further comments at this time.

If you have questions regarding our comments, please contact Allan Buckmann, Associate Biologist, at (707) 944-5537; or Carl Wilcox, Environmental Services Supervisor, at (707) 944-5525.

Sincerely,

Ken Aasen for
Acting Regional Manager
Region 3

cc: Mr. Raymond E. Krauss
Environmental Manager
Homestake Mining Company
26775 Morgan Valley Road
Lower Lake, California 95457

NAPA COUNTY

CONSERVATION -- DEVELOPMENT
AND PLANNING DEPARTMENT

1195 THIRD STREET, ROOM 210 • NAPA, CALIFORNIA 94559-3092
TELEPHONE 707/253-4416 FAX 707/253-4176

JEFFREY REDDING
Director

January 8, 1996

Post-it® Fax Note 7671	Date	# of pages ▶
To Terry Garbarino	From Steve Zalusky	
Co./Dept. Napa Planning	Co. Lake Planning	
Phone #	Phone # 263-2221	
Fax #	Fax # " 2225	

Steve Zalusky
Lake County Planning Department
255 N. Forbes St.
Lakeport, CA 95453

Subject: Review of Homestake McLaughlin Mine 1994-1995 Annual Monitoring Report

Dear Mr. Zalusky:

The Napa County Conservation, Development and Planning Department is presently reviewing the 1994-1995 Homestake Annual Monitoring Report to provide a general summary and evaluation of the findings to the Napa County Planning Commission.

The Department's annual summary relies on comments and recommendations from technical review agencies for evaluation of the findings and changes in the monitoring methods proposed by Homestake Mining Company. Delora Koontz of Homestake Mining Company has sent a copy of the annual report directly to your office.

In order to incorporate your comments into our report, and enable us to tentatively schedule the item for Planning Commission review, the Department respectfully requests that you submit comments on the adequacy of the annual report to us within 15 days.

If you have any questions or need additional information, feel free to contact me at (707) 253-4416.

Sincerely,

Therese Garbarino

Therese Garbarino
Planner III

cc: Delora Koontz, Homestake Mining Company

Ms. Garbarino:
We couldn't get hold of you by phone. We recommend approval - we have no negative comments.
Sincerely,
Steve Zalusky
Environmental Officer

RECEIVED
JAN 11 1996
LAKE COUNTY PLANNING DEP

5

STATE OF CALIFORNIA - Environmental Protection Agency PETE WILSON, Governo

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION
3443 Routier Road, Suite A
Sacramento, CA 95827-3098
PHONE: (916) 255-3000
FAX: (916) 255-3015

RECEIVED
DEC 7 - 1995
NAPA CO. CONSERVATION
DEVELOPMENT & PLANNING DEPT.

6 December 1995

Sylvia G. Toth
Napa County Conservation, Development
and Planning Department
1195 Third Street, Roome 210
Napa, CA 94559-3092

HOMESTAKE MCLAUGLIN MINE 1994-95 ANNUAL MONITORING REPORT

This is in response to your request for a written review of the 1994-95 Homestake Annual Monitoring Report. Due to a heavy workload and a prioritization of our resources, we are unable to provide you with review comments within 30 days. We may be able to provide them to you at some time in the future, however we cannot project a date for completion of our review.

If you would like to receive a written report at some time in the future, please call me at (916) 255-3140.

William J. Marshall

WILLIAM J. MARSHALL, Chief
Waste Discharge to Land Unit

WJM

6

HOMESTAKE MINING COMPANY

McLaughlin Mine

RECEIVED
JAN 31 1996
NAPA CO. CONSERVATION
DEVELOPMENT & PLANNING DEPT.

January 29, 1996

Terry Garbarino
Napa County
Conservation, Dev. and Planning
1195 Third St., Rm. 210
Napa, CA 94559-3092

Dear Terry,

Attached for your records is a copy of a letter from the Department of Water Resources, Division of Safety of Dams acknowledging receipt of the annual data transmittal for monitoring conducted in association with the jurisdictional impoundments at Homestake Mining Company's McLaughlin Mine during the 1994-1995 monitoring year. Additionally, the letter provides approval for monitoring reductions as proposed for the jurisdictional structures in our 1994-1995 Annual Monitoring Report.

If you should have any questions, please feel free to call.

Sincerely,

Dolora M. Koontz

Dolora M. Koontz
Sr. Environmental Engineer

Attachment

xc: R. E. Krauss

Homestake Mining Co., McLaughlin Mine
26775 Morgan Valley Road
Lower Lake, CA 95457

Telephone (707) 995-6070
FAX (707) 995-6078

STATE OF CALIFORNIA—THE RESOURCES AGE
PETE WILSON, Governor

DEPARTMENT OF WATER RESOURCES
1416 NINTH STREET, P.O. BOX 942836
SACRAMENTO, CA 94236-0001
(916) 653-5791

JAN 11 1996

Ms. Dolora M. Koontz
Environmental Engineer
Homestake Mining Company
26775 Morgan Valley Road
Lower Lake, California 95457

Dear Ms. Koontz:

Homestake Tailings Impoundment Dam
and Reservoir, No. 1391, Lake County
Homestake Sediment M-1 Dam and Reservoir,
No. 1391-2, Napa County
Davis Creek Dam and Reservoir, No. 1391-3,
Yolo County

Thank you for the surveillance data transmitted to us on September 27, 1995. We collect this information in accordance with Division 3, Sections 6101 and 6102, of the California Water Code to monitor ongoing conditions for safety.

Your request to reduce the dam performance monitoring at Davis Creek Dam is approved. Should you desire to remove the M-1 Dam from jurisdiction as mentioned in the Glasgow Engineering Group Report, you will need to file an alteration application with this office.

If you have any questions, please contact Area Engineer David R. Borger at (916) 323-5312 or Regional Engineer Frederick J. Sage at (916) 323-1421.

Sincerely,

Vernon H. Persson, Chief
Division of Safety of Dams

ATTACHMENT "A"

REVIEW OF THE ANNUAL 1994-1995 ENVIRONMENTAL MONITORING PROGRAM McLAUGHLIN PROJECT

The 1994-1995 Annual Monitoring Report represents the twelfth report submitted by Homestake Mining Company in fulfillment of the requirement to report annually the results of the McLaughlin Mine Environmental Monitoring Program. The objective of the monitoring program is to measure compliance with environmental performance standards recognized in the regulatory permits issued for the project. The monitoring program also requires the assessment of trends indicative of potential impacts attributable to the McLaughlin Project.

Monitoring data presented in the 1994-1995 annual report covers the 12 month period from July 1, 1994 to June 30, 1995. Quarterly data reports were presented through the year summarizing the data collected each quarter of the monitoring year. The purpose of the annual report is to provide the reviewer with an analysis of the data collected during the previous monitoring year.

This report summarizes the Executive Summary Conclusions and significant findings for each monitoring discipline presented by Homestake in the Annual 1994-1995 report. Staff sent a request for comments to each of the responsible agencies with jurisdiction over the project to comment on the adequacy of the annual report. Requests were sent to the Central Valley Regional Water Quality Control Board, Lake County Air Quality Management District, Yolo-Solano Air Quality Management District, the Bay Area Air Quality Management District, California Department of Fish and Game (Region 2 and 3), and the U.S. Dept of Interior Bureau of Land Management. All agencies contacted have indicated that the report adequately addresses the monitoring required by their individual permits. Homestake's Executive Summary is attached as Attachment B.

WATER QUALITY

The Water Quality Monitoring Program consists of surface and groundwater monitoring of the hydrologic system surrounding the McLaughlin Mine facilities. The program is designed to monitor ambient or background water quality and regional water quality as well as waters closely adjacent to project facilities. There are nine (9) surface water stations, twenty-two (22) groundwater stations, and three (3) wasterock underdrain stations. Monitoring occurs on a quarterly basis.

Homestake indicated that no changes in surface or groundwater quality were identified during the past monitoring year. The quality of the waters in the vicinity of the processing facility, tailings impoundment, Davis Creek Reservoir, and the mine pit area remain essentially the same as described prior to the project's operation.

The 1994-1995 monitoring data indicate that the upward trend in the concentration of sulfate in the waste rock area is continuing as predicted in the EIR and the 1986-1987 through the 1989-1990 reports. No significant changes have resulted in overall water quality in Hunting or Knoxville Creeks.

Homestake reported that only 10 (one percent) of 710 water quality data points exceeded the maximum likely concentration of water quality variables tested for the reporting period. No trends or changes associated with the exceedences were identified.

The high intensity storm events in January and March of 1995 caused two incidents where the underdrain flow of the waste rock area exceeded the capability of the pumpback system which resulted in commingling of underdrain flows and surface runoff, and subsequent discharge to Hunting Creek. After the January incident, Homestake upgraded the pumping capacity of the underdrain system, consequently the March event was a lower volume and had a shorter duration of discharge to the creek. Homestake indicated that there was no negative impact on the water quality of Hunting Creek.

Because the volume of stormwater from the two major storm events in January and March was greater than the volume of water that the pumpback system could handle to recycle the water back for use in the process facility, the spare slurry pipeline was used to pump excess storm water to the tailing impoundment for containment and subsequent evaporation during the summer. A booster pump was installed on the spare slurry pipeline adjacent to one of the slurry line containment ponds, however, a low volume leak developed at the pump location and runoff was contained in the adjacent containment pond. A discharge to a tributary of Hunting Creek occurred when an operator inadvertently opened the pond. The leak was corrected immediately and followup monitoring indicated no evidence of damage to aquatic life in Hunting Creek or the tributary where the release occurred.

The exceptionally high surface water runoff associated with the March 1995 storms resulted in sediment ponds being filled, resulting in a low volume discharge but had no impact on Hunting Creek.

NPDES DATA

The collection of NPDES data is required by the Central Valley Regional WQCB Order No. 94-159, NPDES No. CA0081477, to analyze the discharge from sediment control dams and receiving waters. Homestake reports that normal stormwater discharges occurred from Pond 7 of the Waste Rock Sediment Control System in compliance with applicable discharge limits. Low volume storm water discharges occurred from Pond 1. No discharge occurred from the East Waste Rock Facility Pond.

The high flood level storm events in January and March of 1995 exceeded the capacity of the underdrain collection and pumpback system, resulting in commingling of underdrain flows with surface runoff which was collected in the sediment control ponds then discharged to Hunting Creek. Homestake upgraded the pumpback system in response to the January flows resulting in a lower volume of discharge in March.

In-stream flow conditions during January and March were extremely high resulting in high in-stream TSS levels. The NPDES monitoring indicated that the exceedances were negligible in comparison with in-stream conditions, indicating they were a result of naturally occurring variability associated with the elevated in-stream flow rather than the mining operation.

The NPDES monitoring data indicates that ongoing containment efforts have been successful in protecting the quality of downstream waters. The data collected through the reminder of 1994-1995 year demonstrate compliance with applicable discharge and receiving water limits.

OTHER MONITORING

Sampling required in the Environmental Monitoring Program but not included in routine sample sets for surface and groundwater are included in this section. Data summarized include sampling of the cooling pond in March and June, semiannual sediment data for four locations, quarterly composite of samples of the tailings, quarterly domestic well samples, quarterly sampling of the tailings seepage return sump, and quarterly tailings reclaim water sampling for cresol and carbon disulfide.

Homestake reports that the cooling pond and tailings seepage return sump reflect expected operational values. Sediment data samples reflect ambient stream conditions. Tailings samples test as nonhazardous, and tailings reclaim water analyses reflect nondetectable levels of cresol and carbon disulfide as expected. No unusual variations were detected in the domestic wells.

AIR QUALITY / METEOROLOGY

The Air Quality Monitoring Program is conducted in accordance with the requirements of the Bay Area Air Quality Management District, Lake County Air Quality Management District, and Yolo-Solano Air Pollution Control District. The focus of the air quality monitoring program is on documenting Total Suspended Particulate Concentrations (dust). The program supplies values for particulates and measurements of particulate mercury, particulate arsenic, and asbestos in the air near the mine. In the processing area, the program supplies data on source emissions from process vents, stacks, tanks, and ponds. Meteorological measurements are taken continuously at four locations to assist in the interpretation of the air sampler data.

Total mine average rainfall was 44.71 inches, well above the 11 year normal of 27.68 inches. Most of the precipitation occurred during the months of January and March.

Homestake reports that compliance was maintained with all ambient air standards and operating permit conditions.

AQUATIC ECOLOGY

The Aquatic Ecology Monitoring Program supplements the chemical water quality monitoring program. Data is collected on benthic macroinvertibrate community structure and diversity, fish community structure and population density, and levels of heavy metals in fish.

Hunting and Knoxville Creeks

Bodega Research Associates performed the annual aquatic ecology monitoring for Hunting and Knoxville Creeks in compliance with the Central Valley Regional Water Quality Control Board Waste Discharge Requirements and Reporting Program # 94-315 and Order # 94-159, NPDES No. CA0081477, Receiving Water Limitation D.13 for aquatic ecology monitoring on Hunting and Knoxville Creeks. Their summary of conclusions indicated that no meaningful trends in trace element concentrations can be identified as resulting from the Homestake mining operations. Changes appeared to relate to annual variation in rainfall and stream hydrology, rather than to changes associated with the Homestake mining operation.

Davis Creek and Davis Creek Reservoir

Davis Creek and Davis Creek Reservoir sampling was conducted by Ecological Research Associates and U.C. Davis under the direction of Dr. Charles Goldman to fulfill the requirements of the Central Valley Regional Water quality Control Board Waste Discharge Requirements and Reporting Program # 94-315. Reservoir sampling commenced in April of 1985 and has continued as specified in the Environmental Monitoring Manual, with an additional thirty six (36) annual mercury analyses. Ecological Research and U.C. Davis concluded that the water quality and aquatic ecology monitoring aspects of the McLaughlin Project in Yolo County are operating in an orderly, logical and timely manner.

Rainfall in the Davis Creek watershed during the 1994-1995 monitoring year was extremely high with total combined rainfall of 48.71 inches. Davis Creek Reservoir spilled in late January - early February, and still spilled at the end of May 1995. The majority of the flow was during February and March.

Sampling from Davis Creek and Davis Creek reservoir included: a) water quality samples, 2) sediment samples for heavy metal concentrations, 3) mercury analysis on fish, 4) "other" metals on fish.

The Davis Creek project data base covers 13+ years. Distribution and magnitude of metal concentrations and values follow general patterns largely regulated by creek hydrology. A wide variety of flow conditions have occurred during the operation of the project, including prolonged drought and severe flooding. To date, no single parameter other than mercury has been of regulatory concern. The Davis Creek Reservoir data have been collected for 10+ years, and have posed no concern to downstream water quality at any time.

VEGETATION MONITORING

The Vegetation Monitoring Program includes monitoring of previously reclaimed areas (reclamation success), sensitive plants and the management of contiguous lands. Reclamation research and test plantings to determine most suitable reclamation methods are also included in the program. During the 1994-95 monitoring year, Homestake obtained approval from all responsible agencies to redirect up to 20 million tons of waste rock to the south pit for reclamation. Reclamation of the backfill areas is conducted in the same manner as the waste rock disposal facility.

Sensitive Plants

In general, Homestake reported that all populations of sensitive plants observed during the 1994-1995 monitoring season were generally larger than those reported in the 1993-94 reporting year. Sensitive plant monitoring was conducted by Biosystems Analysis, Inc. and the Napa Chapter of the California Native Plant Society (CNPS). Two new sites were documented in 1994. On the whole, 29 of 61 numbered sensitive plant occurrence sites were monitored during the 1994-1995 field season for their proximity to existing facilities. Many sites were not inventoried since they have not been impacted by the project since 1985. No new or significant impacts to sensitive plants were observed in 1994-95.

Reclamation Review

Reclamation review was completed by Lorraine Van Kekerix, an independent consultant formerly with Cal Division of Mines and Geology. Revegetation efforts have been successful in establishing plant cover adequate to stabilize disturbed sites and control erosion. Native species from undisturbed sites have started to invade the revegetated areas.

Successful revegetation in the 1994-1995 season was completed on 37 acres of disturbed land in 9 areas including: the west waste rock disposal facility southern portion of the 1800 elevation bench, repairs to gullies on the north portion of the 1800 elevation bench, repairs to pond 9 at the 1500 elevation bench, the toe of the 1350 elevation bench, a tailings test plot, portion of the upper bench of the topsoil stockpile at the tailings dam; repairs to a slump area at monitoring well S-08, an exploration site in the pit area, and repairs to a berm around the equipment storage area.

The seed mixes used in the 1994-1995 season were the same mixes used since 1987-88, and are again recommended for the 1995-1996 season, with the same change recommended for the last three years that the serpentine mix be changed to replace lana vetch with rose clover. Soil amendments and mulch recommendations that were used since 1985-86 have provided good results and are recommended for the next season.

Species composition on reclaimed sites has changed over time with annual grasses predominant in the first year, followed by emerging perennial grasses, and clover in the second year. In the third year, perennial grasses are predominant, with native grasses more abundant, and in the fourth and fifth years, the invasion of native plants increases. Over time, the native species are expected to replace the seeded species.

There was a significant increase in the number of different plant species invading the revegetated sites as compared to the number of species present in the past several springs. The proportion of seeded legumes increased (i.e. rose clover and lana vetch) while the proportion of volunteer legumes continued to decrease from the high proportion present in the 1988 and 1989 evaluation.

The heavy rains in early 1995 caused significant erosion in numerous areas around the mine, including slumps along both county and Homestake roads, the waste rock facility, tailings dam, and topsoil stockpile west of the tailings dam. In the west waste rock facility, slumping has occurred on the 1800, 1700, 1500 and 1400 elevation benches, with a few gullies on the 1600 bench. Before theses areas can be revegetated, examination by an engineer or engineering geologist is needed to determine the cause, potential for ongoing failure and course of action needed to stabilize the areas. Eroded materials have been held on the benches and have not moved further downslope.

The Recommendations included repair of the identified areas in conjunction with 1995-1996 revegetation program. Homestake has indicated that these repairs have been incorporated into the 1995-1996 revegetation program.

WILDLIFE

The Wildlife data base consists of wildlife observation cards submitted by project employees, contractors, researchers, and wildlife monitoring by Ecological Research Associates at Davis Creek Reservoir.

The Davis Creek reservoir wildlife monitoring data reported by Darrell Slotten of Ecological Research Associates, for the 1994-1995 is the ninth annual report submitted summarizing the wildlife found in routine surveys of the Davis Creek Reservoir (DCR). The DCR Wildlife Monitoring Program serves to document usage of the reservoir by native wildlife and to keep track of species which could be potentially affected by high mercury levels in DCR fish. The survey schedule followed during the reporting period included 4 surveys for the year, conducted roughly at the midpoint of each season. Each survey included monitoring of water-oriented birds, nearshore terrestrial birds, and mammals.

The DCR Monitoring program report identified 66 species of birds on or around Davis Creek reservoir, including 24 species of water oriented birds. The improved shoreline habitat with heavy growths of cattails and submerged aquatic plants, attracted notably increased numbers of fall migrant waterfowl. The heavy storms quickly filled the reservoir. Wintering waterfowl demonstrated increased numbers relative to recent years, probably due to the improved littoral habitat. Fish-eating birds are a major focus of the monitoring at the reservoir. A green backed heron and a great blue heron were present in the summer of 1994, as in the previous year. A single double-crested cormorant resided at DCR during the summer of 1994, with 3-4 cormorants fishing in the lake in early 1995. A belted kingfisher was present during the August 94 and May 95 surveys, and one western grebe was living at the reservoir in February 1995. Only a single common merganser was seen in November 1994 compared to earlier years when 20-30 mergansers fished the lake each winter. As seen last year, a single bald eagle was seen near DCR in the Fall survey.

As in previous years, Mule deer and coyotes were the dominant large mammals noted at DCR, with an annual pattern of increased usage in summer and fall and incidental presence near the reservoir in winter and spring when other water sources are available. A gray fox was seen in November of 1994, and an adult bobcat was seen in February 1995. A river otter was seen in the reservoir in May 1995, which probably traveled up lower Davis Creek from Cache Creek during the high runoff flows of winter/spring 1995.

An aerial helicopter search for raptor nests was conducted on May 3, 1995. Golden eagles were occupying the nest site south of the property along Hunting Creek which was last occupied in 1992. One chick was observed in the nest. Two other nests on the northern property along Cache Creek and Davis Creek Reservoir area were lost due to heavy winter winds which snapped the trees where they were located.

The Townsend's big eared bat (Plecotus townsendii) continued to use the protected roost sites prepared in 1988-1989. The electronic monitoring system installed in the maternity site in 1988 continues to provide data on nightly and seasonal activity patterns, data on roost temperature and light levels. Records of activity patterns and visual observation confirm the continued successful use of these sites. Ongoing studies are conducted by others separate from the routine wildlife monitoring program.

A western bluebird birdbox program was initiated and nest boxes for wood ducks and kestrels were installed at Davis Creek Reservoir in 1992. The bluebird boxes had confirmed nesting at 30% of the boxes. No kestrels or wood ducks were observed with nests. The alternate nest site for cliff swallows installed by the grinding facility has again been used by an increasing number of swallows.

GEOTECHNICAL MONITORING

The Geotechnical Monitoring Program monitors the integrity of dams and embankments. Structures reviewed include the Tailings Dam, M-1 Dam, Davis Creek Dam, the Waste Rock Sediment Control Facility, and the East Waste Rock Disposal Facility Pond. Inspection of the Davis Creek Dam, Tailings Impoundment, and M-1 dam was conducted by The Division of Dam Safety of the California Department of Water Resources, with all structures performing as designed.

Geotechnical monitoring data was reviewed and analyzed by Glasgow Engineering Group, Inc. (formerly D.P. Engineering Inc.). They completed a field inspection of each structure and an evaluation of structure performance relative to design criteria and permit requirements.

All structures are performing as designed and the monitoring data show that the structures are considered safe and continue to operate with no special monitoring or remedial work necessary.

CONTIGUOUS LANDS MANAGEMENT PROGRAM

The Contiguous Lands Management Program (CLMP) was developed as an extension of the mine's Environmental Monitoring Program to manage Homestake's adjacent nonmined lands. Six programs were established within the CLMP's framework. Homestake provided a summary description of the program objectives and work performed and/or programs initiated to date.

The Hazard Reduction Program was designed to reduce the risk of fire resulting from activities on mine property, facilitate reaction to fire, and reduce fuel load and improve habitat quality through prescribed burning. Fire training has been provided to mine personnel, fuel reduction programs included expansion of the firebreak adjacent to the process facility through conversion of chaparral to grassland in 1986, and an ongoing grazing program. Access roads on site are regularly maintained to reduce fire hazard and provide access to fire crews, if needed.

The Shoreline Development Program was developed to assess the natural habitat development over time and for the development of habitat enhancement programs as needed. A habitat development project was initiated at the T-3 sediment pond in 1993 by Sonoma State students. Willow and cotton wood slips from native stock on-site were planted along the shoreline to augment the cattails which had invaded naturally. Follow up and monitoring indicate a high survival rate for willows. Cottonwood slips were planted this year to further enhance the habitat. All cottonwood plantings were actively growing in spring of 1995. The natural invasion of tules and cattails has occurred at many of the spring fed ponds onsite. Natural invasion of willows and cottonwoods is also occurring at some of these locations.

The Sensitive Plant Restoration Program was developed for monitoring and management of sensitive plant species onsite for ultimate inclusion in the U.C. Reserve System. Annual monitoring of sensitive plants has been added to the data base. One species was transplanted on site in 1986, 88, 89, and 1991 with followup monitoring. Salvage of an additional species for relocation occurred in spring of 1994, where the original location will be impacted by the filling of the tailings impoundment.

Pasture Use Management provides for management of pasture lands within the contiguous lands area. An ongoing grazing program was initiated in 1988, with management input from the Lake County Farm Advisor. Grazing was initiated on lands east of the mine in Napa County in 1991, and the Napa County Resource Conservation District conducted a grazing land assessment which will be used in future management decisions.

The Habitat Restoration and Improvement Program addresses wildlife habitat management practices and includes prescribed burning restoration and development of water resources. Grazing was removed from the blue oak woodlands surrounding Davis Creek reservoir in 1983. Monitoring of habitat improvement has not been initiated to date. Reclamation of the Reid Mine was completed in 1989-1990. The site was a contributing source of mercury and other metals into the Davis Creek Reservoir system. The reclamation included sealing the old mine tunnel to eliminate discharge, and redistributing the topsoil over the spent mine waste for revegetation. Annual monitoring documents the revegetation success and natural invasion of native plant species. The extraordinary rainfall events in early 1995 resulted in a low volume seepage from the previously sealed Reid adit.

The successful relocation of Townsend's big eared bat (Plecotus townsendii) colony to protected roost sites was completed in 1988. Records of activity patterns and visual observation confirm the continued successful use of these sites.

The installation of Davis Creek Reservoir and numerous sediment ponds have provided year round water resources for wildlife. The natural invasion of shoreline vegetation has increased habitat diversity. Nursery habitat for juvenile fish has been enhanced and waterfowl usage of the project site has increased dramatically over baseline studies.

Ongoing reclamation conducted at the waste rock site provides for natural invasion of native plant species. Woody species test plots have provided information on species selection and planting methods. Ultimately 10% of reclaimed areas will be replanted with woody species. Wildlife use of the reclaimed areas is documented in the annual wildlife monitoring report.

The Education and Research Program provides for the facilities and resources necessary to fulfill the postmining use of the property as a research site for regional educational institutions as provided for in the approved reclamation plan. In 1994, the Donald & Sylvia McLaughlin Natural Reserve of 300 acres was incorporated into the University of California Natural Reserve System. A large part of the reserve is comprised of serpentine soils, which is restrictive to plant growth and is limited to those species which have adapted to the poor soil conditions.

Scientific research and education programs continue to be conducted onsite. To date, two research programs have been completed resulting in post graduate degrees. Other programs, such as the T-3 habitat enhancement project have been conducted by undergraduates. The ongoing environmental monitoring program continues to add data to the growing data base. This information will ultimately be available for research purposes.

Attachment B

HOMESTAKE MINING COMPANY
McLAUGHLIN MINE
ANNUAL ENVIRONMENTAL MONITORING REPORT
JULY 1, 1994 - JUNE 30, 1995

EXECUTIVE SUMMARY

Introduction

The Executive Summary lists the findings of the analyses conducted on monitoring data collected during the reporting period of July 1, 1994 through June 30, 1995. The summary is organized in sections by monitoring topic.

1.0 Water Quality

The July 1994 - June 1995 Annual Environmental Monitoring Report includes a summary and analysis of the water quality data collected for the Mine's Water Quality Monitoring Program as previously reported in this year's Quarterly Monitoring Reports. These reports have been prepared in accordance with the requirements of the California Regional Water Quality Control Board, Central Valley Region, Waste Discharge Order No. 94-315 for the McLaughlin Mine. The reports fulfill the annual reporting requirements (due October 30, 1995), demonstrate conformance with existing plans thereby fulfilling annual notification (due January 15, 1996) per Provision 3, and fulfill the requirement for an annual update of the water quality evaluation report per Provision 14 of the current Order.

No changes in surface or groundwater quality in terms of those elements or compounds which are fundamental to compliance with regulatory requirements have been identified. Analytical emphasis has been on those parameters most likely to be impacted by mining: cyanide, arsenic, boron, chromium, copper, lead, mercury, nickel, and zinc.

Water quality of waters in the vicinity of the processing facility, tailings impoundment, Davis Creek Reservoir, and the mine pit area remains essentially as it was described prior to the project's operation.

Water quality trends associated with sulfide oxidation in the waste rock areas were identified and discussed in the 1986-1987 through 1988-1989 Annual Environmental Monitoring Reports and also predicted in the Environmental Impact Report. The 1993-1994 monitoring data indicate that these trends are continuing. Changes in water quality are apparent for certain parameters associated

with sulfide oxidation at specific monitoring locations in the waste rock areas. It should be noted that no significant changes in overall water quality have been observed in Hunting or Knoxville Creeks particularly with respect to metals concentrations. The waste rock underdrain pumpback systems designed, installed, and operated by Homestake in response to initial trends identified through environmental monitoring, have proven effective in recycling flow from the waste rock underdrains to the process circuits. Upgrades to these systems were made in 1993 and again in 1995 in response to routine monitoring and data analysis conducted in conjunction with above average to flood level storm events. The underdrain collection and pumpback systems continue to provide protection of water quality and ensure compliance with permit criteria.

For the reporting period only ten (or one percent) of the 710 water quality data points evaluated for stream monitoring stations and groundwater wells exceeded the statistically derived maximum likely concentrations. No trends or changes associated with these "exceedences" have been identified.

2.0 NPDES Data

NPDES data are collected from the discharge of sediment control dams and from receiving waters as required by California Water Quality Control Board, Central Valley Region, Order No. 94-159, NPDES No. CA0081477. The July 1994 - June 1995 Annual Environmental Monitoring Report, in conjunction with the previously distributed Quarterly Monitoring Reports, fulfill the annual reporting requirements of that Order.

Normal storm water discharges occurred from Pond 7 of the Main Waste Rock Sediment Control System (discharge point 003 and receiving waters HC-05R and HC-10R). Low volume storm water discharges also occurred from Pond 1 (discharge point 002 and receiving waters HC-05R and HC-10R). No discharge occurred from the East Waste Rock Facility Pond (discharge point 001 and receiving stream, KC-03R).

During the flood level storm events which hit California in January and March of 1995, increased underdrain flows exceeded some components of the underdrain collection and pumpback system. This resulted in the commingling of underdrain flows with surface runoff which is collected in the sediment control ponds and subsequently discharged to Hunting Creek. Additionally, the volume of surface water runoff associated with these storm events resulted in the storage capacity of the sediment ponds being consumed with a low volume discharge occurring at the Pond 1 emergency overflow spillway (NPDES discharge point 002).

In response to the January floods, Homestake took immediate steps to upgrade the pumpback system with subsequent containment achieved. As a result of the recent upgrade, the exceedance to the

maximum pumping capacity of the underdrain system experienced in March was of low volume and short duration, and the low volume discharge from Pond 1 was minimized.

In-stream flow conditions during January and March were extremely high resulting in correspondingly high in-stream TSS levels and associated total metals values. The NPDES monitoring data, as previously reported to the Regional Water Quality Control Board, Central Valley Region, in according with reporting requirements, demonstrated that the effluent exceedances were negligible in comparison to in-stream conditions with no impact observed in the Creek as a result of the discharges. The reported exceedances to the receiving stream criteria, as demonstrated, were not a result of the effluent but rather naturally occurring variability associated with the extremely elevated in-stream flow.

Despite the flood level storms experienced this past winter, NPDES monitoring data demonstrates that ongoing containment efforts have proven successful in protecting the quality of downstream water.

NPDES data collected throughout the remainder of the 1994-1995 monitoring year demonstrate compliance with applicable discharge and receiving water limits. Receiving water quality parameters were within the range of natural variability.

3.0 Other

Sampling required in the McLaughlin Project Environmental Monitoring Manual but not included in the routine sample sets for surface and groundwater are presented in this section. Data summarized include sampling of the cooling pond in March and June, semiannual sediment data for four locations, quarterly composite samples of the Tailings, domestic well sampling, sampling of the Tailings seepage return sump, and sampling of Tailings reclaim water.

The cooling pond (CP-01) and tailings seepage return sump (TRS-01) reflect expected operational values for monitored parameters.

Sediment data collected reflect ambient stream conditions.

Tailings samples reflect concentrations expected during operations for total and filtered values. The tailings continue to test as nonhazardous.

Tailings reclaim water analyses reflect nondetectable levels of cresol and carbon disulfide as expected.

Domestic well data show no unusual variations.

4.0 Air Quality and Meteorology

The Air Quality Monitoring Program is conducted in accordance with the requirements of the Bay Area Air Quality Management District, Lake County Air Quality Management District, and Yolo-Solano Air Quality Management District. It is evident that road dust suppression measures, baghouses, scrubbers, and other air quality control measures have been effective in controlling emissions as evidenced by air quality data collected at our compliance monitoring stations.

Total Mine average rainfall for the twelve-month period was 44.71 inches. This was well above our eleven-year normal of 27.68 inches. Most of the precipitation occurred during the months of January and March 1995.

Compliance was maintained with all ambient air standards and operating permit conditions.

The level of monitoring currently employed under the McLaughlin Mine Air Quality Monitoring Program is more than adequate to describe operation conditions and to monitor compliance at the McLaughlin facility.

5.0 Aquatic Ecology

Hunting and Knoxville Creeks

Aquatic ecology monitoring on Hunting and Knoxville Creeks is conducted by Bodega Research Associates. Their report, reproduced in full in the volume entitled "Annual Monitoring Report, July 1, 1994 - June 30, 1995, Aquatic Ecology", fulfills the requirements of and demonstrates compliance with the California Regional Water Quality Control Board, Central Valley Region, Waste Discharge Requirement Monitoring and Reporting Program No. 94-315 and Order No. 94-159, NPDES No. CA0081477, Receiving Water Limitation D.13 for aquatic ecology monitoring on Hunting and Knoxville Creeks. The report Summary of Conclusions is reproduced below:

Summary of Conclusions

The reduced and focused monitoring program implemented in 1986 for Hunting Creek and Knoxville Creek, and refined in 1994 and 1995, has functioned efficiently and productively and should be continued without major alteration in 1995-1996. The cumulative increase in the data base from April sampling at the four primary sites (HC-5, HC-7A, HC-10, KC-3/3A) and from August benthic sampling at HC-7A will make the program more effective each year, as long as a consistent, careful, and appropriate methodology is maintained. This growing data base has become sufficient to detect statistically significant annual changes in the benthic invertebrate communities at each of the sampling stations, as well as to provide further insight into the temporal variability of the invertebrate fauna. These changes in benthic communities relate to annual variation in rainfall and stream hydrology or to other sources of natural variability rather

than to changes associated with the Homestake mining operation. Furthermore, we have traced some of the changes in richness and diversity of the benthic invertebrate community at Hunting Creek sites over the years of the monitoring program to variation in flow conditions, with resultant variation in winter scouring or silt accumulation, and have demonstrated correlations between invertebrate community parameters and rainfall variables at several sites.

Chemical changes produced by the accidental discharge from Sediment Pond M-1 in 1986 and further changes in 1987-1988 evidenced by a reddish iron precipitate on the stream bottom at KC-3, produced by drainage from the East Waste Disposal site, remain as possible causes of changes in invertebrate communities at KC-3 during 1985-1989. However, by 1992, recovery of the benthic invertebrate community at KC-3 was essentially complete, since species richness, diversity, density, and relative abundance of Chironomidae and "EPT" taxa (3 orders of insects considered sensitive to water quality) had all returned to prespill values.

California roach populations had been generally declining at all sites for six or more years, until the 1994 sampling indicated a dramatic recovery at Hunting Creek sites. Several different factors may have contributed to this decline. The 1987-1992 drought has certainly been an important factor, with the potential to influence fish populations in several ways. Since rainfall over the six-year drought totalled little more than one-half normal, the cumulative rainfall deficit became very large, producing a continuous series of summer flow conditions that were very low (at HC-5 and HC-10), intermittent (at HC-7A), or nonexistent (at KC-3). As flow decreases, water temperature rises, oxygen levels decrease, and conductivity rises. These conditions probably decrease survival and reproduction in California roach at all sites, and also may have been responsible for the declines in Sacramento squawfish and Sacramento sucker at HC-10.

Low rainfall during the drought was probably also the cause of increasing emergent and streamside vegetation at all Hunting Creek sites. The resultant change in habitat may have altered conditions for California roach. The unusual length of the drought allowed stream vegetation of several species, especially willows, sedges, and cattails, to grow to sufficient size, with proportionately extensive root systems, so that a moderately heavy rainfall year 1992-1993 did not produce sufficient flows to dislodge them. Flows during 1994-95 remained at flood stage for longer periods, and some willows and sedges were dislodged, but all sites remain more heavily vegetated than when the monitoring program began in 1984. Some silt was carried away from most sites, returning the streambed to rockier conditions than in recent years, but an accumulation of sediments added to the streambed at HC-7A during the drought remained in April 1995. The increase in vegetation at this site may also have been influenced by the removal of grazing livestock from the site in 1984, and from a decrease in the available area of the watershed contributing to the stream after isolation of the tailings reservoir. It is not possible to separate these various factors as contributors to the major habitat change at this site.

After the 1992-93 heavy rainfall winter, we predicted that higher summer flows in 1993 would lead to enhanced summer survival and higher fish populations in April 1994. This prediction was borne out, as reported in last year's report (Bodega Research Associates 1994): California roach densities recovered to their highest levels in 7 years at Hunting Creek sites, and Sacramento sucker densities rose to their highest levels of the entire 11-year monitoring program.

However, after the very high rainfall winter of 1994-95, California roach and Sacramento sucker densities in April 1995 had dropped to near the lowest levels of the entire monitoring program. By June 1995 densities had begun to rebound, and we predict that high summer survival will again lead to healthy populations in 1996.

At KC-3, the decline in roach populations since 1985, previously confined to the immediate sampling site, gradually spread further downstream, but roach remain fairly common at the alternate collection site KC-3A, 1.6 miles downstream of KC-3. Concentrations of metals in fish collected at that site do not identify a chemical basis for the population decline, however. Mercury levels, which were high in 1988, have declined over the subsequent seven years; in 1995 they were only 37% of the 1988 levels. The monitoring program should continue to focus on these mercury concentrations in future years, but the long drought is a more probable cause of the roach population decline in Knoxville Creek. California roach populations were high at KC-3A in 1994, and we predict that they will rebound from the lower 1995 levels by the next sampling in 1996.

Within the limits of reliability of the laboratory analytical results, no meaningful trends in trace element concentrations can be identified as arising from Homestake mining operations. As the database of measured concentrations in fish tissues from the monitoring sites expands each year, the extent of natural biological variability and of analytical variability inherent in the monitoring program will become better defined, and identification of underlying trends will become easier. The archiving of frozen samples of fish tissue each year, added to the monitoring program in 1990, will permit future reanalysis of samples to corroborate any suspected trends.

During the past two seasons, we have initiated several changes in the monitoring program. As emergent vegetation has continued to increase at site HC-7A, electroshocking of fish at station HC-7A-4 has become increasingly difficult, and this station was omitted from the monitoring program in 1994. The heavy flows of 1995 partially cleared the station, and we were able to shock it in 1995, but it may become unavailable in future years. To offset this loss, we began supplementing electroshocker sampling at HC-7A with a new station to be estimated visually. This new station consists of a long, open pool, too deep to be effectively electroshocked, but affording easy visual estimates. We will continue to monitor this visual station in all subsequent years. We have also added to our monitoring program at Knoxville Creek, by establishing two new fish population monitoring stations at KC-3A. These will replace stations at KC-3 from which California roach have been absent since 1987.

5.2 Davis Creek and Davis Creek Reservoir

Davis Creek and Davis Creek Reservoir sampling was conducted by Ecological Research Associates and U.C. Davis respectively under the direction of Dr. Charles Goldman. Reservoir sampling commenced in April 1985 and has continued as specified in the Environmental Monitoring Manual with an additional thirty-six mercury analyses authorized annually. The report, reproduced in full in the volume entitled "Annual Monitoring Report, July 1, 1994 - June 30, 1995, Aquatic Ecology", fulfills the requirements of the California Regional Water Quality Control Board, Central Valley Region, Waste Discharge Requirement Monitoring and Reporting Program No. 94-315 for aquatic ecology monitoring on Davis Creek. The executive summary of that report is reproduced below:

PROJECT SUMMARY

Section 1 - Introduction

This is our tenth Annual Report documenting water quality in Davis Creek Reservoir and the stream stations located in Davis Creek. The 1994-1995 Annual Report which is presented here, specifically focuses on the data collected this past monitoring year; July 1994 through June 1995. We provide plots of the entire long-term data base for Davis Creek and Davis Creek Reservoir and, discuss/evaluate the past year's findings in light of the historical record and regulatory criteria.

The major issues addressed in the current report include: a detailed review and evaluation of quality assurance and quality control (QA/QC) data; presentation/evaluation of current data in light of the long-term and seasonal trends of general water quality constituents and heavy metals in Davis Creek and Davis Creek Reservoir; presentation/evaluation of current data in light of the long-term and seasonal trends of heavy metals in the biota and sediments of Davis Creek and Davis Creek Reservoir; concentrations of mercury and other metals in Davis Creek Reservoir sediments, both spatially at the four long-term stations, and mercury accumulation by fish in Davis Creek Reservoir.

Since 1990, the EMP has included a list of parameters and sampling schedule designed to insure that changes in surface water quality would be identified. After thoughtful evaluation of the long-term data, we believe much of the regulatory sampling in Davis Creek and DCR is no longer necessary for us to assist the County and HMC in evaluating the potential impacts of mining activities on the surface waters in Davis Creek watershed and in developing an operations plan for Davis Creek Reservoir. Many of the parameters measured (such as arsenic or copper in fish flesh or sediment) are not of environmental concern for this project. Consequently, we strongly recommend that the focus of monitoring and research be on mercury dynamics in both the Creek and Reservoir. Indeed, this is the information needed to help with management decisions in the near future. In this regard the water quality and aquatic life portion of the EMP will change its emphasis from one of regulatory intent to one of management.

It is our conclusion that the water quality and aquatic ecology monitoring aspects of the McLaughlin Project in Yolo County are operating in an orderly, logical, and timely manner. Continued discussions between ERA, UCD, HMC, and the Yolo TRP continue to be productive. The HMC data for environmental monitoring associated with the McLaughlin Project has become one of the most comprehensive and high quality data bases dealing with aquatic heavy metals in northern California.

Section 2 - QA/QC

A reliable and comprehensive QA/QC plan forms the cornerstone of a sound environmental monitoring program. It provides us with assurance that the data base is accurate and precise and allows us to proceed to the interpretation phase. The ultimate goal is to be able to detect changes in water quality should they occur.

A total of five surface water samples were analyzed as intralaboratory replicates and thirteen were included as interlaboratory replicates. In general the results of these QA/QC tests were adequate. For interlaboratory comparisons, a total of 277 paired comparisons were made. Of these, 103 pairs or 37% showed at least one value of the data pair above the limit of detection. Using a value of 80% agreement as a criterion for acceptable interlaboratory comparability, we found that both total (8%) and filtered iron (33%), nitrate (71%) and total nickel (75%) failed to achieve this level for pairs with at least one value above the limit of detection. NET performed very well on metal spike-recovery samples with mean %-recoveries (±SD) of, As - 105±6. Cr - 99±2, Cu - 96±4, Pb - 102±11, Hg - 102±7, Ni - 94±3, and Zn - 89±7. Audit samples for dissolved metals in water were run with adequate results; the exception to this was iron. Given the poor performance on iron analyses on intralaboratory, interlaboratory, and audit samples, we recommend that HMC request an explanation from NET as to the nature of this apparent discrepancy. The supplemental, "in-house" QA/QC analyses run by NET were adequate.

Of primary significance for the QA/QC program for sediment and fish metals analyses are the Standard Reference Materials or SRM's that were assayed along with environmental samples. Certified SRM material was analyzed by both the contract laboratory and UCD in conjunction with their sediment metals analyses (UCD sediment analyses were limited to mercury). The results from four separate runs of sediment SRM from the Buffalo River by the contract laboratory was generally consistent. The APD or absolute percent difference between the certified concentration and the measured concentration was less than or equal to 20% in all four samples for copper, lead, mercury, and zinc. UCD also conducted a QA program in conjunction with their analysis of DCR sediment mercury. Specific QA analyses done in each analytical batch included: sediment Reference materials ([i] European Certified Reference Material - Lake Sediment and [ii] Certified Reference Material - Industrial Sludge in duplicate; duplicates of environmental samples; a spike-recovery sample; and use of 6-point standard curves, with blanks, for calculation of concentration in each run. The mean APD for CRM - Lake Sediment was 4% (n=12) and 11% (n=8) for CRM - Industrial Sludge. The mean percent difference for UCD sediment mercury duplicates was 8%.

NET maintains analytical responsibility for priority pollutant metals in fish flesh other than mercury. QA/QC performance was generally adequate. The QA/QC tests run by UCD for fish mercury were extensive and included 104 standards, 8 blanks, 38 SRM samples 12-spike-recovery samples and 30 duplicate splits which analyzed two samples from the same fish. The mean APD for two different fish mercury SRM's were 7.4% and 1.3%. UCD replication on thirty duplicates showed a difference of ≤10%. UCD continues to do an excellent job in the area of sediment and fish mercury analyses. On the basis of this performance, we believe that it is unnecessary to run split samples with the California Department of Fish and Game Laboratory.

Section 3 - Davis Creek Water Quality

A 13+ year data record now exists for water chemistry in Davis Creek at stations DC-5 and DC-6. During the period July 1994 - June 1995, samples were collected on six dates at DC-5 and DC-6, including monthly sampling during the heavy winter storm period of January to April 1995.

Rainfall in the Davis Creek watershed was extremely high during 1994-1995 with a total combined rainfall of 48.71 inches measured. This was much higher than during the "legendary" storms of 1986 and extended over a much longer time interval, i.e. months versus weeks. Despite this record setting rainfall, the maximum measured flow upstream at DC-5 was 8420 gpm in late March 1995. This flow was not very different from many other, yet less wet, years. Discharge from the Reservoir began sometime in late-January or early-February and was still spilling, albeit in lesser quantities in May. The majority of the flow out of the Reservoir was during February and March. While the current sampling schedule (quarterly and first-flush and/or high flow months) is adequate to obtain a generalized view of flow characteristics in Davis Creek, it is not sufficient for more detailed monitoring/research purposes.

The maximum total suspended solids concentration at DC-5 was also low at 100 mg/l. This was much lower than the typical winter spike of TSS as measured during previous years. The low TSS levels on the given sampling dates were reflected in the low concentrations for total heavy metals. At no time did any of the measured heavy metals exceed their project MLC. Concentrations of total iron and filtered nickel appeared related to leakage from the Reed Mine adit which was "blown" as a result of high groundwater pressure.

Almost all water quality parameters, including the general water quality constituents and heavy metals, were consistent with the historic data record.

Section 4 - Davis Creek Aquatic Ecology - Heavy Metals

The sampling schedules for sediment and roach metals remained consistent with previous years, (1) quarterly collection of a composite (3-7 fish depending on availability) California roach sample at DC-5 and DC-6 and (2) collection of Creek sediment samples. Creek sediment samples were obtained in October 1994 and April 1995. Roach were taken in August 1994, November 1994, February 1995 and May 1995. The May sampling also included an expanded survey of roach and benthic invertebrate mercury in Davis Creek. A total of five sites were visited, including DC-5 and DC-6.

During monitoring year 1994-1995, roach-Hg values at DC-5 ranged from 0.28 to 0.52 ppm (wet wt.). Only the 0.52 mg/kg value taken in November 1994 exceeded the California Department of Health Services 0.5 ppm criterion for edible fish. The values of 0.28 and 0.30 mg/kg found in DC-5 roach in February and May 1995 were the lowest concentrations at this site since 1992. An interesting pattern emerging from the long-term roach mercury data at DC-5 is that in general, concentrations are highest in the late-fall and early-winter and show a rapid decline between winter and spring during the period of high precipitation high flow. Intensive sampling of biota mercury from other sites along Davis Creek showed that concentrations in both roach and benthic invertebrates was similar at locations upstream from any historic mining activity. This suggests a regional - geologic source for mercury.

During monitoring year 1994-1995, sediment mercury concentrations in Davis Creek ranged from 0.64 to 23 mg/kg (dry wt.) at DC-5 and 7.2 to 7.5 mg/kg (dry wt.) at DC-6. Since the clean-up of the abandoned Reed Mine, sediment mercury concentrations at DC-5 have been

very low and typically less than 1 mg/kg. This continued through October of 1994; however, the measured concentration at this site increased dramatically to 23 mg/kg on the April 1995 collection. This is the second highest sediment mercury value at DC-5 since 1988. While continued sampling is required to ascertain the validity of this value, the water quality, benthic invertebrate and roach data all indicate that there was no further effect from this increase. Given the erosive nature of the high discharge associated with the winter of 1995 storms, such a value is not unexpected.

Concentrations of the other metals (As, Cr, Cu, Pb, Ni and Zn) were very consistent with the historical data record and showed no significant changes.

Section 5 - Davis Creek Reservoir - Water Quality

The limnology of Davis Creek Reservoir continues to be influenced by the erratic rainfall patterns that have become more the rule than the exception in Northern California. During the 10 year life of the Reservoir, we have now experienced three so called "100 year" precipitation seasons in 1986, 1993, and 1995, each of which filled the Reservoir to overflowing. The six year drought of 1987-1992 was bounded on both sides by two of these record precipitation years, as was the record dry season of 1994. It is notable that even the low inflow of 1994 was sufficient to bring the DCR surface level back up to spillway height. This can be attributed to the water conservation measures instituted by Homestake since 1991, which have resulted in reduced water removal for mine process work. The biotic consequences of this increased littoral zone stability include the establishment of lush aquatic macrophyte populations and enhanced nursery habitat and cover for juvenile fish, allowing increased recruitment of younger year classes and the enhancement of the fish biomonitoring program.

DCR general water quality parameters behaved as in previous years, with the system being dominated by the seasonal cycle of spring-fall thermal stratification followed by isothermal aerobic mixing. Depletion of oxygen in the deep water layer (hypolimnion) during the stratified season of 1995 progressed as in prior years, again allowing the buildup of several parameters to relatively high levels temporarily (hydrogen sulfide, iron, manganese) before fall overturn and isothermal mixing returned the entire water column to aerobic conditions. It was notable that seasonal anoxia progressed more rapidly in the low inflow year of 1994, as compared to the high inflow years of 1993 and 1995..

Concentrations of most monitored water quality components have remained considerably lower in DCR than those typically or periodically found in the Creek, and consequently pose no hazard to downstream water quality. In 1995, DCR spilled over into lower Davis Creek between January and May.

Secchi transparency increased steadily in the last four summers, following the large water volume increases from 1991, 1993, and 1995 inflows. This also occurred in the years following the large 1986 inflows.

Nickel and zinc were slightly above their respective levels of detection this year in conjunction with the massive, turbid storm inputs of winter 1995. These excursions were far lower than corresponding concentrations sampled in Davis Creek upstream of the Reservoir. Arsenic, chromium, copper, lead, and mercury continued to be below their levels of detection in all samples. The monitored metals in the Reservoir water can thus be seen to have posed no threat to downstream water quality to date, and the Reservoir continues to act as a trap for the majority of sediment-associated metals which would otherwise move downstream to Cache Creek.

The relevant chemistry of the metal of importance at DCR, mercury, occurs at concentrations well below the analytical capabilities of contract laboratories. However, we hope to develop ultra-trace level capabilities at U.C. Davis, contingent on the acquisition of additional (non-HMC) funding.

Section 6 - Davis Creek Reservoir Aquatic Ecology Metals

In addition to the standard quarterly sediment sampling for metals analysis at the 4 Reservoir index stations, we conducted a large-scale synoptic sediment mercury survey of the entire Reservoir this year, following the extreme rainfall and runoff of winter 1995. A similar study was conducted following the large runoff of 1993. This year's study found that a total of 88,300 metric tons of new sediment, including 227 kg of new mercury, deposited in the Reservoir in 1995. This compares to 1993 totals of 32,500 metric tons of new sediment deposition and 193 kg of depositional mercury (re-calculated since the 1993 report, using improved integration techniques and a more accurate topographic map of the Reservoir). Though similar large amounts of mercury entered the Reservoir in each of the two major storm years, the patterns of deposition were quite different. Most notable is the fact that the depositional sediment of 1995 had a significantly lower average mercury concentration (2.6 ppm vs 5.9 ppm in 1993). While 18% more total mercury deposited in 1995 as compared to 1993, this was accompanied by 272% more total depositional sediment. Clearly, a large amount of lower mercury material was eroded from the watershed in the 1995 storms.

As in 1993, the western margins of the Inlet and South Arms and, particularly, the back portions of each were the clear source regions for the majority of the depositional mercury. With the much larger inflows of 1995, the new sediment and mercury from these source areas deposited further out into the Reservoir as compared to 1993, with significant deposition in the upper portions of the Inlet and South Arms, extending to the Midlake region. The Creek inflow to the arm of the Reservoir containing the Dam, outlet works, and spillway was characterized by large quantities of low mercury depositional sediment. We note that the significant flows and large deposition of low mercury sediment in the Dam Arm of the Reservoir have acted in all high precipitation years to isolate the deposition of high mercury sediment away from the Dam and spillway region. Finally, we again note that the very substantial loads of mercury which we have calculated to deposit in the Reservoir in each of these years would have moved downstream to Cache Creek and beyond, without the presence of the Dam and Reservoir on Davis Creek.

The other monitored sediment metals (arsenic, chromium, copper, lead, nickel, and zinc) exhibited slight to moderate concentration increases at some or all of the stations following the

large inputs of new depositional watershed sediment. This was consistent with the trend in other large inflow years. All concentrations were within the ranges described by the historic data bases.

Largemouth bass, which have been monitored for mercury since 1985, demonstrated marked declines in muscle mercury in 1994, continuing through May of 1995. This decline was apparent across a range of sizes. Normalized 200 g bass muscle mercury dropped from levels of ~1.5-2.0 ppm between May 1993 and May 1994, to ~1.1 ppm in August 1994, to ~0.6 ppm in November 1994 and May 1995. The larger bass dropped from concentrations of 2.1-2.4 ppm in 1993 to levels of 1.3-1.4 ppm by late 1994 and early 1995. We hypothesize that this decline in mercury uptake by the bass was linked to the relative lack of new sediment and water inflows in the extreme drought conditions of winter 1994. Burial of surficial sediment by internally produced organic material may isolate depositional watershed sediment mercury from the water column and, thus, lower mercury bioavailability relatively rapidly. Indeed, the long-term sediment record indicates a significant drop in surficial sediment mercury concentrations at the higher mercury stations in conjunction with drought periods.

Bluegill, which have been monitored for mercury in Davis Creek Reservoir since 1987, have, like the bass, not demonstrated any rise in mercury concentrations over this period. In the past monitoring year, sampled bluegill of 100-550 g contained muscle mercury concentrations of 0.6-1.7 ppm. Trends in 100 g fish generally paralleled those of the larger (500 g) size class, though at a consistently lower level. Concentrations in the larger individuals, which had been very stable through most of the period of record, dropped notably in 1994 to 1.2 ppm, continuing lower through May 1995 (0.9 ppm). This was seen in the smaller fish as well. For both size classes, concentrations in 1993 were higher than in either 1992 or 1994. Large bluegill muscle mercury from 1991 was higher than that from 1992 as well, though no smaller size class data exists from that time. Thus, the bluegill data is consistent with the bass data, in that years with significant new inputs of water and mercury-enriched watershed sediment correspond to higher muscle mercury concentrations in the fish. Conversely, low inflow years appear to be correlated with declines in mercury uptake by the fish. A response to the 1995 record inflows was not yet apparent in the spring collection of either species.

As in the previous four monitoring years, mercury was assayed in three mid-summer whole fish composites of young-of-year juvenile bass in August 1994. These composites (approximately 10 fish each) consisted of fish under 5 grams in size and under 4 months in age, which were seined consistently at a midlake location. They are therefore very useful indicators of year-to-year trends in mercury bioavailability, as they accumulate mercury only in the year they are collected. Thus far, trends are consistent with the large fish findings, though at lower mercury concentrations. Notably higher mercury concentrations were seen in 1991 and 1993, following high runoff winters, and a substantial drop (from 0.80 to 0.28 ppm) occurred in 1994, which was an extremely dry year. It is notable that data for large bass and bluegill, young-of-year juvenile bass, and sediment mercury are all consistent.

Concentrations of mercury in bass and bluegill liver composite samples have ranged, fairly erratically, from 1.4 to 8.7 ppm since 1985. Composite liver-Hg in the most recent monitoring year was 3.0-4.7 ppm in adult bass and 4.6-6.9 ppm in bluegill. Mercury is typically

higher in the liver than in muscle, though the mercury in liver may contain large proportions of inorganic mercury, as compared to the methyl mercury which accumulates in muscle. A consistent seasonal trend has become apparent in the bluegill data record over the past five years, with fall liver-Hg levels considerably higher than those seen in the spring. This year we analyzed mercury in both muscle and liver from 19 individual bass and 10 individual bluegill. Liver-Hg was dramatically higher in the larger individuals of both species. Mercury is not measured in fish livers by California Fish and Game, so no comparative data is available.

Additional metals monitored in bass and bluegill liver and juvenile bass composites (As, Cr, Cu, Pb, Ni, Zn) were within the range of concentrations described by the long-term data sets. Copper was again higher in bass liver as compared to bluegill (13.9 ppm vs 1.8 ppm) and detectable in juvenile bass composites (1.5 ppm). Zinc during the last monitoring year averaged 29 ppm in bass liver, 22 ppm in bluegill liver, and 25 ppm in juvenile bass composites, similar to previous levels and to levels found in the original stocker bass. Arsenic was somewhat above the detection level this last year, at 0.2-0.8 ppm in bass liver, 0.2-0.3 ppm in bluegill liver, and 0.2-0.3 ppm in juvenile bass composites. Concentrations of chromium, lead, and nickel were either near or below their analytical detection limits in recent years in fish livers of both monitoring species, as well as in the juvenile bass composites.

Section 7 - Aquatic Ecology Monitoring in Davis Creek

Davis Creek, both above and below the Reservoir, experienced dramatic extremes in flow and water quality conditions throughout the year reported here (July 1994 - June 1995). Last year (1994) included the fourth driest winter recorded in California. Flow conditions at DC-5 were minimal throughout the summer and fall and, at DC-6, flows consisted only of low volume Dam seepage. With winter 1995 bringing the highest rainfall and associated runoff seen since the Reservoir was built, flows went from very low to maximal at both locations. In February, flows were estimated at 520 cubic feet per minute (8 cfs) at DC-5 and 780 cubic feet per minute (13 cfs) at DC-6 a full week after significant recent storms. Flows were undoubtedly much higher during and immediately after each of the large storm series in the winter of 1995. The Reservoir spilled significantly between January and late May. Spillway flows were larger than those recorded upstream at DC-5, as the Reservoir had many smaller inflowing tributaries in addition to upper Davis Creek throughout the winter and spring. The high flows significantly altered the downstream channel, removing much of the formerly dense cattail stand and scouring fine grained sediments.

The record runoff of this last wet season apparently resulted in tremendous pressure buildup behind the concrete plug Homestake earlier installed at the Reed Mine Adit. The barrier was breached at this time and, as a result, water quality at DC-5 returned to the iron precipitate-dominated conditions typical of pre-HMC times. Flows below the adit at DC-5 have run opaque orange-brown since mid-winter 1995. It is notable that this material, which historically would have washed downstream to Cache Creek, largely sedimented out in the Reservoir.

As a consequence of the return to turbid, orange flows at DC-5, invertebrate diversity and density have dropped precipitously there. However, the resilient California roach remained in fair numbers, together with young Sacramento suckers. Roach in sufficient numbers for metals analysis were taken in a consistent size range in all seasons from both DC-5 and DC-6, maintaining the long-term data record. Collections of roach were supplemented in the last year by collections of stream invertebrates at DC-5 and DC-6, and by collections of both stream invertebrates and fish at additional sites upstream and downstream of the index stations.

PROJECT RECOMMENDATIONS

Section 1 - Introduction

1. *Initiate the recommended changes to the EMP by the beginning of monitoring year 1996-1997.*

Section 2 - QA/QC

1. *It is important that QA/QC be continued throughout the life of the monitoring-research program; however, the QA/QC should reflect our recommended changes to the scientific program.*

2. *Laboratories running sediment and fish metals should continue to use SRM's along with each analytical batch. UCD's QA/QC design and performance records are very good and should be continued. Based on the QA/QC results we have extremely high confidence in their mercury concentrations.*

3. *Split samples for fish flesh mercury between UCD and California DFG are no longer necessary and should be discontinued.*

4. *It is recommended that HMC request an explanation from NET as to the nature of the apparent discrepancy in measuring iron in the certified stock standards for metals in water.*

Section 3 - Davis Creek Water Quality

1. *Routine monitoring for all the current EMP water quality parameters appears unnecessary. The project data base now covers 13+ years and the distribution and magnitude of concentrations and values follow general patterns. As is the case for TSS and total metals, these patterns are largely regulated by Creek hydrology. For other parameters such as conductivity, hardness and others related to ionic characteristics, it is clear that the range of concentrations is dictated by natural geological conditions with flow regulating inter-annual differences. Since the project has been in operation during a wide variety of flow conditions, including prolonged drought and severe flooding, we believe that there is little*

to be gained from continuing the quarterly sampling schedule. Clearly, we now have a good understanding of the range of these water quality parameters, both upstream and downstream of the Reservoir, and up to this point no single parameter, with the exception of mercury, has been shown to be of regulatory concern.

2. *Only those constituents, which are needed to support the mercury research should be measured at DC-5.*

3. *For the purpose of compliance monitoring of water chemistry, a single sample taken during the first-flush period is all that is required at DC-6.*

4. *An effort should be made to have a continuous flow recorder installed at DC-5 with a concomitant increase in the number of TSS samples taken during periods of high discharge.*

Section 4 - Davis Creek Aquatic Ecology - Heavy Metals

1. *Quarterly sampling for arsenic, chromium, copper, lead, nickel, and zinc in roach at DC-5 and DC-6 should discontinued. The long-term data base is sufficiently rich and indicates the stability of these parameters. In addition, none of the data over the past ten years has given us any cause for concern regarding either public health and aquatic life toxicity. Mercury is the parameter of most concern and efforts should be focused on this element.*

2. *Semiannual sampling for arsenic, chromium, copper, lead, nickel, and zinc in sediment at DC-5 and DC-6 should also be discontinued for the same reasons as above.*

3. *As recommended for water quality sampling, monitoring for arsenic, chromium, copper, lead, nickel, and zinc in Creek sediment should consist of sampling DC-6 once per year during the first-flush period, for the purpose of downstream compliance monitoring. Similarly, these metals should be analyzed in composite roach samples once in the spring at DC-6, allowing them a period in which to integrate high flow metals concentrations.*

4. *Roach should continue to be taken quarterly from both DC-5 and DC-6 for analysis of mercury. The mercury program should be expanded to include more synoptic sediment, benthic invertebrate, and roach sampling. The County should encourage current UCD efforts to start-up a low level mercury laboratory for the purpose of measuring extremely minute amounts of total and methyl mercury in water.*

Section 5 - Davis Creek Reservoir - Water Quality

1. *Eliminate the bulk of routine monitoring parameters in the Reservoir water in order to provide cost savings and permit the continuation and expansion of research on the one parameter shown to be of concern at Davis Creek Reservoir--mercury. The routine monitoring parameters have all been well characterized over the past 10+ years and have posed no concern to downstream water quality at any time, across extremes of hydrologic conditions which have included "100-year" storm events and extensive drought.*

Section 6 - Davis Creek Reservoir Aquatic Ecology Metals

1. *Eliminate sediment and biota analyses of arsenic, chromium, copper, lead, nickel, and zinc from the ongoing Reservoir monitoring program in order to provide cost savings and permit the continuation and expansion of research on the one parameter shown to be of concern at Davis Creek Reservoir--mercury. The other metals have all been well characterized over the past 10+ years and have posed no concern to downstream water quality at any time, across extremes of hydrologic conditions which have included "100-year" storm events and extensive drought.*

2. *Continue sampling Reservoir fish for mercury at the current schedule, including adult bass and bluegill and young-of-year juvenile bass.*

3. *Continue to sample adult fish from a range of sizes when possible, in order to permit the construction of size vs mercury concentration curves for use in normalization of data for each collection date.*

4. *Proceed with development of methyl mercury analytical capacity at U.C. Davis, together with the ability to analyze parts per trillion concentrations of mercury in water.*

Section 7 - Aquatic Ecology Monitoring in Davis Creek

1. *Continue visual surveys of DC-5 and DC-6 conditions on a quarterly schedule, together with collections of California roach for mercury analysis. Collect stream invertebrates for mercury analysis when available, and make a more extensive series of upstream/downstream observations and collections in the spring.*

6.0 Vegetation

The Vegetation Monitoring Program includes monitoring of previously reclaimed areas (reclamation success), sensitive plants and the management of contiguous lands. Reclamation research and test plantings to determine reclamation methods best suited for the site are also an integral part of the program.

During the 1994-1995 monitoring year, HMC applied for and received approval from the responsible agencies to allow reconfiguration of the previously approved in-pit waste rock backfill. The previously approved backfill configuration provided for transport to and reclamation of waste rock in the northern portion of the pit. The approved reconfiguration provides for redirection of a portion of the waste rock tonnage to the southern end of the pit for disposal and reclamation. The basic waste rock management strategy as currently implemented on-site remains unchanged.

As per understanding with Napa County, in an effort to consolidate the Reclamation Plan and fulfill the condition of approval for the in-pit waste rock reconfiguration, revisions

associated with the approved reconfiguration and revisions associated with the final Mine Plan, which is nearing completion, will be incorporated into a final Reclamation Plan and submitted upon completion.

There were no construction activities at the site during the monitoring year which were not a part of the routine mining and milling operations. The July 1994 - June 1995 Annual Environmental Monitoring Report fulfills the annual reporting requirements for the 1994-1995 monitoring year (due January 15, 1996) per Provision 10 of the current Waste Discharge Order issued by the California Regional Water Quality Control Board, Central Valley Region.

Sensitive plant monitoring was conducted by Glen Clifton of Biosystems Analysis, Inc., and Joe Callizo of the Napa Chapter of the California Native Plant Society. In general, all populations of sensitive plants observed during the 1995 monitoring studies were generally larger than those documented in 1994. This is especially true for species associated with drainages, seeps, and wet plains. Two new sites were documented in 1995. On the whole, 29 of 61 numbered sensitive plant occurrence sites were monitored during the 1995 field season. These sites were chosen for their proximity to existing facilities. Many sites were not inventoried since they have not been impacted by the project since 1985.

No other new or significant impacts to sensitive plant occurrences were observed in the vicinity of the existing mining project during 1994. The current mine operational procedures continue to completely avoid the remaining known sites.

Reclamation review was completed by Lorraine Van Kekerix, an independent consultant, formerly with the California Division of Mines and Geology. Her report provides a review of seed mixes and general reclamation practices as well as an area by area review. In general, revegetation efforts have been successful in establishing plant cover adequate to stabilize disturbed sites and control erosion. Most of the areas revegetated to date are adjacent to undisturbed areas and native species from undisturbed sites have started to invade the revegetated areas. The 1994-1995 revegetation program was implemented on thirty-seven acres of disturbed land and was successful in controlling erosion.

Reclamation research has been conducted at the waste rock areas in the form of large scale test plantings of shrub and woody specie seedlings which have been installed and monitored by Circuit Rider Productions, Inc. Additionally, Homestake initiated a trial program for direct seeding of woody species in 1992-1993 which was expanded in 1995 with an additional 200 plantings. These programs have provided valuable information on specie selection and planting techniques.

In order to test and evaluate effective reclamation methods for the Tailings impoundment, a test plot was established during 1992-

25

1993 with initial testing of three different treatment methods conducted in 1993-1994. Based on the success of trial seeding, the entire test plot (approximately 4 acres) was prepared and seeded in 1994-1995. Due to last winter's flood level storms, the entire test plot was underwater by May 1995. As the water evaporated, cattails and grasses did become established around the edge of the plot providing about 50% cover were present.

7.0 Wildlife

The Wildlife Monitoring Program includes documentation of wildlife observations, wildlife use of Davis Creek Reservoir, and an annual search for golden eagle nests. The Davis Creek Reservoir has added a feature to the area wildlife habitat that did not previously exist. Monitoring indicates wildlife use of the Reservoir and resulting beneficial effects.

An aerial helicopter search for raptor nests was conducted on May 3, 1995 by wildlife biologist Marty Gilroy of Biosystems Analysis, Inc. The project area was covered flying for approximately one hour. Golden eagles were again occupying the nest site south of the property along Hunting Creek which they last utilized in 1992. One large downy chick was observed in the nest during the survey. No other active nests were observed this year.

The Townsend's Big-eared Bat colony continues to inhabit the roost site secured for them in 1988. Ongoing behavioral, habitat requirement, and population studies are being conducted by researchers. Guano traps are providing information on seasonal food source selection.

The approved Contiguous Lands Management Plan (CLMP), was developed as an extension of the mine's Environmental Monitoring Program for the management of nonmined lands. In order to better administer CLMP, six different programs were established within the Plan's framework. A summary describing the program objectives and the work performed and/or programs initiated to date is presented in the Wildlife section.

8.0 Geotechnical

The Geological and Geotechnical Monitoring Program monitors the integrity of dams and embankments. The structures reviewed include the Tailings Dam, M-1 Dam, Davis Creek Dam, the Main Waste Rock Sediment Control Facility, the East Waste Rock Disposal Facility Pond, and sediment ponds T-2 and T-3. All structures are performing as designed.

9.0 Environmental Monitoring Plan Proposed Reductions

As reported in the 1993-1994 Annual Monitoring Report, Homestake's McLaughlin Mine is approaching the time when a number of significant adjustments in the nature and scale of the Mine's operations will occur. Current projections indicate that mine operations will decline rapidly as the last ores are recovered from

the south pit in mid-1996. By that time, we expect to have completed the mining of the ore body and the processing of higher grade materials. Our continuing operation will focus primarily upon processing of stockpiled lower grade ores and improving direct cyanidation gold recovery processes. Processing should continue into 2004 with final closure and reclamation extending through several additional years.

Changes in the operation of the Mine and Mill will necessitate adjustments in the focus of the project's environmental monitoring program. As a part of the transition to lowgrade stockpile processing, we have undertaken a review of our environmental monitoring programs to determine what, if any, streamlining might be reasonable without sacrificing the overall program objectives. We believe that it is possible to focus the environmental monitoring programs on collecting those data minimally necessary to continue to characterize downstream watershed water quality, air quality, aquatic ecology, and geotechnical integrity, and to detect any trends towards significant or unusual environmental change.

Proposals for program reductions are discussed in detail in section 9.0. Changes, upon approval by the responsible agencies, will be implemented at the beginning of the 1996-1997 monitoring year.

RECOMMENDATIONS

The following recommendations are made for the 1995-1996 monitoring year:

Water Quality

1. Continue to monitor surface and groundwater quality according to the current Water Quality Monitoring Program as approved by the California Regional Water Quality Control Board, Central Valley Region and the Responsible Agencies.

2. Continue to scrutinize data from monitoring stations associated with the Waste Rock Disposal Facilities for trends.

3. Continue the QA/QC program in its present format.

Air Quality and Meteorology

1. Asbestos monitoring has demonstrated that mining activities have not increased asbestos fiber concentrations in the ambient air. Only one chrysotile fiber greater than 5 microns in diameter was detected during the seven years of monitoring. The greatest concentration measured during those eight years is 0.0131 fibers/cc. This is 1/150 of the TLV standard of 2 fibers/cc (chrysotile). We recommend, as we have in the past, that asbestos monitoring at this location be discontinued.

Geotechnical

1. As recommended in the Annual Monitoring Reports since 1988-1989, and the Geotechnical Data Reviews completed by Glasgow Engineering Group, Inc. (formerly D. P. Engineering, Inc.) since 1989-1990., it is recommended that M-1 Dam be eliminated from the Geotechnical Monitoring Program.

9.0 ENVIRONMENTAL MONITORING PLAN PROPOSED REDUCTIONS

9.1 Facility Design and Project Evolution

In 1985, Homestake completed construction of the McLaughlin Gold Project consisting of a mine pit, a lowgrade ore storage pad, waste rock disposal facilities, sedimentation ponds, a 6000 acre foot fresh water reservoir, a 4000 TPD crushing and grinding facility, a state-of-the-art pressure oxidation and cyanidation process, a tailings disposal facility, a 4.5 mile slurry pipeline, and a 12 mile transmission line.

In 1988, expansion and modification of the operation allowed processing of oxidized portions of stockpiled low-grade ores in parallel with the higher grade material. This nearly doubled the material throughput of the grinding and refining processes while meeting original mine emission criteria. Technologies are being developed which will allow economical gold recovery of remaining stockpiled ores.

Current projections indicate that mine operations will decline rapidly as the last ores are recovered from the south pit in mid-1996. By that time, we expect to have completed the mining of the ore body and the processing of higher grade materials. Our continuing operation will focus primarily upon processing of stockpiled lower grade ores and improving direct cyanidation gold recovery processes. Processing should continue into 2004 with final closure and reclamation extending through several additional years.

9.2 Environmental Monitoring Strategy

From the onset of mine development, Homestake has maintained a proactive approach to environmental control by identifying concerns in advance and designing a project so as to minimize environmental impact. Historically, the monitoring program has undergone numerous changes and additions to reflect expansion and modification of the mine and extraction processes. Homestake has been recognized for maintaining a technologically sound monitoring program with data integrity through quality control, quality assurance, and substantial documentation.

Changes in the operation of the Mine and Mill will necessitate adjustments in the focus of the project's environmental monitoring program. As a part of the transition to lowgrade stockpile processing, we have undertaken a review of our environmental monitoring programs to determine what, if any, streamlining might be reasonable without sacrificing the overall program objectives. We believe that it is possible to focus the environmental monitoring programs on collecting those data minimally necessary to continue to characterize downstream watershed water quality, air

quality, aquatic ecology, and geotechnical integrity, and to detect any trends towards significant or unusual environmental change.

9.3 Environmental Monitoring Plan Description and Proposed Modifications

The Environmental Monitoring Plan focuses on six areas of potential impact: water quality, air quality, aquatic ecology, vegetation, wildlife, and geotechnical. Many of the program components are specified by permits issued by federal, state, and local regulatory agencies while others are adopted internally as best management practice given the present mode of operation.

9.3.1 Water Quality Monitoring

The water quality monitoring program at McLaughlin includes the monitoring of surface and groundwaters within three watersheds or hydrographic units; Hunting Creek, Knoxville Creek, and Davis Creek. Monitoring is conducted in accordance with permit conditions as required by the California Regional Water Quality Control Board, Central Valley Region (CRWQCB,CVR).

The process/tailing disposal facility, located in Lake County, is a zero discharge facility. The Tailings disposal site was chosen because it offered a deep, impermeable clay layer that precludes subterranean migration of waters. Storm water runoff from the surrounding hillsides is diverted around the facility while runoff from the process area and process tailings report to and are contained within the Tailings impoundment where the water is allowed to evaporate or is recycled back into the process. Water quality monitoring conducted in association with this facility includes upstream and downstream monitoring stations on Hunting Creek, groundwater monitoring wells surrounding the facility, and groundwater monitoring wells within the embankment of the Tailings impoundment for early detection of potential seepage. Domestic well sampling is also conducted peripherally to the water quality monitoring systems surrounding this facility.

The mine site, which includes the mine pit, truck shop, grinding facility, and lowgrade pads, is also a zero discharge facility, and is located approximately 4.5 miles downstream from the process area. The majority of this facility resides in Napa County with a portion of the north pit residing in Yolo County. All storm water runoff from this facility currently reports to the M-1 Pond where it is utilized in the process and subsequently discharged to the Tailings impoundment for evaporation or reuse in the process.

Adjacent to the mine site are the east waste rock disposal facility, completed in 1990, and the main waste rock disposal facility, which will be completed in 1996. In development of these waste rock units, waste rock has been deposited in lifts which have progressively been reclaimed through encapsulation and

revegetation. Both of these units are located in Napa County. Storm water runoff from active areas of the waste rock facility report to sedimentation ponds and must meet NPDES permit criteria prior to discharge. Reclaimed areas of the facility are excluded from this requirement by permit. Underdrain collection and pumpback systems collect waste rock leachate which is then pumped back for use in the process.

Water quality monitoring conducted in association with the mine site/waste rock disposal facility includes upstream and downstream monitoring stations on Hunting Creek, a monitoring station on Knoxville Creek, and groundwater monitoring wells both internal to the pit and surrounding the facilities. Composite samples are collected at station HC-10 which is downgradient of all mining activities. Additionally, NPDES monitoring is conducted in association with storm water discharges from the waste rock sediment control ponds.

The north pit and the southern portion of the south pit are currently being backfilled with waste rock as it is mined. Reclamation for these waste rock units is being conducted in the same manner as for the original waste rock units including lift development, encapsulation, and revegetation. These units will be finalized in 1996. Storm water drainage from these units will for the most part report internal to the pit with the exception of a portion on the north end which will drain to the north following reclamation. This is consistent with NPDES discharge permit conditions for the waste rock units. As determined in the hydrologic investigation conducted prior to the development of these waste rock units, the water level within the open portion of the south pit is anticipated to return to a static elevation following completion of mining, and remain isolated from surrounding surface and ground waters. Being internal to the mine pit, water quality monitoring stations for these units are the same as for the mine site/waste rock facility.

Davis Creek Reservoir (DCR), located in Yolo County, was constructed by Homestake to provide fresh water to the grinding and mill processes. Mining activities are not conducted in the Davis Creek watershed, and hydrologic investigations have demonstrated that there is no hydraulic connection between the open pit and Reservoir as confirmed by the period of record data. Water quality monitoring in the Davis Creek watershed includes surface water monitoring stations on Davis Creek, both upstream and downstream of the Reservoir, and a groundwater well downgradient of the mine pit. Additionally, monitoring of the waters and sediment in Davis Creek Reservoir is conducted as part of the cooperative research program conducted by UCD/ERA (Ecological Research Associates). Refer to sections 1.4 through 1.6 of the ERA report presented in the volume entitled "Annual Monitoring Report, July 1, 1994 - June 30, 1995, Aquatic Ecology" for a discussion on proposed DCR program reductions.

Sediment sampling is also conducted in conjunction with the water quality monitoring program. Semiannual sediment sampling is currently conducted on Hunting, Davis, and Knoxville Creeks.

The comprehensive hydrologic investigations previously conducted by HMC and adopted by the CRWQCB,CVR for the Tailings disposal facility, waste rock disposal facility, and mine site found only minor amounts of groundwater, and determined that there are no detectable vertical or lateral hydraulic connections with groundwaters or surface waters with beneficial uses. Now that we have ten plus years of accumulated data confirming these findings it should be possible to focus the program on collecting those data minimally necessary to continue to characterize water quality and to detect any significant or unusual environmental change. Over the next ten years of reduced operation, a greater portion of the disturbed land will be reclaimed resulting in reduced potential impact to water quality.

It should be noted that the impacts related to the waste rock disposal site are those associated with the oxidation of naturally occurring sulfides in the rock resulting in increased TDS as predicted in the project Environmental Impact Report. These impacts have been largely mitigated by our augmented containment and pump back systems, and waste rock management practices. To the extent that these increases do occur, they are storm dependent and are effectively monitored in our NPDES sampling.

9.3.1.1 Proposed Water Quality Monitoring Program Modifications

The fundamental proposed change in the water quality monitoring program is a reduction in frequency from quarterly to biannually for the routine surface and groundwater monitoring locations. This will not affect the NPDES monitoring which is directly tied to the period of release of storm waters and will continue at the currently approved frequency. Those items where we have established a fundamental certainty, or persistently find less than detectable values, could reasonably be eliminated from the program. The proposed monitoring frequencies are presented in Tables 1 and 2, and are discussed below:

1. Reduce routine surface water and groundwater sampling from quarterly to biannual.

2. Retain the continuous monitoring station at HC-10, however, reduce sampling frequency from weekly to semimonthly.

3. Eliminate monthly Pond 7 samples. This system will be effectively monitored through NPDES sampling which will remain in its current format.

4. Eliminate domestic well sampling.

5. Eliminate creek sediment sampling. These samples reflect natural stream load variation associated with normal sediment transport during storm events, and are not reflective of mining activities. As discussed, the only storm water discharge from the mine facility is from the permitted NPDES discharge points below the waste rock disposal areas. Retention time within the sediment pond system prior to discharge, and progressive reclamation of the waste rock area have proven effective in erosion control and reduction in sediment transport as demonstrated by the historic NPDES monitoring data. With final closure of the main waste rock unit in 1996, potential impact will be effectively eliminated.

Refer to Table 9-5 for a summary of the proposed water quality and sediment monitoring program for DCR as recommended by ERA.

9.3.2 Air Quality Monitoring

Emissions from the McLaughlin Project that have a potential to affect the ambient air quality primarily occur as particulate. In order to measure actual impact, particulate monitors were sited at locations predicted to have maximum concentrations. The original air quality measurement system operated on a third day schedule at numerous locations near the mine and process, and as far away as Capay Valley. Once sufficient data was acquired to define those areas significantly impacted by the project, it was determined that the sampling network should monitor near the mine at upwind and downwind locations AQ1, AQ2, and AQ5. AQ7 was chosen using similar criteria to collect fence line samples near the Process. Sampling frequency was eventually reduced to sixth day sampling, concurrent to the federal monitoring schedule.

Asbestos and PM10 metals analyses have been performed for nearly ten years with no evidence of asbestos or heavy metals above normal background concentrations. Many of the parameters measured by the air quality monitoring system were adopted as a result of uncertainties associated with ore components and potential for release. In review of over ten years of particulate sampling data, one may conclude with certainty that specific ore components pose no threat to the air quality.

9.3.2.1 Proposed Air Quality Monitoring Program Modifications

The next ten years of operation will focus upon processing stockpiled ores. Since air sampling was performed during the ore's mining and stockpiling, no ore component could be expected to occur at greater proportion than that measured during prior removal and storage. Control and measurement of total and PM10 particulate will continue to be an important part of the environmental program, however, specific component analyses of particulate samples would be unnecessary and redundant and should be eliminated from the monitoring program.

The McLaughlin gold extraction process in Lake County includes a pressure oxidation circuit in which trace components of ore may be liberated from the slurry and released to the atmosphere. However, during ten years of operation, source and ambient air sampling of particulate and elemental mercury has demonstrated that the air quality has not been significantly affected by the processing of ore. As the process begins to focus upon low grade throughput, those areas of potential concern to the air quality will be eliminated or greatly reduced. Monitoring and sampling requirements associated with those processes should also be reduced. This includes (refer to Tables 9-2 and 9-3):

* PM10-PIXE Analyses
* Slurry Metals Analyses
* Recycle/Reclaim WAD CN
* Stack Testing Associated with Eliminated Processes
* Ambient Elemental Mercury Analyses
* PM10 Metals Analysis

9.3.3 Aquatic Ecology Monitoring

The aquatic ecology monitoring program is an extension of the water quality monitoring program. The program includes fish and benthic invertebrate population surveys, as well as trace element analyses of fish tissue. Monitoring on Hunting, Davis, and Knoxville Creeks is conducted in accordance with permit conditions as established by the California Regional Water Quality Control Board, Central Valley Region. Additionally, a cooperative research program which includes aquatic ecology, water quality, and sediment sampling is conducted within the Davis Creek Reservoir system.

9.3.3.1 Proposed Aquatic Ecology Monitoring Program Modifications

As the aquatic systems have become better understood and thus predictable, sampling frequency and/or analyses for many items could reasonably be reduced. No program reductions are proposed at this time for the monitoring conducted on Hunting and Knoxville Creeks (refer to Table 4 for current schedule). Proposed program reductions for monitoring conducted at Davis Creek and Davis Creek Reservoir have been compiled by ERA as outlined in sections 1.4 through 1.6 of their report and presented in the volume entitled "Annual Monitoring Report, July 1, 1994 - June 30, 1995, Aquatic Ecology". The program is summarized here in Table 9-5.

9.3.4 Vegetation Monitoring

Vegetation monitoring includes monitoring of previously reclaimed areas and sensitive plant populations. Reclamation research to determine reclamation methods best suited for the site have also been a part of this program. The vegetation monitoring program is outlined below:

1. Monitoring of previously reclaimed lands is conducted by an independent consultant. This program has provided information on seed mixes and general reclamation practices. Additionally, the monitoring has documented both the success of the reclamation program in establishing plant cover adequate enough to control erosion, and the natural invasion of native species into areas previously reclaimed.

2. Sensitive plant monitoring is conducted jointly by Biosystems Analysis, Inc. and the California Native Plant Society. The program, which initially identified native plant populations throughout the property, now focuses on those populations in close proximity to mining activities.

3. Reclamation research has included the installation of woody specie test plots by Circuit Rider Productions, Inc. to evaluate individual species selection, the installation of direct seeding test plots by HMC to evaluate alternative propagation methods for woody species, and the ongoing Tailings test plot program which is designed to evaluate effective reclamation practices for final closure of the Tailings facility.

The vegetation monitoring program is complemented by the Contiguous Lands Management Plan which is discussed in detail in section 7.2 of this report.

9.3.4.1 Proposed Vegetation Monitoring Program Modifications

Only one reduction is recommended for the vegetation monitoring program:

1. As mining operations decline, the sensitive plant monitoring program should continue to reduce the area of focus to those populations in close proximity to areas of ongoing mining activity.

9.3.5 Wildlife Monitoring

Homestake's McLaughlin Mine controls approximately 10,000 acres of which less than 2,000 acres are disturbed by mining activities. The remainder of the property is utilized for wildlife purposes. The wildlife monitoring program includes:

1. Documentation of wildlife observations submitted by HMC employees, contractors, and researchers.

2. Documentation of wildlife usage of Davis Creek Reservoir as conducted and reported by UCD/ERA.

3. An annual eagle nest survey which is conducted by HMC personnel and a contracted wildlife biologist.

4. Habitat protection and enhancement programs such as the successful relocation of Townsend's big-eared bat, the initiation of a bird box program, and the T-3 habitat enhancement project as discussed in further detail in section 7.0 of this report.

The wildlife program is also enhanced by the Contiguous Land Use Management Plan which is discussed in detail in section 7.2.

9.3.5.1 Proposed Wildlife Monitoring Program Modifications

The following reductions are proposed for the program:

1. Elimination of the annual eagle nest survey. The only eagle nest sites (both inactive and successfully active) which have been identified in nearly ten years of monitoring have been located to the north and the south of the mine pit/waste rock area. No eagle nest sites have been found in the vicinity of the process facility. With the completion of mining in 1996, the potential impact to known nesting areas will be reduced.

2. As recommended by ERA, wildlife monitoring at DCR should be directed toward those species that reside on and/or derive food sources from the Reservoir. Refer to sections 1.4 through 1.6 of their report found in the volume entitled "Annual Monitoring Report, July 1, 1994 - June 30, 1995, Aquatic Ecology".

9.3.6 Geotechnical Monitoring

The geotechnical monitoring program evaluates the integrity of the dams and water impoundments on-site. Monitoring conducted in association with Davis Creek Reservoir, the Tailings Impoundment, and the M-1 Dam is conducted in accordance with requirements of the California Department of Water Resources, Division of Safety of Dams (DSOD). Monitoring of the nonjurisdictional sediment ponds on-site is conducted as outlined in the currently approved Environmental Monitoring Manual for the McLaughlin Mine. All geotechnical monitoring data associated with both the jurisdictional and nonjurisdictional structures is reviewed by The Glasgow Engineering Group, Inc. (formerly D. P. Engineering, Inc.).

The components of the geotechnical monitoring program are outlined below:

1. Visual inspections of dams and appurtenant structures are conducted on all jurisdictional and nonjurisdictional structures. Inspections of the embankments are conducted

to identify any potential changes such as slumps, cracks, creep, seepage, or significant erosion. Spillways are checked for potential blockage, and flow control structures are evaluated where applicable. Visual inspections are conducted on a quarterly basis for all jurisdictional structures. The majority of the sediment control ponds are monitored on a monthly basis during the wet season. Additional monitoring is triggered by significant storm events or seismic events.

2. Piezometer readings provide a means of evaluating pore pressure and water levels within the embankments. Piezometers are located within the Tails Dam, Davis Creek Dam, and the embankments on Ponds 6 and 7. The piezometers are monitored on a quarterly basis. Additional monitoring is triggered by seismic events.

3. Inclinometers are utilized to measure lateral displacement within a slope. Two inclinometers are located at Davis Creek Reservoir, and were installed in the native hillsides to the east and west of the dam structure. Adjacent to each inclinometer a slope piezometer was installed for tracking of subsurface pore pressures. These systems were installed to evaluate the potential for increase in the creep rate of the hillsides during the Reservoir operation. Monitoring is conducted on an annual basis. Additional monitoring is triggered by seismic events.

4. Surface monument surveys are utilized to detect both vertical and horizontal movements in a slope. Surface monuments are located on the Davis Creek Dam, Tailings Dam, and on the embankments of Ponds 1-8. Surveys are conducted semiannually. Additional monitoring is triggered by seismic events.

5. The Tailings and Davis Creek Dams were designed and constructed with internal drain systems for stability purposes. Seepage rates at the Davis Creek Dam are monitored during the quarterly impoundment inspections. Seepage rates at the Tailings Impoundment are monitored monthly, with seepage reporting to collection and pumpback systems below the main dam and saddle section. These waters are pumped back to and contained within the Tailings facility. Additional monitoring is triggered by seismic events.

6. Following the clean-up and reclamation of the Reid Mine, Homestake elected to initiate geotechnical monitoring at this site to ensure the integrity of the remedial work. Inspections include checks on ditches, reclaimed slopes, and the sealed adit. The majority of the inspections are

conducted on a quarterly basis with additional wet season monitoring.

9.3.6.1 Proposed Geotechnical Monitoring Program Modifications

Monitoring conducted during the past nine years by HMC, DSOD, and consulting engineers has found all structures to be operating as designed and safe for continued operation. Although monitoring is required to ensure the continued integrity of the impoundments, a reduction in monitoring frequency for some components of the program could be achieved while continuing to maintain an adequate level of scrutiny to ensure safe operation. The proposed monitoring frequencies are presented in Figure 9-6, and are discussed below:

1. Reduce routine impoundment inspections for all nonjurisdictional structures (sediment ponds) to biannual (June and October).

2. Because of the earlier construction of the east waste rock dump over the downstream side of the M-1 Impoundment, the spillway was relocated to the north side of the embankment where any potential discharge would report internally to the mine pit. Following completion of mining in 1996, activity within the pit will cease. At that time, the M-1 Impoundment could reasonably be delisted by DSOD and inspections eliminated. Impoundment inspections for the Tailings Impoundment and Davis Creek Dam will continue in their present format.

3. Reduce routine piezometer readings on nonjurisdictional structures (Ponds 6 and 7) to biannual (June and October).

4. Eliminate monitoring of inclinometers and adjacent slope piezometers at Davis Creek Reservoir. No problems have been identified in the historic data for these sites. Additionally, fluctuations in pool level which could effect slope stability have been minimized through the implementation of water conservation measures on-site.

5. Reduce the Reid Mine monitoring to biannual (June and October).

9.4 Conclusions

Homestake has demonstrated through ten plus years of environmental data accumulation, evaluation and documentation, as reported in each of the Quarterly and Annual Environmental Monitoring Reports, that systems have operated and continue to operate as designed with no significant impact to the environment. Based on these findings, the proposed modifications to the monitoring program were developed in an effort to maintain a

technically sound monitoring program while keeping pace with the upcoming operational changes. In short, we believe that the proposed changes to the Environmental Monitoring Program would not compromise the utility or effectiveness of the monitoring program, particularly in regard to documenting and protecting air quality, downstream water quality, aquatic ecology, and geotechnical integrity while maintaining public confidence.

TABLE 9-1

WATER QUALITY MONITORING

STATIONS AND SAMPLING FREQUENCY
(Proposed changes in frequencies italicised)

I. SURFACE WATER AND SEDIMENT

	STATION	SAMPLING FREQUENCY
SURFACE WATER SITES	Davis Creek	
	DC-05	*B*
	DC-06	*B*
	Hunting Creek	
	HC-05	*B*
	HC-09	*B*
	HC-10	*B*
	HC-11	*B*
	Knoxville Creek	
	KC-03	*B*
	Putah Creek	
	PC-01	*B*
	PC-02	*B*
PONDS	Sediment Ponds	
	Pond 7	*NPDES*
HC-10 CONTINUOUS COMPOSITE	Hunting Creek HC-10	*SM*
NPDES	001 (East Waste Rock Disposal Facility Pond)	D**
	Knoxville Creek	
	KC-03R	D**
	003 (Pond 7)	D**
	Hunting Creek	
	HC-05R	D**
	HC-10R	D**
	002 (Pond 1)***	D**
	Hunting Creek	
	HC-05R	D**
	HC-10R	D**

50

TABLE 9-1 (CONT'D)

WATER QUALITY MONITORING

STATIONS AND SAMPLING FREQUENCY
(Proposed changes in frequencies italicised)

II. GROUNDWATER

	STATION	SAMPLING FREQUENCY
N SERIES WELLS Mill and Tailings Pond Area	N-01	*B*
	N-02	*B*
	N-05	*B*
	N-06	*B*
	N-07	*B*
	N-08A	*B*
	N-08B	*B*
	N-08C	*B*
	N-09	*B*
	N-10	*B*
	N-11	*B*
	N-12	*B*
S SERIES WELLS Mine and Waste Rock Area	S-01	*B*
	S-02	*B*
	S-03	*B*
	S-04	*B*
	S-05	*B*
	S-06	*B*
	S-07	*B*
	S-08	*B*
	S-10	*B*
	Underdrains	
	S-11	*B*
	S-12	*B*
	S-13	*B*
OW SERIES Tailings Embankment	OW-01A	*B*
	OW-02A	*B*
	OW-03A	*B*
	OW-04A	*B*
	OW-05	*B*
	OW-06	*B*
	OW-07	*B*
	OW-08	*B*
	OW-09	*B*

51

WATER QUALITY MONITORI

STATIONS AND SAMPLING FREQUENCY
(Proposed changes in frequencies italicised)

	STATION	SAMPLING FREQUENCY
III. OTHER	Tailings Reclaim Water Reclaim	*B*
	Tailings Return Sump #1	
	TRS-01 (Blanket Drain)	*B*
	Chimney (Chimney Drain)	*B*
	GWTRS-1 (Dewatering Well)	*B*
	Tailings Return Sump #2	
	TRS-02N (North Drain)	*B*
	TRS-02S (South Drain)	*B*
	GWTRS-2 (Dewatering Well)	*B*
	Tailings Sand Collection Drains	
	CD-1	*B*
	CD-2	*B*
	CD-3	*B*
	CD-4	*B*
IV. QAQC - Interlaboratory Split Sample Sites (Submitted to Alternate Laboratory)		
	Davis Creek	
	DC-06#	*B*
	Hunting Creek	
	HC-10#	*B*
	Knoxville Creek	
	KC-03#	*B*
	N-Series Wells	
	N-08B#	*B*
	S-Series Wells	
	S-06#	*B*
- Intralaboratory Split Sample Sites (Submitted to Primary Laboratory)		
	One Surface Water Station (Blind Submittal)	*B*
	One Groundwater Station (Blind Submittal)	*B*
	Certified Standard Reference Material for Water (Blind Submittal)	*B*

58

WATER QUALITY MONITORING

STATIONS AND SAMPLING FREQUENCY
(Proposed changes in frequencies italicised)

	STATION	SAMPLING FREQUENCY
IV. QAQC - Field Blanks	FB-01 (for surface water)	*B*
	FB-01 (for groundwater)	*B*

Note: DC-5/DC-6 first flush, stream sediment, domestic wells and cooling pond sampling eliminated.

D = Daily** (For first two days of discharge, weekly thereafter).

B = Biannual

SM = Semimonthly

TABLE 9-2

ENVIRONMENTAL MONITORING PARAMETERS AND

SAMPLING FREQUENCIES FOR PROCESS SAMPLES
(Proposed changes in frequencies italicised)

MILLFEED

Parameter	Type of Sample	Frequency of Analysis
Flouride	Daily Composite	*B*
Filtered Sulfate	Daily Composite	*B*
Percent Solids	Daily Composite	*B*
Metals (total only)		
Antimony	Daily Composite	*B*
Arsenic	Daily Composite	*B*
Chromium	Daily Composite	*B*
Copper	Daily Composite	*B*
Iron	Daily Composite	*B*
Mercury	Daily Composite	*B*
Nickel	Daily Composite	*B*
Selenium	Daily Composite	*B*

DISCHARGE TO THE TAILINGS POND

Parameter	Type of Sample	Frequency of Analysis
Flow to Tailings Pond	Metered	
Recycle Flow to Mill	Metered	
CAM-WET	Daily Composite	*B*
pH	Grab	*B*
Sulfate	Daily Composite	*B*
Total Cyanide	Daily Composite	*B*
Free Cyanide	Daily Composite	*B*
Percent Solids	Daily Composite	*B*
Metals (total & dissolved)		
Arsenic	Daily Composite	*B*
Chromium	Daily Composite	*B*
Copper	Daily Composite	*B*
Mercury	Daily Composite	*B*
Nickel	Daily Composite	*B*

Notes: - Daily composite samples are collected by HMC personnel or automatic composite sampler.

- Daily samples composited biannually.

AIR QUALITY - METEOROLOGY MONITORING STATIONS & EQUIPMENT
(Proposed changes as noted)

LOCATION	PARAMETER	PROBE HT. (m)	SENSOR MFR. & MODEL	METHOD OF MEASUREMENT	SAMPLING FREQUENCY
MET 1	Wind Speed	10	R.M. Young #05103	Induced Pulse Ct. (0-50 M/S)	Continuous
	Wind Direction	10	R.M. Young #05103	Potentiometric (0-360 Deg.)	10 Second
	Wind Std. Dev.	10	R.M. Young #05103	Microprocessor (0-80 Deg.)	10 Second
	Temperature	6	C.S.I. #207	Thermistor -20 to 50 Deg. C.	10 Second
	Relative Humid.	6	C.S.I. #207	Resistance 10 to 90%	10 Second
	Precipitation	1	Sierra Misco #2501	8" Tipping Bucket (0.01")	Event
	Pyranometer	10	Li-Cor #200S7C	Silicon Photodiode	10 Second
MET 2	Wind Speed	10	R.M. Young #05103	Induced Pulse Ct. (0-50 M/S)	Continuous
	Wind Direction	10	R.M. Young #05103	Postentiometric (0-360 Deg.)	10 Second
	Wind Std. Dev.	10	R.M. Young #05103	Microprocessor (0-80 Deg.)	10 Second
	Temperature	6	C.S.I. #207	Thermistor -20 to 50 Deg. C.	10 Second
	Relative Humid.	6	C.S.I. #207	Resistance 10 to 90%	10 Second
	Precipitation	1	Sierra Misco #2501	8" Tipping Bucket (0.01")	Event
	Barometric Press	6	Sensotec TJE/4598-01	Transducer (26-32 IN.)	10 Second
MET 7	Wind Direction	10	R.M. Young #05103	Potentiometric (0-360 Deg.)	10 Second
	Wind Std. Dev.	10	R.M. Young #05103	Microprocessor (0-80 Deg.)	10 Second
	Temperature	6	C.S.I. #207	Thermistor -20 to 50 Deg. C.	10 Second
	Relative Humid.	6	C.S.I. #207	Resistance 10 to 90%	10 Second
	Precipitation	1	Taylor	Manual Read - 0.01" Res.	Continuous
AQ-1	PM-10*	6	Sierra Anderson #321	Gravimetric	Nat'l. 6t Sampling Schedule
AQ-2	PM-10*	6	Sierra Anderson #321	Gravimetric	Nat'l. 6t Day Smplg. Schedule
	TSP[1]	6	Sierra #305-2000	Gravimetric	
	Asbestos	6	Aerovironment #10UM	Transmission Electron Micro - *Recommend Removal*	
AQ-5	PM-10*[1]	6	Sierra Anderson #321	Gravimetric	Nat'l. 6t Day Smplg Schedule
	TSP	6	Sierra #305-2000	Gravimetric	
AQ-7	Staged Impactor	1.5	Aerometric PM-10	Proton Induced X-ray Fluorescense - *Recommend Removal*	Nat'l. 6t Day Smplg Schedul
	Mercury Vapor	1.5	Jerome #411	Gold Film Detection - *Recommend Removal*	

[1] Collocated samplers.

* Filters composited monthly for analysis of mercury and arsenic by atomic absorption spectrometry.

65

TABLE 9-4

AQUATIC ECOLOGY MONITORING

HUNTING AND KNOXVILLE CREEKS

Monitoring stations and sampling schedules (typical). I, benthic invertebrates; F, fish populations; T, trace element (metal) concentrations in fish.

SITE	APRIL	AUGUST
KC-3	I,F,T	
HC-5	I,F,T	
HC-7A	I,F,T	I
HC-10	I,F,T	

Note: No changes proposed

TABLE 9-5

AQUATIC ECOLOGY MONITORING*

UCD/ERA DAVIS CREEK AND DAVIS CREEK RESERVOIR MONITORING

SAMPLE TYPE	# SAMPLES	PARAMETERS	SAMPLING FREQUENCY WINTER	SPRING	SUMMER	FALL
DCR						
Water Quality	3	Fe,Mn	X	X	X	X
Sediment	4**	Hg	X	X	X	X
Biota						
Juvenile bass comp.	3	Hg			X	
Bass liver comp.	1	Hg		X		X
Bluegill liver comp.	1	Hg		X		X
Bass muscle	5	Hg		X	X	X
Bluegill muscle	5	Hg		X	X	X
Field profiles	-	--	X	X	X	X
DC-5/DC-6						
Water Quality	DC-6 first flush	Std. analyses	X			
Sediment	2**	Hg		X		X
Biota						
Roach comp.	6**	Hg	X	X	X	X
Benthic invertebrates	As available	Hg	X	X	X	X
Visual Inspections	-	--	X	X	X	X

* - As proposed by ERA. Refer to their report in the volume titled "Annual Monitoring Report, July 1, 1994 - June 30, 1995, Aquatic Ecology".
** - Expanded spring sampling
*** - Triplicates in spring

TABLE 9-6

GEOLOGIC AND GEOTECHNICAL MONITORING SCHEDULE
(Proposed changes italicised)

FACILITY	MONITORING FREQUENCY	DRAWDOWN	SEISMIC EVENT
Davis Creek Dam Embankment: Pneumatic Piezometers	Quarterly for P-1 through P-4 Semiannually for remaining piezometers. When P-2 reaches an elevation of 1355', piezometers and seepage be measured monthly.	Halfway through drawdown.	Immediately following a seismic event and aftershocks when ground shaking is felt at the site; then daily until readings return to normal should a change be recorded.
Embankment: 3 Surface Monuments	Semiannually	End of drawdown and one week after drawdown is completed.	Same as for DCR piezometers.
Embankment: Visual Inspection Weir & Seepage Measurements	Quarterly or following a 3"/hr. or 100 yr.-24 hr. (7.67")storm event. Response will be made for lesser events if the intensity approximates the criteria, or conditions warrant.	End of drawdown.	Same as for DCR piezometers.
Reservoir Slopes: 2 Slope Inclinometers & 2 Slope Piezometers	*Eliminate*	*Eliminate*	*Eliminate*
Sediment Dam M-1 Visual Inspection	*Eliminate*	-----	*Eliminate*
Tailings Embankment			
Embankment: 9 Vibrating Wire Piezometers	Quarterly	-----	Same as for DCR piezometers.
Embankment: 5 Surface Monuments	Semiannually	-----	Same as for DCR piezometers.

TABLE 9-6 (cont'd)

GEOLOGIC AND GEOTECHNICAL MONITORING SCHEDULE
(Proposed changes italicised)

FACILITY	MONITORING FREQUENCY	DRAWDOWN	SEISMIC EVENT
Tailings Embankment (cont'd)			
Visual Inspection & Seepage Measurement	Quarterly or following a 3"/hr. or 100 yr.-24 hr. (7.67") storm event. Response will be made for lesser events if the intensity approximates the criteria, or conditions warrant.	-----	Same as for DCR piezometers.
Tailings Return Sump Meters (Seepage)	Monthly	-----	Same as for DCR piezometers.
9 Embankment Observation Wells (water levels)	Bimonthly	-----	Same as for DCR piezometers.
Waste Rock Sediment Control Facilities			
Ponds 1-5 5 Surface Monuments	Semiannually	-----	Same as for DCR piezometers.
Ponds 6 & 7 2 Surface Monuments	Semiannually	-----	Same as for DCR piezometers.
Pond 8 Surface Monument	*Semiannually* or following a 10-yr.-24 hr. (5.16") storm event.	-----	Same as for DCR piezometers.
Ponds 6 & 7 4 Standpipe Piezometers	*Semiannually (June & Oct.)* or immediately following a 15' fluctuation in the water level within a 24-hr. period.	-----	Same as for DCR piezometers.

TABLE 9-6 (cont'd)

GEOLOGIC AND GEOTECHNICAL MONITORING SCHEDULE
(Proposed changes italicised)

FACILITY	MONITORING FREQUENCY	DRAWDOWN	SEISMIC EVENT
Waste Rock Sediment Control Facilities (cont'd)			
Ponds 1-7 Visual Inspection & Seepage	*Semiannually (June & Oct.) or following a 3"/hr. or 100 yr.-24 hr. (7.67") storm event.*	-----	Same as for DCR piezometers.
Ponds 8 & 9 Visual Inspection & Seepage	*Semiannually (June & Oct.)* or following operation of valves.	-----	Same as for DCR piezometers.
Sediment Pond T-1			
Visual Inspection	Annually	-----	Same as for DCR piezometers.
Sediment Ponds T-2 and T-3			
Visual Inspection	Semiannually & following a 10 yr. -24 hr. (5.16") storm event.	-----	Same as for DCR piezometers.
Reclaimed Reid Mine			
Visual Inspection	Ditches and slopes checked *semiannually*. Lower adit closure checked *semiannually*. Creek above lower adit checked *semi-annually*.	-----	Same as for DCR piezometers.

File xc: RK
Mayan Permits
RK

NAPA COUNTY

CONSERVATION -- DEVELOPMENT AND PLANNING DEPARTMENT

JEFFREY REDDING
Director

1195 THIRD STREET, ROOM 210 • NAPA, CALIFORNIA 94559-3092
AREA CODE 707/253-4416

December 12, 1994

RECEIVED
DEC 20 1994

Delora M. Koontz
Environmental Engineer, McLaughlin Mine
Homestake Mining Company
26775 Morgan Valley Road
Lower Lake, CA 95457

Dear Ms. Koontz:

At their December 7, 1994 meeting, The Conservation, Development and Planning Commission accepted the Department's review of the 1993-94 Homestake Annual Environmental Monitoring Report, and determined that the report was consistent with Condition #16 of Use permit # U-198283.

If you have any questions, do not hesitate to contact me at (707) 253-4416.

Sincerely,

Therese Garbarino

Therese Garbarino
Planner III

cc: Jeffrey Redding, Director

NAPA COUNTY
CONSERVATION, DEVELOPMENT AND PLANNING DEPARTMENT

DEPARTMENT REPORT

Meeting of December 7, 1994

Agenda Item: # 11

OWNER: **HOMESTAKE MINING COMPANY**

SUBJECT: **REVIEW OF THE 1993-1994 ANNUAL ENVIRONMENTAL MONITORING PROGRAM FOR THE McLAUGHLIN GOLD MINE PROJECT**

FILE: **Use Permit # U-198283, CONDITION # 16**

BACKGROUND:

In accordance with Condition # 16 of Homestake's Use Permit/SMARA Permit, the Planning Division has prepared this report for the Conservation, Development and Planning Commission as a general summary of the findings presented in the Executive Summary of the 1993-1994 Annual Monitoring Report submitted by Homestake Mining Company on September 27, 1994.

The attached report discusses the monitoring results for the 1993-1994 monitoring year. No new recommendations have been requested this year by Homestake to modify the reporting requirements of the Monitoring Program.

The Planning Department's Review of the Environmental Monitoring Report is included as Attachment A, and the Homestake Mining Company's Executive Summary of the Annual Environmental Monitoring Report for 1993-1994 is attached as Attachment B. The full document is on file in the Conservation, Development and Planning Department Library.

Project activity at the Homestake Mine during the 1993-1994 monitoring year included a minor revision to the Reclamation Plan to allow for the expansion of the lowgrade ore stockpile, (File # 93102-MINORMOD), and an exploration permit, (File # 93296-UP/EXPL). The Master Reclamation Plan was updated to incorporate the reclamation of the north pit backfill which was approved in the 1992-93 reporting year, (File # 92161-MOD).

RECOMMENDATION:

1. Accept the Department's attached review of the 1993-1994 Annual Environmental Monitoring Report (Attachment A) as adequate.

ATTACHMENT "A"

REVIEW OF THE ANNUAL 1993-1994 ENVIRONMENTAL MONITORING PROGRAM McLAUGHLIN PROJECT

The 1993-1994 Annual Monitoring Report represents the eleventh report submitted by Homestake Mining Company in fulfillment of the requirement to report annually the results of the McLaughlin Mine Environmental Monitoring Program. The objective of the monitoring program is to measure compliance with environmental performance standards recognized in the regulatory permits issued for the project. The monitoring program also requires the assessment of trends indicative of potential impacts attributable to the McLaughlin Project.

Monitoring data presented in the 1993-1994 annual report covers the 12 month period from July 1, 1993 to June 30, 1994. Quarterly data reports were presented through the year summarizing the data collected each quarter of the monitoring year. The purpose of the annual report is to provide the reviewer with an analysis of the data collected during the previous monitoring year.

This report summarizes the Executive Summary Conclusions and significant findings for each monitoring discipline presented by Homestake in the Annual 1993-1994 report. Staff sent a request for comments to each of the responsible agencies with jurisdiction over the project to comment on the adequacy of the annual report. Requests were sent to the Central Valley Regional Water Quality Control Board, Lake County Air Quality Management District, Yolo-Solano Air Quality Management District, the Bay Area Air Quality Management District, California Department of Fish and Game (Region 2 and 3), and the U.S. Dept of Interior,Bureau of Land Management. All agencies contacted have indicated that the report adequately addresses the monitoring required by their individual permits. Homestake's Executive Summary is attached as Attachment B.

WATER QUALITY

The Water Quality Monitoring Program consists of surface and groundwater monitoring of the hydrologic system surrounding the McLaughlin Mine facilities. The program is designed to monitor ambient or background water quality and regional water quality as well as waters closely adjacent to project facilities. There are nine (9) surface water stations, twenty-three (23) groundwater stations, and three (3) wasterock underdrain stations. Monitoring occurs on a quarterly basis.

Homestake indicated that no changes in surface or groundwater quality were identified. The quality of the waters in the vicinity of the processing facility, tailings impoundment, Davis Creek Reservoir, and the mine pit area remain essentially the same as described prior to the project's operation.

The 1993-1994 monitoring data indicate that the upward trend in the concentration of sulfate in the waste rock area is continuing as predicted in the EIR and the 1986-1987 through the 1989-

1990 reports. Homestake indicates that changes in water quality are apparent for certain parameters associated with sulfide oxidation at specific monitoring stations in the waste rock areas. No significant changes have resulted in overall water quality in Hunting or Knoxville Creeks.

Homestake reported that only 11 of 710 water quality data points (one percent) exceeded the maximum likely concentration of water quality variables tested for the 1992-93 reporting period. No trends or changes associated with the exceedences were identified.

NPDES DATA

The collection of NPDES data is required by the Central Valley Regional WQCB Order No. 94-159 (renewed in May 1994) to analyze the discharge of sediment control dams and receiving waters. Homestake reports that normal stormwater discharges occurred from Pond 7 of the Waste Rock Sediment Control System in compliance with applicable discharge limits. No discharge occurred during the monitoring year from the East Waste Rock Facility Pond, or from Pond 1. The 1993-1994 data collected demonstrate compliance with applicable discharge and receiving water limits.

OTHER MONITORING

Sampling required in the Environmental Monitoring Program but not included in routine sample sets for surface and groundwater are included in this section. Data summarized include sampling of the cooling pond in March and June, semiannual sediment data for four locations, quarterly composite of samples of the tailings, quarterly domestic well samples, quarterly sampling of the tailings seepage return sump, and quarterly tailings reclaim water sampling for cresol and carbon disulfide.

Homestake reports that the cooling pond and tailings seepage return sump reflect expected operational values. Sediment data samples reflect ambient stream conditions. Tailings samples test as nonhazardous, and tailings reclaim water analyses reflect nondetectable levels of cresol and carbon disulfide as expected. No unusual variations were detected in the domestic wells.

AIR QUALITY / METEOROLOGY

The Air Quality Monitoring Program is conducted in accordance with the requirements of the Bay Area Air Quality Management District, Lake County Air Quality Management District, and Yolo-Solano Air Pollution Control District. The focus of the air quality monitoring program is on documenting Total Suspended Particulate Concentrations (dust). The program supplies values for particulates and measurements of particulate mercury, particulate arsenic, and asbestos in the air near the mine. In the processing area, the program supplies data on source emissions from process vents, stacks, tanks, and ponds. Meteorological measurements are taken continuously at four locations to assist in the interpretation of the air sampler data.

Total mine average rainfall was 18.4 inches, slightly less than the 10 year normal of 23.2 inches. Nine inches fell form October to December, with 7.7 inches between January and March. Most precipitation occurred during November, December, and January.

Homestake reports that the existing road dust suppression measures, baghouses, scrubbers, and other air quality control measures have been effective in controlling emissions. Compliance with all regulatory requirements have been met. Homestake reports that compliance was maintained with all ambient air standards and operating permit conditions.

AQUATIC ECOLOGY

The Aquatic Ecology Monitoring Program supplements the chemical water quality monitoring program. Data is collected on benthic macroinvertibrate community structure and diversity, fish community structure and population density, and levels of heavy metals in fish.

Hunting and Knoxville Creeks

Bodega Research Associates performed the annual aquatic ecology monitoring for Hunting and Knoxville Creeks in compliance with the Central Valley Regional Water Quality Control Board Waste Discharge Requirements and Reporting Program # 93-121 and Order # 94-159. Their summary of conclusions indicated that no meaningful trends in trace element concentrations can be identified as resulting from the Homestake mining operations. Changes appeared to relate to annual variation in rainfall and stream hydrology, rather than to changes associated with the Homestake mining operation.

The higher than normal rainfall of the 1992-93 season led to better reproduction and summer survival of fish populations. April 1994 data indicated that California Roach densities were at the highest level of the past seven years at all Hunting Creek sites, and Sacramento Sucker were measured at the highest levels of the past 11 years. However, they indicated that habitat changes (emergent vegetation) observed over the last years of drought were not reversed by the high rainfall of 1992-1993, so the fish populations may continue to be affected.

Concentrations of metals in fish do not identify a chemical basis for population decline. The long drought is a more probable cause of population decline in Knoxville Creek. No meaningful trends in trace element concentrations were identified as arising from Homestake Mining operations.

Davis Creek and Davis Creek Reservoir

Davis Creek and Davis Creek Reservoir sampling was conducted by Ecological Research Associates and U.C. Davis under the direction of Dr. Charles Goldman to fulfill the requirements of the Central Valley Regional Water quality Control Board Waste Discharge Requirements and Reporting Program # 93-121. Reservoir sampling commenced in April of 1985 and has continued as specified in the Environmental Monitoring Manual, with an additional thirty six (36) annual mercury analyses.

Ecological Research and U.C. Davis concluded that the water quality and aquatic ecology monitoring aspects of the McLaughlin Project in Yolo County are operating in an orderly, logical and timely manner.

The hydrologic characteristics of Davis Creek during the 1993-1994 monitoring year were dominated by drought conditions. The total rainfall in the Davis Creek Watershed was 16.21 inches (10 inches less than last year.) Davis Creek Reservoir spilled in late February - early March. By the end of May 1994, water level was .6 ft below the spillway. Spillage was minimal this year.

Sampling from Davis Creek and Davis Creek reservoir included: a) water samples, 2) sediment samples, 3) mercury analysis on fish, 4) "other" metals on fish. Sediment mercury sampling was completed on sediment cores taken from Davis Creek Reservoir. Closure of the Reid Mine in 1989 has resulted in reduced metal loading in the creek and reservoir sediment.

VEGETATION MONITORING

The Vegetation Monitoring Program includes monitoring of previously reclaimed areas (reclamation success), sensitive plants and the management of contiguous lands. Reclamation research and test plantings to determine most suitable reclamation methods are also included in the program.

Sensitive Plants

In general, Homestake reported that all populations of sensitive plants observed during the 1993-1994 monitoring season were similar to the 1992-93 reporting year and were similar in number and size. Sensitive plant monitoring was conducted by Biosystems Analysis, Inc. and the Napa Chapter of the California Native Plant Society (CNPS). Ten previously undocumented populations of various sensitive species were observed at sites monitored this year. No new sites were documented in 1994. On the whole, 22 of 61 numbered sensitive plant occurrence sites were monitored during the 1993-1994 field season for their proximity to existing facilities. Many sites were not inventoried since they have not been impacted by the project since 1985. No new or significant impacts to sensitive plants were observed in 1994.

Reclamation Review

Reclamation review was completed by Lorraine Van Kekerix, an independent consultant formerly with Cal Division of Mines and Geology. Revegetation efforts have been successful in establishing plant cover adequate to stabilize disturbed sites and control erosion. Native species from undisturbed sites have started to invade the revegetated areas. Successful revegetation in the 1993-1994 season was completed on 50 acres of disturbed land in 7 areas including: the 1800 elevation bench, south portion of the 1700 elevation bench and the Parnum ramp of the west waste rock disposal facility; the roads between the toe of the west waste rock facility and sediment pond # 6; the north pit shoulders and exploration sites; the south pit

exploration site; the access road between N-7 and N-8 below the tailings dam; the diversion ditch in the northwest corner of the tailings pond; and the tailings test plot in the northwest corner of the tailings pond.

The seed mixes used in the 1993-1994 season were the same mixes used since 1987-88, and are again recommended for the 1994-1995 season, with the same change recommended for the last two years that the serpentine mix be changed to replace lana vetch with rose clover. Soil amendments and mulch recommendations that were used since 1985-86 have provided good results and are recommended for the next season.

Species composition on reclaimed sites has changed over time with annual grasses predominant in the first year, followed by emerging perennial grasses, and clover in the second year. In the third year, perennial grasses are predominant, with native grasses more abundant, and in the fourth and fifth years, the invasion of native plants increases. Over time, the native species are expected to replace the seeded species.

There was a significant increase in the number of different plant species invading the revegetated sites as compared to the number of species present in the past several springs. The proportion of seeded legumes increased (i.e. rose clover and lana vetch) while the proportion of volunteer legumes continued to decrease from the high proportion present in the 1988 and 1989 evaluation. Vegetation coverage for the 1993-1994 plantings on the West Waste Rock Facility was 70-90%.

WILDLIFE

The Wildlife Monitoring Program includes documentation of wildlife observations made on the Homestake property including the tailings impoundment, wildlife use of Davis Creek Reservoir, and an annual golden eagle nest survey. The Wildlife data base consists of wildlife observation cards submitted by project employees, contractors, researchers, and wildlife monitoring by Ecological Research Associates at Davis Creek Reservoir. -

Wildlife observations sighting routes included Morgan Valley Road for Lower Lake to Knoxville, perimeter roads to Davis Creek Reservoir and the Tailings impoundment, Rayhouse Road from the Reid Mine continuing easterly across Davis Creek Dam. Wildlife observations are also documented within and adjacent to the east rock sediment control ponds, mine and process areas, and neighboring residential lands. Numerous sightings were accumulated by Dr. Darell Slotten of U.C. Davis in conjunction with his work at Davis Creek Reservoir.

Species diversity for the 1993-1994 study year as compared to the previous five years resulted in 50 bird species not evident this year which were documented in the previous eight years. One new bird specie was added. Thirteen mammal species and nine herptile species previously sighted were absent in this year's survey. No new mammal species were added.

The Davis Creek reservoir wildlife monitoring data reported by Darrell Slotten for the 1993-1994 identified 63 species of birds on or around Davis Creek reservoir, including 24 species of water oriented birds. The improved shoreline habitat with heavy growths of cattails and submerged aquatic plants, attracted notably increased numbers of fall migrant waterfowl. The

reservoir was able to fill to volume in 1994 despite drought conditions. Wintering waterfowl demonstrated increased numbers.

Mule deer and coyotes were the dominant large mammals sighted, as in previous years. An aerial helicopter search for raptor nests was conducted on May 10, 1994, and resulted in the sighting of one active golden eagle nest with two nearly fledged juveniles on the north of the mine property along Cache Creek.

The Townsend's big eared bat (Plecotus townsendii) continued to use the protected roost sites prepared in 1988-1989. The electronic monitoring system installed in the maternity site in 1988 continues to provide data on nightly and seasonal activity patterns, data on roost temperature and light levels. Records of activity patterns and visual observation confirm the continued successful use of these sites.

A western bluebird birdbox program was initiated and nest boxes for wood ducks and kestrels were installed at Davis Creek Reservoir in 1992. No wood ducks were observed at Davis Creek Reservoir, however 50% of the sites were occupied by screech owls. The bluebird boxes had a 26% occupancy rate. An alternate nest site installed by the grinding facility has again been used by cliff swallows that previously nested above electrical equipment. Over 160 active nests were present this year.

CONTIGUOUS LANDS MANAGEMENT PROGRAM

The Contiguous Lands Management Program (CLMP) was developed as an extension of the mine's Environmental Monitoring Program to manage Homestake's adjacent nonmined lands. Six programs were established within the CLMP's framework. Homestake provided a summary description of the program objectives and work performed and/or programs initiated to date.

The Hazard Reduction Program was designed to reduce the risk of fire resulting from activities on mine property, facilitate reaction to fire, and reduce fuel load and improve habitat quality through prescribed burning. Fire training has been provided to mine personnel, fuel reduction programs included expansion of the firebreak adjacent to the process facility through conversion of chaparral to grassland in 1986, and an ongoing grazing program. Access roads on site are regularly maintained to reduce fire hazard and provide access to fire crews, if needed.

The Shoreline Development Program was developed to assess the natural habitat development over time and for the development of habitat enhancement programs as needed. No shoreline habitat work has been initiated.

A habitat development project was initiated at the T-3 sediment pond in 1993 by Sonoma State students. Willow and cotton wood slips from native stock on-site were planted. Follow up and monitoring and assessment of survival rates has been conducted by the students, with an 85% survival rate for willows.

The Sensitive Plant Restoration Program was developed for monitoring and management of sensitive plant species onsite for ultimate inclusion in the U.C. Reserve System. Annual monitoring of sensitive plants has been added to the data base. One species was transplanted on site in 1986, 88, 89, and 1991 with followup monitoring. Salvage of an additional species for relocation occurred in spring of 1994, where the original location will be impacted by the filling of the tailings impoundment.

Pasture Use Management provides for management of pasture lands within the contiguous lands area. an ongoing grazing program was initiated in 1988, with management input from the Lake County Farm Advisor. Grazing was initiated on lands east of the mine in Napa County in 1991, and the Napa County Resource Conservation District conducted a grazing land assessment which will be used in future management decisions.

The Habitat Restoration and Improvement Program addresses wildlife habitat management practices and includes prescribed burning restoration and development of water resources. Grazing was removed from the blue oak woodlands surrounding Davis Creek reservoir in 1983. Monitoring of habitat improvement has not been initiated to date. Reclamation of the Reid Mine was completed in 1989-1990. Installation of Davis Creek Reservoir has provided year round water resources for wildlife. Ongoing reclamation at the waste rock site provides for natural invasion of native species.

The Education and Research Program provides for the facilities and resources necessary to fulfill the postmining use of the property as a research site for regional educational institutions as provided for in the approved reclamation plan. In 1994, the Donald & Sylvia McLaughlin Natural Reserve of 300 acres was incorporated into the University of California Natural Reserve System.

GEOTECHNICAL MONITORING

The Geotechnical Monitoring Program monitors the integrity of dams and embankments. Structures reviewed include the Tailings Dam, M-1 Dam, Davis Creek Dam, the Waste Rock Sediment Control Facility, and the East Waste Rock Disposal Facility Pond. Homestake reports that all structures are performing as designed. Monitoring data was reviewed and analyzed by D.P. Engineering Inc., Geotechnical Engineers. the State Department of Water Resources, Division of Dam Safety completed inspection reports dated March and October 1993 indicating that the ~~six~~ 3 dams reviewed are safe for continued use. (3 reports for each)

All structures are performing as designed and the monitoring program is sufficient to track structure performance.

ATTACHMENT B

HOMESTAKE MINING COMPANY
McLAUGHLIN MINE
ANNUAL ENVIRONMENTAL MONITORING REPORT
JULY 1, 1993 - JUNE 30, 1994

EXECUTIVE SUMMARY

Introduction

The Executive Summary lists the findings of the analyses conducted on monitoring data collected during the reporting period of July 1, 1993 through June 30, 1994. The summary is organized in sections by monitoring topic.

1.0 Water Quality

The July 1993 - June 1994 Annual Environmental Monitoring Report includes a summary and analysis of the water quality data collected for the Mine's Water Quality Monitoring Program as previously reported in this year's Quarterly Monitoring Reports. These reports have been prepared in accordance with the requirements of the California Regional Water Quality Control Board, Central Valley Region, Waste Discharge Order No. 93-121 for the McLaughlin Mine. The reports fulfill the annual reporting requirements (due October 30, 1994), demonstrate conformance with existing plans thereby fulfilling annual notification (due January 15, 1995) per Provision 3, and fulfill the requirement for an annual update of the water quality evaluation report per Provision 13 of the current Order.

No changes in surface or groundwater quality in terms of those elements or compounds which are fundamental to compliance with regulatory requirements have been identified. Analytical emphasis has been on those parameters most likely to be impacted by mining: cyanide, arsenic, boron, chromium, copper, lead, mercury, nickel, and zinc.

Water quality of waters in the vicinity of the processing facility, tailings impoundment, Davis Creek Reservoir, and the mine pit area remains essentially as it was described prior to the project's operation.

Water quality trends associated with sulfide oxidation in the waste rock areas were identified and discussed in the 1986-1987 through 1988-1989 Annual Environmental Monitoring Reports and also predicted in the Environmental Impact Report. The 1993-1994 monitoring data indicate that these trends are continuing. Changes in water quality are apparent for certain parameters associated

with sulfide oxidation at specific monitoring stations in the waste rock areas. It should be noted that no significant changes in overall water quality have been observed in Hunting or Knoxville Creeks particularly with respect to metals concentrations. The waste rock underdrain pumpback systems designed, installed, and operated by Homestake in response to initial trends identified through environmental monitoring, have proven effective in recycling flow from the waste rock underdrains to the process circuits. These systems were upgraded during 1993 in response to routine monitoring and data analysis conducted in conjunction with the above average rainfall experienced during the 1992-1993 monitoring year. The underdrain collection and pumpback systems continue to provide protection of water quality and ensure compliance with permit criteria.

For the reporting period only eleven (or one percent) of the 710 water quality data points evaluated for stream monitoring stations and groundwater wells exceeded the statistically derived maximum likely concentrations. No trends or changes associated with these "exceedences" have been identified.

2.0 NPDES Data

NPDES data are collected from the discharge of sediment control dams and from receiving waters as required by California Water Quality Control Board, Central Valley Region, Order No. 94-159, NPDES No. CA081477. The July 1993 - June 1994 Annual Environmental Monitoring Report, in conjunction with the previously distributed Quarterly Monitoring Reports, fulfill the annual reporting requirements of that Order.

Normal storm water discharges occurred from Pond 7 of the Main Waste Rock Sediment Control System (discharge point 003 and receiving waters HC-05R and HC-10R). No discharge occurred from Pond 1 (discharge point 002 and receiving waters HC-05R and HC-10R) or from the East Waste Rock Facility Pond (discharge point 001 and receiving stream station KC-03R) during the monitoring year.

Data collected during the 1993-1994 monitoring year demonstrate compliance with applicable discharge and receiving water limits. Receiving water quality parameters were within the range of natural variability.

The underdrain collection and pumpback systems in addition to waste rock management practices continue to provide protection of water quality and ensure compliance with NPDES Permit criteria.

3.0 Other

Sampling required in the McLaughlin Project Environmental Monitoring Manual but not included in the routine sample sets for surface and groundwater are presented in this section. Data

summarized include sampling of the cooling pond in March and June, semiannual sediment data for four locations, quarterly composite samples of the tailings, domestic well sampling, sampling of the tailings seepage return sump, and sampling of Tailings reclaim water.

The cooling pond (CP-01) and tailings seepage return sump (TRS-01) reflect expected operational values for monitored parameters.

Sediment data collected reflect ambient stream conditions.

Tailings samples reflect concentrations expected during operations for total and filtered values. The tailings continue to test as nonhazardous.

Tailings reclaim water analyses reflect nondetectable levels of cresol and carbon disulfide as expected.

Domestic well data show no unusual variations.

4.0 Air Quality and Meteorology

The Air Quality Monitoring Program is conducted in accordance with the requirements of the Bay Area Air Quality Management District, Lake County Air Quality Management District, and Yolo-Solano Air Pollution Control District. It is evident that road dust suppression measures, baghouses, scrubbers, and other air quality control measures have been effective in controlling emissions as evidenced by air quality data collected at our compliance monitoring stations.

Total Mine average rainfall for the twelve-month period was 18.4 inches. This was slightly below our ten-year normal of 23.20 inches. Most of the precipitation occurred during November, December, and January 1993/94.

Compliance was maintained with all ambient air standards and operating permit conditions.

The level of monitoring currently employed under the McLaughlin Mine Air Quality Monitoring Program is more than adequate to describe operation conditions and to monitor compliance at the McLaughlin facility.

5.0 Aquatic Ecology

Hunting and Knoxville Creeks

Aquatic ecology monitoring on Hunting and Knoxville Creeks is conducted by Bodega Research Associates. Their report, reproduced in full in the volume entitled "Annual Monitoring Report, July 1, 1992 - June 30, 1993, Aquatic Ecology", fulfills the requirements of and demonstrates compliance with the California Regional Water Quality Control Board, Central Valley Region, Waste Discharge Requirement Monitoring and Reporting Program No. 93-121 and Order No. 94-159, NPDES No. CA0081477, Receiving Water Limitation D.13 for aquatic ecology monitoring on Hunting and Knoxville Creeks. The report Summary of Conclusions is reproduced below:

Summary of Conclusions

The reduced and focused monitoring program implemented in 1986 for Hunting Creek and Knoxville Creek has functioned efficiently and productively through 1994, and should be continued with some minor alteration in 1994-1995. The cumulative increase in the data base from April sampling at the four primary sites (HC-5, HC-7A, HC-10, KC-3) and August benthic sampling at HC-7A will make the program more effective each year, as long as a consistent, careful, and appropriate methodology is maintained. Already this growing data base has become sufficient to detect statistically significant annual changes in the benthic macroinvertebrate communities at each of the sampling stations. These changes appear to relate to annual variation in rainfall and stream hydrology or to other sources of natural variability rather than to changes associated with the Homestake mining operation. We have traced some of the changes in richness and diversity of the benthic invertebrate community at Hunting Creek sites over the years of the monitoring program to variation in flow conditions, with resultant variation in winter scouring or silt accumulation, and have demonstrated correlations between invertebrate community parameters and rainfall variables at several sites. These relationships are strongest at HC-5, where hydraulic stress is probably greater than at the other monitoring sites.

Chemical changes produced by the accidental discharge from Sediment Pond M-1 in 1986 and further changes in 1987-1988 evidenced by a reddish iron precipitate on the stream bottom at KC-3, produced by drainage from the new East Waste Disposal site, remain as possible causes of changes in invertebrate communities at KC-3 during 1985-1989. However, our sampling data from 1992-1994 demonstrate that recovery of the benthic macroinvertebrate community at KC-3 is essentially complete, since species richness, diversity, density, and relative abundance of Chironomidae and "EPT" taxa (3 orders of insects considered sensitive to water quality) have all returned to prespill values.

California roach populations had been generally declining at all sites for six or more years, until this year's sampling has indicated a dramatic recovery at Hunting Creek sites. Several different factors may have contributed to the decline. The 1987-1992 drought has certainly been an important factor, with the potential to influence fish populations in several different ways. Since rainfall over the six-year drought totalled little more than one-half normal, the cumulative rainfall deficit became very large, producing a continuous series of summer flow conditions that were very low (at HC-5 and HC-10), intermittent (at HC-7A), or nonexistent

(at KC-3). As flow decreases, water tempetature rises, oxygen levels decrease, and conductivity rises. These conditions probably decrease survival and reproduction in California roach at all sites, and also may have been responsible for the declines in Sacramento squawfish and Sacramento sucker at HC-10.

Low rainfall is probably also the cause of increasing emergent and streamside vegetation at all Hunting Creek sites. The resultant change in habitat may have altered conditions for California roach; heavy winter scouring will be needed to return the streambed to conditions similar to those of 1984-1986. However, the unusual length of the drought has allowed stream vegetation of several species, especially willows (Salix spp.) to grow to sufficient size, with proportionately extensive root systems, so that a moderately heavy rainfall year (such as 1992-93) cannot dislodge them. At this point, the willows and several species of rhizomatous sedges and cattails may require a very significant flood before the plants and their trapped sediments will be swept away from the monitoring sites.

Homestake mining operations probably exacerbated the effects of the drought at HC-7A, through the isolation of the tailings reservoir from the watershed of Hunting Creek. This isolation minimizes the possibility of contamination of Hunting Creek, but has removed 11% of the original watershed draining into Hunting Creek above HC-7A. This loss is probably unimportant under most rainfall conditions, but under the stress of the six-year drought, it may be a contributing factor in the increase in vegetation and decrease in fish at HC-7A.

Removal of grazing livestock from the HC-7A area in 1984 may also have allowed vegetation to flourish where it had been depressed during the open range years prior to Homestake operations. It is not possible to separate these various factors (extended drought, decreased watershed, and reduced grazing pressure) as contributors to the major habitat change at this site.

In last year's Report (Bodega Research Associates 1993) we noted that the higher rainfall of 1992-1993 did not produce a recovery of fish populations by April 1993, but we predicted that the higher flow conditions should lead to better reproduction and summer survival in 1993, and higher populations in April 1994. This prediction has been dramatically borne out, with 1994 California roach densities at the highest levels of the past seven years at all Hunting Creek sites, and with Sacramento sucker densities at HC-10 rising to the highest levels of the entire 11-year study. However, since the habitat changes observed during the drought were not reversed, California roach populations may continue to be affected. This is especially true at HC-7A, where habitat changes have been most pronounced, and have continued during 1994. At this site, one of our sampling stations has become so choked with emergent vegetation that it can no longer be sampled, and has been abandoned. If this process continues, the other two stations at HC-7A are also in jeopardy. To offset this loss of monitoring capability, we have begun a visual assessment of roach populations at one large pool just below the HC-7A site. This pool is too deep for electroshocking, but sustains large roach populations (310 fish in 100 feet, 1994).

At KC-3, the decline in roach populations since 1985, previously confined to the immediate sampling site, has spread further downstream, but roach remain fairly common at the alternate collection site (KC-3A) 1.6 miles downstream of KC-3. KC-3A is the site from which

we have been collecting fish for trace element analysis for several years; in 1994 roach numbers increased dramatically at this alternate site, but they remain absent from original site KC-3. To increase the sensitivity of our Knoxville Creek monitoring program, we have tentatively established a new fish monitoring station at the KC-3A site. In 1995, we recommend repeating this station, and considering establishment of a second 100-foot station at the same site.

Concentrations of metals in fish collected at KC-3A do not identify a chemical basis for the population decline. Mercury levels, which were high in 1988, have declined over the subsequent six years; they are now only 60% of the 1988 levels. Copper data in recent years suggest a trend of increasing concentrations of this metal in California roach from the site, but this trend is not yet conclusive. The monitoring program should continue to focus on these metal concentrations in future years, but the long drought is a more probable cause of the roach population decline in Knoxville Creek.

Within the limits of reliability of the laboratory analytical results, no meaningful trends in trace element concentrations can be identified as arising from Homestake mining operations. As the database of measured concentrations in fish tissues from the monitoring sites expands each year, the extent of natural biological variability and of analytical variability inherent in the monitoring program will become better defined, and identification of underlying trends will become easier. The archiving of frozen samples of fish tissue each year, added to the monitoring program in 1990, will permit future reanalysis of samples to corroborate any suspected trends.

Davis Creek and Davis Creek Reservoir

Davis Creek and Davis Creek Reservoir sampling was conducted by Ecological Research Associates and U.C. Davis respectively under the direction of Dr. Charles Goldman. Reservoir sampling commenced in April 1985 and has continued as specified in the Environmental Monitoring Manual with an additional thirty-six mercury analyses authorized annually. The report, reproduced in full in the volume entitled "Annual Monitoring Report, July 1, 1993 - June 30, 1994, Aquatic Ecology", fulfills the requirements of the California Regional Water Quality Control Board, Central Valley Region, Waste Discharge Requirement Monitoring and Reporting Program No. 93-121 for aquatic ecology monitoring on Davis Creek. The executive summary of that report is reproduced below:

PROJECT SUMMARY

Section 1 - Introduction

This is our ninth Annual Report documenting water quality in Davis Creek Reservoir and the stream stations located in Davis Creek. A five-year summary report was issued for the period January 1982 - June 1989 in September 1989. Next year we anticipate producing a second five-year report which will include an overview and summarization of issues and progress over the entire period of record, 1982-1995. The 1993-1994 Annual Report which is presented here, specifically focuses on the data collected this past monitoring year: July 1993 through June 1994. We provide plots of the entire long-term data base for Davis Creek and Davis Creek

Reservoir and, discuss/evaluate the past year's findings in light of the historical record and regulatory criteria.

The major issues addressed in the current report include: a detailed review and evaluation of quality assurance and quality control (QA/QC) data; presentation/evaluation of current data in light of the long-term and seasonal trends of general water quality constituents and heavy metals in Davis Creek and Davis Creek Reservoir; presentation/evaluation of current data in light of the long-term and seasonal trends of heavy metals in the biota and sediments of Davis Creek and Davis Creek Reservoir; concentrations of mercury and other metals in Davis Creek Reservoir sediments, both spatially at the four long-term stations, and mercury accumulation by fish in Davis Creek Reservoir.

Since 1990, an irreducible list of parameters and sampling schedule have been collected to insure us that changes in surface water quality would be identified. These parameters were recommended in the ERA 1989-1990 Annual Report and were incorporated into the sampling and data reporting program. As always, HMC and the County will be immediately notified if we have reason to believe that additional parameters should be added. To date, there has been no reason to further modify the sampling schedule.

It is our conclusion that the water quality and aquatic ecology monitoring aspects of the McLaughlin Project in Yolo County are operating in an orderly, logical, and timely manner. Continued discussions between ERA, UCD, HMC, and the Yolo TRP continue to be productive. The HMC data for environmental monitoring associated with the McLaughlin Project has become one of the most comprehensive and high quality data bases dealing with aquatic heavy metals in northern California.

Section 2 - QA/QC

1. A reliable and comprehensive QA/QC plan forms the cornerstone of a sound environmental monitoring program. It provides us with assurance that the data base is accurate and precise and allows us to proceed to the interpretation phase of the process. While all analytical laboratories are required to meet certain QA/QC standards, the exact nature of a QA/QC plan is dependent on the questions being asked of the environmental monitoring program. The ultimate goal is to be able to detect changes in water quality should they occur.

2. The current analytical responsibilities are as follows; a) NET continues to test all water samples from Davis Creek (DC-5 and DC-6) and Davis Creek Reservoir [DCR] (Surface, Mid, Bottom), b) NET runs all sediment metals samples from Davis Creek and DCR, c) UCD runs all mercury analyses on Davis Creek and DCR fish, d) NET runs 'other' metals on Davis Creek and DCR fish (As, Cr, Cu, Pb, Ni and Zn), and e) UCD also runs sediment mercury on samples taken in DCR.

3. During 1992-1993 the following QA/QC samples were sent to NET by HMC, ERA, and UCD (note: these are in addition to the lab QA/QC tests which are routinely done by NET as part of their internal QA/QC plan): replicated intralaboratory samples, replicated

interlaboratory samples, field blanks, aqueous certified stock standard metals-in-water samples prepared by a commercial laboratory, and NIST certified aquatic sediment material for metals.

4. A total of four surface water samples were analyzed as intralaboratory replicates. Each sample was tested for water quality constituents included in the current sampling plan. The purpose of these samples is to check on the precision or reproducibility of the contract lab's methodology. The data yielded a total of 26 paired comparisons which had at least one value above the analytical limit of detection. Of all the parameters, TSS, nitrate, ammonia, arsenic (T/F), chromium (T/F), copper (T/F), iron (F),lead (T/F), mercury (T/F), nickel (T/F), and zinc (T/F) were below detection on at least three of the four dates, making quantitative comparisons difficult. Even with stricter RPD exceedence criteria suggested for intralaboratory comparisons, surface water data were outside the criteria for only one constituent, iron (as total and filtered. For the past five years, the percent exceedences for total iron have been low at 7%, 13%, 5%, 0%, 3%, and 33%. This year it was 50% (# exceedences÷# pairs above detection).

5. Of the 322 paired analyses run as interlaboratory replicates, 102 pairs or 32% showed at least one value of the data pair above the limit of detection. Of the seven Priority Pollutant metals (As, Cr, Cu, Pb, Hg, Ni,and Zn) only 15 of the 196 data pairs (8%) were above the limit of detection. This was similar to previous years. Using a value of 80% agreement as a cut off for acceptable interlaboratory comparability (i.e. for any parameter, the two labs were in agreement on ≥80% of the twelve samples), the parameters could be grouped into five categories:

- *Adequate number of sample pairs above detection ($n \geq 6$) and high agreement (<80%): These included: hardness, TDS, sulfate, T-boron, T-manganese, and arsenic (T/F).*
- *Adequate number of sample pairs above detection ($n \geq 6$) and low agreement (<80%): These included: T-iron.*
- *Inadequate number of sample pairs above detection ($n < 6$) and high agreement (≥80%): These included ammonia, T-mercury, and F-zinc.*
- *Inadequate number of sample pairs above detection ($n < 6$) and low agreement (<80%): F-iron.*
- *No data pairs above detection: These included, nitrate, chromium (T/F), copper (T/F), lead (T/F), F-mercury, nickel (T/F), and T-zinc.*

In general there was good agreement between the two labs. While most of the heavy metals concentrations were below detection, an important question is, can the laboratory accurately measure higher concentrations of metals in the water should they occur? The fact that the mean NET spike-recovery values on matrix samples were 91%-101% indicates that over the period of record, this lab would have had the ability to detect high concentrations of metals if they occurred. Only arsenic (one recovery of 79%), lead (one recovery of 121%), and mercury (one recovery of 68%) exceeded the ±15% limit.

6. *HMC submitted quarterly sets of a commercially prepared reference material for metals in water. As, Cr, Cu, Mn, and Ni never exceeded the above criteria. Iron, Hg, and Zn exceeded had 4, 3, and 3 exceedences respectively out of four samples.*

7. *On the basis of all this information we conclude that NET has the ability to measure water chemistry constituents at adequate levels for this project.*

8. *For sediment metals, NET uses US EPA methods for both the digestion and analytical phases. Details of these methods have been provided in the past. Blanks, external standards, method standards, spike-recoveries, and matrix duplicates were run and were all within project control limits. The individual QC samples were all within the control limits established by NET and we consider the values to be good.*

9. *Certified SRM sediment material from the Buffalo River was analyzed by the contract laboratory in conjunction with their sediment metals analyses and by UCD along with their measurement of mercury in sediments from DCR. For NET, the contract lab, absolute percent difference between the certified concentration and the measured concentration (for all four samples) was less than or equal to 20% for copper, lead, and zinc. The APD for chromium exceeded 20% on each of the four analytical runs. Arsenic exceeded an APD of 20% on three of the four runs with values of 27%, 23%, and 27%. Mercury exceeded a 20% APD on only one of four runs (36% APD), with the other three in very close agreement, 2-9% APD.*

The UCD QA/QC program for mercury in sediments included two different sediment Reference Materials ([i] European Certified Reference Material - Lake Sediment, [ii] Certified Reference Material - Industrial Sludge, and [iii] NIST Buffalo River Sediment) in duplicate; duplicates of environmental samples; a spike recovery sample; and use of 6-point standard curves, with blanks, for calculation of concentration in each run. APD's for the SRM's ranged between 1%-13% (n=10). UCD also ran 3 duplicate environmental samples. The mean percent difference was 12%. A comparison of 12 split samples from the routine, quarterly DCR sediment collection sites (Inlet, Midlake, Dam and South Arm) were analyzed by both UCD and NET. Based on this comparison, it was concluded that the difference found between these two labs would not have significantly influenced the long-term data record nor our interpretation of this record.

10. *Since the mercury content of reservoir and creek fish remains the single most environmental concern related to water quality and aquatic ecology in Yolo County, it is very important that the QA/QC for these samples be rigorous.*

The 1993-94 fish samples were run in four full runs and one partial run. Seven standard concentration levels were included in each run ranging from 0-2.00 to 4.00 ppm. For each of the runs, the r^2-value for the regression equation was always greater than 0.99 and typically around 0.995. Laboratory QA/QC samples for 1993-1994 included, 35 standards, 5 blanks, 10 NIST Reference Material, 4 spike-recovery samples and 16 duplicate splits which analyzed two samples from the same fish. Replicate fish (DCR) and composites (DC) were also analyzed so that with few exceptions, the reported seasonal value comes from the analysis of more than a single fish.

Individual measurements of NIST RM 50 tuna material ranged from 0.87-1.21 ppm. The mean of all four runs combined was 0.99±0.13 ppm Hg (n=10), with a mean APD of 4.2%. Sample replication was also good. Sample replication was also excellent for both DCR and Davis Creek fish. For the 16 duplicate samples, the relative percent different ranged from <1-10% with a mean (±SD) of 4% ± 3%. In terms of the absolute ppm difference between samples, the range was 0.00-0.24 ppm Hg, with all but one value less than or equal to 0.13 ppm Hg. Spike-recoveries were very good for DCR-bass, DCR-bluegill and DC-roach (93-105%); however, they were poor for juvenile bass (215%) and benthic invertebrates (539%).

11. At the request of Ecological Research Associates, the California Department of Fish & Game, Water Pollution Control Laboratory in Rancho Cordova has agreed to analyze DCR fish for mercury as part of an interlaboratory QA/QC check. This year arrangements are being made for both labs to test the fish tissue and the other lab's digest. At this time the results of these tests are not available; however, we hope to receive the data before the Yolo County TRP conducts their formal meeting on this 1993-1994 Annual Report.

12. NET QA/QC data on As, Cr, Cu, Pb, Ni and Zn in DCR and Davis Creek fish were all good and within project specifications.

Section 3 - Davis Creek Water Quality

A 12+ year data record now exists for water chemistry in Davis Creek at stations DC-5 and DC-6. During the period July 1993 - June 1994, samples were collected on five dates at DC-5 and on six dates at DC-6, including the first flush flow in December.

The hydrologic characteristics of Davis Creek during this past monitoring year were dominated by drought conditions which once again affected northern California. A total combined rainfall of only 16.21 inches was measured in the Davis Creek watershed with the majority occurring in November (3.15 in.) and December (6.86 in.); this was 10 inches less than occurred last year. Maximum daily precipitation was 4.6 in. on 9 December. Between January and April an additional 5.02 in. fell producing additional runoff and flow during the spring.

Flows increased significantly at DC-6 and especially DC-5 on 11 December 1993; 7517 gpm at DC-5 and 6615 gpm at DC-6. Indeed, December was the first flush month. Visual observations and flow measurements showed that Davis Creek Reservoir spilled over the dam some time between late-February and early March. By mid-May 1994, water level elevation in DCR was 0.6 feet below the spillway. Observations by HMC staff indicate that spillage was minimal this year and this is only the second time since the 100-year flood of February 1986 that DCR has spilled.

Temperature, dissolved oxygen and pH were within the historic range of the 12+ year data base and levels of these parameters did not interfere with creek biota or water quality.

Concentrations of total suspended solids (TSS) are very important with regard to metals transport since these elements are associated with the particulate versus the dissolved phase in

the water. The only sampling date when TSS was significantly above baseline was on 11 December 1993 during the first-flush event. At that time TSS concentration at DC-5 was 1,100 mg/L. This concentration was much less than the 7,800 mg/l and 5,100 mg/l values which were found during the first flush flows of monitoring years 1990-1991 and 1991-1992; however, it was very similar to the first flush TSS concentration found in monitoring years 1983-1984, 1986-1987, 1989-1990, and 1992-1993. For the remaining sampling dates, TSS was less than 10 mg/L at both stations. The distribution of total iron was well correlated with TSS in the sense that the only time that total iron was found above detection (0.01 mg/L) was at DC-5 and DC-6 during the first-flush when a seasonal spike of TSS was found. As reported last year, with the exception of the first-flush flows, total iron at DC-5 was reduced to near detection limit concentrations after the Reed Adit closure. The distribution of the remaining water quality parameters was not different from that observed in the historical data base and concentrations did not interfere with the beneficial uses of the creek.

For the priority pollutant metals (As, Cr, Cu, Hg, Pb, Ni and Zn), the absolute concentrations and seasonal distribution was consistent with the historical data base. The high seasonal flows at DC-5 in December 1993 were a dominant feature of metals transport at this site. As observed in 1992-1993, all the metals except for arsenic and lead were above detection at DC-5 on that date. It is noteworthy that on the same date, filtered metals at DC-5 were all below detection. With the exception of December 1993, total metals were only found at DC-5 when nickel was above detection on 13 July 1993 and 14 April 1994.

First flush conditions in December also resulted in total-Cr, total-Cu, total-Ni and total-Zn being above detection at DC-6. This was the only sampling date when metals at DC-6 were above detection and at no time were filtered metals at this station measurable. Only total-Cr at DC-5 in December exceeded its MLC concentration. The reservoir continues to act as an effective trap for upstream metals. Beneficial uses of DC-6 water were not negatively impacted.

The data suggest that the closure of the Reed Adit and the Reed Mine clean-up in November 1989 by HMC may have had an effect on reducing the baseline concentrations of nickel at DC-5. However, filtered-Cr levels during the summer were above detection for the first time since 1989. Continued long-term monitoring is required to detect trends.

Section 4 - Davis Creek Aquatic Ecology - Heavy Metals

1. California Roach were collected at both DC-5 and DC-6 in August, October 1993 and February and May 1994. In the period since summer-1991, Roach have been available for collection at DC-6 on eleven occasions. In May, triplicates were taken at DC-5 and DC-6. In May 1994, individual species of benthic invertebrates were collected from DC-5, DC-6 and DC-6A located approximately 0.8 miles downstream of DC-6. A luxuriant cattail wetland community dominates the Davis Creek channel between DC-6 and DC-6A. Creek bottom sediments continued to be sampled on a bi-annual schedule in the fall and spring.

2. *Since 1985, mercury analysis for Roach has been done on 34 individual sampling dates at DC-5 and on 31 dates at DC-6. Over this period of record, the mean of the mercury concentrations at DC-5 was 0.36±0.17 (mean±SD) ppm wet wt. The minimum and maximum individual quarterly measurements are 0.13 ppm and 0.94 ppm. For the same period, the mean Roach mercury concentration at DC-6 was 33% lower at 0.24±0.09 ppm; with a minimum quarterly value of 0.10 ppm and a maximum value of 0.41 ppm. From February 1991 to present (May 1994) the mean mercury content of the DC-5 composites has been 0.43±0.17 ppm (SD) and was 60% higher than at DC-6, 0.27±0.10 ppm. Indeed, this difference was typical of the historic data set prior to the apparently anomalous data collected in 1989-1990 when Roach-Hg at DC-6 was apparently double that at DC-5. At this time, the data looks "regular" and there is no cause for concern. There is reason to suspect that the so-called anomalous 1989-1990 data may have been either a labeling error in the field or at the contract laboratory.*

3. *During monitoring year 1993-1994, Roach-Hg values at DC-5 ranged from 0.38 to 0.50 ppm (wet wt.). None of these values exceeded the California Department of Health Services 0.5 ppm criterion for edible fish. Roach at DC-5 have been at or above this criteria on seven separate occasions during the period of record. During monitoring year 1993-1994, Roach-Hg at DC-6 ranged from 0.31 to 0.40 ppm (wet wt.). The difference between these two stations was less than either that found for the entire period of record or between February 1991 and present. With the inclusion of this latest set of data for both DC-5 and DC-6, we can now be certain that closing the Reed Adit has not had an impact on Roach-Hg content.*

4. *In general, the limited data collected on benthic invertebrate mercury content above and below the channelized wetland immediately downstream of DC-6 clearly indicated that benthic invertebrates downstream of the cattails contained less mercury than those upstream at DC-6. The mean concentration at DC-6A was 0.81 ppm 65-70% less than the mean (2.43 ppm) at DC-6. Only damselfly nymphs were found at both DC-6 and DC-6A; organisms of this genus contained 72% less mercury at DC-6A below the cattails relative to above the cattails.*

5. *During monitoring year 1993-1994, sediment mercury concentrations in Davis Creek ranged from 0.13 to 0.69 mg/kg (dry wt.) at DC-5 and 0.53 to 12 mg/kg (dry wt.) at DC-6. With the exception of the spring 1988 when mercury at DC-5 was 39 mg/kg, and April 1994 during the current monitoring year when sediment-Hg was 12 ppm at DC-6, sediment mercury at both stations has been consistently less than 5 mg/kg. It was concluded that the high concentration at DC-6 in April was an anomalous point in the respect that it represented more of a localized phenomenon and was not typical of this reach of Davis Creek.*

6. *The lower limits of detection for fish metals analysis which were instituted in 1990-1991 were again achieved in 1993-1994. The continued expansion of the environmental data base has allowed us to recognized that the closure and cleanup of the Reed Mine in November 1989 may have had a positive influence on levels of some priority pollutant metals (especially nickel and perhaps arsenic) in DC-5 Roach. A mid-summer peak in nickel from roach at DC-5 was observed for the first time since 1990; however, this peak was much less than measured during the period 1985-1988. The elevated Roach-Ni concentrations at DC-5 coincided with higher filtered-Ni at this station in the preceding month.*

7. The lower limits of detection for fish metals analysis which were instituted in 1990-1991 were again achieved in 1993-1994. The continued expansion of the environmental data base has allowed us to recognize that the closure and cleanup of the Reed Mine in November 1989 may have had a positive influence on levels of some priority pollutant metals in DC-5 Roach. It appears concentrations of nickel in Roach correspond most closely with concentrations of filtered-Ni in Davis Creek water.

8. Concentrations of priority pollutant metals in Davis Creek sediment were generally consistent with other measures made since the change in sampling procedure which took place in October 1987. It is of particular interest that the metals associated with the naturally geology of the area, i.e. Hg, Ni, As and Cr (DC-5) all have shown declines in sediment concentration since April 1991. Given that the cleanup of the Reed Mine and closure of the adit was completed in November 1989 it is not unreasonable to conclude that this clean-up action has reduced metals loading to the creek sediment and likewise to the downstream reservoir.

Section 5 - Davis Creek Reservoir - Water Quality

The limnology of Davis Creek reservoir continues to be influenced by the erratic rainfall patterns that have become more the rule than the exception in Northern California. The six year drought of 1987-1992 was bordered on both sides by "100 year" precipitation seasons in 1986 and 1993, each of which filled the reservoir to overflowing. The high precipitation winter of 1993 was then followed, in this most recent year of 1994, by an extremely dry winter. However, even the low inflow that resulted was sufficient to bring the DCR surface level back up to spillway height. This can be attributed to the water conservation measures instituted by Homestake since 1991, which have resulted in reduced water removal for mine process work. The biotic consequences of this increased littoral zone stability include the establishment of lush aquatic macrophyte populations and enhanced nursery habitat and cover for juvenile fish, allowing increased recruitment of younger year classes.

DCR general water quality parameters basically behaved as in previous years, with the system being dominated by the seasonal cycle of spring-fall thermal stratification followed by isothermal aerobic mixing. Depletion of oxygen in the deep water layer (hypolimnion) during the stratified season of 1993 progressed as in prior years, again allowing the buildup of several parameters to temporarily high levels (hydrogen sulfide, iron, manganese) before fall overturn and isothermal mixing returned the entire water column to aerobic conditions. However, with the large increase in DCR water volume that accompanied the 1993 winter inflows, the onset of deep water anoxia progressed more slowly in 1993, as compared to years with smaller hypolimnetic volume.

Concentrations of most monitored water quality components have remained considerably lower in DCR than those typically or periodically found in the creek, and consequently pose no hazard to downstream water quality. In 1994, DCR spilled over (slightly) into lower Davis Creek in March, though at a much reduced rate as compared to 1986 and 1993, the only other years when the reservoir passed surface water downstream.

Secchi transparency increased steadily in the last three summers, following the large volume increases from 1991 and 1993 inflows. This also occurred in the years following the large 1986 inflows.

Six of the seven priority pollutant metals monitored at DCR were at or below their respective levels of detection in all samples during the past year, with only mercury exhibiting an anomalous elevation to 1.0 ppb, in one sample on one date. As this occurrence did not coincide with any notable inflow, storm, or limnological event, it may reflect contamination of the sample, either in the field or in the analytical lab. All other mercury samples in the past three years, from all depths, have been below the 0.2 ppb (0.0002 ppm) level of detection. Levels of these metals in the reservoir water can thus be seen to have posed no threat to downstream water quality to date.

The relevant chemistry of the metal of importance at DCR, mercury, occurs at concentrations well below the analytical capabilities of contract laboratories. However, we hope to develop ultra-trace level capabilities at U.C. Davis, contingent on the acquisition of additional (non-HMC) funding.

Section 6 - Davis Creek Reservoir Aquatic Ecology Metals

DCR bottom sediments have been collected at least semi-annually (spring and fall) each year since impoundment, for analysis of the 7 priority pollutant metals (As, Cr, Cu, Pb, Hg, Ni,

and Zn). Additional sediment samples have been taken for mercury in the summer and winter of most years since 1987. Each sediment collection has consisted of composite bottom samples taken from 3 locations in the reservoir, along a transect leading from the dominant water input source, Davis Creek, to the Dam and spillway. Sampling at a fourth sediment sampling station, located in the South Arm of the reservoir, was initiated in October 1990.

The large sediment inputs that accompanied the high inflows of winter 1993 brought a large volume of new sediment mercury to the reservoir. This was the subject of our synoptic sediment mercury study, summarized in last year's report. The relatively high mercury levels found in the South Arm were localized to the Split Cove region, with high mercury concentrations occurring in conjunction with a low inflow source stream, relative to Davis Creek and the creek at the back of Dam Arm. This region is still under study. Since the large 1993 inflow, mercury concentrations in surficial sediments have returned in the past year to levels consistent with the low range of the long-term data record. This can be attributed to burial of watershed inflow sediment by internally produced, lower mercury material. Concentrations increased to lower maxima and returned to baseline much more quickly following the 1993 inflows, as compared to the similar magnitude 1986 inflows. This may reflect a positive effect of the earlier cleanup efforts by Homestake at the abandoned Reed Mine.

All of the other monitored sediment metals (arsenic, chromium, copper, lead, nickel, and zinc) exhibited slight to dramatic declines in surficial concentrations since 1991 and continuing through this last year. The 20 foot rise in reservoir water level that accompanied the

concentrated March 1991 rainfall represented the first significant inflows to the reservoir of runoff water and entrained sediment after 1986. This was also the first major new input of sediment following the late 1980s Reed Mine cleanup. The continued decline of these metals following the very large new input of watershed sediment in 1993 indicates that recent inputs of sediment from Davis Creek have been lower in metals content than those of 1986. As the Reed Mine mitigation work occurred between these two times, the declining trends in the DCR sediment metals data records further suggest a positive effect from this cleanup.

This year, we investigated the feasibility of collecting sediment-dwelling organisms from the reservoir bottom for mercury analysis. Preliminary work indicates that the deeper sites do not contain sufficient density of bottom organisms for effective collection/analysis, but that sampling for chironomid midge larvae at some of the sites with depths under 10 m may be feasible by sieving a large number of sediment grabs. In May 1994, it was possible to obtain relatively reliable mercury numbers from two sites: the South Arm and Reed Arm index stations. The South Arm composite had a mercury concentration of 2.62 ppm (dry wt), while the Reed Arm composite had 1.46 ppm. This is consistent with the difference in sediment mercury concentrations at the two sites (2.53 ppm wet wt at South Arm and 1.12 ppm at Reed Arm from the same date), and suggests that mercury uptake by benthic invertebrates in DCR may be roughly proportional to sediment total mercury levels. It would be very interesting to determine what proportion of this uptaken mercury in chironomids is methyl-Hg and how much is inorganic-Hg.

Measurement of mercury in fish tissue from DCR forms the cornerstone of the EMP in this water body. The current fish monitoring includes the following annual samples: (1) 30 individual adult fish for analysis of mercury in muscle, (2) two semi-annual composites of both bass and bluegill livers (4 total) for analysis of 7 metals (As, Cr, Cu, Pb, Hg, Ni, Zn) and (3) three composites of young-of-year bass for 7 metals. In the 1993-1994 monitoring year, all of the above samples were collected and analyzed, plus an additional 31 adult fish muscle mercury samples and 9 additional liver mercury samples from individual fish. Most notably, it continued to be possible during the last year to obtain a good number of 1-3 year old fish which were comparable in size and age to the initial fish samples which had the very high mercury levels in the 1980s.

Consistent with the last several years, the new bass muscle mercury data indicates that the declining bass mercury trend noted in the 1980s has clearly leveled off. Following the peak mercury levels of the first two years after impoundment, all subsequent samples have been lower, and all but the peak 1987 sample have been statistically lower. However, mean muscle mercury concentrations in the larger sampled adult DCR bass have not declined since mid 1989, and have instead remained within a range of 1.5-2.5 ppm over a five year period. While these levels are well above the Health Advisory level of 0.5 ppm, it is notable that they are approximately 50% lower than the 1985-1986 peak levels of over 4 ppm.

The within-year increased stability of the shoreline and the associated healthy aquatic macrophyte development, due to water conservation measures instituted by Homestake, has resulted in the survival and availability of a larger cross-section of fish size and age classes in the reservoir. Since 1991, it has become increasingly possible to collect fish of a size and age

comparable to the 1980s bass which demonstrated the maximal mercury levels. The younger bass collections averaged 1.4 ppm mercury in August 1993, 1.5 ppm in late October 1993, and 1.2 ppm in May 1994, as compared to mean levels of 2.5-4.2 ppm in similar sized fish in 1985 and 1986. This is clear indication that mercury bioavailability in DCR declined significantly following initial impoundment years.

A collection of 1-3 year old bass in May of 1993, following the large storm inflows, was notably higher in mercury at 1.85 ppm, as compared to 1-3 year old bass from 1992 or 1994. Fish from August 1991 was also relatively elevated, at 1.53 ppm. This may be reflective of the significant new sediment mercury inputs associated with the 1991 and 1993 storms. It may be that large new inputs of water and naturally mercury-enriched sediment lead to spike increases in mercury bioavailability, with subsequent declines in intervening years. At this point, the data base for this parameter is not large enough to allow us to reach firm conclusions, but the data should become increasingly useful with time. Every effort will be made to maintain collections of 1-3 year old bass in the future, in addition to collections of the larger fish, and this parameter will be watched carefully as an indicator of mercury bioavailability trends.

Data from the very largest, purely piscivorous bass also indicate the change in mercury bioavailability since impoundment. While the recaptured stocker bass taken in 1987 and 1988 had mercury concentrations in excess of 5 ppm, comparably sized individuals taken in the 1990s have consistently contained < 2.8 ppm, again denoting a major decline in uptaken mercury.

Bluegill, which have been monitored for mercury in Davis Creek Reservoir since 1987, have, like the bass, not demonstrated any rise in mercury concentrations over this period. In the past monitoring year, sampled bluegill of 50-500 g contained mean muscle mercury concentrations of 0.8-2.4 ppm. Trends in < 250 g fish generally paralleled those of the larger size classes, though at a consistently lower level. Concentrations in the larger individuals, which had been very stable through most of the period of record, dropped notably in May 1994. This was seen in the < 250 g fish as well. For both size classes, concentrations in 1993 were higher than in either 1992 or 1994. Large bluegill muscle mercury from 1991 was higher than that from 1992 as well, though no smaller size class data exists from that time. Thus, the bluegill data is consistent with the bass data, in that the two years with significant new inputs of water and mercury-enriched watershed sediment, 1991 and 1993, correspond to higher muscle mercury concentrations in the fish. Conversely, low inflow years such as 1992 and 1994 appear to be correlated with declines in mercury uptake by the fish.

As in the previous four monitoring years, mercury was assayed in three mid-summer whole fish composites of young-of-year juvenile bass in August 1993. These composites (approximately 10 fish each) consisted of fish under 3 grams in size and under 4 months in age, which were seined consistently at a midlake location. They therefore are potentially very useful indicators of year-to-year trends in mercury bioavailability. Thus far, trends are consistent with the large fish findings, though at much lower mercury concentrations. While data from before 1989 are not available, the relatively low 1989 and still lower 1990 mercury levels suggest a decline from earlier, following several years with no significant water or sediment inputs to the reservoir. With the first major inflows since 1986 of both water and sediment in 1991, the young-of-year bass demonstrated significantly higher mercury accumulations. Levels declined

somewhat in the following year, 1992, but increased again in 1993, which was another high inflow year. It is notable that data for large bass and bluegill, young-of-year juvenile bass, and sediment mercury are all consistent.

Concentrations of mercury in bass and bluegill livers have ranged, fairly erratically, from 1.4 to 8.7 ppm since 1985. Liver-Hg in the most recent monitoring year averaged 5.3 ppm in large bass and 5.6 ppm in bluegill. Mercury is typically higher in the liver than in muscle, though the mercury in liver may contain large proportions of inorganic mercury, as compared to the methyl mercury which accumulates in muscle. A consistent seasonal trend has become apparent in the bluegill data record over the past five years, with fall liver-Hg levels at approximately double those seen in the spring. This year we analyzed mercury in both muscle and liver from nine individual bass. Liver-Hg was dramatically higher in the larger, purely piscivorous individuals. Mercury is not measured in fish livers by California Fish and Game, so no comparative data is available.

Copper continued to demonstrate an interesting pattern of bioaccumulation, with bass concentrating copper in their livers at concentrations an order of magnitude higher than the bluegill. During the past monitoring year, mean liver-Cu was 1.7 ppm in bluegill, as compared to 15.5 in the bass, a nine-fold difference. This is interesting, as it indicates a strong difference between the two main monitoring species. Though copper is relatively high in DCR sediments, it is accumulating in bass but not in bluegill, which apparently metabolize copper in a unique way.

Liver zinc during the last monitoring year averaged 30 ppm in bass and 22 ppm in bluegill, similar to previous levels and to levels found in original stocker bass.

Concentrations of arsenic, chromium, lead, and nickel in fish livers of all three species in recent years, as well as in the juvenile bass composites, were either near or below the analytical detection limits, which have been lowered over this period.

Section 7 - Aquatic Ecology Monitoring in Davis Creek

1993/1994 was a very low runoff year. However, following the repair of the Reed adit plug by Homestake after it was compromised during an earlier high flow event, even the relatively low flows of winter 1994 were sufficient to leave DC-5 in very clean condition, with little or no iron/bacterial floc and a full complement of typical coast range stream biota. Additionally, trap censuses indicate that Sacramento suckers are now successfully recruiting young in Davis Creek above the reservoir. This can be attributed to the filling with gravel of the culvert pool in the 1993 storm flows and corresponding removal of the former blocking ledge, such that adult suckers can now migrate freely upstream and back to the reservoir. Presence of numerous one year old suckers also indicates the success of our juvenile sucker transplantation exercise last year. Roach in sufficient numbers for metals analysis were taken in a consistent size range in all seasons from DC-5.

At DC-6, a very slight overspill from the reservoir in March 1994 had little effect on stream conditions. Flow, outside of the slight March 1994 overspill, consisted of a combination

of spring flow and dam seepage which collected at the northwest corner of the dam, as in prior years. Water was uniformly clear and bottom sediments in the cattail marsh were black and organic. The cattail monoculture filled the channel to a distance of ~0.8 mile downstream of the dam. Roach of a consistent size were collected in sufficient numbers for metals analysis during each of the quarterly surveys. Juvenile Sacramento suckers have become relatively prevalent at DC-6 in the last year, after having been basically absent prior to 1993. This may be due to migration of spawning suckers upstream from Cache Creek during the high flow 1993 winter, when the reservoir spilled at upwards of 30 cubic feet per second for an extended period. Since that time, Davis Creek has generally been dry below ~1 mile downstream of DC-6 through most of the year.

PROJECT RECOMMENDATIONS

Section 1 - Introduction

1. The 1993-1994 data base did not indicate any major changes to the current annual schedule for water quality and aquatic ecology sampling in Davis Creek or Davis Creek Reservoir.

Section 2 - QA/QC

1. It is important that the QA/QC program be continued throughout the life of the monitoring program and that an evaluation of these data be part of each Annual Report. In addition to the routine laboratory QA/QC samples (e.g. lab blanks, matrix spike-recoveries, method standards, external stands, calibration curves, interlaboratory duplicates), HMC should continue to send quarterly water samples (as blind samples) to NET and another independent analytical lab for interlaboratory comparison. Recently, these samples have been sent to ENSECO and we recommend that this be continued. In addition, HMC should continue to collect field blanks.

2. Since metals are such an important part of the monitoring effort, and since their concentration in creek and reservoir water is normally at or below detection, we recommend that HMC continue to send samples of the commercially prepared metals in water reference material to NET as blind samples.

3. All laboratories running sediment metals analyses should continue to run NIST material #2704 (Buffalo River Sediment) along with each batch of sediment samples.

4. It is recommended that HMC request an explanation from NET as to the nature of the apparent discrepancy in measuring iron in the certified stock standards for metals in water.

5. The As and especially the Cr results from the NIST SRM (sediment metals) testing should continue to be investigated by both HMC and the contract laboratory.

Section 3 - Davis Creek Water Quality

1. Continue sampling as presented in the Environmental Monitoring Program and as presented in Table 2 of this report.

2. No new changes to this aspect of the monitoring program are required.

Section 4 - Davis Creek Aquatic Ecology - Heavy Metals

1. Quarterly sampling for Roach metals at DC-5 and DC-6 should continue.

2. Measurement of metals in Davis Creek sediment should also be continued, but it should be realized that comparison with pre-October 1987 data is not appropriate.

3. Maintain the new limits of detection initiated during the 1990-1991 monitoring year.

4. Samples for benthic invertebrate mercury content should be taken from DC-5, DC-6 and DC-6A on each of the quarterly surveys.

5. Should the reservoir spill in the upcoming year, roach samples should be collected downstream of DC-6.

Section 5 - Davis Creek Reservoir - Water Quality

1. Maintain the current list of general water quality parameters, with quarterly seasonal monitoring.

2. Continue the reservoir monitoring program with the existing parameter list of seven priority pollutant metals in water (As, Cr, Cu, Pb, Hg, Ni, Zn). Though the majority of these metals continue to be below detection in reservoir water, that information in itself is of interest, and it is always possible that they could reach higher levels under changing conditions. In addition, while we continue to analyze these metals in fish, we need a record of water concentrations even if they are below detection. Zinc, nickel, and of course mercury, have been important in the system at different times and should definitely be retained.

Section 6 - Davis Creek Reservoir Aquatic Ecology Metals

1. Maintain sediment metals monitoring at the current schedule, with mercury sampled quarterly and arsenic, chromium, copper, lead, nickel, and zinc sampled semi-annually from each of the four reservoir bottom sediment index stations.

2. Continue sampling reservoir fish at the current schedule, including adult bass and bluegill and young-of-year juvenile bass.

3. Collect 1-3 year old bass and bluegill when possible, as a consistent sample group and comparable to fish collected in early years of the project. Also attempt to sample fish from a range of larger year classes.

4. Choose a consistent size class of fish for future liver composites, if possible.

5. If the capacity is developed for UCD analysis of methyl mercury in biota samples, investigate the ratio of methyl to total mercury in bass and bluegill liver, as well as in non-fish reservoir biota including zooplankton and chironomid midge larvae.

Section 7 - Aquatic Ecology Monitoring in Davis Creek

1. Continue stream monitoring on quarterly schedule.

6.0 Vegetation

The Vegetation Monitoring Program includes monitoring of previously reclaimed areas (reclamation success), sensitive plants and the management of contiguous lands. Reclamation research and test plantings to determine reclamation methods best suited for the site are also an integral part of the program.

During the 1993-1994 monitoring year, HMC applied for and received approval from the responsible agencies to allow utilization of the north end of the pit as a waste rock disposal site. Backfilling commenced in the spring of 1993. As per condition of approval as required by Napa and Yolo Counties, an addendum to the previously approved Reclamation Plan for the McLaughlin Mine was prepared and submitted. The basic waste rock management strategy as implemented on-site remains unchanged.

There were no construction activities at the site during the monitoring year which were not a part of the routine mining and milling operations. The July 1993 - June 1994 Annual Environmental Monitoring Report fulfills the annual reporting requirements for the 1993-1994 monitoring year (due January 15, 1995) per Provision 9 of the current Waste Discharge Order issued by the California Regional Water Quality Control Board, Central Valley Region.

Sensitive plant monitoring was conducted by Glen Clifton of Biosystems Analysis, Inc., and Joe Callizo of the Napa Chapter of the California Native Plant Society. In general, all populations of sensitive plants observed during the 1994 monitoring studies were similar in size to those documented in 1993, with the exception of Helianthus exilis populations being larger and similar to years previous to 1993. Ten previously undocumented populations of various sensitive species were observed at sites monitored in 1994. On the whole 22 of 61 numbered sensitive plant occurrence sites were monitored during the 1994 field season. These sites were chosen for their proximity to existing facilities. Many sites were not inventoried since they have not been impacted by the project since 1985.

In late April, the California Native Plant Society conducted a salvage program of Fritillaria purdyi bulbs at those sites which will be impacted by filling of the Tailings impoundment. This impact was previously identified and approved during the original permitting.

No other new or significant impacts to sensitive plant occurrences were observed in the vicinity of the existing mining project during 1994. The current mine operational procedures continue to completely avoid the remaining known sites.

Reclamation review was completed by Lorraine Van Kekerix, an independent consultant, formerly with the California Division of Mines and Geology. Her report provides a review of seed mixes and general reclamation practices as well as an area by area review. In general, revegetation efforts have been successful in establishing plant cover adequate to stabilize disturbed sites and control erosion. Most of the areas revegetated to date are adjacent to undisturbed areas and native species from undisturbed sites have started to invade the revegetated areas. The 1993-1994 revegetation program was implemented on fifty acres of disturbed land and was successful in controlling erosion.

Reclamation research has been conducted at the waste rock areas in the form of large scale test plantings of shrub and woody specie seedlings which have been installed and monitored by Circuit Rider Productions, Inc. Additionally, Homestake initiated a trial program for direct seeding of woody species in 1992-1993. These programs have provided valuable information on specie selection and planting techniques.

In order to test and evaluate effective reclamation methods for the Tailings impoundment, a test plot was established during 1992-1993 with initial testing of three different treatment methods conducted in 1993-1994. Seeding was conducted using the standard seed mix and three-step application as implemented at the waste rock areas. Preliminary results show excellent growth (90-100% cover) with minimal soil application.

7.0 Wildlife

The Wildlife Monitoring Program includes documentation of wildlife observations, wildlife use of Davis Creek Reservoir, and an annual search for golden eagle nests. The Davis Creek Reservoir has added a feature to the area wildlife habitat that did not previously exist. Monitoring indicates wildlife use of the Reservoir and resulting beneficial effects.

An aerial helicopter search for raptor nests was conducted on May 10, 1994 by wildlife biologist Jack Barclay of Biosystems Analysis, Inc. The project area was covered flying for approximately one hour. Golden Eagles were again occupying the nest site identified last year north of the mine property along Cache Creek. Two nearly fledged juvenile eagles were observed at this site during the survey. No other active nests were observed this year.

The Townsend's Big-eared Bat colony continues to inhabit the roost site secured for them in 1988. Ongoing behavioral, habitat requirement, and population studies are being conducted by researchers. Guano traps, installed this past year, are providing information on seasonal food source selection.

The approved Contiguous Lands Management Plan (CLMP), was developed as an extension of the mine's Environmental Monitoring Program for the management of nonmined lands. In order to better administer CLMP, six different programs were established within the Plan's framework. A summary describing the program objectives and the work performed and/or programs initiated to date is presented in the Wildlife section.

8.0 Geotechnical

The Geological and Geotechnical Monitoring Program monitors the integrity of dams and embankments. The structures reviewed include the Tailings Dam, M-1 Dam, Davis Creek Dam, the Main Waste Rock Sediment Control Facility, the East Waste Rock Disposal Facility Pond, and sediment ponds T-2 and T-3. All structures are performing as designed.

RECOMMENDATIONS

The following recommendations are made for the 1994-1995 monitoring year:

Water Quality

1. Continue to monitor surface and groundwater quality according to the current Water Quality Monitoring Program as approved by the California Regional Water Quality Control Board, Central Valley Region and the Responsible Agencies.

2. Continue to scrutinize data from monitoring stations associated with the Waste Rock Disposal Facilities for trends.

3. Continue to monitor station DC-06 monthly during the winter runoff season to provide additional data on Davis Creek below the Reservoir. This monitoring is above and beyond the requirement for quarterly monitoring and is in response to a recommendation made by Ecological Research Associates in their review of the 1987-1993 Annual Monitoring Report.

4. Continue the QA/QC program in its present format.

Air Quality and Meteorology

1. Asbestos monitoring has demonstrated that mining activities have not increased asbestos fiber concentrations in the ambient air. Only one chrysotile

fiber greater than 5 microns in diameter was detected during the seven years of monitoring. The greatest concentration measured during those eight years is 0.0131 fibers/cc OSHA standard. We recommend, as we have in the past, that asbestos monitoring at this location be discontinued.

Geotechnical

1. As recommended in the Annual Monitoring Reports since 1988-1989, and the Geotechnical Data Reviews completed by D.P. Engineering, Inc., it is recommended that M-1 Dam be eliminated from the Geotechnical Monitoring Program.

FUTURE ENVIRONMENTAL MONITORING CONSIDERATIONS

Homestake's McLaughlin Mine is approaching the time when a number of significant adjustments in the nature and scale of the Mine's operations will occur. The current schedule calls for the majority of the mill feed to be provided from stockpile reclaim rather than in-pit mining by the end of 1995 or early 1996. With the shift to stockpiled low grade ores, the use of the autoclaves will be phased out and the average annual production will decline.

Ongoing exploration will continue and additional zones of mineralization may prove to be of sufficient grade to expand the Mine's reserves, extend the mine life, and defer the scheduled changes.

These changes in the operation of the Mine and Mill will necessitate adjustments in the Mine's environmental monitoring program. Monitoring activities will need to be redirected to focus on the areas of continuing activities, while some monitoring may no longer be required and should be phased out. Reclamation of the completed areas will accelerate.

A detailed proposal and rational for any proposed changes in the environmental monitoring program will be submitted as a separate document late this year after results of the current underground exploration have been evaluated, and the Mine's schedules and plans reviewed. All proposed changes will be subject to approval of the appropriate regulatory agencies.

XC: RK

NAPA COUNTY

CONSERVATION -- DEVELOPMENT
AND PLANNING DEPARTMENT

1195 THIRD STREET, ROOM 210 • NAPA, CALIFORNIA 94559-3092
AREA CODE 707/253-4416

JEFFREY REDDING
Director

May 19, 1994

Dolora Koontz
Homestake Mining Co.
McLaughlin Mine
26775 Morgan Valley Road
Lower Lake, CA 95457

Dear Ms. Koontz:

At its meeting of May 18, 1994, the Conservation, Development and Planning Commission accepted Homestake's 1992-93 Annual Monitoring Report for the McLaughlin Mine as adequate.

Thank you for your cooperation in this matter.

Very truly yours,

Michael Miller
Deputy Planning Director

cc. Jeffrey Redding, Director
Therese Garbarino, Planner II

NAPA COUNTY
CONSERVATION, DEVELOPMENT AND PLANNING DEPARTMENT

DEPARTMENT REPORT

Meeting of May 18, 1994

Agenda Item: # 13

SUBJECT: REVIEW OF THE 1992-1993 ANNUAL ENVIRONMENTAL MONITORING PROGRAM FOR THE McLAUGHLIN GOLD MINE PROJECT

FILE: Use Permit # U-198283, CONDITION # 16

OWNER: HOMESTAKE MINING COMPANY

BACKGROUND:

In accordance with Condition # 16 of Homestake's Use Permit/SMARA Permit, the Planning Division has prepared this report for the Conservation, Development and Planning Commission as a general summary of the findings presented in the Executive Summary of the 1992-1993 Annual Monitoring Report submitted by Homestake Mining Company on September 29, 1993.

The attached report discusses the monitoring results for the 1992-1993 monitoring year. No new recommendations have been requested this year by Homestake to modify the reporting requirements of the Monitoring Program.

The Planning Department's Review of the Environmental Monitoring Report is included as Attachment A, and the Homestake Mining Company's Executive Summary of the Annual Environmental Monitoring Report for 1992-1993 is attached as Attachment B. The full document is on file in the Conservation, Development and Planning Department Library.

Project activity at the Homestake Mine during the 1992-1993 monitoring year included a revision to the Reclamation Plan to allow for the backfill of the north pit, (File # 92161-MOD), and four activities that were exempt from County review including two new exploration holes, a low grade ore oxidation study on the existing low grade ore pad, and testing of several floatation reagents added to the ore at the mill site rather than the processing site.

RECOMMENDATION:

1. Accept the Department's attached review of the 1992-1993 Annual Environmental Monitoring Report (Attachment A) as adequate.

ATTACHMENT "A"

REVIEW OF THE ANNUAL 1992-1993 ENVIRONMENTAL MONITORING PROGRAM McLAUGHLIN PROJECT

The 1992-1993 Annual Monitoring Report represents the tenth report submitted by Homestake Mining Company in fulfillment of the requirement to report annually the results of the McLaughlin Mine Environmental Monitoring Program. The objective of the monitoring program is to measure compliance with environmental performance standards recognized in the regulatory permits issued for the project. The monitoring program also requires the assessment of trends indicative of potential impacts attributable to the McLaughlin Project.

Monitoring data presented in the 1992-1993 annual report covers the 12 month period from July 1, 1992 to June 30, 1993. Quarterly data reports were presented through the year summarizing the data collected each quarter of the monitoring year. The purpose of the annual report is to provide the reviewer with an analysis of the data collected during the previous monitoring year.

This report summarizes the Executive Summary Conclusions and significant findings for each monitoring discipline presented by Homestake in the Annual 1992-1993 report. Homestake's Executive Summary is attached as Attachment B.

WATER QUALITY

The Water Quality Monitoring Program consists of surface and groundwater monitoring of the hydrologic system surrounding the McLaughlin Mine facilities. The program is designed to monitor ambient or background water quality and regional water quality as well as waters closely adjacent to project facilities. There are nine (9) surface water stations, twenty-three (23) groundwater stations, and three (3) wasterock underdrain stations. Monitoring occurs on a quarterly basis.

Homestake indicated that no changes in surface or groundwater quality were identified. The quality of the waters in the vicinity of the processing facility, tailings impoundment, Davis Creek Reservoir, and the mine pit area remain essentially the same as described prior to the project's operation.

The 1992-93 monitoring data indicate that the upward trend in the concentration of sulfate in the waste rock area is continuing as predicted in the EIR and the 1986-1987 through the 1989-1990 reports. Homestake indicates that changes in water quality are apparent for certain parameters associated with sulfide oxidation at specific monitoring stations in the waste rock areas. No significant changes have resulted in overall water quality in Hunting or Knoxville Creeks.

Homestake reported that only 11 of 710 water quality data points (one percent) exceeded the maximum likely concentration of water quality variables tested for the 1992-93 reporting period. No trends or changes associated with the exceedences were identified.

NPDES DATA

The collection of NPDES data is required by the Central Valley Regional WQCB Order No. 88-181 to analyze the discharge of sediment control dams and receiving waters. Homestake reports that stormwater discharges occurred from Pond 7 of the Waste Rock Sediment Control System after a series of exceptionally heavy and prolonged rainfall events in January 1993. Increased underdrain flows observed in association with the storm events exceeded the capacity of the pumpback systems which recycle flows from the waste rock area to the process area. This resulted in co-mingling of underdrain flows with surface runoff collected in the sediment control ponds and subsequently discharged to Hunting Creek. Effluent and receiving waters were back in compliance by early February 1993.

Concentrations in the measured exceedences were low, however, Homestake initiated a program to immediately upgrade the capacity of the pumpback system to prevent future exceedences due to storm flows. Engineered upgrades to the underdrain system completed prior to the 93-94 rain season should improve interception of underdrain flows.

No discharge occurred from the East Waste Rock Facility Pond, or from Pond 1.

OTHER MONITORING

Sampling required in the Environmental Monitoring Program but not included in routine sample sets for surface and groundwater are included in this section. Data summarized include sampling of the cooling pond in March and June, semiannual sediment data for four locations, quarterly composite of samples of the tailings, quarterly domestic well samples, quarterly sampling of the tailings seepage return sump, and quarterly tailings reclaim water sampling for cresol and carbon disulfide.

Homestake reports that the cooling pond and tailings seepage return sump reflect expected operational values. Sediment data samples reflect ambient stream conditions. Tailings samples reflect expected concentrations of tested constituents, and continue to test as nonhazardous. Tailings reclaim water analyses reflect nondetectable levels of cresol and carbon disulfide as expected. No unusual variations were detected in the domestic wells.

AIR QUALITY / METEOROLOGY

The Air Quality Monitoring Program is conducted in accordance with the requirements of the Bay Area Air Quality Management District, Lake County Air Quality Management District, and Yolo-Solano Air Pollution Control District. The focus of the air quality monitoring program is on documenting Total Suspended Particulate Concentrations (dust). The program supplies values for particulates and measurements of particulate mercury, particulate arsenic, and asbestos in the air near the mine. In the processing area, the program supplies data on source emissions from process vents, stacks, tanks, and ponds. Meteorological measurements are taken continuously at four locations to assist in the interpretation of the air sampler data.

Rainfall was above normal, ending the six year drought. Most precipitation occurred during December, January, February. The mine area average rainfall was 37.35 inches.

Homestake reports that the existing road dust suppression measures, baghouses, scrubbers, and other air quality control measures have been effective in controlling emissions. Compliance with all regulatory requirements have been met. Homestake reports that compliance was maintained with all ambient air standards and operating permit conditions.

AQUATIC ECOLOGY

The Aquatic Ecology Monitoring Program supplements the chemical water quality monitoring program. Data is collected on benthic macroinvertibrate community structure and diversity, fish community structure and population density, and levels of heavy metals in fish.

Hunting and Knoxville Creeks

Bodega Research Associates performed the annual aquatic ecology monitoring for Hunting and Knoxville Creeks. Their summary of conclusions indicated that no meaningful trends in trace element concentrations can be identified as resulting from the Homestake mining operations. They indicated that the reduced and focused monitoring system, implemented in 1986, has functioned efficiently and productively through 1993, and should be continued without major alteration through 1993-1994. The growing data base has become sufficient to detect statistically significant annual changes in the benthic macroinvertebrate communities at each sampling station. Changes appeared to relate to annual variation in rainfall and stream hydrology, rather than to changes associated with the Homestake mining operation.

Reestablishment of benthic invertebrates lost in 1986 has occurred in Knoxville Creek. The loss may have been due to an accidental discharge from sediment pond M-1 in 1986, or drainage from the new East Waste Disposal site in 1987-88, or may have been the result of hydrologic changes. After the 1993 field sampling the recovery of the benthic macroinvertibrate community is essentially complete, since species richness, diversity, density, and relative abundance of 3 taxa of insects considered sensitive to water quality have all returned to pre-spill values.

Analysis this year demonstrates correlations between invertebrate community parameters and rainfall variables at several sites. California roach populations have been declining at all sites for the past 7-8 years, although numbers have recovered slightly at some Hunting Creek sites in 1992 and 1993. The drought has been an important factor in the reductions of roach population due to very low summer flow conditions which decrease the probability of survival and reproduction of roach at all sites, and has increased emergent and streamside vegetation. The change in habitat may have altered conditions for California roach. With the heavy rainfall year of 1992-1993, flow conditions should remain more favorable to roach populations than the previous drought conditions.

No meaningful trends in trace element concentrations were identified as arising from Homestake Mining operations.

Davis Creek and Davis Creek Reservoir

Davis Creek and Davis Creek Reservoir sampling was conducted by Ecological Research Associates and U.C. Davis under the direction of Dr. Charles Goldman. Reservoir sampling commenced in April of 1985 and has continued as specified in the Environmental Monitoring Manual, with an additional thirty six (36) annual mercury analyses.

Ecological Research and U.C. Davis concluded that the water quality and aquatic ecology monitoring aspects of the McLaughlin Project in Yolo County are operating in an orderly, logical and timely manner.

The 1992-93 monitoring year saw a continuation of efforts to characterize and evaluate the distribution of mercury in Davis Creek Reservoir (DCR) sediment. This will continue to be the area of research focus in future years. This type of data sets the framework for additional studies related to processes which regulate the deposition of mercury to the reservoir's sediments and the potential influence of benthic microbial activity on its distribution and bioavailability.

The hydrologic characteristics of Davis Creek during the 1992-1993 monitoring year were dominated by the December-February rain storms which dropped 27.77 inches of water during that period. This accounted for 75% of the annual precipitation. Davis Creek reservoir spilled over the dam starting in late January to early February and continued into late March to April. By the end of May 1993, water level was .2 ft below the spillway. This is the first time since the least 100 year storm event in 1986 that the DCR spilled.

Sampling from Davis Creek and Davis Creek reservoir included: a) water samples, 2) sediment samples, 3) mercury analysis on fish, 4) "other" metals on fish. Sediment mercury sampling was completed on sediment cores taken from Davis Creek Reservoir.

The 1992-1993 data base did not indicate any major changes to the current annual schedule for water quality and aquatic ecology sampling in Davis Creek or Davis Creek Reservoir.

VEGETATION MONITORING

The Vegetation Monitoring Program includes monitoring of previously reclaimed areas (reclamation success), sensitive plants and the management of contiguous lands. Reclamation research and test plantings to determine most suitable reclamation methods are also included in the program.

Sensitive Plants

In general, Homestake reported that all populations of sensitive plants observed during the 1992-1993 monitoring season were similar to the 1991-92 reporting year and were smaller than normal in number and size. Sensitive plant monitoring was conducted by Biosystems Analysis, Inc. and the Napa Chapter of the California Native Plant Society (CNPS). Many populations were absent altogether and believed to be the result of the sixth year of drought and low rainfall in spring of 1992. Eight previously undocumented populations of various sensitive species were observed

at sites monitored this year. Four new sites were documented in 1993. On the whole, 12 of 59 numbered sensitive plant occurrence sites were monitored during the 1992-1993 field season for their proximity to existing facilities. Many sites were not inventoried since they have not been impacted by the project since 1985.

Reclamation Review

Reclamation review was completed by Lorraine Van Kekerix, an independent consultant formerly with Cal Division of Mines and Geology. Revegetation efforts have been successful in establishing plant cover adequate to stabilize disturbed sites and control erosion. Native species from undisturbed sites have started to invade the revegetated areas. Successful revegetation in the 1992-1993 season was completed on 72 acres of disturbed land, including the 1600 elevation bench, northern 1/3 of the 1700/1750 elevation bench, repairs to the 1350 and 1400 elevation bench in the West Waste Rock Disposal Facility; repairs on the West Waste rock disposal facility at the 1910 elevation bench, the western topsoil stockpile at the Davis Creek Reservoir; 2 exploration sites just north of the pit; 2 exploration sites off HMC-1 road, ampho storage and south pit power line ; a north pit topsoil stockpile and sump; and a new freshwater ditch below site 5.

The seed mixes used in the 1992-1993 season were the same mixes used since 1987-88, and are recommended for the 1993-1994 season, with the same change recommended last year that the serpentine mix be changed to replace lana vetch with rose clover. Soil amendments and mulch recommendations that were used since 1985-86 have provided good results and are recommended for the next season.

Weather during the year was not average. This was the first year of above average rainfall after a 6 year drought. Rainfall was 39 inches from July 1, 1991 to June 30, 1992, approximately 140% of normal rainfall. Most of the precipitation (28 inches) fell between December and February.

Species composition on reclaimed sites has changed over time with annual grasses predominant in the first year, followed by emerging perennial grasses, and clover in the second year. In the third year, perennial grasses are predominant, with native grasses more abundant, and in the fourth and fifth years, the invasion of native plants increases. Over time, the native species are expected to replace the seeded species.

There was a significant increase in the number of different plant species invading the revegetated sites as compared to the number of species present in the past several springs. The proportion of seeded legumes increased (i.e. rose clover and lana vetch) while the proportion of volunteer legumes continued to decrease from the high proportion present in the 1988 and 1989 evaluation. A list of invading plants was submitted with the annual report, including conifers, dicots, and monocots.

Vegetation coverage for the 1992-1993 plantings on the West Waste Rock Facility was 80-90%, with grasses 2 and 1/2 to 3 feet tall.

WILDLIFE

The Wildlife Monitoring Program includes documentation of wildlife observations made on the Homestake property including the tailings impoundment, wildlife use of Davis Creek Reservoir, and an annual golden eagle nest survey. The Wildlife data base consists of wildlife observation cards submitted by project employees, contractors, researchers, and wildlife monitoring by Ecological Research Associates at Davis Creek Reservoir.

Wildlife observations sighting routes included Morgan Valley Road for Lower Lake to Knoxville, perimeter roads to Davis Creek Reservoir and the Tailings impoundment, Rayhouse Road from the Reid Mine continuing easterly across Davis Creek Dam. Wildlife observations are also documented within and adjacent to the east rock sediment control ponds, mine and process areas, and neighboring residential lands. Numerous sightings were accumulated by Dr. Darell Slotten of U.C. Davis in conjunction with his work at Davis Creek Reservoir.

Species diversity for the 1992-1993 study year as compared to the previous five years resulted in 55 bird species not evident this year which were documented in the previous seven years. Four new bird species were added. Fourteen mammal species and ten herptile species previously sighted were absent in this year's survey. No new mammal species were added.

63 species of birds were recorded on or around Davis Creek reservoir over the 1992-1993 reporting year, including 21 species of water oriented birds. The heavy precipitation this year after a 6 year drought quickly filled the reservoir with the immediate effect of submerging the former littoral zone and associated aquatic vegetation beyond the reach of most waterfowl. The previous 6 year drought had resulting in a fairly stable shoreline with heavy growths of cattails and submerged aquatic plants, and the fall of 1992 attracted notably increased numbers of fall migrant waterfowl. The submerging of this zone created temporarily poor habitat and the bulk of the waterfowl moved away from the reservoir.

Mule deer and coyotes were the dominant large mammals sighted, as in previous years.
An aerial helicopter search for raptor nests was conducted on May 5, 1993, and resulted in the sighting of one active golden eagle nest with two young on the north of the mine property along Cache Creek. A prairie falcon and a raven were observed near the established nest site north of Hole Creek, however, the nest was empty.

The Townsend's big eared bat (Plecotus townsendii) continued to use the protected roost sites prepared in 1988-1989. The electronic monitoring system installed in the maternity site in 1988 continues to provide data on nightly and seasonal activity patterns, data on roost temperature and light levels. Records of activity patterns and visual observation confirm the continued successful use of these sites.

A western bluebird birdbox program was initiated and nest boxes for wood ducks and kestrels were installed at Davis Creek Reservoir. No wood ducks were observed, however, the bluebird boxes were used. An alternate nest site installed by the grinding facility was accepted by cliff swallows that previously nested above electrical equipment. Over 100 nests were present this year.

CONTIGUOUS LANDS MANAGEMENT PROGRAM

The Contiguous Lands Management Program (CLMP) was developed as an extension of the mine's Environmental Monitoring Program to manage Homestake's adjacent nonmined lands. Six programs were established within the CLMP's framework. Homestake provided a summary description of the program objectives and work performed and/or programs initiated to date.

The Hazard Reduction Program was designed to reduce the risk of fire resulting from activities on mine property, facilitate reaction to fire, and reduce fuel load and improve habitat quality through prescribed burning. Fire training has been provided to mine personnel, fuel reduction programs included expansion of the firebreak adjacent to the process facility through conversion of chaparral to grassland in 1986, and an ongoing grazing program. Access roads on site are regularly maintained to reduce fire hazard and provide access to fire crews, if needed.

The Shoreline Development Program was developed to assess the natural habitat development over time and for the development of habitat enhancement programs as needed. No shoreline habitat work has been initiated. The reservoir filled to capacity and spilled in January due to above average rainfall.

A habitat development project was initiated at the T-3 sediment pond in 1993 by Sonoma State students. Willow and cotton wood slips from native stock on-site were planted. Follow up and monitoring and assessment of survival rates is conducted by the students.

The Sensitive Plant Restoration Program was developed for monitoring and management of sensitive plant species onsite for ultimate inclusion in the U.C. Reserve System. Annual monitoring of sensitive plants has been added to the data base. One species was transplanted on site in 1986, 88, 89, and 1991 with followup monitoring. Salvage of an additional species for relocation will occur in spring of 1994 where the original location of the plant will be impacted by the filling of the tailings impoundment.

Pasture Use Management provides for management of pasture lands within the contiguous lands area. an ongoing grazing program was initiated in 1988, with management input from the Lake County Farm Advisor. Grazing was initiated on lands east of the mine in Napa County in 1991, and the Napa County Resource Conservation District conducted a grazing land assessment which will be used in future management decisions.

The Habitat Restoration and Improvement Program addresses wildlife habitat management practices and includes prescribed burning restoration and development of water resources. During winter of 1991-1992, the Audubon Society made two visits to the property to conduct wintering bird counts in the Davis Creek Reservoir area. Grazing was removed from the blue oak woodlands surrounding davis Creek Reservoir in 1983. Monitoring of habitat improvement has not been initiated to date.

The Education and Research Program provides for the facilities and resources necessary to fulfill the postmining use of the property as a research site for regional educational institutions as provided for in the approved reclamation plan. The ongoing annual environmental monitoring data is added to the data base which will eventually be available for research purposes. Two

research programs have been completed for post graduate degrees, with a third research project nearing completion.

GEOTECHNICAL MONITORING

The Geotechnical Monitoring Program monitors the integrity of dams and embankments. Structures reviewed include the Tailings Dam, M-1 Dam, Davis Creek Dam, the Waste Rock Sediment Control Facility, and the East Waste Rock Disposal Facility Pond. Homestake reports that all structures are performing as designed. Monitoring data was reviewed an analyzed by D.P. Engineering Inc., Geotechnical Engineers.

All structures are performing as designed and the monitoring program is sufficient to track structure performance.

Two Davis Creek Reservoir embankment piezometers (instrument used to measure integrity of dam) became inoperable during the 1992-1993 monitoring year. The impact of the loss of these data points on the integrity of the monitoring system was found to be not significant at this time. Homestake personnel resolved the issue with the California Department of Water Resources, Division of Dam Safety by modifying the monitoring schedule with an understanding to replace the piezometers if necessary.

EXHIBIT "B"

HOMESTAKE MINING COMPANY

McLAUGHLIN MINE

ANNUAL ENVIRONMENTAL MONITORING REPORT

JULY 1, 1992 THROUGH JUNE 30, 1993

EXECUTIVE SUMMARY

Introduction

The Executive Summary lists the findings of the analyses conducted on monitoring data collected during the reporting period of July 1, 1992 through June 30, 1993. The summary is organized in sections by monitoring topic.

1.0 Water Quality

The July 1992 - June 1993 Annual Environmental Monitoring Report, in conjunction with the Quarterly Environmental Monitoring Reports previously submitted throughout the monitoring year, have been prepared in accordance with the requirements of the California Regional Water Quality Control Board, Central Valley Region, Waste Discharge Order No. 89-107 (revised and adopted on August 5, 1993 as Order No. 93-121) for the McLaughlin Mine. These reports fulfill the annual reporting requirements (due October 30, 1993) and demonstrate conformance with existing plans thereby fulfilling annual notification (due January 15, 1994) per Provision 3 of the current Order.

No changes in surface or groundwater quality in terms of those elements or compounds which are fundamental to compliance with regulatory requirements have been identified. Analytical emphasis has been on those parameters most likely to be impacted by mining: cyanide, arsenic, boron, chromium, copper, lead, mercury, nickel, and zinc.

Water quality of waters in the vicinity of the processing facility, tailings impoundment, Davis Creek Reservoir, and the mine pit area remains essentially as it was described prior to the project's operation.

Water quality trends associated with sulfide oxidation in the waste rock areas were identified and discussed in the 1986-1987 through 1988-1989 Annual Environmental Monitoring Reports and also predicted in the Environmental Impact Report. The 1992-1993 monitoring data indicate that these trends are continuing. Changes in water quality are apparent for certain parameters associated

with sulfide oxidation at specific monitoring stations in the waste rock areas. It should be noted that no significant changes in overall water quality have been observed in Hunting or Knoxville Creeks particularly with respect to metals concentrations. The waste rock underdrain pumpback systems designed, installed, and operated by Homestake in response to initial trends identified through environmental monitoring, have proven effective in recycling flow from the waste rock underdrains to the process circuits.

For the reporting period only eleven (or one percent) of the 710 water quality data points evaluated for stream monitoring stations and groundwater wells exceeded the statistically derived maximum likely concentrations. No trends or changes associated with these "exceedances" have been identified.

2.0 NPDES Data

NPDES data are collected from the discharge of sediment control dams and from receiving waters as required by California Central Valley Regional Water Quality Control Board Order No. 88-181, NPDES No. CA0081477. The July 1992 - June 1993 Annual Environmental Monitoring Report, in conjunction with the previously distributed Quarterly Monitoring Reports, fulfill the annual reporting requirements of that Order.

Stormwater discharges occurred from Pond 7 of the Main Waste Rock Sediment Control System (discharge point 003 and receiving waters HC-05R and HC-10R). No discharge occurred from Pond 1 (discharge point 002 and receiving waters HC-05R and HC-10R) or from the East Waste Rock Facility Pond (discharge point 001 and receiving stream station KC-03R) during the monitoring year.

Following a series of exceptionally heavy and prolonged rainfall events experienced during our above average rainfall year, technical exceedances were observed at discharge point 003 (Pond 7 discharge) and associated receiving stream stations HC-05R and HC-10R in January 1993, as previously reported to the Regional Water Quality Control Board, Central Valley Region, in accordance with reporting requirements. Increased underdrain flows observed in association with the storm events exceeded the capacity of the pumpback systems which recycle flows from the waste rock area to the process. This resulted in the commingling of underdrain flows with surface runoff which is collected in the sediment control ponds and subsequently discharged to Hunting Creek. Effluent limits, although slightly elevated, were statistically negligible in comparison to in-stream conditions with no impact observed in the Creek as a result of the discharge.

Although concentrations involved in the measured exceedances were extremely low, Homestake initiated a program to immediately upgrade the capacity of the pumpback systems in order to prevent

future occurrences. In addition, improved interception of underdrain flows is being provided through the installation of engineered upgrades to the underdrain systems and is scheduled for completion prior to the 1993-1994 rain season.

Effluent and receiving waters were back in compliance by early February 1993.

3.0 Other

Sampling required in the McLaughlin Project Environmental Monitoring Manual but not included in the routine sample sets for surface and groundwater are presented in this section. Data summarized include sampling of the cooling pond in March and June, semiannual sediment data for four locations, quarterly composite samples of the tailings, domestic well sampling, sampling of the tailings seepage return sump, and sampling of Tailings reclaim water.

The cooling pond (CP-01) and tailings seepage return sump (TRS-01) reflect expected operational values for monitored parameters.

Sediment data collected reflect ambient stream conditions.

Tailings samples reflect concentrations expected during operations for total and filtered values. The tailings continue to test as nonhazardous.

Tailings reclaim water analyses reflect nondetectable levels of cresol and carbon disulfide as expected.

Domestic well data show no unusual variations.

4.0 Air Quality and Meteorology

The Air Quality Monitoring Program is conducted in accordance with the requirements of the Bay Area Air Quality Management District, Lake County Air Quality Management District, and Yolo-Solano Air Pollution Control District. It is evident that road dust suppression measures, baghouses, scrubbers, and other air quality control measures have been effective in controlling emissions as evidenced by air quality data collected at our compliance monitoring stations.

Rainfall was above normal, ending the six-year drought experienced in California. Most of the precipitation occurred during December, January, and February 1992/1993. Total mine area average rainfall was 37.35 inches.

Compliance was maintained with all ambient air standards and operating permit conditions.

The level of monitoring currently employed under the McLaughlin Mine Air Quality Monitoring Program is more than adequate to describe operation conditions and to monitor compliance at the McLaughlin facility.

5.0 Aquatic Ecology

Hunting and Knoxville Creeks

Aquatic ecology monitoring on Hunting and Knoxville Creeks is conducted by Bodega Research Associates. Their report is reproduced in full in the volume entitled "Annual Monitoring Report, July 1, 1992 - June 30, 1993, Aquatic Ecology". The report Summary of Conclusions is reproduced below:

Summary of Conclusions

The reduced and focused monitoring program implemented in 1986 for Hunting Creek and Knoxville Creek has functioned efficiently and productively through 1993, and should be continued without major alteration in 1993-1994. The cumulative increase in the data base from April sampling at the four primary sites (HC-5, HC-7A, HC-10, KC-3) and August benthic sampling at HC-7A will make the program more effective each year, as long as a consistent, careful, and appropriate methodology is maintained. Already this growing data base has become sufficient to detect statistically significant annual changes in the benthic macroinvertebrate communities at each of the sampling stations. These changes appear to relate to annual variation in rainfall and stream hydrology or to other sources of natural variability rather than to changes associated with the Homestake mining operations. In last year's Report we traced some of the changes in richness and diversity of the benthic invertebrate community at Hunting Creek sites over the years of the monitoring program to variation in flow conditions, with resultant variation in winter scouring or silt accumulation. Our further analysis this year demonstrates correlations between invertebrate community parameters and rainfall variables at several sites. These relationships are strongest at HC-5, where hydraulic stress is probably greater than at the other monitoring sites.

Chemical changes produced by the accidental discharge from Sediment Pond M-1 in 1986 and further changes in 1987-1988 evidenced by a reddish iron precipitate on the stream bottom at KC-3, produced by drainage from the new East Waste Disposal site, remain as possible causes of changes in invertebrate communities at KC-3 during 1985-1989. However, we concluded last year, and reaffirm after the 1993 field sampling, that recovery of the benthic macroinvertebrate community at KC-3 is essentially complete, since species richness, diversity, density, and relative abundance of Chironomidae and "EPT" taxa (3 orders of insects considered sensitive to water quality) have all returned to prespill values.

California roach populations have been generally declining at all sites for the past 7 or 8 years, although numbers have recovered slightly at some Hunting Creek sites in 1992 and 1993; several different factors may be contributing to this decline. The drought has certainly been an important factor, with the potential to influence fish populations in

several different ways. Since rainfall over the six-year drought totalled little more than one-half normal, the cumulative rainfall deficit became very large, producing a continuous series of summer flow conditions that were very low (at HC-5 and HC-10), intermittent (at HC-7A), or nonexistent (at KC-3). As flow decreases, water temperature rises, oxygen levels decrease, and conductivity rises. These conditions probably decrease survival and reproduction in California roach at all sites, and also may have been responsible for the declines in Sacramento squawfish and Sacramento sucker at HC-10.

Low rainfall is probably also the cause of increasing emergent and streamside vegetation at all Hunting Creek sites. The resultant change in habitat may have altered conditions for California roach; heavy winter scouring will be needed to return the streambed to conditions similar to those of 1984-1986. However, the unusual length of the drought has allowed stream vegetation of several species, especially willows (Salix spp.) to grow to sufficient size, with proportionately extensive root systems, so that a moderately heavy rainfall year (such as 1992-93) cannot dislodge them. At this point, the willows and several species of rhizomatous sedges and cattails may require a very significant flood before the plants and their trapped sediments will be swept away from the monitoring sites.

Homestake mining operations probably exacerbated the effects of the drought at HC-7A, through the isolation of the tailings reservoir from the watershed of Hunting Creek. This isolation minimizes the possibility of contamination of Hunting Creek, but has removed 11% of the original watershed draining into Hunting Creek above HC-7A. This loss is probably unimportant under most rainfall conditions, but under the stress of the six-year drought, it may be a contributing factor in the increase in vegetation and decrease in fish at HC-7A.

Now that the area has finally experienced a heavy rainfall year in 1992-93, we expect flow conditions to remain more favorable to roach populations than the conditions that have prevailed for the past several summers. This should lead to higher survival. However, since the habitat changes during the drought were not reversed, we cannot predict whether populations can return to densities comparable to predrought conditions.

At KC-3, the decline in roach populations since 1985, previously confined to the immediate sampling site, has spread further downstream, but roach remain fairly common at the alternate collection site 1.6 miles downstream of KC-3. Concentrations of metals in fish collected at that site do not identify a chemical basis for the population decline, however. Mercury levels which were high in 1988, have declined over the subsequent five years; they are now only 41% of the 1988 levels. The monitoring program should continue to focus on these mercury concentrations in future years, but the long drought is a more probable cause of the roach population decline in Knoxville Creek. If this is the case, the return to average or heavy rainfall, if it continues in future years, should be accompanied by increasing roach populations.

Within the limits of reliability of the laboratory analytical results, no meaningful trends in trace element concentrations can be identified as arising from Homestake mining operations. As the database of measured concentrations in fish tissues from the monitoring sites expands each year, the extent of natural biological variability and of analytical variability inherent in the monitoring program will become better defined, and identification of underlying trends will become easier. The archiving of frozen samples of fish tissue each year, added to the monitoring program in 1990, will permit future reanalysis of samples to corroborate any suspected trends.

Davis Creek and Davis Creek Reservoir

Davis Creek and Davis Creek Reservoir sampling was conducted by Ecological Research Associates and U.C. Davis respectively under the direction of Dr. Charles Goldman. Reservoir sampling commenced in April 1985 and has continued as specified in the Environmental Monitoring Manual with an additional thirty-six mercury analyses authorized annually. The report is reproduced in full in the volume entitled "Annual Monitoring Report, July 1, 1992 - June 30, 1993, Aquatic Ecology". The executive summary of that report is reproduced below:

PROJECT SUMMARY

Section 1 - Introduction

This is our eighth Annual Report documenting water quality in Davis Creek Reservoir and the stream stations located in Davis Creek. A five year summary report was issued for the period January 1982-June 1989 in September 1989. The 1992-1993 Annual Report which is presented here, specifically focuses on the data collected this past monitoring year; July 1992 through June 1993. We provide plots of the entire long-term data base for Davis Creek and Davis Creek Reservoir and, discuss/evaluate the July 1992-June 1993 findings in light of the historical record and regulatory criteria.

The major issues addressed in the current report include: a detailed review and evaluation of 1992-1993 quality assurance and quality control (QA/QC) data; presentation/evaluation of current data in light of the long-term and seasonal trends of general water quality constituents and heavy metals in Davis Creek and Davis Creek Reservoir; presentation/evaluation of current data in light of the long-term and seasonal trends of heavy metals in the biota and sediments of Davis Creek and Davis Creek Reservoir; the influence of heavy precipitation which caused the reservoir to fill and spill during the 1992-1993 monitoring year; concentrations of mercury and other metals in Davis Creek Reservoir sediments, both spatially at the four long-term stations, and in the case of mercury, synoptically at 51 stations through out the reservoir; and mercury accumulation by fish in Davis Creek Reservoir.

As we have entered the second five year period of the post-reservoir phase of the project, data collection includes an irreducible list of parameters and sampling schedule which would insure us that changes in surface water quality would be identified. These parameters were recommended in the 1989-1990 Annual Report and have been incorporated into the sampling and data reporting program. As always, HMC and the County will be immediately notified if we have reason to believe that additional parameters should be added.

It is our conclusion that the water quality and aquatic ecology monitoring aspects of the McLaughlin Project in Yolo County are operating in an orderly, logical and timely manner. Continued discussions between ERA, UCD, HMC and the Yolo TRP continue to be productive.

The 1992-1993 monitoring year saw a continuation of efforts to characterize and evaluate the distribution of mercury in DCR sediment. This will continue to be the area of research focus in future years. This type of data sets the framework for additional studies related to processes with regulate the deposition of mercury to the reservoir's sediments and the potential influence of benthic microbial activity on its distribution and bioavailability.

Section 2 - QA/QC

1. A reliable and comprehensive QA/QC plan forms the cornerstone of a sound environmental monitoring program. It provides us with assurance that the data base is accurate and precise and allows us to proceed to the interpretation phase of the process. While all analytical laboratories are required to meet certain QA/QC standards, the exact nature of a QA/QC plan is dependent on the questions being asked of the environmental monitoring program. The ultimate goal is to be able to detect changes in water quality should they occur.

2. The current analytical responsibilities are as follows; a) NET continues to test all water samples from Davis Creek (DC-5 and DC-6) and Davis Creek Reservoir [DCR] (Surface, Mid, Bottom), b) NET runs all sediment metals samples from Davis Creek and DCR, c) UCD runs all mercury analyses on Davis Creek and DCR fish, d) NET runs 'other' metals on Davis Creek and DCR fish (As, Cr, Cu, Pb, Ni and Zn), and e) UCD runs sediment mercury on the vertical sediment cores taken in DCR.

3. During 1992-1993 the following QA/QC samples were sent to NET by HMC, ERA and UCD (note: these are in addition to the lab QA/QC tests which are routinely done by NET as part of their internal QA/QC plan): replicated intralaboratory samples, replicated interlaboratory samples, field blanks, aqueous certified stock standard metals-in-water samples prepared by a commercial laboratory, and NIST certified aquatic sediment material for metals.

4. A total of three surface water samples were analyzed as intralaboratory replicates. Each sample was tested for the full suite of water quality constituents as outlined by the current sampling plan. The purpose of these samples is to check on the precision or

reproducibility of the contract lab's methodology. The data yielded a total of 29 paired comparisons which had at least one value above the analytical limit of detection. Of all the parameters, nitrate, arsenic (T/F), chromium (T/F), copper (T/F), lead (T/F), mercury (T/F), nickel (T/F) and zinc (T/F) were below detection on at least three of the four dates making quantitative comparisons difficult. Even with stricter RPD exceedence criteria suggested for intralaboratory comparisons, surface water data were outside the criteria only one time and that was for total iron. For the past five years, the percent exceedences for total iron have been low at 7%, 13%, 5%, 0%. and 3%. This year it was 33% (# exceedences÷# pairs above detection).

5. Of the 276 paired analyses run as interlaboratory replicates, 125 pairs or 45% showed at least one value of the data pair above the limit of detection.. Of the seven Priority Pollutant metals (As, Cr, Cu, Pb, Hg, Ni and Zn) only 36 of the 168 data pairs (21%) were above the limit of detection. This was similar to previous years. Using a value of 80% agreement as a cut off for acceptable interlaboratory comparability (i.e. for any parameter, the two labs were in agreement on ≥80% of the twelve samples), the parameters could be grouped into five categories:

- *Adequate number of sample pairs above detection (n≥6) and high agreement (≥80%): These included; hardness, TDS, ammonia†, sulfate, T-boron, nickel (T/F) and T-manganese.*
  (note: † individual ammonia RPD's were greater than 50% for seven of the 9 cases where the pairs were above detection. However, because the measured value was close to the limit of detection a >50% RPD was allowed)

- *Adequate number of sample pairs above detection (n≥6) and low agreement (<80%): These included; T-iron and F-iron (50% agreement).*

- *Inadequate number of sample pairs above detection (n<6) and high agreement (≥80%): These included, nitrate, arsenic (T/F), T-lead, mercury (T/F), zinc (T/F), F-chromium, and F-copper .*

- *Inadequate number of sample pairs above detection (n<7) and low agreement (<80%): None.*

- *No data pairs above detection: These included, T-chromium, T- copper, F-mercury and F-lead.*

In general there was good agreement between the two labs. While most of the heavy metals concentrations were below detection, an important question is, can the laboratory accurately measure higher concentrations of metals in the water should they occur. The fact that the average NET spike-recovery values on matrix samples were 93%-102% indicates that over the period of record, this lab would have had the ability to detect high concentrations of metals if they occurred.

6. HMC submitted quarterly sets of a commercially prepared reference material for metals in water. Cr, Cu, Mn, and Ni never exceeded the above criteria. Iron exceeded it's criterion on 2 of the 4 samples, As and Hg exceeded on three of the four samples, and mercury only once.

7. On the basis of all this information we conclude that NET has the ability to measure water chemistry constituents at adequate levels for this project.

8. For sediment metals, NET uses US EPA methods for both the digestion and analytical phases. Details of these methods have been provided in the past. Blanks, external standards, method standards, spike-recoveries and matrix duplicates were run and were all within project control limits. The individual QC samples were all within the control limits established by NET and we consider the values to be good.

9. Certified SRM sediment material from the Buffalo River was analyzed by the contract laboratory in conjunction with their sediment metals analyses and by UCD along with their measurement of mercury in sediments from DCR. For NET, the contract lab, absolute percent difference between the certified concentration and the measured concentration (for all four samples) was less than or equal to 20% for copper, lead, nickel and zinc; for all these metals combined, 14 of the 16 individual analyses had an APD of 15% or less. The APD for chromium exceeded 20% on each of the four analytical runs. Arsenic exceeded an APD of 20% on three of the four runs with values of 31.6%, 27.4% and 23.1%. Mercury exceeded a 20% APD on one of four runs (56.5% APD).

The UCD QA/QC program for mercury in sediments included two different sediment Reference Materials ([i] European Certified Reference Material - Lake Sediment, [ii] NIST Buffalo River Sediment) and [iii] European CRM - Sludge with duplicates; duplicates of environmental samples; and use of 6-point standard curves for calculation of concentration in each run. APD's for the SRM's ranged between 4%-11% (n=7). UCD also ran 8 duplicate environmental samples. The mean percent difference was 7.6±4.1 (SD)%. A comparison of 12 splits samples from the routine, quarterly DCR sediment collection sites (Inlet, Midlake, Dam and South Arm) were analyzed by both UCD and NET. Based on this comparison, it was concluded that the difference found between these two labs would not have significantly influenced the long-term data record nor our interpretation of this record.

10. Since the mercury content of reservoir and creek fish remains the single most environmental concern related to water quality and aquatic ecology in Yolo County, it is very important that the QA/QC for these samples be rigorous.

The 1990-91 fish samples were run in three batches. Seven standard concentration levels were included in each run ranging from 0–2.00 ppm. For each of the runs, the r^2-value for the regression equation was always greater than 0.99 and typically around 0.995. Laboratory QA/QC samples for 1992-1993 included, 21 standards, 3 blanks, 7 NIST Reference Material and 4 internal duplicates which analyzed two flesh samples from

the same fish. Replicate fish (DCR) and composites (DC) were also analyzed so that with few exceptions, the reported seasonal value comes from the analysis of more than a sing fish.

Individual measurements of NIST RM 50 tuna material ranged from 0.91-1.08 ppm. The mean of all four runs combined was 1.02 ppm Hg (n=7) with a mean APD of only 7.4%. Sample replication was also good. For the 4 duplicates, the relative percent different ranged from 3.0-15.4% with a mean (±SD) of 4.9% ± 7.1%. In terms of the absolute ppm difference between samples, this corresponded to a range of 0.06-0.19 ppm Hg.

11. At the request of Ecological Research Associates, the California Department of Fish & Game, Water Pollution Control Laboratory in Rancho Cordova agreed to analyze DCR fish for mercury as part of an interlaboratory QA/QC check. We submitted 10 samples to this lab in August 1992, 5 DCR bass and 5 DCR bluegill which were collected in 1992. For bass, the mean±SE for the UCD samples was 2.3±0.05 and 1.7±0.12 for CFG. This values were statistically different at the 95% level of significance. For bluegill the UCD mean±SE was 1.5±0.2 and 1.1±0.4 which were not statistically different at the 95% level of significance. The lower CFG values, relative to the UCD measures, were also observed in a similar QA/QC check run last year. Both labs were able to recover SRM samples within ±10% of their certified values indicating the ability of both groups to accurately measure Hg in a given digest. At this time we strongly suspect that the different results obtained between UCD and CFG arises during the sample preparation phase of analysis, prior to digestion.

12. NET QA/QC data on As, Cr, Cu, Pb, Ni and Zn in DCR and Davis Creek fish were all very good and within project specifications.

Section 3 - Davis Creek Water Quality

An 11+ year data record now exists for water chemistry in Davis Creek at stations DC-5 and DC-6. During the period July 1992 - June 1993, samples were collected on five dates at DC-5 and on six dates at DC-5, including the first flush flow in December.

The hydrologic characteristics of Davis Creek during this past monitoring year were dominated by the December-February rain storms which dropped at total of 27.77 inches of water during that period. This accounted for 75% of the annual precipitation. Precipitation in December, January and February was relatively well distributed with a maximum of 2.43 inches, and typically not much greater than 1 inch for any given day. Another noteworthy aspect of precipitation during the 1992-1993 monitoring year was the relatively high amount of rainfall which occurred late in the season, i.e. April through June.

Flows increased significantly at DC-6 and especially DC-5 on 11 December; 7217 gpm at DC-5 and 2406 gpm at DC-6. Just greater than 70% of the 8.21 inch monthly rainfall for December fell between 1-11 December which resulted in the relatively high flows measured for that month's sampling. Indeed, December was the first flush month.

Visual observations and flow measurements showed that Davis Creek Reservoir spilled over the dam starting in the period late-January to early February and continued into late-March to April. By 20 May 1993, water level elevation in DCR was 0.2 feet below the spillway. This is the first time since the 100-year flood of February 1986 that DCR has spilled. Synoptic sampling of inflows on 3 March 1993 showed that flow in Davis Creek accounted for approximately one-half of the total combined flow to DCR at that time.

Temperature, dissolved oxygen and pH were within the historic range of the 11+ year data base and levels of these parameters did not interfere with creek biota or water quality. Higher than usual Davis Creek streamflow in the spring were reflected in a lower water temperature at this location in April.

Concentrations of total suspended solids (TSS) are very important with regard to metals transport since these elements are associated with the particulate versus the dissolved phase in the water. The only sampling date when TSS was significantly above baseline was on 11 December 1992 during the first-flush event. At that time TSS concentration at DC-5 was 670 mg/L. This concentration was much less than the 7,800 mg/l and 5,100 mg/l values which were found during the first flush flows of monitoring years 1990-1991 and 1991-1992, respectively. For the remaining sampling dates, TSS was less than approximately 10 mg/L at both stations. The distribution of total iron was well correlated with TSS in the sense that the only time that total iron was found above detection (0.01 mg/L) was at DC-5 during the first-flush when the seasonal spike of TSS was found. As reported last year, with the exception of the first-flush flows, total iron at DC-5 was reduced to near detection limit concentrations after the Reed Adit closure. New leakage from the Adit occurred too late in the monitoring year for an adequate data base to be collected. The distribution of the remaining water quality parameters was not different from that observed in the historical data base and concentrations did not interfere with the beneficial uses of the creek. Concentrations of total iron, manganese and ammonia continue to show an apparent decrease following the closure of the Reed Adit in November 1989.

For the priority pollutant metals (As, Cr, Cu, Hg, Pb, Ni and Zn), the absolute concentrations and seasonal distribution was consistent with the historical data base. The high seasonal flows at DC-5 in December 1992 were a dominant feature of metals transport at this site. All the metals except for arsenic and lead were above detection at DC-5 on that date. In is noteworthy that on the same date, filtered metals at DC-5 were all below detection. Total zinc was just at the 20 µg/l limit of detection in October and January and filtered nickel was high in April. At DC-6 total nickel was above detection in December as was total-Zn in December and January and filtered-Zn in December. On all other sampling dates the priority pollutant metals were below detection at DC-6. No MLC concentrations were exceeded at either station on any sampling date. The reservoir continues to act as an effective trap for upstream metals. Beneficial uses of DC-6 water were not negatively impacted.

The data suggest that the closure of the Reed Adit and the Reed Mine clean-up in November 1989 by HMC may have had an effect on reducing the baseline concentrations of nickel at DC-5.

Section 4 - Davis Creek Aquatic Ecology - Heavy Metals

1. California Roach were collected at both DC-5 and DC-6 in August, November 1992 and May 1993. In the period since summer-1991, Roach have been available for collection at DC-6 on seven occasions. In May, triplicates were taken at DC-5; downstream at DC-6, duplicates were taken in the seepage pool at the base of the dam and just downstream of the spillway (during a spilling period). Creek bottom sediments continued to be sampled on a bi-annual schedule in the fall and spring.

2... Since 1985, mercury analysis for Roach has been done on thirty (30) individual sampling dates at DC-5 and on twenty-seven (27) dates at DC-6. Over this period of record, the mean of the mercury concentrations at DC-5 was 0.35±0.17 (mean±SD) ppm wet wt. The minimum and maximum individual quarterly measurements are 0.13 ppm and 0.94 ppm. For the same period, the mean Roach mercury concentration at DC-6 was 37% lower at 0.22±0.09 ppm; with a minimum quarterly value of 0.10 ppm and a maximum value of 0.41 ppm. From January 1991 to present (May 1993) the mean mercury content of the DC-5 composites was 0.42±0.20 ppm (SD) and was nearly double that at DC-6, 0.22±0.07 ppm. Indeed, this difference was typical of the historic data set prior to the apparently anomalous data collected in 1989-1990 when Roach-Hg at DC-6 was apparently double that at DC-5. At this time, the data looks "regular" and there is no cause for concern. There is reason to suspect that the so-called anomalous 1989-1990 data may have been either a labelling error in the field or at the contract laboratory.

3. During monitoring year 1992-1993, the November-1992 Roach-Hg value at DC-5 was the highest on record at 0.94 ppm (wet wt.) and well above the California Department of Health Services 0.5 ppm criterion for edible fish. Roach at DC-5 have been at or above this criteria on five other, separate occasions during the period of record. In August 1992, DC-5 had a concentration of 0.38 mg/kg, while in May 1993 the concentration at this site was similar (0.34 mg/kg). During monitoring year 1992-1993, Roach-Hg at DC-6 was 0.27 mg/kg-August 1992, 0.25 mg/kg-November 1992, and 0.34 mg/kg-May 1993.

4. Roach-Hg in two composite samples taken at the spillway in May 1993 was much higher in concentration that those taken in the seepage pool; 0.34 ppm for both duplicates in the seepage pool versus 0.52 ppm and 0.78 ppm at the spillway. Both the latter data points exceed the DOHS edible fish criterion and were clearly much higher than the range of the historical data for Roach-Hg at DC-6.

5. With the inclusion of this latest set of data for both DC-5 and DC-6, we can be relatively certain now that closing the Reed Adit has not had an impact on Roach-Hg content.

6. During the 1992-1993 sampling year, sediment mercury concentrations in Davis Creek ranged from 0.3 to 0.8 mg/kg (dry wt.). This is consistent with the historical, post-1987 data base which shows that with the single exception of spring 1988 when mercury at DC-5 was 39 mg/kg, sediment mercury at both stations has been consistently

less than 5 mg/kg. While the sample size is too small to show statistical significance between the pre- and post Reed Adit closure, the mean value for the period October 1992-April 93 was 3.2 times lower than for October 1987-April 1989.

7. The lower limits of detection for fish metals analysis which were instituted in 1990-1991 were again achieved in 1992-1993. The continued expansion of the environmental data base has allowed us to recognized that the closure and cleanup of the Reed Mine in November 1989 may have had a positive influence on levels of some priority pollutant metals (especially nickel and perhaps arsenic) in DC-5 Roach.

8. Concentrations of priority pollutant metals in Davis Creek sediment were generally consistent with other measures made since the change in sampling procedure which took place in October 1987. It is of particular interest that the metals associated with the naturally geology of the area, i.e. Hg, Ni, As and Cr (DC-5) all have shown declines in sediment concentration since April 1991. Given that the cleanup of the Reed Mine and closure of the adit was completed in November 1989 it is not unreasonable to conclude that this clean-up action has reduced metals loading to the creek sediment and likewise to the downstream reservoir.

Section 5 - Davis Creek Reservoir - Water Quality

The high rainfall/high runoff winter of 1993 was a significant limnological event which affected nearly all DCR water parameters in this latest monitoring year. This followed over 6 years of drought conditions and, for the first time since 1986, resulted in the reservoir filling and overflowing. This large input of new water resulted in a general dilution of most DCR water constituents to pre-drought levels.

DCR general water quality parameters basically behaved as in previous years, with the system being dominated by the seasonal cycle of spring-fall thermal stratification followed by isothermal aerobic mixing. Depletion of oxygen in the deep water layer (hypolimnion) during the stratified season of 1992 progressed as in prior years, again allowing the buildup of several parameters to temporarily high levels (hydrogen sulfide, iron, manganese) before fall overturn and isothermal mixing returned the entire water column to aerobic conditions. With the recent large increase in DCR water volume, the onset of deep water anoxia is progressing more slowly in 1993.

It should be noted that concentrations of most monitored water quality components have remained at levels in DCR that are considerably lower than those typically or periodically found in the creek, and consequently pose no hazard to downstream water quality. In 1993, DCR spilled over into lower Davis Creek between late January and late April (3 months), for the first time since the spring of 1986.

Secchi transparency was less during the last 3 years than in previous years, indicating that recent conditions may have favored an increase in algal biomass within the mixed water layer. This is consistent with normal reservoir development.

Six of the seven priority pollutant metals monitored at DCR were at or below their respective levels of detection in essentially all samples during the past year, with only zinc exhibiting slight elevations on two dates. Levels of these metals in the reservoir water can thus be seen to have posed no threat to downstream water quality to date.

Though the relevant chemistry of the metal of importance at DCR, mercury, occurs at concentrations well below the analytical capabilities of contract laboratories, we were fortunate in the past to have trace mercury expert Dr. Gary Gill do some work at DCR, which is discussed in Darell Slotton's Ph.D. dissertation. Additional, future work of this type is a possibility.

Section 6 - Davis Creek Reservoir Aquatic Ecology Metals

DCR bottom sediments have been collected at least semi-annually (spring and fall) each year since impoundment, for analysis of the 7 priority pollutant metals (As, Cr, Cu, Pb, Hg, Ni, and Zn). Additional sediment samples have been taken for mercury in the summer and winter of each year since 1987. Each sediment collection has consisted of composite bottom samples taken from 3 locations in the reservoir, along a transect leading from the dominant water input source, Davis Creek, to the Dam and spillway. Sampling at a fourth sediment sampling station, located in the South Arm of the reservoir, was initiated in October 1990. A sediment core study was performed at the reservoir in the spring of 1992. This year, following the large storm inflows of winter 1993, we performed an extensive synoptic survey of the newly deposited sediments. We believe that this synoptic sediment mercury survey has provided significant new information for the project. For the first time, it provides a comprehensive overview of sediment mercury transport into and around the reservoir. It also enables us to define important watershed sources of mercury.

In early March, immediately following the heaviest storm inflows of winter 1993, sediment grabs were carefully taken at a total of 51 sites throughout the reservoir, including the 4 long-term sediment index stations. The newly deposited sediment was very clearly defined in the intact grab samples, and it was possible to measure the thickness of the new layer at each site. A significant amount of new sediment (centimeters thick) blanketed the entire reservoir bottom to varying degrees. In addition, samples were carefully taken from the fresh surficial sediment at each of the 51 sites for mercury analysis at U.C. Davis. These analyses were performed on carefully homogenized, refrigerated, fresh samples in the weeks immediately following collection.

The mercury concentration data clearly indicates Davis Creek to be an elevated mercury source and Rayhouse Creek, at the back of the Dam Arm, to be a source of relatively low-mercury sediment. The Inlet (Reed) Arm had post-deposition surficial sediment mercury concentrations ranging from 12.5 ppm at the inlet to ~ 2.5 ppm toward midlake. Two smaller streams, Pinnacles Inlet and Indian Inlet along the west side of the Reed Arm, also were clearly sources of elevated mercury, with levels of 5.4 and 8.6 ppm Hg, respectively, at their mouths. In contrast, the Dam Arm, dominated by heavy inflow from Rayhouse Creek, had mercury levels of 0.1 - 0.6 ppm. The Midlake region, between these two main sources of DCR inflowing water and sediment, demonstrated intermediate mercury levels of 0.4 - 2.4 ppm. Thus, the intensive synoptic data for the Reed Arm, Dam Arm, and Midlake regions of DCR corresponds closely to the conclusions drawn from the long-term data sets from the three sediment index stations in these locations. Additional new findings from these areas include (1) the mercury source nature of Pinnacles and Indian Inlets along the west side of Reed Arm, and (2) the relatively low mercury sediment

emanating from all Midlake and Dam Arm seasonal streams, including those at Turtle Cove (0.7 ppm), Square Bay (1.5 ppm) and, particularly, Digger Bay (~0.5 ppm), which had a relatively substantial flow entering after the storms.

The South Arm synoptic data expands upon our index site long-term data most dramatically. The conclusion drawn from the index site data–that the South Arm must include an additional source of elevated mercury sediment outside of Davis Creek–is clearly corroborated by the synoptic data. The lower (backwater) portion of the South Arm received new deposition with mercury levels higher than any measured thus far in the project. The most extreme concentrations were centered on Split Cove, on the southwest side of this arm, where newly deposited surficial sediment contained 91.2 ppm of mercury. This cove was the apparent source of high mercury sediment (34-10 ppm) which extended from Split Cove to near the mid-South Arm index site, moving toward Midlake. The upper portion of South Arm had much lower mercury levels of 2-7 ppm.

The entire synoptic data set is consistent with the concept of a generalized, regional mercury source along the entire western margin of the reservoir. Davis Creek and, particularly, the Split Cove region of the South Arm are clearly the major specific sources of the most concentrated mercury sediment.

The data for new sediment deposition, in general, sheds additional light on the nature of mercury sources to the reservoir. Back Reed Arm and the Dam Arm were sites of maximal sediment deposition, consistent with the fact that these two regions contain the largest two inflowing creeks. We estimate that 33,000 metric tons of new sediment deposited in the reservoir in 1993. The Reed (Inlet) Arm, which contains 25.6% of the DCR surface area, was the site of 36.8% of the total sediment deposition. The Dam Arm, with 18.3% of the surface area, had a further 33.1% of the deposition. In contrast, the South Arm, with a surface area similar to that of the Reed Arm (26.0%), was the site of only 11.3% of the total sediment deposition. Thus, the highest concentration mercury input in the reservoir was associated with the lowest total sediment deposition.

As the synoptic sites were distributed fairly evenly across the lake bottom, it was possible to use the new deposition depth and mercury concentration data to estimate total sediment deposition to each portion of the reservoir following the 1993 inputs, as well as total amounts of new mercury. These calculations result in estimates of 33,000 metric tons of total new sediment deposition (wet weight), or 33 million kilograms, including 128 kilograms of new mercury. The great bulk of the new mercury was deposited into the back regions of the Reed Arm (50 Kg) and South Arm (56 Kg). These two backwater regions, occupying 24.5% of the DCR surface area, together accounted for 82.4% of the total new mercury deposition. The remaining 17.6% of the new mercury was distributed across the other 75.4% of the reservoir in decreasing levels, moving toward the dam.

The presence of the reservoir has resulted in high mercury sediment falling out near its source regions. Without the dam in place, virtually all of this mercury could be expected to have moved unimpeded down Davis Creek and ultimately to Cache Creek, as must have occurred historically during high flow events before the reservoir was built. With this synoptic survey, we have documented that very large mercury loads are discharged to Davis Creek Reservoir following a high runoff year. At this time we do not know how much of this newly deposited sediment mercury is bioavailable and what

portion will be permanently buried. This question should form the basis for future reservoir research. Continued monitoring of reservoir biota can be expected to demonstrate any potential effects attributable to the new mercury within the reservoir, and continued downstream monitoring at station DC-6 will indicate relative mercury bioavailability below the reservoir.

Similar to mercury, nickel and chromium have previously been elevated from the Davis Creek watershed as compared to the other arms of DCR. The South Arm, however, has not been a source region for these metals. Sediment nickel and chromium concentrations increased at the Davis Creek inlet following the 1993 storm inflows (230 ppm Ni, 85 ppm Cr) but remained fairly static at the other stations (50-150 ppm Ni, 25-55 ppm Cr). The increases near Davis Creek were well within the range of historic levels. The other monitored metals (As, Cu, Pb, Zn) have always demonstrated a more uniform general distribution throughout the reservoir watershed. Arsenic levels in DCR sediment at all four stations have exhibited a continuous decline from 1987 through 1992, with concentrations during the past year of < 4 ppm throughout DCR, even following the large new sediment inputs. The lead record indicates relatively low levels in DCR sediment, in a very consistent ~2-4 ppm range at all sites, for all sample dates. The 1993 storm inflows also did not result in significant increases of copper (~20 ppm) or zinc (~35 ppm) at any of the stations.

Measurement of mercury in fish tissue from DCR forms the cornerstone of the EMP in this water body. The current fish monitoring includes the following annual samples: (1) 30 individual adult fish for analysis of mercury in muscle, (2) two semi-annual composites of both bass and bluegill livers (4 total) for analysis of 7 metals (As, Cr, Cu, Pb, Hg, Ni, Zn) and (3) three composites of young-of-the-year bass for 7 metals. In the 1991-1992 monitoring year, all of the above samples were collected and analyzed, plus an additional 7 adult fish. Most notably, it was possible this year to obtain a number of 1-3 year old fish which were comparable in size and age to the initial fish samples which had the very high mercury levels in the 1980s.

The new bass muscle mercury data indicates that the declining bass mercury trend noted in previous years has clearly levelled off in the main 1985/1986 cohort of reservoir-born fish which have been monitored over the years. Following the peak mercury levels of the first two years after impoundment, all subsequent samples have been lower, and all but the peak 1987 sample have been statistically lower. However, it is now apparent that mercury concentrations in the larger sampled adult DCR bass have not declined since mid 1989, and have instead remained at ~2.2 ppm over a four year period. While these levels are still well above the Health Advisory level of 0.5 ppm, it is notable that they are approximately 50% lower than the 1985-1986 peak levels of over 4 ppm.

The collectible bass in DCR were until recently dominated by the original year classes of reservoir-hatched fish, as they grow older and larger. Larger, older fish from most described systems typically have higher mercury levels than smaller, younger fish. The decline in mercury concentration seen in this group of fish as they grew, between 1986 and 1989, was the exact reverse of the trend reported in virtually all equilibrium systems, which find an <u>increase</u> in mercury concentrations with age. This was very strong evidence that bioavailable methyl mercury <u>decreased</u> significantly over this period. The

currently level trend in the collected group of growing bass over time, though not as dramatic as an actual decline, is still contrary to the typical ascending curve of age/growth vs fish mercury in equilibrium systems, and suggests a continued, though less pronounced, decline in bioavailable mercury at DCR.

The within-year increased stability of the shoreline and the associated healthy aquatic macrophyte development, due to water conservation measures instituted by Homestake, have resulted in the survival and availability of a larger cross-section of fish sizes and ages at DCR. In the past 18 months, it has been possible to collect fish of a size comparable to the 1980s bass which demonstrated the highest mercury levels. The younger bass collections averaged 1.5 ppm mercury in October 1991, 0.9 ppm in August 1992, and 1.1 ppm in November 1992, as compared to mean levels of 2.5-4.2 ppm in similar sized fish in 1985 and 1986. This is clear indication that bioavailable mercury levels in DCR declined significantly between 1986 and 1992. A collection of 2-3 year old bass in May of 1993, following the big storms, was notably higher in mercury at 1.85 ppm, as compared to 1-3 year old bass from 1992, but was lower than the larger bass collected at the same time (2.32 ppm). We hesitate at this point to draw any conclusions from a single data point. Every effort will be made to maintain collections of 1-3 year old bass in the future, in addition to collections of the largest fish, and this parameter will be watched carefully as an indicator of mercury bioavailability trends.

Now that the main group of reservoir-born bass has achieved a size comparable to the stocker individuals which were recaptured sporadically in the earlier years of the project, we can present another piece of fish evidence which demonstrates the relative decline in bioavailable mercury in DCR in recent years, as compared to the initial years following creation of the reservoir. While the recaptured stocker bass taken in 1987 and 1988 had mercury concentrations in excess of 5 ppm, comparably sized individuals taken in the 1990s have consistently contained < 2.7 ppm, again denoting an approximate 50% decline in uptaken mercury.

Bluegill, which have been monitored for mercury in Davis Creek Reservoir since 1987, have, like the bass, not demonstrated any rise in mercury concentrations over this period. The bluegill's range of mean mercury levels (1.7-2.5 ppm) has, outside of some seasonal variation, remained essentially level through the spring of 1993.

As noted in other recent reports, all three large DCR fish species have had remarkably similar mercury concentrations in recent years, despite being quite different in their feeding habits. The several well documented differences noted in this system in relation to fish uptake of mercury, as compared to most other reported mercury studies, make DCR a very important research site. The steady enlargement of the already considerable data record can only improve our understanding of mercury dynamics.

Mercury concentrations (wet weight) in the three most recent juvenile bass composites (August 1992) was 0.64 ± 0.06 ppm. This compares to a mean level of 0.80 ± 0.08 ppm for this parameter in 1991. Both the 1991 and 1992 juvenile bass were significantly higher in mercury than composite juvenile bass from the previous 2 years, which were 0.34 ± 0.04 ppm in 1990 and 0.41 ± 0.05 ppm in 1989. The utility of the parameter of midsummer composite juvenile bass will increase as the data base is enlarged. At this point no trend can be inferred, though we will monitor this parameter closely.

Concentrations of mercury in bass and bluegill livers have ranged, fairly erratically, from 1.4 to 8.7 ppm since 1985. Similar to mercury in reservoir fish flesh, these concentrations are considerably higher than levels in the stocker bass (0.16 ppm). Liver-Hg levels were generally higher than muscle-Hg levels by a factor of ~1.5-3.0, as is typical. Liver-Hg in the most recent monitoring year averaged 4.7 ppm in large bass and 6.7 ppm in bluegill. Mercury is not measured in fish livers by California Fish and Game, so no comparative data is available.

Copper continued to demonstrate an interesting pattern of bioaccumulation. During the past 3 monitoring years, mean liver-Cu was 1.9 ppm in bluegill, as compared to 13.1 in the bass, a six-fold difference. This is interesting, as it indicates a strong difference between the two main monitoring species. Though copper is relatively high in DCR sediments, it is accumulating in bass but not in bluegill, which apparently metabolize copper in a unique way.

Liver zinc during the last monitoring year averaged 26 ppm in bass and 22 ppm in bluegill, similar to previous levels and to levels found in original stocker bass.

Concentrations of arsenic, chromium, lead, and nickel in fish livers of all three species in recent years, as well as in the juvenile bass composites, were either below, at, or slightly above the analytical detection limits, which have been lowered over this period.

Section 7 - Aquatic Ecology Monitoring in Davis Creek

Aquatic ecology sampling of Davis Creek above (DC-5) and below (DC-6) Davis Creek Reservoir was conducted during the last monitoring year in four quarterly surveys: August and November 1992, and March and May 1993. Sampling included collection of California roach for metals analysis and visual analysis of water and creek bed conditions (e.g. algal cover, iron oxide precipitate and organic floc, bank modification, bottom sediment distribution, emergent and submergent plants, fish populations, etc.).

DC-5: Following six years of drought, the winter of 1993 brought extremely high flows to this section of Davis Creek, similar to conditions observed in 1986. Estimated flows of over 600 cubic feet per minute were noted over a week following one series of major storms. Higher flows were undoubtedly present during and immediately after large storm events throughout the winter. After 6 years with very little change in creek morphometry, this year extensive bedload movement, bank erosion, and stream course modification were clearly apparent at DC-5. Virtually all fine grained creek sediments were washed downstream into the reservoir. Bed material to the size of boulders were moved considerable distances and gravel filled in all depressions along the lower reaches of the creek. The former culvert plunge pool, which had presented a barrier to upstream fish migration, was completely filled with gravel and is now flush with the culvert. Sacramento suckers were able to make a spawning run upstream of the culvert for the first time since the culvert was built for Davis Creek to pass beneath County Road 40. California roach were collected in sufficient numbers for all quarterly samplings (6 fish per set), including the triplicate sampling in May 1993 (18 fish total). In addition, it was possible to capture an excess of fish for population monitoring. These fish, which were returned to the creek unharmed, indicated normal population distributions for this

species, despite the massive winter flows this site was subjected to. The plug of the Reed Mine adit, which Homestake installed in 1989 and which had resulted in a 95+ % reduction in iron/organic floc in recent years, was breached sometime in February 1993, presumably due to high water pressures this storm season. March and May surveys of 1993 indicated a return of the former iron floc material covering the DC-5 bottom, however, at approximately 50% of the former densities noted prior to installation of the plug. This reduced floc may have been due to (1) partial rather than complete breaching of the plug and/or (2) higher than normal flows diluting the adit input.

****NOTE: As this report goes to press (August 1993), we can report that Homestake is in the process of repairing and extensively reinforcing the Reed adit plug in a good-faith effort to minimize this source of undesirable water quality elements which historically emanated from this pre-Homestake, abandoned mining site.*

DC-6: With the reservoir filling and spilling extensively in 1993 for the first time since 1986, station DC-6 exhibited even greater changes than those noted above for station DC-5. Davis Creek below the reservoir had been entirely sheltered from natural flows throughout the drought years (May 1986 - January 1993). The reservoir began spilling in late January and continued to spill until April (approximately 3 months total). Flow over the spillway consisted of the sum of all the creeks which flowed into the reservoir, and was estimated at over 20 cubic feet per second in March. This was equivalent to a small whitewater river hitting the lower section of creek (which had experienced essentially no flow since May of 1986). During the intervening time, DC-6 water had come entirely from a ~1-5 cubic foot per minute stream of springflow and dam seepage, which moved almost imperceptibly through the cattail thicket which filled the area in. The resulting dense cattail thicket, with organic-rich black bottom sediment, remained unchanged throughout the 0.3 km between the seepage inflow at the west base of the dam and the intersection of the creekbed with the spillway flow. At this point and downstream, the cattail thicket was extensively modified by the high flows, which moved naturally through this section for the first time in six years. Virtually all of the fine marsh sediments which had accumulated were washed downstream, leaving a bottom of cobble to gravel. This is typical of high flow events under unimpeded, natural conditions in this part of the Coast Range. Despite the loss of fine sediments, however, an estimated 50% of the cattails managed to hold onto the rocks with their tough roots. This has resulted in a continuing cattail-dominated streambed, even throughout the sections which experienced maximal flows. This year it was possible to collect sufficient California Roach for all quarterly samplings at DC-6. Following the reservoir spillover flows, it was possible to collect additional roach from the stream section which had received the spillover, to compare with those fish taken at the index (seepage) site, which typically monitors all downstream flow in lower Davis Creek.

PROJECT RECOMMENDATIONS

Section 1 - Introduction

1. *The 1992-1993 data base did not indicate any major changes to the current annual schedule for water quality and aquatic ecology sampling in Davis Creek or Davis Creek Reservoir.*

2. *The research emphasis conducted by UCD towards understanding the role of benthic sediments in mercury cycling should be continued.*

Section 2 - QA/QC

1. *It is important that the QA/QC program be continued throughout the life of the monitoring program and that an evaluation of these data be part of each Annual Report. In addition to the routine laboratory QA/QC samples (e.g. lab blanks, matrix spike-recoveries, method standards, external stands, calibration curves, interlaboratory duplicates), HMC should continue to send quarterly water samples (as blind samples) to NET and another independent analytical lab for interlaboratory comparison. Recently, these samples have been sent to ENSECO (CAL Labs) and we recommend that this be continued. In addition, HMC should continue to collect field blanks.*

2. *Since metals are such an important part of the monitoring effort, and since their concentration in creek and reservoir water is normally at or below detection, we recommend that HMC continue to send samples of the commercially prepared metals in water reference material to NET as blind samples.*

3. *All laboratories running sediment metals analyses should continue to run NIST material #2704 (Buffalo River Sediment) along with each batch of sediment samples.*

4. *The As and especially the Cr results from the NIST SRM testing (i.e. high APD) should be investigated by both HMC and the contract laboratory.*

5. *For this year's fish-Hg cross check with CFG, we will see that UCD and CFG not only analyze their own fish subsamples, but that a subsample of the prepared material from each lab is also analyzed by the other. In this way, questions relating to differences in sample preparation can be addressed.*

Section 3 - Davis Creek Water Quality

1. *Continue sampling as presented in the Environmental Monitoring Program and as presented in Table 2 of this report.*
2. *No new changes to this aspect of the monitoring program are required.*

Section 4 - Davis Creek Aquatic Ecology - Heavy Metals

1. *Quarterly sampling for Roach metals at DC-5 and DC-6 should continue.*

2. *Measurement of metals in Davis Creek sediment should also be continued but, it should be realized that comparison with pre-October 1987 data is not appropriate.*

3. *Maintain the new limits of detection initiated during the 1990-1991 monitoring year.*

4. *Should DCR spill again during monitoring year 1993-1994, DC-6 Roach-Hg samples must be taken at multiple locations downstream of the dam. This is to further investigate the phenomenon observed this year when concentrations in Roach collected at the spillway, during a spilling event, were 50%-100% higher than those in Roach from the seepage pool immediately below the dam structure.*

Section 5 - Davis Creek Reservoir - Water Quality

1. *Maintain the current parameter list of general water quality parameters, with quarterly seasonal monitoring.*

2. *Continue the reservoir monitoring program with the existing parameter list of seven priority pollutant metals in water (As, Cr, Cu, Pb, Hg, Ni, Zn). Though As, Cr, Cu, Hg, Pb, and Ni continue to be below detection in reservoir water, that information in itself is of interest, and it is always possible that these metals could reach higher levels. In addition, while we continue to analyze for these metals in fish, we need a record of water concentrations even if they are below detection. Zinc, nickel, and of course mercury, have been important in the system and should definitely be retained.*

Section 6 - Davis Creek Reservoir Aquatic Ecology Metals

1. *Continue reservoir sediment and biota samples at the current schedule.*

2. *Continue to collect 1-3 year old bass when possible, comparable to fish collected in early years of the project. Also attempt to sample fish of a range of sizes and ages, including the largest fish available.*

Section 7 - Aquatic Ecology Monitoring in Davis Creek

1. *Continue stream monitoring program with existing parameters on a quarterly schedule.*

2. *Attempt to collect a comparison set of California roach from downstream of the reservoir spillway flow in years when the reservoir spills.*

6.0 Vegetation

The Vegetation Monitoring Program includes monitoring of previously reclaimed areas (reclamation success), sensitive plants and the management of contiguous lands. Reclamation research and test plantings to determine reclamation methods best suited for the site are also an integral part of the program.

During the 1992-1993 monitoring year, there were no changes in the approved Reclamation Plan for the McLaughlin Mine, nor were there construction activities at the site which were not a part of the routine mining and milling operations. The July 1992 - June 1993 Annual Environmental Monitoring Report fulfills the annual reporting requirements for the 1992-1993 monitoring year (due January 15, 1994) per Provision 9 of the current Waste Discharge Order issued by the California Regional Water Quality Control Board, Central Valley Region.

Construction and reclamation of the East Waste Rock Disposal Facility was finalized in 1990. The reclamation work as completed has proven successful in stabilizing the site and controlling erosion. HMC requests the release by Napa County of the performance bond for the East Waste Rock Disposal Facility given the site is essentially reclaimed.

Sensitive plant monitoring was conducted by Glen Clifton of Biosystems Analysis, Inc., and Joe Callizo of the Napa Chapter of the California Native Plant Society. In general, all populations of sensitive plants observed during the 1992 monitoring studies were similar in size to those documented in 1991. Many populations were absent altogether and believed to be the result of low rainfall during the winter and spring of 1992 and a sixth consecutive year of drought. Ten previously undocumented populations of various sensitive species were observed at sites monitored in 1992. On the whole 19 of 59 numbered sensitive plant occurrence sites were monitored by Biosystems and CNPS during the 1992 field season. These sites were chosen for their proximity to existing facilities. Many sites were not inventoried since they have not been impacted by the project since 1985.

No other new or significant impacts to sensitive plant occurrences were observed in the vicinity of the existing mining project during 1993. The current mine operational procedures continue to completely avoid the remaining known sites.

Reclamation review was completed by Lorraine Van Kekerix, an independent consultant, formerly with the California Division of Mines and Geology. Her report provides a review of seed mixes and general reclamation practices as well as an area by area review. In general, revegetation efforts have been successful in establishing plant cover adequate to stabilize disturbed sites and control erosion. Most of the areas revegetated to date are

adjacent to undisturbed areas and native species from undisturbed sites have started to invade the revegetated areas. The 1992-1993 revegetation program was implemented on seventy-two acres of disturbed land and was successful in controlling erosion.

Large scale reclamation research has been conducted in the form of test plantings of shrubs and woody species on waste rock dumps. The trial plantings have been installed and monitored by Circuit Rider Productions, Inc., and are designed to evaluate individual species and planting methods. This program has provided valuable information on the use of selected species at the site.

7.0 Wildlife

The Wildlife Monitoring Program includes documentation of wildlife observations, wildlife use of Davis Creek Reservoir, and an annual search for golden eagle nests. The Davis Creek Reservoir has added a feature to the area wildlife habitat that did not previously exist. Monitoring indicates wildlife use of the Reservoir and resulting beneficial effects.

An aerial helicopter search for raptor nests was conducted on May 5, 1993 by wildlife biologist Jack Barclay of Biosystems Analysis, Inc. The project area was covered flying for approximately one hour. One active golden eagle nest, with two large, downy young, was observed north of the mine property along Cache Creek. A prairie falcon and a raven were observed near the established nest site north of Hole Creek, however, the nest site was empty.

A western bluebird birdbox program, implemented by HMC personnel and conducted in conjunction with the Conservation Club from the Oak Hill Middle School, was initiated this year. In addition, HMC personnel constructed and installed next boxes for wood ducks and kestrels. Ongoing monitoring will be coordinated with the school.

The approved Contiguous Lands Management Plan (CLMP), was developed as an extension of the mine's Environmental Monitoring Program for the management of nonmined lands. In order to better administer CLMP, six different programs were established within the Plan's framework. A brief summary describing the program objectives and the work performed and/or programs initiated to date are presented in the Wildlife section.

8.0 Geotechnical

The Geological and Geotechnical Monitoring Program monitors the integrity of dams and embankments. The structures reviewed include the Tailings Dam, M-1 Dam, Davis Creek Dam, the Main Waste Rock Sediment Control Facility, the East Waste Rock Disposal Facility Pond, and sediment ponds T-2 and T-3. All structures are performing as designed.

RECOMMENDATIONS

The following recommendations are made for the 1993-1994 monitoring year:

Water Quality

1. Continue to monitor surface and groundwater quality according to the current Water Quality Monitoring Program as approved by the California Regional Water Quality Control Board, Central Valley Region and the Responsible Agencies.

2. Continue to scrutinize data from monitoring stations associated with the Waste Rock Disposal Facilities for trends.

3. Continue to monitor station DC-06 monthly during the winter runoff season to provide additional data on Davis Creek below the Reservoir. This monitoring is above and beyond the requirement for quarterly monitoring and is in response to a recommendation made by Ecological Research Associates in their review of the 1987-1988 Annual Monitoring Report.

4. Continue the QA/QC program in its present format.

Air Quality and Meteorology

1. Asbestos monitoring has demonstrated that mining activities have not increased asbestos fiber concentrations in the ambient air. Only one chrysotile fiber greater than 5 microns in diameter was detected during the seven years of monitoring. The greatest concentration measured during those seven years is 0.0131 fibers/cc, which is significantly less than the 2 fibers/cc OSHA standard. We recommend, as we have in the past annual reports, that asbestos monitoring at this location be discontinued.

Geotechnical

1. As recommended in both the Annual Monitoring Reports since 1988-1989, and the Geotechnical Data Review completed by D.P. Engineering, Inc., it is recommended that M-1 Dam be eliminated from the Geotechnical Monitoring Program.

File
Napa Permit

NAPA COUNTY

CONSERVATION -- DEVELOPMENT AND PLANNING DEPARTMENT

1195 THIRD STREET, ROOM 210 • NAPA, CALIFORNIA 94559-3092
AREA CODE 707/253-4416

JEFFREY REDDING
Director

December 17, 1992

RECEIVED
DEC 21 1992
Ans'd.....

Raymond E. Krauss
Environmental Manager, McLaughlin Mine
Homestake Mining Company
P.O. Box 1010
Lower Lake, CA 95457

Dear Mr. Krauss:

At their December 16, 1992 meeting, the Conservation, Development and Planning Commission accepted the Department's review of the 1991-92 Homestake Annual Environmental Monitoring Report, and determined that the report was consistent with Condition #16 of Use permit # U-198283.

The Commission approved the requested changes to the environmental monitoring program as recommended by Homestake Mining Company and listed in the staff report dated December 16, 1992. The remainder of the monitoring program shall follow the approved format consistent with Condition #16 of Use Permit #U-198283.

The Commission also modified Condition #18 of #U-198283 to read as follows:

> Homestake shall deposit with the Conservation, Development and Planning Department on or before July 1, beginning in 1993, an annual fee of $2,500 to cover the costs incurred by the County in connection with the preparation of the annual summary report for the ongoing operation phase of the McLaughlin Mine (Phase II-B).
>
> The annual fee shall be evaluated by the Department every three years, with the first review to occur in conjunction with the 1994-1995 annual review of the Environmental Monitoring Program.

APPROVAL DATE: December 16, 1992 EXPIRATION DATE: December 26, 1993

The modification becomes effective ten (10) working days from the approval date unless an appeal is filed with the Napa County Board of Supervisors pursuant to Title XIII of the Napa County Code. You may appeal the modified condition. In the event an appeal is made to the Board by another, you will be notified.

Pursuant to Section 12806 of the Napa County Code, the modification must be activated within one (1) year and ten (10) calendar days from the approval date or it shall automatically expire and become void. A one-year extension of time in which to activate the modification may be granted by the County provided that such extension request is made thirty (30) days prior to the expiration date. A request for an extension of time is subject to payment of a $385.00 filing fee.

This letter serves as the only notice you will receive regarding the expiration date of your permit or procedures for extensions.

Very truly yours,

MICHAEL MILLER
Deputy Planning Director

cc: John Tuteur, County Assessor

mmp10

NAPA COUNTY
CONSERVATION, DEVELOPMENT AND PLANNING DEPARTMENT

DEPARTMENT REPORT

Meeting of December 16, 1992

Agenda Item: # 10

RECEIVED
DEC 14 1992
Ans'd.....

SUBJECT: **Modification of Condition # 18 of U-198283 to reduce the annual review fee to cover administrative cost incurred by the County for review and preparation of the annual report of the Environmental Monitoring Program.**

FILE: **92226-MOD of Use Permit # U-198283, Condition # 18**

OWNER: **HOMESTAKE MINING COMPANY**

BACKGROUND:

The Conservation, Development and Planning Commission approved the Use Permit and Surface Mining Permit for the McLaughlin Gold Mine project on December 7, 1983 (Use Permit # U-198283). The permit was subject to 23 conditions of approval and was separated into three phases. Phase I - initial construction and pre-construction activities; Phase II - initial and ongoing operations; and Phase III - ongoing and post mining reclamation

The original use permit included conditions of approval which required submittal of an annual report on the Environmental Monitoring Program to the Conservation, Development and Planning Department summarizing the monitoring data collected during the year (Condition #16), and established a fee to cover the cost of the County's review of the annual monitoring report (Condition # 18). Condition #18 of the 1983 Use permit required a fee of $16,500 for the construction and initial operation phases (Phase I and Phase II-A) to cover the costs incurred by the County in connection with the administration of the Homestake McLaughlin project. The condition required that the fee be paid annually on the first regular working day starting in January 1984, through the ongoing operations.

On June 1, 1988 the Planning Commission approved a reduced annual fee to $8,500 for the ongoing operation phase of the project (Phase II-B). The revised project condition required Homestake to deposit with the CDPD on or before July 1, 1988 an annual fee of $8500 to cover the costs incurred by the county in connection with the ongoing administration of the McLaughlin Mine Monitoring Program Review Panel and preparation of the annual summary report. At the time that the fee was modified, it was anticipated that a panel would be involved in the review of the ongoing activities, and the review would entail the equivalent of 6 to 8 weeks of a full time Planner workload.

NAPA COUNTY
CONSERVATION, DEVELOPMENT AND PLANNING DEPARTMENT

DEPARTMENT REPORT

Meeting of December 16, 1992

Agenda Item: # 11

SUBJECT: 1991-1992 ANNUAL REPORT REVIEW OF THE ENVIRONMENTAL MONITORING PROGRAM FOR THE McLAUGHLIN GOLD MINE PROJECT

FILE: Use Permit # U-198283, CONDITION # 16

OWNER: HOMESTAKE MINING COMPANY

BACKGROUND:

In accordance with Condition # 16 of Homestake's Use Permit/SMARA Permit, the Planning Division has prepared this report for the Conservation, Development and Planning Commission as a general summary of the findings presented in the Executive Summary of the 1991-1992 Annual Monitoring Report submitted by Homestake Mining Company on September 25, 1992.

The attached report discusses the monitoring results for the 1991-1992 monitoring year, and contains recommendations by Homestake to modify certain aspects of the current Monitoring Program. This year, Homestake included a discussion on the implementation to date of the Contiguous Lands Management Program (CLMP), a program designed to manage the Homestake's adjacent non-mined lands. Six programs were discussed and summarized in the report.

The Planning Department's Review of the Environmental Monitoring Report is included as Attachment A, and the Homestake Mining Company's Executive Summary of the Annual Environmental Monitoring Report for 1991-1992 is attached as Attachment B. The full document is on file in the Conservation, Development and Planning Department Library.

RECOMMENDATIONS:

1. Accept the Department's attached review of the 1991-1992 Annual Environmental Monitoring Report (Attachment A) as adequate.

2. Approve the requested changes to the Environmental Monitoring Program as recommended by Homestake in the 1992 report as follows, with the remainder of the monitoring program to follow the approved format. In the 1992 report, Homestake requests one change of significance. This change affects an air quality monitoring station which is outside of Napa County's jurisdiction. (Air Quality Recommendation #3.)

A summary of the recommendations is listed below:

Water Quality:

The recommendations are unchanged from the 1990-1991 report and include:

1. Continue surface and groundwater quality monitoring in accordance with current WQMP as approved by the Central Valley Regional Water Quality Control Board, and other responsible agencies.

2. Continue to scrutinize monitoring station data from the waste rock disposal area for trends.

3. Continue to monitor station DC-6 monthly during the winter runoff season to provide additional data on Davis Creek below the Reservoir.

4. Continue the Quality Assurance/ Quality Control (QA/QC) program in its present format.

Air Quality Meteorology:

Recommendations 1 and 2 below are unchanged from the 1990-1991 report. Recommendation 3 is a proposed change per the 1992 report.

1. The high volume air sampling station at the pit, AQ-3, should be removed from the air network. This sampling station was targeted for two years. Homestake indicates that this station does not describe any impacts to ambient air quality or exposure to the general public. Continued operation of this station will not add to the understanding of spatial distributions at McLaughlin and should be eliminated from the network. This recommendation has been made since 1987, however, AQ-3 is located in Yolo County, and is under the jurisdiction of the Yolo-Solano Air Pollution District.

2. Asbestos monitoring has demonstrated that the mining activity has not increased asbestos fiber concentrations in the ambient air. Only one occurrence of a crysotile fiber measured greater than 5 microns in diameter was detected during the seven years of monitoring. Homestake recommends deletion of asbestos monitoring at this station. This recommendation was included in previous annual reports, however, the asbestos monitoring at station AQ-2 is under the jurisdiction of the Yolo-Solano Air Pollution District.

3. PIXE data collected at AQ-7 over the past seven years demonstrates that there are no airborne toxics near the process area. Homestake recommends that the PIXE sampling be discontinued at this location. The AQ-7 air sampling station is located in Lake County, and is under the jurisdiction of the Lake County air Quality Management District.

Aquatic Ecology:

1. Continue monitoring in Hunting and Knoxville Creeks as completed in the 1991-1992 monitoring year.

2. Continue the monitoring in Davis Creek and Davis Creek Reservoir as completed for the 1991-1992 year for water quality, and aquatic ecology heavy metal concentrations for Davis Creek and davis Creek Reservoir.

Vegetation:

1. Recommended seed mixes, amendments and mulches are the same as pervious years, with one change in the serpentine mix to delete lana vetch and replace it with rose clover. the purpose for the change is the lana vetch has a tendency to spread to areas where it was not seeded, it can produce a high fuel load, and it is competitive with other plants.

2. As recommended in previous years, reseeding should take place just prior to the rainy season and before temperatures drop, with seeding completed by November 1, 1992. Seed should be applied separately prior to the mulch.

3. On well consolidated rocky cut slopes, where no mulch will be used, 50000 lbs/acre of wood fiber should be added to seed before it is applied to slopes.

Wildlife:

1. Continuation of the Wildlife Monitoring programs in their present format for the 1991-1992 year.

Geotechnical:

1. The M-1 dam should be eliminated from the Geotechnical Review Program. This was originally recommended in the 1988-89 Annual Monitoring Report.

ATTACHMENT A

REVIEW OF THE ANNUAL 1991-1992 ENVIRONMENTAL MONITORING PROGRAM McLAUGHLIN PROJECT

The 1991-1992 Annual Monitoring Report represents the ninth report submitted by Homestake Mining Company in fulfillment of the requirement to report annually the results of the McLaughlin Mine Environmental Monitoring Program. The objective of the monitoring program is to measure compliance with environmental performance standards recognized in the regulatory permits issued for the project. The monitoring program also requires the assessment of trends indicative of potential impacts attributable to the McLaughlin Project.

Monitoring data presented in the 1992 annual report covers the 12 month period from July 1, 1991 to June 30, 1992. Quarterly data reports were presented through the year summarizing the data collected each quarter of the monitoring year. The purpose of the annual report is to provide the reviewer with an analysis of the data collected during the previous monitoring year.

This report summarizes the Executive Summary Conclusions and significant findings for each monitoring discipline presented by Homestake in the Annual 1992 report. Homestake's Executive Summary is attached as Attachment B.

WATER QUALITY

The Water Quality Monitoring Program consists of surface and groundwater monitoring of the hydrologic system surrounding the McLaughlin Mine facilities. The program is designed to monitor ambient or background water quality and regional water quality as well as waters closely adjacent to project facilities. There are nine (9) surface water stations, twenty-three (23) groundwater stations, and three (3) wasterock underdrain stations. Monitoring occurs on a quarterly basis.

Homestake indicated that no changes in surface or groundwater quality were identified. The quality of the waters in the vicinity of the processing facility, tailings impoundment, Davis Creek Reservoir, and the mine pit area remain essentially the same as described prior to the project's operation.

The 1991-92 monitoring data indicate that the upward trend in the concentration of sulfate in the waste rock area is continuing as predicted in the EIR and the 1986-1987 through the 1989-1990 reports. Homestake indicates that changes in water quality are apparent for certain parameters associated with sulfide oxidation at specific monitoring stations in the waste rock areas. The pumpback drains that were installed to contain flows from the wasterock facility back to the processing station have worked effectively since the 1988-89 season and no significant changes have resulted in overall water quality in Hunting or Knoxville Creeks.

Homestake reported that only 11 of 710 water quality data points (one percent) exceeded the maximum likely concentration of water quality variables tested for the 1991-92 reporting period. Three of the "exceedences" were associated with "first flush" samples. No trends or changes associated with the exceedences were identified.

Recommendations:

The recommendations are unchanged from the 1990-1991 report and include:

1. Continue surface and groundwater quality monitoring in accordance with current WQMP as approved by the Central Valley Regional Water Quality Control Board, and other responsible agencies.

2. Continue to scrutinize monitoring station data from the waste rock disposal area for trends.

3. Continue to monitor station DC-6 monthly during the winter runoff season to provide additional data on Davis Creek below the Reservoir.

4. Continue the Quality Assurance/ Quality Control (QA/QC) program in its present format.

NPDES DATA

The collection of NPDES data is required by the Central Valley Regional WQCB Order No. 88-181 to analyze the discharge of sediment control dams and receiving waters. Homestake reports that normal stormwater discharges occurred from Pond 7 of the Waste Rock Sediment Control System. Discharge was in compliance with applicable discharge limits. Receiving water quality parameters were also in compliance and remained within the range of natural variability. No discharge occurred from the East Waste Rock Facility Pond, or from Pond 9.

OTHER MONITORING

Sampling required in the Environmental Monitoring Program but not included in routine sample sets for surface and groundwater are included in this section. Data summarized include sampling of the cooling pond in March and June, semiannual sediment data for four locations, quarterly composite of samples of the tailings, quarterly domestic well samples, quarterly sampling of the tailings seepage return sump, and quarterly tailings reclaim water sampling for cresol and carbon disulfide.

Homestake reports that the cooling pond and tailings seepage return sump reflect expected operational values. Tailings samples reflect expected concentrations of tested constituents, and continue to test as nonhazardous. Tailings reclaim water analyses reflect nondetectable levels of cresol and carbon disulfide as expected. No unusual variations were detected in the domestic wells.

AIR QUALITY / METEOROLOGY

The Air Quality Monitoring Program is conducted in accordance with the requirements of the Bay Area Air Quality Management District, Lake County Air Quality Management District, and Yolo-Solano Air Pollution Control District. The focus of the air quality monitoring program is on documenting Total Suspended Particulate Concentrations (dust). The program supplies values for particulates and measurements of particulate mercury, particulate arsenic, and asbestos in the air near the mine. In the processing area, the program supplies data on source emissions from process vents, stacks, tanks, and ponds. Meteorological measurements are taken continuously at four locations to assist in the interpretation of the air sampler data.

Homestake reports that the existing road dust suppression measures, baghouses, scrubbers, and other air quality control measures have been effective in controlling emissions. Compliance with all regulatory requirements have been met.

Homestake reports that compliance was maintained with all ambient air standards and operating permit conditions.

Recommendations:

Recommendations 1 and 2 below are unchanged from the 1990-1991 report. Recommendation # 3 is proposed for to be implemented for the 1992-1993 monitoring season.

1. The high volume air sampling station at the pit, AQ-3, should be removed from the air network. This sampling station was targeted for two years. Homestake indicates that this station does not describe any impacts to ambient air quality or exposure to the general public. Continued operation of this station will not add to the understanding of spatial distributions at McLaughlin and should be eliminated from the network.

2. Asbestos monitoring has demonstrated that the mining activity has not increased asbestos fiber concentrations in the ambient air. Only one occurrence of a crysotile fiber measured greater than 5 microns in diameter was detected during the seven years of monitoring. Homestake recommends deletion of asbestos monitoring at this station.

3. PIXE data collected at AQ-7 over the past seven years demonstrates that there are no airborne toxics near the process area. Homestake recommends that the PIXE sampling be discontinued at this location.

AQUATIC ECOLOGY

The Aquatic Ecology Monitoring Program supplements the chemical water quality monitoring program. Data is collected on benthic macroinvertibrate community structure and diversity, fish community structure and population density, and levels of heavy metals in fish.

Hunting and Knoxville Creeks

Bodega Research Associates performed the annual aquatic ecology monitoring for Hunting and Knoxville Creeks. Their summary of conclusions indicated that no meaningful trends in trace element concentrations can be identified as resulting from the Homestake mining operations. They indicated that the reduced and focused monitoring system, implemented in 1986, has functioned efficiently and productively, and should be continued without major alteration through 1992. The growing data base resulting from the 1986 modification was sufficient to detect statistically significant annual changes in the benthic macroinvertebrate communities at each sampling station. Changes appeared to relate to annual variation in rainfall and stream hydrology, rather than to changes associated with the Homestake mining operation.

Low rainfall from 1987-1990 resulted in rich benthic macroinvertibrate spring communities, probably due to reduced winter scouring. The drought continued through the winter of 1990-91, however the erratic pattern of monthly precipitation resulted in heavy stream flows in March, with a resulting decrease in the benthic macroinvertibrate community and population parameters. (Benthic species richness, mean species richness per sample, and mean density.) In April 1992, richness and density increased again.

Reestablishment of benthic invertebrates lost in 1986 has occurred in Knoxville Creek. The loss may have been due to an accidental discharge from sediment pond M-1 in 1986, or drainage from the new East Waste Disposal site in 1987-88, or may have been the result of hydrologic changes. Of 15 species that were present in 1985 prior to the spill, fourteen had recolonized the site by 1990.

California Roach populations have been declining at all sites for the past six to seven years, most probably a result of the drought. Concentrations of metals in fish tissue do not suggest a chemical basis for the decline of population. The continuing drought is the more probable cause of Roach population decline on Knox Creek. Low rainfall is probably also the cause of increasing emergent and streamside vegetation at the Hunting Creek monitoring sites. The resultant change in habitat may have altered conditions for California roach; heavy winter scouring will be needed to return the streambed to conditions similar to those in 1984-1986.

No meaningful trends in trace element concentrations were identified as arising from Homestake Mining operations.

Recommendations:
Continue monitoring as completed in the 1991-1992 monitoring year.

Davis Creek and Davis Creek Reservoir

Davis Creek and Davis Creek Reservoir sampling was conducted by Ecological Research Associates and U.C. Davis under the direction of Dr. Charles Goldman. Reservoir sampling commenced in April of 1985 and has continued as specified in the Environmental Monitoring Manual, with an additional thirty six (36) annual mercury analyses.

Ecological Research at U.C. Davis concluded that the water quality and aquatic ecology monitoring aspects of the McLaughlin Project in Yolo County are operating in an orderly, logical and timely manner.

The 1991-92 monitoring year was a transition where mercury bioaccumulation in Davis Creek Reservoir (DCR) fish was concluded, and new research on the spatial and vertical distribution of mercury in DCR sediments began. A series of vertical sediment cores were taken from four routing monitoring locations and analyzed for mercury content at different depths within the cores.

The 1991-1992 data base did not indicate any major changes to the current annual schedule for water quality and aquatic ecology sampling in Davis Creek or Davis Creek Reservoir.were low and typically below detection.

Recommendations:

Recommendations were made to continue the monitoring as completed for the 1991-1992 year for water quality, and aquatic ecology heavy metal concentrations for Davis Creek and Davis Creek Reservoir.

VEGETATION MONITORING

The Vegetation Monitoring Program includes monitoring of previously reclaimed areas (reclamation success), sensitive plants and the management of contiguous lands. Reclamation research and test plantings to determine most suitable reclamation methods are also included in the program.

Sensitive Plants

In general, Homestake reported that all populations of sensitive plants observed during the 1991 monitoring season were smaller than normal in number and size, with many absent altogether. This is most likely attributable to the fifth year of drought.

Sensitive plant monitoring was conducted by Biosystems Analysis, Inc. and the Napa Chapter of the California Native Plant Society. (CNPS) Populations of sensitive plants observed in 1991-1992 were similar to size as those observed in 1990-1992. Ten previously undocumented populations of sensitive plants were observed at sites monitored in 1992. On the whole, 19 of 59 numbered sensitive plant occurrence sites were monitored during the 1991-1992 field season.

Reclamation Review

Reclamation review was completed by Lorraine Van Kekerix, an independent consultant formerly with Cal Division of Mines and Geology. Revegetation efforts have been successful in establishing plant cover adequate to stabilize disturbed sites and control erosion. Native species from undisturbed sites have started to invade the revegetated areas. Successful revegetation in the 1991-1992 season was completed on 80 acres of disturbed land, including the

west waste rock disposal facility, 1500 bench elevation and top, a brow ditch above the slurry pipeline road,; the north pit Davis Creek Access; and an exploration site west of HMC-1 Road.

Weather during the year was not average. Rainfall was 19.1 inches from July 1, 1991 to June 30, 1992, approximately 75% of average rainfall. For the second year, a higher than normal proportion fell in the spring, with a very low rainfall in fall and early winter. 12.8 inches of rain fell in fall in winter, with 5.6 inched in spring.

The seed mixes used in the 1991-1992 season were the same mixes used since 1987-88, and are recommended for the 1992-1993 season, with one change in the serpentine mix to replace lana vetch with rose clover. Soil amendments and mulch recommendations that were used since 1985-86 have provided good results and are recommended for the next season.

Species composition on reclaimed sites has changed over time with annual grasses predominant in the first year, followed by emerging perennial grasses, and clover in the second year. In the third year, perennial grasses are predominant, with native grasses more abundant, and in the fourth and fifth years, the invasion of native plants increases. Over time, the native species are expected to replace the seeded species.

The revegetation evaluations over the past four years indicate that plant cover was sparse on three types of areas: serpentine areas, rocky cut slopes, and some waste rock areas. Serpentine soils are difficult to revegetate due to the chemical composition of the soil and rock. The slopes are often geologically unstable, and unable to support plants. Rock cut slopes are difficult to revegetate due to few fracture areas where plant roots can take hold, and the fractures hold little water or plant nutrients. The waste rock areas have experience less regermination than other revegetated areas due in part to the low concentration of plant nutrients in waste rock.

This is the sixth year of drought, and many of the established grasses set seed for the first time in the last few years. There was less seed set than would be expected in a normal rainfall year. The lack of seed will have little effect on the areas that are stabilized by perennial plants. There was an increase in the diversity of plant species invading the revegetated sites compared to the number of species present in 1990 and 1991.

Recommendations:

1. Recommended seed mixes, amendments and mulches are the same as pervious years, with one change in the serpentine mix to delete lana vetch and replace it with rose clover. the purpose for the change is the lana vetch has a tendency to spread to areas where it was not seeded, it can produce a high fuel load, and it is competitive with other plants.

2. As recommended in previous years, reseeding should take place just prior to the rainy season and before temperatures drop, with seeding completed by November 1, 1992. Seed should be applied separately prior to the mulch.

3. On well consolidated rocky cut slopes, where no mulch will be used, 50000 lbs/acre of wood fiber should be added to seed before it is applied to slopes.

WILDLIFE

The Wildlife Monitoring Program includes documentation of wildlife observations made on the Homestake property including the tailings impoundment, wildlife use of Davis Creek Reservoir, and an annual golden eagle nest survey. The Wildlife data base consists of wildlife observation cards submitted by project employees, contractors, researchers, and wildlife monitoring by Ecological Research Associates at Davis Creek Reservoir.

The 1991-1992 census was focused on common resident species versus documentation of all species present. Species diversity for 1991-1992 compared to the previous five years resulted in 42 bird species not sited this year, with 9 newly observed species. A total of 16 mammal species and 7 herptile species previously sighted were absent in this year's survey. An additional 2 herptile species were added. No new mammal species were added.

Wildlife observations sighting routes included Morgan Valley road for Lower Lake to Knoxville, perimeter roads to Davis Creek Reservoir and the Tailings impoundment, Rayhouse Road from the Reid Mine continuing easterly across Davis Creek dam. Wildlife observations are also documented within and adjacent to the east rock sediment control ponds, mine and process areas, and neighboring residential lands. Numerous sighting s were accumulated by Dr. Darell Slotten of U.C. Davis in conjunction with his work at Davis Creek Reservoir.

An aerial helicopter search for raptor nests was conducted in April of 1992, and resulted in the sighting of one occupied golden eagle nest along Hunting Creek south of the mine property. A second potential golden eagle nest was observed at the Davis Creek Reservoir, but found empty at the time. A mature golden eagle was sighted, and subsequent monitoring of the nest showed use. Two prairie falcon nests were observed.

The Townsend's big eared bat (Plecotus townsendii) continued to use the protected roost sites prepared in 1988-1989. The electronic monitoring system installed in the maternity site in 1988 continues to provide data on nightly and seasonal activity patterns, data on roost temperature and light levels. Records of activity patterns and visual observation confirm the continued successful use of these sites. A preliminary radio tracking was conducted in fall of 1991 to learn more about late season activities and hibernaculum sites of Townsend's big eared bat. Further studies will be performed before conclusions can be drawn.

A hack box site was constructed on Homestake property during spring of 1992 in conjunction with the bird rescue center of Santa Rosa. The hack box allows young birds of prey that have been displaced to be cared for and eventually returned to the wild. Homestake volunteers assumed feeding responsibilities for three Great Horned Owlets which were successfully released.

Recommendations:

Homestake recommends continuation of the Wildlife Monitoring programs in their present format for the 1991-1992 year.

CONTIGUOUS LAND MANAGEMENT PROGRAM

The Contiguous Lands Management Program (CLMP) was developed as an extension of the mine's Environmental Monitoring Program to manage Homestake's adjacent nonmined lands. Six programs were established within the CLMP's framework. In the 1991-1992 Annual Monitoring Report, Homestake provided a summary description of the program objectives and work performed and/or programs initiated to date.

The Hazard Reduction Program was designed to reduce the risk of fire resulting from activities on mine property, facilitate e reaction to fire, and reduce fuel load and improve habitat quality through prescribed burning. Fire training has been provided to mine personnel, fuel reduction programs included expansion of the firebreak adjacent to the process facility through conversion of chaparral to grassland in 1986, and an ongoing grazing program.

The Shoreline Development Program was developed to assess the natural habitat development over time and for the development of habitat enhancement programs as needed. No shoreline habitat work has been initiated yet.

The Sensitive Plant Restoration Program was developed for monitoring and management of sensitive plant species onsite for ultimate inclusion in the U.C. Reserve System. Annual monitoring of sensitive plants has been added to the data base. One species was transplanted on site in 1986, 88, 89, and 1991 with followup monitoring. Salvage of an additional species for relocation will occur in spring of 1993 where the original location of the plant will be impacted by the filling of the tailings impoundment.

Pasture Use Management provides for management of pasture lands within the contiguous lands area. an ongoing grazing program was initiated in 1988, with management input from the Lake County Farm Advisor. Grazing was initiated on lands east of the mine in Napa County in 1991, and the Napa County Resource Conservation District conducted a grazing land assessment which will be used in future management decisions.

The Habitat Restoration and Improvement Program addresses wildlife habitat management practices and includes prescribed burning restoration and development of water resources. During winter of 1991-1992, the Audubon Society made two visits to the property to conduct wintering bird counts in the Davis Creek Reservoir area. Grazing was removed from the blue oak woodlands surrounding davis Creek Reservoir in 1983. Monitoring of habitat improvement has not been initiated to date.

The Education and Research Program provides for the facilities and resources necessary to fulfill the postmining use of the property as a research site for regional educational institutions as provided for in the approved reclamation plan. The ongoing annual environmental monitoring data is added to the data base which will eventually be available for research purposes.

GEOTECHNICAL MONITORING

The Geotechnical Monitoring Program monitors the integrity of dams and embankments. Structures reviewed include the Tailings Dam, M-1 Dam, Davis Creek Dam, the Waste Rock Sediment Control Facility, and the East Waste Rock Disposal Facility Pond. Homestake reports that all structures are performing as designed. Monitoring data was reviewed an analyzed by D.P. Engineering Inc., Geotechnical Engineers.

The embankment on Pond 9 was modified as a result of regrading for reclamation purposes. All structures are performing as designed and the monitoring program is sufficient to track structure performance.

Recommendation:

1. The M-1 dam should be eliminated from the Geotechnical Review Program. This was originally recommended in the 1988-89 Annual Monitoring Report.

ATTACHMENT B

HOMESTAKE MINING COMPANY

McLAUGHLIN MINE

ANNUAL ENVIRONMENTAL MONITORING REPORT

JULY 1, 1991 THROUGH JUNE 30, 1992

EXECUTIVE SUMMARY

Introduction

The Executive Summary lists the findings of the analyses conducted on monitoring data collected during the reporting period of July 1, 1991 through June 30, 1992. The summary is organized in sections by monitoring topic.

1.0 Water Quality

In accordance with the requirements of California Central Valley Regional Water Quality Control Board Waste Discharge Order No. 89-107 for the McLaughlin Mine, a summary and analysis of the water quality data collected for the Mine's Water Quality Monitoring Program over the preceding twelve-month period (July 1991 through June 1992) has been prepared. The analysis is focused on changes in water quality over time (temporal analyses) and comparisons of the data to statistically calculated maximum likely concentrations.

No changes in surface or groundwater quality in terms of those elements or compounds which are fundamental to compliance with regulatory requirements have been identified. Analytical emphasis has been on those parameters most likely to be impacted by mining: cyanide, arsenic, boron, chromium, copper, lead, mercury, nickel, and zinc.

Water quality of waters in the vicinity of the processing facility, tailings impoundment, Davis Creek Reservoir, and the mine pit area remains essentially as it was described prior to the project's operation.

Water quality trends associated with sulfide oxidation in the waste rock areas were identified and discussed in the 1986-1987 through 1988-1989 Annual Environmental Monitoring Reports and also predicted in the Environmental Impact Report. The 1991-1992 monitoring data indicate that these trends are continuing. Changes in water quality are apparent for certain parameters associated with sulfide oxidation at specific monitoring stations in the waste rock areas. It should be noted that no significant changes in

overall water quality have been observed in Hunting or Knoxville Creeks particularly with respect to metals concentrations. The waste rock underdrain pumpback systems designed, installed, and operated by Homestake in response to initial trends identified through environmental monitoring, have operated effectively through the rainy seasons of 1988-1989 through 1991-1992. These systems contain and pump back to the process circuits, flows from the waste rock underdrains.

For the reporting period only eleven (or one percent) of the 710 water quality data points evaluated for stream monitoring stations and groundwater wells exceeded the statistically derived maximum likely concentrations. Three of those exceedances were associated with first flush samples. No trends or changes associated with these "exceedances" have been identified.

2.0 NPDES Data

NPDES data are collected from the discharge of sediment control dams and from receiving waters as required by California Central Valley Regional Water Quality Control Board Order No. 88-181. Normal storm water discharges occurred from Pond 7 of the Waste Rock Sediment Control System (discharge point 003 and receiving waters HC-05R and HC-10R). Discharge was in compliance with applicable discharge limits. Receiving water quality parameters were also in compliance and remained within the range of natural variability.

3.0 Other

Sampling required in the McLaughlin Project Environmental Monitoring Manual but not included in the routine sample sets for surface and groundwater are presented in this section. Data summarized include sampling of the cooling pond in March and June, semiannual sediment data for four locations, quarterly composite samples of the tailings, domestic well sampling, sampling of the tailings seepage return sump, and sampling of Tailings reclaim water.

The cooling pond (CP-01) and tailings seepage return sump (TRS-01) reflect expected operational values for monitored parameters.

Sediment data collected reflect ambient stream conditions.

Tailings samples reflect concentrations expected during operations for total and filtered values. The tailings continue to test as nonhazardous.

Tailings reclaim water analyses reflect nondetectable levels of cresol and carbon disulfide as expected.

Data for domestic wells show no unusual variations.

4.0 Air Quality and Meteorology

The Air Quality Monitoring Program is conducted in accordance with the requirements of the Bay Area Air Quality Management District, Lake County Air Quality Management District, and Yolo-Solano Air Pollution Control District. It is evident that road dust suppression measures, baghouses, scrubbers, and other air quality control measures have been effective in controlling emissions as evidenced by air quality data collected at our compliance monitoring stations. A request has been made to Yolo/Solano APCD for approval to remove AQ-3, a redundant measurement of compliance, in Yolo County.

Rainfall was again below normal, reflecting the six-year drought being experienced in California. Most of the precipitation occurred during February and March 1992. Total rainfall was 18.97 inches.

Compliance was maintained with all ambient air standards and operating permit conditions.

The level of monitoring currently employed under the McLaughlin Mine Air Quality Monitoring Program is more than adequate to describe operation conditions and to monitor compliance at the McLaughlin facility.

5.0 Aquatic Ecology

Hunting and Knoxville Creeks

Aquatic ecology monitoring on Hunting and Knoxville Creeks is conducted by Bodega Research Associates. Their report is reproduced in full in the volume entitled "Annual Monitoring Report, July 1, 1991 - June 30, 1992, Aquatic Ecology". The report Summary of Conclusions is reproduced below:

Summary of Conclusions

The reduced and focused monitoring program implemented in 1986 for Hunting and Knoxville Creeks has functioned efficiently and productively through 1992, and should be continued without major alteration in 1993. The cumulative increase in the data base from April sampling at the four primary sites (HC-5, HC-7A, HC-10, KC-3) and August benthic sampling at HC-7A will make the program more effective each year, as long as a consistent, careful, and appropriate methodology is maintained. Already this growing data base has become sufficient to detect statistically significant annual changes in the benthic macroinvertebrate communities at each of the sampling stations. These changes appear to relate to annual variation in rainfall and stream hydrology rather than to changes associated with the Homestake mining operation. Low rainfall during 1987-1990 had resulted in richer spring communities because of the reduced winter scouring. The 1990-1991 winter continued the long drought, but with an exceptionally erratic pattern of monthly

precipitation that included very heavy rainfall during March, producing heavy spring flows. As a result, benthic macroinvertebrate community and population parameters (total species richness, mean species richness per sample, and mean density) declined in 1991 from the high levels reached in 1990 at all four sites. In April 1992, richness increased again at all four sites, and density increased at all sites except KC-3.

Chemical changes produced by the accidental discharge from Sediment Pond M-1 in 1986 and further changes in 1987-1988 evidenced by a reddish iron precipitate on the stream bottom at KC-3, produced by drainage from the new East Waste Disposal site, remain as possible causes of changes in invertebrate communities at KC-3 during 1985-1989. Alternatively, hydrologic events might have been responsible. However, we now can conclude that recovery of the benthic macroinvertebrate community at KC-3 is essentially complete, since species richness, diversity, density, and relative abundance of Chironomidae and "EPT" taxa (3 orders of insects considered sensitive to water quality) have all returned to prespill levels showing no significant differences over the years of this study. Of fifteen species present in 1985 but absent after the spill in 1986, fourteen had recolonized the site by 1990.

California roach populations have been generally declining at all sites for the past six or seven years, although numbers recovered very slightly at Hunting Creek sites in 1992; several different factors may be contributing to this decline. The continuing drought is certainly an important factor, with the potential to influence fish populations in several different ways. Since rainfall over the six-year period totalled only slightly above one-half normal, the cumulative rainfall deficit is very large, producing a continuous series of summer flow conditions that have been very low (at HC-5 and HC-10), intermittent (at HC-7A), or nonexistent (at KC-3). As flow decreases, water temperature rises, oxygen levels decrease, and conductivity rises. These conditions probably decrease survival and reproduction in California roach at all sites, and also may have been responsible for the declines in Sacramento squawfish and Sacramento sucker at HC-10.

Low rainfall is probably also the cause of increasing emergent and streamside vegetation at all Hunting Creek sites. The resultant change in habitat may have altered conditions for California roach; heavy winter scouring will be needed to return the streambed to conditions similar to those of 1984-1986.

Homestake mining operations probably exacerbated the effects of the drought at HC-7A, through the isolation of the tailings reservoir from the watershed of Hunting Creek. This isolation minimizes the possibility of contamination of Hunting Creek, but has removed 11% of the original watershed draining into Hunting Creek above HC-7A. This loss is probably unimportant under most rainfall conditions, but under the stress of the current six-year drought, it may be a contributing factor in the increase in vegetation and decrease in fish at HC-7A.

At KC-3, the decline in roach populations since 1985, previously confined to the immediate sampling site, has now spread downstream. In April 1991, roach were difficult to find at the alternate site 1.6 miles downstream of KC-3 where they had remained abundant in recent years. In 1992 they were again common at that site. Concentrations of metals in fish collected at that site do not identify a chemical basis for the decline, however. Mercury levels, which were high in 1988, declined for the next three years, then increased in 1992; they are now 28% below the 1988 levels. Furthermore, roach populations in both Hunting Creek and Knoxville Creek increased somewhat in 1992, even as mercury levels were apparently increasing. The monitoring program should continue to focus on these mercury concentrations in future years, but the continuing drought is a more probable cause of the roach population decline in Knoxville Creek. If this is the case, a return to average or heavy rainfall in future years should be accompanied by increasing roach populations.

Within the limits of reliability of the laboratory analytical results, no meaningful trends in trace element concentrations can be identified as arising from Homestake Mining operations. As the data base of measured concentrations in fish tissues from the monitoring sites expands each year, the extent of natural biological variability and of analytical variability inherent in the monitoring program will become better defined, and identification of underlying trends will become easier. The archiving of frozen samples of fish tissue each year, added to the monitoring program in 1990, will make possible future reanalysis of samples to corroborate any suspected trends.

Davis Creek and Davis Creek Reservoir

Davis Creek and Davis Creek Reservoir sampling was conducted by Ecological Research Associates and U.C. Davis respectively under the direction of Dr. Charles Goldman. Reservoir sampling commenced in April 1985 and has continued as specified in the Environmental Monitoring Manual with an additional thirty-six mercury analyses authorized annually. The report is reproduced in full in the volume entitled "Annual Monitoring Report, July 1, 1991 - June 30, 1992, Aquatic Ecology". The executive summary of that report is reproduced below:

Summary of Conclusions

Section 1 - Introduction

This is our seventh Annual Report documenting water quality in Davis Creek Reservoir and the stream stations located in Davis Creek. A five-year summary report was issued for the period January 1982 - June 1989 in September 1989. This was followed by our July 1989 - June 1990 Annual Report (issued September 1990)

which presented and analyzed the entire data base to that time. The 1991-1992 Annual Report which is presented here, specifically focuses on the data collected this past year; July 1991 through June 1992. We provide plots of the entire 7+ to 10+ data base and discuss/evaluate the July 1991 - June 1992 findings in light of the historical record and regulatory criteria.

The major issues addressed in the current report include:

- *Detailed review and evaluation of 1991-1992 quality assurance and quality control (QA/QC) data. This includes "in-house" laboratory QA/QC protocol, field samples taken for QA purposes, measurement of metals in water, and estimates of the accuracy and precision on fish mercury and sediment metals analyses (Section 2).*

- *Long-term and seasonal trends of general water quality constituents (Section 3.1) and heavy metals (Section 3.2) in Davis Creek.*

- *Long-term and seasonal trends of heavy metals in the biota and sediments of Davis Creek (Section 4).*

- *Impact of the Reed Adit closure and Reed Mine cleanup on water quality, biota and sediments at DC-5 (Sections 3 and 4).*

- *Long-term and seasonal trends of general water quality constituents (Section 5.1) and heavy metals (Section 5.2) in Davis Creek Reservoir.*

- *Concentrations of mercury and other metals in Davis Creek Reservoir sediments, both spatially, and in the case of mercury, vertically in the bottom sediments (Section 6.1).*

- *Mercury accumulation by fish in Davis Creek Reservoir (Section 6.2).*

As we have entered the second five-year period of the post-reservoir phase of the project, data collection includes an irreducible list of parameters and sampling schedule which would insure us that changes in surface water quality would be identified. These parameters were recommended in the 1989-1990 Annual Report and have been incorporated in to sampling and data reporting program. As always, HMC and the County will be immediately notified if we have reason to believe that additional parameters should be added.

It is our conclusion that the water quality and aquatic ecology monitoring aspects of the McLaughlin Project in Yolo County

are operating in an orderly, logical, and timely manner. Continued discussions between ERA, UCD, HMC, and the Yolo TRP continue to be productive.

The 1991-1992 monitoring year represented a transition period which saw the detailed UCD research program which investigated mercury bioaccumulation in DCR fish come to a conclusion, and new research on the spatial and vertical distribution of mercury in DCR sediments begin. A series of vertical sediment cores were taken from the four routing monitoring locations and analyzed for mercury content at different depths within these cores. This data sets the framework for additional studies related to processes which regulate the deposition of mercury to the reservoir's sediments and the potential influence of benthic microbial activity on its distribution and bioavailability. During 1992-1993, this research will be done in joint cooperation between the Division of Environmental Studies and the Department of Microbiology at the University of California at Davis.

Section 2 - QA/QC

1. A reliable and comprehensive QA/QC plan forms the cornerstone of a sound environmental monitoring program. It provides us with assurance that the data base is accurate and precise and allows us to proceed to the interpretation phase of the process. While all analytical laboratories are required to meet certain QA/QC standards, the exact nature of a QA/QC plan is dependent on the questions being asked of the environmental monitoring program. The ultimate goal is to be able to detect changes in water quality should they occur.

2. The current analytical responsibilities are as follows: a) NET continues to test all water samples from Davis Creek (DC-5 and DC-6) and Davis Creek Reservoir [DCR] (Surface, mid, Bottom), b) NET runs all sediment metals samples from Davis Creek and DCR, c) UCD runs all mercury analyses on Davis Creek and DCR fish, d) NET runs "other" metals on Davis Creek and DCR fish (As, Cr, Cu, Pb, Ni and Zn), and e) UCD runs sediment mercury on the vertical sediment cores taken in DCR.

3. During 1991-1992 the following QA/QC samples were sent to NET by HMC and ERA and UCD (note: these are in addition to the lab QA/QC tests which are routinely done by NET as part of their internal QA/QC plan): replicated intralaboratory samples, replicated interlaboratory samples for both surface and groundwater, field blanks, aqueous certified stock standard metals samples prepared by a commercial laboratory, and NIST certified aquatic sediment materials for metals.

4. A total of four surface water samples were analyzed as interlaboratory replicates. Each sample was tested for the full

suite of water quality constituents as outlined by the current sampling plan. The purpose of these samples is to check on the precision or reproducibility of the contract lab's methodology. The data yielded a total of 40 paired comparisons which had at least one value above the analytical limit of detection. Of all the parameters, nitrate, ammonia, chromium (T/F), copper (T/F), lead (T/F), mercury (T/F), and zinc (T/F) were generally below detection on at least three of the four dates, making quantitative comparisons difficult. Even with stricter RPD exceedence criteria suggested for intralaboratory comparisons, surface water data were outside the criteria only one time and that was for total iron. For the past four years, the percent exceedances have been low at 7%, 13%, 5% and 0%. This year it was 3% (# exceedances + # pairs above detection).

5. Of the 322 paired analyses run as interlaboratory replicates, 136 pairs or 42% showed at least one value of the data pair above the limit of detection. Of the seven Priority Pollutant metals (As, Cr, Cu, Pb, Hg, Ni and Zn) only 34 of the 196 data pairs (17%) were above the limit of detection. This was similar to previous years. Using a value of 80% agreement as a cutoff for acceptable interlaboratory comparability (i.e. for any parameter, the two labs were in agreement on ≥80% of the fourteen samples), the parameters could be grouped into five categories:

- Adequate number of sample pairs above detection ($n \geq 7$) and high agreement (≥80%): These included TDS, ammonia, sulfate, T-arsenic, T-boron, and T-manganese.
- Adequate number of sample pairs above detection ($n \geq 7$) and low agreement (<80%): These included hardness (79% agreement), T-iron (50% agreement) and F-iron (55% agreement).
- Inadequate number of sample pairs above detection ($n < 7$) and high agreement (≥80%): These included nitrate, T-lead, mercury (T/F), nickel (T/F), zinc (T/F), and F-arsenic.
- Inadequate number of sample pairs above detection ($n < 7$) and low agreement (<80%): None.
- No data pairs above detection: These included, chromium (T/F), copper (T/F), and F-lead.

In general, there was good agreement between the two labs. While most of the heavy metals concentrations were below detection, an important question is, can the laboratory accurately measure higher concentrations of metals in the water should they occur. The fact that the average NET spike-recovery values on matrix samples were 89%-97% indicates that over the period of record, this lab would have had the ability to detect high concentrations of metals if they occurred.

6. HMC submitted quarterly sets of a commercially prepared reference material for metals in water. Chromium, copper, and mercury were added to the standard mixture in 1992 and will remain as part of future reference materials for metals-in-water. As, Cr, Cu, Mn, Ni, and Zn never exceeded the above criteria. Iron exceeded its criterion on two of the four samples (50%). Valid mercury comparisons were possible on only one of the two dates because of a spiking error by the commercial supplier. On the single date when mercury could be run on the reference solution the contract lab reported a concentration of >0.0002 mg/l while the spike was at a concentration of 0.001 mg/l. This represents only a single comparison and a special effort to watch the results of the mercury-in-water audit sample will be made during the upcoming monitoring year.

7. On the basis of all this information, we conclude that NET has the ability to measure water chemistry constituents at adequate levels for this project.

8. For sediment metals, NET uses US EPA methods for both the digestion and analytical phases. Details of these methods have been provided in the past. Blanks, external standards, method standards, spike-recoveries, and matrix duplicates were run and were all within project control limits. The individual QC samples were all within the control limits established by NET and we consider the values to be good.

9. Certified SRM sediment material from the Buffalo River was analyzed by both the contract laboratory in conjunction with their sediment metals analyses and by UCD along with their measurement of mercury in the vertical sediment cores from DCR. For NET, the contract lab, absolute percent difference between the certified concentration and the measured concentration was less than 20% for copper, lead, mercury, nickel, and zinc; for all these metals combined, fifteen of the twenty individual analyses had an APD of 15% or less. Only on 15 May did the APD for lead exceed 20% (24.8%). In contrast, the APD for arsenic and chromium exceeded 20% on each of the four analytical runs. It is significant that for sediment-Hg, the mean $\pm$SD APD for the four runs was very low at 3.7%$\pm$3.4%.

The UCD QA/QC program for mercury sediments included three different sediment Reference Materials ([i] European Certified Reference Material - Lake Sediment, [ii] European Certified Reference Material - Industrial Sludge, and [iii] the NIST Buffalo River Sediment). APD's for these materials ranged between 1%-4%. UCD also ran 12 duplicate environmental samples with wet weight concentrations ranging from a low of <1 ppm to a high of >8 ppm. The mean percent difference was 8.6%.

10. Since the mercury content of reservoir and creek fish remains the single most environmental concern related to water

quality and aquatic ecology in Yolo County, it is very important that the QA/QC for these samples be rigorous. At our recommendation, UCD took over the responsibility for making mercury measurements in all fish samples.

The 1991-1992 fish samples were run in three batches. Seven standard concentration levels were included in each run ranging from 0-2.00 ppm. For each of the runs, the r^2-value for the regression equation was always greater than 0.99 and typically around 0.995. During 1990-1991 a total of 73 project samples were analyzed. Of these 49 were required as part of the routine EMP. The remaining 24 were done at our scientific discretion to obtain a better understanding of roach mercury at DC-6. On top of these there were 21 standards, 3 blanks, 9 NIST Reference Material and 8 internal duplicates which analyzed two flesh samples from the same fish. Replicate fish and composites from a given time or location were also analyzed so that with few exceptions, a reported value comes from the analysis of more than a single fish. Of the 108 total individual analyses, 41 or 38% were for QA/QC. This is an extraordinary amount of QA/QC work for a monitoring program and because of it we have complete faith in the fish mercury data.

Individual measurements of NBS RM 50 tuna material ranged from 0.89-1.02 ppm. The mean of all four runs combined was 0.97 ppm Hg with a mean (n=9) APD of only 1.8%. Sample replication was also excellent. For the 28 duplicates, the relative percent difference ranged from 1.3%-6.7% with a mean ($\pm$SD) of 4.2% $\pm$2.3%. In terms of the absolute ppm difference between samples, this corresponded to a range of 0.00-0.30 ppm Hg for fish flesh.

11. At the request of Ecological Research Associates, the California Department of Fish and Game, Water Pollution Control Laboratory in Ranch Cordova agreed to analyze DCR fish for mercury as part of an interlaboratory QA/QC check. We submitted 10 samples to this lab in August 1992, 5 DCR bass, and 5 DCR bluegill which were collected in 1992. Unfortunately, we have not received the CF&G results at this time. When these values become available we will issue an Addendum to this report.

12. NET QA/QC data on As, Cr, Cu, Pb, Ni, and Zn in DCR and Davis Creek fish were all very good and within project specifications.

Section 3 - Davis Creek Water Quality

A 10+ year data record now exists for water chemistry in Davis Creek at stations DC-5 and DC-6. During the period July 1991 - June 1992, samples were collected on five dates; three routine quarterly dates (July, October, and January), once in June instead of the scheduled April, and in February, the month of first-flush flow conditions.

The hydrologic characteristics of Davis Creek during this past monitoring year were dominated by the relatively February-March

rain storms which dropped a total of 14.25 inches of water during that period. During February, 95% of the monthly precipitation fell in the two-week period 10-22 February. In March, almost all significant rainfall was confined to the first two weeks of the month with a total of 4.21 inches measured on 2 March alone. Despite the fact that rainfall in February-March was moderately high, measurements of flow at DC-5 were very low with a maximum of 1503 gpm recorded on 14 February 1992. The apparent discrepancy between rainfall and flow resulted from the fact that by 14 February (when the routine creek sample was taken) only 50% of the monthly precipitation had fallen. A flow measurement after the large 2 March storm would have undoubtedly yielded a much higher creek flow. With regard to TSS and other water quality constituents, the timing of the February sample appeared adequate to capture the first-flush of these materials. Water did not spill over the reservoir during this past year. Flow at DC-6 during the first-flush month was due to runoff from the watershed downstream of the dam. Temperature, dissolved oxygen and pH were within the historic range of the 9+ year data base and levels of these parameters did not interfere with creek biota.

Concentrations of total suspended solids (TSS) are very important with regard to metals transport, since these elements are associated with the particulate versus the dissolved phase in the water. The only sampling date when TSS was significantly high was on 14 February 1992 during the first-flush period (5,100 mg/L). This was the second largest concentration measured since the Environmental Monitoring Program began in 1982 and was only exceeded last year when a value of 7,800 mg/L was measured during the first-flush event in March 1991. For the first-flush sample of the current year, TSS at DC-6 was very low at 17 mg/L. The distribution of total iron followed that of TSS and this has been observed in previous years. For the remaining sampling dates, TSS was less than approximately 10 mg/L at both stations. The distribution of total iron was well correlated with TSS in the sense that the only time that total iron was found above detection (0.01 mg/L) was at DC-5 during the first-flush when the seasonal spike of TSS was found. The distribution of the remaining water quality parameters was not different from that observed in the historical data base and concentrations did not interfere with the beneficial uses of the creek. Concentrations of total iron, manganese, and ammonia continue to show an apparent decrease following the closure of the Reed Adit in November 1989.

For most of the priority pollutant metals (As, Cr, Cu, Hg, Pb, Ni, and Zn), the absolute concentrations and seasonal distribution was consistent with the historical data base. The large flows at DC-5 in February 1992 were a dominant feature of metals transport at this site. All seven metals were above detection on that date whereas they were typically below detection on all other sampling dates during the period July 1991 - June 1992. As a result of

either transport in surface runoff, or resuspension of bottom and bank material, MLC concentrations for Cu, Pb, and Zn, but not As, Cr, Hg, or Ni were exceeded at DC-5. Concentrations were never above detection at DC-6. The reservoir continues to act as an effective trap for upstream metals. Beneficial uses of DC-6 water were not negatively impacted.

The data suggest that the closure of the Reed Adit and the Reed Mine cleanup in November 1989 by HMC may have had an effect on reducing the baseline concentrations of nickel and zinc at DC-5. However, given the limited number of samples taken since the adit was closed, definite conclusions are not possible at this time.

Section 4 - Davis Creek Aquatic Ecology - Heavy Metals

1. California roach were collected at both DC-5 and DC-6 in August, October 1991 and February, May 1992. This marks the first time since the spring of 1991 that roach were available for capture at DC-6. In addition to the routine monitoring samples required at DC-6, an extra 10 samples (comprising 35 individual fish) were sampled to further our understanding of mercury bioaccumulation at this important station. Creek bottom sediments continued to be sampled on a bi-annual schedule in the fall and spring.

2. Since 1985, mercury analysis for roach has been done on twenty-seven (27) individual sampling dates at DC-5 and on twenty-four (24) dates at DC-6. Over this period of record, the mean of the mercury concentrations at DC-5 was 0.32±0.14 (mean±SD) ppm wet wt. The minimum and maximum individual quarterly measurements are 0.13 ppm and 0.70 pm. For the same period, the mean roach mercury concentration at DC-6 was 34% lower at 0.21±0.09 ppm; with a minimum quarterly value of 0.10 ppm and a maximum value of 0.41 ppm. While the mercury content of roach at DC-5 had been higher relative to DC-6 on all but one of the collection dates, the summer-1989 to summer-1990 showed the opposite trend with roach-Hg nearly twice as high at DC-6. At both DC-5 and DC-6 during this past monitoring year the results clearly show that the previously consistent pattern of higher mercury in DC-5 versus DC-6 roach was re-established. During period August 1991 to May 1992 the mean mercury content of the DC-5 composites was 0.34±0.05 ppm (SD) and was double that at DC-6, 0.17±0.03 ppm.

3. The absolute levels of roach-Hg at DC-5 and DC-6 are still below the California Department of Health Services 0.5 ppm criteria for edible fish.

4. With the inclusion of this latest set of data for both DC-5 and DC-6, it does not appear that closing the Reed Adit has had an impact on roach-Hg content.

5. Young juvenile bass in Davis Creek Reservoir (weights of 1-4 g) have mercury concentrations which are 2.5-3 times that measured in the largest, most mature roach (±20 g) collected at DC-6. This highlights the fact that mercury is much more bioavailable in DCR.

6. During the 1991-1992 sampling year, sediment mercury concentrations in Davis Creek ranged from below detection to 1.4 mg/kg (dry wt.) with 75% of the samples less than 1.0 mg/kg. This is consistent with the historical, post-1987 data base which shows that with the single exception of spring 1988 when mercury at DC-5 was 39 mg/kg, sediment mercury at both stations has been consistently less than 5 mg/kg. While the sample size is too small to show statistical significance between the pre- and post- Reed Adit closure, the mean value for the period October 1991-April 1992 was 3.3 times lower than for October 1987-April 1989.

7. The lower limits of detection for sediment metals analysis which were instituted in 1990-1991 were again achieved in 1991-1992. The continued expansion of the environmental data base has allowed us to recognize that the closure and cleanup of the Reed Mine in November 1989 may have had a positive influence on levels of some priority pollutant metals (especially nickel and perhaps arsenic) in DC-5 roach. Roach-Hg concentrations at DC-5 do not appear influenced by the Reed Mine cleanup.

8. Concentrations of priority pollutant metals in Davis Creek sediment were generally consistent with other measures made since the change in sampling procedure which took place in October 1987. It is of particular interest that the metals associated with the natural geology of the area, i.e. Hg, Ni, As, and Cr all have shown declines in sediment concentration since April 1991. Given that the cleanup of the Reed Mine and closure of the adit was completed in November 1989 it is not unreasonable to conclude that this clean-up action has reduced metals loading to the creek sediment and likewise to the downstream reservoir. Of course, this conclusion is based on the current data base and further monitoring will be needed to explore this trend in more detail.

Section 5 - Davis Creek Reservoir - Water Quality

DCR general water quality parameters basically behaved as in previous years, with the system being dominated by the seasonal cycle of spring-fall thermal stratification followed by isothermal aerobic mixing. Depletion of oxygen in the deep water layer (hypolimnion) during the stratified season, progressed as in prior years, again allowing the buildup of several parameters to temporarily high levels (hydrogen sulfide, iron, manganese) before fall overturn and isothermal mixing returned the entire water column to aerobic conditions.

It should be noted that concentrations of most monitored water quality components have remained at levels in DCR that are considerably lower than those typically or periodically found in Davis Creek, and consequently post no hazard to downstream water quality. It should also be noted that DCR has not spilled water into Davis Creek since the spring of 1986.

The input of significant runoff in 1991, combined with a reduction in water removal by HMC, has resulted in a more stable shoreline level, which has enhanced the aquatic plant growth in the nearshore zone, improving fish and wildlife habitat. The water inflows additionally resulted in a dilution of most reservoir water parameters, which had been concentrating during the drought. Thus, concentrations were generally lower than in the monitoring year 1990-1991.

Secchi transparency was less during the last two years than in previous years, indicating that recent conditions may have favored an increase in algal biomass within the mixed water layer.

The seven priority pollutant metals monitored at DCR were at or below their respective levels of detection in essentially all samples during the past year. Levels of these metals in the reservoir can thus be seen to have posed no threat to downstream water quality to date.

The ecologically relevant concentrations occur at concentrations 1-3 orders of magnitude lower than the conventional limit of detection available through most contract labs. Only a "hand-full" of specialized research labs around the country have the technique and equipment needed to accurately measure these extremely low concentrations.

Section 6 - Davis Creek Reservoir Aquatic Ecology Metals

DCR bottom sediments have been collected at least semiannually (spring and fall) each year since impoundment, for analysis of the seven priority pollutant metals (As, Cr, Cu, Pb, Hg, Ni, and Zn). Additional sediment samples have been taken for mercury in the summer and winter of each year since 1987. Each sediment collection has consisted of composite bottom samples taken from three locations in the reservoir, along a transect leading from the dominant water input source, Davis Creek, to the Dam and spillway. Sampling at a fourth sediment sampling station, located in the South Arm of the reservoir, was initiated in October 1990.

The long-term mercury record indicates that the main inflowing stream to DCR, Davis Creek, has gone from being the major source of elevated particulate mercury in the system to being a source of relatively clean sediment. The Inlet station record shows that Davis Creek was initially the source of relatively high-mercury

sediment (5-6 ppm), which blanketed the Reed Arm and, to a slightly lesser extent, the Midlake region during the massive 1986 storms. Between 1987 and 1991, there was a statistically significant decline in DCR sediment mercury content at the Inlet ($p=0.002$) and Midlake ($p=0.009$). While levels at the Dam have also declined over that period, the level of significance was only $p=0.092$ and largely the result of the fact that initial concentrations were already low. We consider it very significant and positive that the very large March 1991 storms did not deposit a measurable load of mercury on the bottom similar to the winter 1986 storms. The DCR sediment data of the most recent year, through May 1992, is similar to the 1991 data. Mercury levels have not increased at any of the stations and have remained significantly lower than in early project years at the three original stations along the inflow to outlet transect. It appears as though the Reed Mine cleanup efforts have been successful in reducing the transport of mercury to the reservoir.

The South Arm station, which has now been monitored for 7 quarters (19 months), again had higher levels of sediment mercury this monitoring year (1.8-2.5 ppm) than did the other stations, though less than was historically present at the Inlet and Midlake stations. This could be a function of higher "natural" background levels at this site or may be evidence for another mercury source to DCR in addition to Davis Creek. While we are pleased to see both the apparent long-term decline in sediment mercury in the majority of the reservoir, and the observation that the large March 1991 storms did not transport large amounts of mercury to the reservoir bottom, we are very interested in the dynamics of sediment mercury deposition in the South Arm. Indeed, the question of sediment mercury is the focus of the current UCD research program.

Similar to mercury, nickel and chromium have previously been elevated from the Davis Creek watershed as compared to the other arms of DCR. The data record indicates that the Reed Mine cleanup has resulted in a reduced input of these metals as well. Sediment nickel and chromium concentrations decreased at all four stations following the last significant storm inflows (March 1991) and nickel levels lowered again in the most recent monitoring year, to ~140 ppm at the sites closest to Davis Creek and ~65 ppm at the more removed sites. DCR sediment chromium in the last year was ~54 pm at the Inlet and Midlake sites, and ~33 ppm at the Dam and South Arm. The other monitored metals (As, Cu, Pb, Zn) have always demonstrated a more uniform general distribution throughout the reservoir watershed. Arsenic levels in DCR sediment at all four stations have exhibited a continuous decline from 1987 through 1992, with concentrations during the past year of <6 ppm throughout DCR. The lead record indicates relatively low levels in DCR sediment, in a very consistent ~2-4 ppm range at all sites, for all sample dates. The 1991 storm inflows resulted in pulse increases

of copper and zinc at all stations, though subsequent sampling during the most recent monitoring year indicates a slight decrease in sediment copper to levels of 15-21 ppm and zinc to 34-41 ppm throughout DCR.

On 13 May, 1992 UCD and ERA visited Davis Creek Reservoir and collected a series of vertical sediment cores for mercury analysis. Using a piston-type bottom corer, multiple cores were taken at each of the four primary monitoring sites - (i) Inlet, (ii) Midlake, (iii) Dam and, (iv) South Arm. At each location, two sediment cores were retained and analyzed for sediment-Hg down the vertical profile. For both South Arm cores we are relatively confident that the corer reached to the bottom of the aquatic sediment. This was indicated by the dominance of sand and small stones at the lower end of the core. While the cores from the other three locations averaged 25-30 cm (10-12 in) in depth, there was no clear indication that the interface between aquatic and terrestrial sediment had been reached. This was discussed in more detail below.

As is typical for sediment cores, vertical banding was evident down the length of the cores. At this time we believe that the banding was indeed the result of differential rates and types of deposited material and not due simply to redox conditions which can create a "chemical-band" at the interface of oxidized and reduced conditions.

It was stressed that at this time that conclusions drawn from this data are to be considered preliminary until additional, detailed work can be accomplished. For all the vertical core data, we are hesitant at this time to make any strong statements relating the vertical profile to the long-term surficial sediment data. This type of analysis requires a more extensive data base for the vertical profiles.

Dam: Cores A and B exhibited a nearly identical vertical Hg profile between the sediment surface and a depth of 15 cm. Deeper than 15 cm, the two cores differed significantly. Core B showed a continuation of the low level sediment-Hg to the bottom of the core at ±28 cm. Visual observations of the core also revealed a uniform distribution of sediment texture and color throughout this distance. However, Core A was completely different in that below 15 cm, the profile was characterized by a series of periodic Hg-spikes which ranged from ±1-4 ppm dw. The sediment-Hg vs. %-OM data suggest that the deposition of mercury to the sediments at the Dam site is related to organic matter produced within the reservoir and not a function of watershed transport of inorganic soils with elevated mercury content.

Midlake: At this location, cores were obtained with total lengths of 18 cm and 26.6 cm. While sediment-Hg was higher at

Midlake as compared to the Dam (typically 4-8 ppm above the depth of ±15 cm), the sediment-Hg spikes were less conspicuous relative to the variation in baseline concentrations. Both Cores A and B showed a similar pattern of vertical distribution in that while levels remained somewhat uniform down to ±15 cm, a large increase to between 13-18 ppm dw was observed in deeper subsections. While we suspect that the high-Hg material deeper than ±15 cm may represent Davis Creek watershed inputs associated with the February 1986 storms, the current data is not sufficient to substantiate this.

Inlet: Given the high level of sediment deposit which is possible at the inlet, there is no doubt that even though our core extended 26.5 cm into the bottom, this was insufficient to sample the entire depth of the aquatic sediments. The upper 2-4 cm of Core A were characterized by relatively lower sediment-Hg concentration (vis-a-vis, the deeper subsections at this location); however, the 4-7 ppm dw range was much higher than that at the Dam. Below 2-4 cm, sediment-Hg increase dramatically in both cores to levels of 10-17 ppm dw. Visual observations of the cores showed that below 2-4 cm, the texture and color were consistent to the bottom of the sample. At this time we suspect that this deeper, grey-black material came in during the February 1986 runoff.

South Arm: This location clearly contained the shallowest accumulation of aquatic sediments. The total depth of the two cores in the South Arm were only 10.5 and 11 cm for Cores A and B, respectively. This was at least one-half that at the other locations. Dry weight sediment-Hg was high at all depths within the two cores (8.3-14.3 ppm; Figure 63 D). In addition, the vertical profile was relatively uniform from top to bottom. Visual observation of the cores revealed that each core was characterized by distinct sediment banding with a layer of sedimented organic matter on the surface. Given that, (a) the entire profile was very high in sediment-Hg, even the most recently deposited surficial sediments and (b) no other station had this Hg concentration in the surficial sediments where new material has been recently deposited, we suspect that there might be an additional source of mercury into the South Arm but which does not extend to other areas of the reservoir. We propose to work closely with HMC to determine if any nonwater quality related data can shed a light on this phenomenon. We also plan to follow this up during this next monitoring year by taking additional cores and doing a more detailed synoptic survey of lake sediments.

Measurement of mercury in fish tissue from DCR forms the cornerstone of the EMP in this water body. The current fish monitoring includes the following required annual samples: (1) 30 individual fish for analysis of mercury in muscle, (2) 2 semiannual composites of both bass and bluegill livers (4 total) for analysis of 7 metals (As, Cr, Cu, Pb, Hg, Ni, Zn), and (3)

three composites of young-of-the-year bass for 7 metals. In the 1991-1992 monitoring year, all of the above samples were collected and analyzed, plus an additional 3 adult fish and one liver composite.

The new bass muscle mercury data continues the declining bass mercury trend noted in previous years has levelled off. Following the peak mercury levels of the first two years after impoundment, all subsequent samples have been lower, and al but the peak 1987 sample have been statistically lower. However, with the addition of the last year's monitoring data, it is now apparent that mercury concentrations in the larger sampled adult DCR bass have not declined since mid 1989, and have instead remained at ~2.2 ppm over a three-year period. While these levels are still well above the Health Advisory level of 0.5 ppm, it is notable that they are approximately 50% lower than the 1985-1986 peak levels of over 4 ppm.

The collectible bass in DCR continue to be dominated by the original year classes of reservoir-hatched fish, as they grow older and larger. Larger, older fish from most described systems typically have higher mercury levels than smaller, younger fish. The decline in mercury concentration seen in this group of fish as they grew, between 1986 and 1989, was the exact reverse of the trend reported in virtually al equilibrium systems, which find an <u>increase</u> in mercury concentrations with age. This was very strong evidence that bioavailable methyl mercury <u>decreased</u> significantly over this period. The currently level trend in the collected group of growing bass over time, though not as dramatic as an actual decline, is still contrary to the typical ascending curve of age/growth vs. fish mercury in equilibrium systems, and suggests a continued, though less pronounced, decline in bioavailable mercury at DCR. It is very notable that two significantly younger individuals were taken in October 1991 (2-3 years and 120-140 g, vs. 6-7 years and 400-700 g). These fish were comparable in size and age to the initial bass which had the extreme levels of mercury in 1986. The younger bass from 1991 averaged 1.5 pm mercury, as compared to mean levels of 2.5-3.8 ppm in similar sized fish in 1986. Additional fish of this size have simply been too scarce at DCR to collect in significant numbers. The recently stable shoreline and healthy aquatic macrophyte development appear to have greatly increased the survival of juvenile bass, suggesting that a larger cross-section of sizes and ages may become readily available in future years.

Bluegill, which have been monitored for mercury in Davis Creek Reservoir since 1987, have, like the bass, not demonstrated any rise in mercury concentrations over this period. The bluegill's range of mean mercury levels (1.7-2.5 ppm) has, outside of some seasonal variation, remained essentially level through the fall of 1991. Bluegill mercury then exhibited an as-yet unexplained decrease in May 1992 to 1.51 ppm.

Similar to last year, it was again possible to make a collection of Sacramento suckers, which were part of the standard monitoring program initially, but which became too scarce to collect in sufficient numbers, due to lack of stream spawning opportunities for this species in recent drought years. The sucker muscle mercury record indicates that this species, similar to the bass and bluegill, has not increased in mercury levels since 1987 and has instead decreased significantly between 1988 and 1991, from 2.9 to 2.1 pm. Sucker mercury was slightly lower in 1992, at 1.9 ppm.

As noted in last year's report, all three large DCR fish species have had remarkably similar mercury concentrations in recent years, despite being quite different in their feeding habits. This finding is discussed in further detail in the Addendum to this Annual Report which is excerpted from the Ph.D. dissertation of D. G. Slotton.

The several well documented differences noted in this system in relation to fish uptake of mercury, as compared to most other reported mercury studies, make DCR a very important research site. The steady enlargement of the already considerable data record can only improve our understanding of mercury dynamics.

Mercury concentrations (wet weight) in the three most recent juvenile bass composites (August 1991) was 0.80±0.08 ppm. This is significantly higher than midsummer levels in composite juvenile bass from the previous two years, which were 0.34±0.04 ppm in 1990 and 0.41±0.05 ppm in 1989. However, as compared to the much more extensive data base for DCR juvenile bass muscle mercury, this level (0.80 ppm) is comparable to concentrations routinely noted during the previous three years. The utility of the recently instituted parameter of midsummer composite juvenile bass will increase as the data base is enlarged. At this point, no trend can be inferred from the single data point of 1991, though we will monitor this parameter closely.

Concentrations of mercury in bass, bluegill, and Sacramento sucker livers have ranged from 1.0 to 7.6 ppm since 1985. Similar to mercury in fish flesh, these concentrations are considerably higher than levels in the stocker bass (0.16 ppm). Liver-Hg were generally higher than muscle-Hg levels by a factor of ~0.5-30. Liver-Hg in the most recent monitoring year averaged 6.3 ppm in bass, 5.9 ppm in bluegill, and 2.6 ppm in suckers.

Copper continued to demonstrate an interesting pattern of bioaccumulation. During the past two monitoring years, mean liver-Cu was 1.8 ppm in bluegill, as compared to 17.0 in the bass, nearly a ten-fold difference. This is interesting, as it indicates a strong difference between the two main monitoring species. Though copper is relatively high in DCR sediments, it is accumulating in

bass but not in bluegill. Liver copper concentration in the sucker composites (16 ppm in 1991, 4.5 ppm in 1992) was similar to the bass liver levels and considerably higher than that of the bluegill, which apparently metabolize copper in a unique way.

Liver zinc during the last monitoring year averaged 31 ppm in bass, 22 pm in bluegill, and 29 pm in suckers, similar to previous levels and to levels found in original stocker bass. Both copper and zinc; which demonstrated pulse increases in the sediment record following the May 1991 storms, increased in fish livers, apparently in relation to this input. Liver copper and zinc subsequently decreased after fall 1991.

Concentrations of arsenic, chromium, lead, and nickel in fish livers of all three species in recent years, as well as in the juvenile bass composites, were either below, at, or slightly above the analytical detection limits, which have been lowered over this period.

Section 7 - Aquatic Ecology Monitoring in Davis Creek

Aquatic ecology sampling of Davis Creek above (DC-5) and below (DC-6) Davis Creek Reservoir was conducted in four quarterly surveys: August and October 1991, and February and May 1992. Sampling included collection of California roach for metals analysis and visual analysis of water and creek bed conditions (e.g. algal cover, iron oxide precipitate and organic floc, bank modification, bottom sediment distribution, emergent and submergent plants, etc.).

DC-5: At station DC-5, just upstream of the reservoir, runoff in 1992 was again substantial enough to permit a successful February spawning run of native Sacramento suckers from the reservoir to a plunge pool which exists ~0.5 km upstream at the Road 40 culvert. The spawning adult suckers made their way back to the reservoir, unlike last year when they remained stranded in the spawning pool until we moved them back to DCR. In 1991, flows were dominated by a single series of large storms which brought a large amount of water through DC-5 in a short period and then quickly dropped off (stranding the suckers). In contrast, 1992 runoff was more continuous, and with a lower total volume. Note that the reservoir rose 6 feet in 1992, as compared to 20 feet in 1991. No significant new bank erosion was apparent, though flows were sufficient to clear algal floc and move fine sediment downstream. The greatly improved water quality of this stretch of creek, following the Reed Mine cleanup by Homestake, continued in the last monitoring year, with notably clear water, absence of iron floc, and prevalence of diverse typical Coast Range stream fauna. California roach were collected in sufficient numbers for all quarterly samplings (6 fish per set), including the triplicate sampling in May 1992 (18 fish total). An additional 10 fish were taken in a range of sizes in February 1992 for a size:mercury analysis.

DC-06: As the reservoir has not spilled since 1986, flow at DC-6 since that time has come entirely from dam seepage and local springs, both of which provided a relatively consistent, non-turbulent flow, and from runoff in the small watershed upstream of DC-6 but downstream of the dam. The result has been the gradual transition of the former pool and riffle stream channel into a long stretch of cattail marsh. This dense stand of cattails recently filled the entire channel for a distance of ~0.8 km, after which there was generally no more surface water. In the DC-6 stretch itself, aquatic habitat consisted of closely spaced cattail stalks with 6-12 cm of water and a uniform bottom of heavily organic black sediment. Before impoundment of Davis Creek to create Davis Creek Reservoir, this section of creek was normally dry throughout the summer and fall. In constructing the dam, several small aquifers were intercepted and the reservoir itself became an additional permanent light source of seepage. This allowed a remnant population of California roach to persist where they previously had been absent for much of each year. Because of collecting difficulties in the cattail thicket, roach were not taken at DC-6 between October 1990 and May 1991. However, new collection techniques were developed during the last year and it was possible to collect sufficient fish for each quarterly sampling, including the spring triplicate sets. In addition, an extensive collection of supplemental fish was taken in August 1991 over the entire size range of this species, for the purpose of performing a size:mercury analysis.

PROJECT RECOMMENDATIONS

Section 1 - Introduction

1. The 1991-1992 data base did not indicate any major changes to the current annual schedule for water quality and aquatic ecology sampling in Davis Creek or Davis Creek Reservoir.

2. The research emphasis conducted by UCD should be focused towards understanding the role of benthic sediments in mercury cycling.

Section 2 - QA/QC

1. It is important that the QA/QC program be continued throughout the life of the monitoring program and that an evaluation of these data be part of each Annual Report. In addition to the routine laboratory QA/QC samples (e.g. lab blanks, matrix spike-recoveries, method standards, external standards, calibration curves, interlaboratory duplicates), HMC should continue to send quarterly water samples (as blind samples) to NET and another independent analytical lab for interlaboratory comparison. Recently, these samples have been sent to ENSECO (CAL Labs) and we recommend that this be continued. In addition, HMC should continue to collect field blanks.

2. Since metals are such an important part of the monitoring effort, and since their concentration in creek and reservoir water is normally at or below detection, we recommend that HMC continue to send samples of the commercially prepared metals in water reference material to NET as blind samples. The inclusion of chromium, copper, and especially mercury should be continued.

3. All laboratories running sediment metals analyses should continue to run NIST material #2704 (Buffalo River Sediment) along with each batch of sediment samples.

Section 3 - Davis Creek Water Quality

1. Continue sampling as presented in the Environmental Monitoring Program and as presented in Table 2 of this report.

2. No new changes to this aspect of the monitoring program are required.

Section 4 - Davis Creek Aquatic Ecology - Heavy Metals

1. Quarterly sampling for roach metals at DC-5 and DC-6 should continue.

2. Measurement of metals in Davis Creek sediment should be continued, but it should be realized that comparison with pre-October 1987 data is not appropriate.

3. Maintain the new limits of detection initiated during the 1990-1991 monitoring year.

Section 5 - Davis Creek Reservoir - Water Quality

1. Maintain the current parameter list of general water quality parameters, with quarterly seasonal monitoring.

2. Continue the reservoir monitoring program with the existing parameter list of seven priority pollutant metals in water (As, Cr, Cu, Pb, Hg, Ni, Zn). Though As, Cr, Cu, and Pb continue to be below detection in reservoir water, that information in itself is of interest, and it is always possible that these metals could reach higher levels. In addition, while we continue to analyze for these metals in fish, we need a record of water concentrations even if they are below detection. Zinc, nickel, and of course mercury, have been important in the system and should definitely be retained.

Section 6 - Davis Creek Reservoir Aquatic Ecology Metals

1. Continue sediment and biota samples at the current schedule.

2. Further investigate the South Arm, vis-a-vis sediment mercury content.

3. Continue studies of vertical distribution of mercury in DCR sediment cores and make a concerted effort to obtain cores which sample the entire depth of the aquatic sediments.

4. Conduct a reservoir-wide survey of surficial sediment-Hg.

5. Begin design and deployment of sediment traps in DCR so that annual or semiannual sedimented material can be assayed for mercury.

Section 7 - Aquatic Ecology Monitoring in Davis Creek

1. Continue stream monitoring program with existing parameters on a quarterly schedule.

6.0 Vegetation

The Vegetation Monitoring Program includes monitoring of previously reclaimed areas (reclamation success), sensitive plants and the management of contiguous lands. Reclamation research and test plantings to determine reclamation methods best suited for the site are also an integral part of the program.

In general, all populations of sensitive plants observed during the 1992 monitoring studies were similar in size to those documented in 1991. Many populations were absent altogether and believed to be the result of low rainfall during the winter and spring of 1992 and a sixth consecutive year of drought. Ten previously undocumented populations of various sensitive species were observed at sites monitored in 1992. On the whole 19 of 59 numbered sensitive plant occurrence sites were monitored by Biosystems and CNPS during the 1992 field season. These sites were chosen for their proximity to existing facilities. Many sites were not inventoried since they have not been impacted by the project since 1985.

No other new or significant impacts to sensitive plant occurrences were observed in the vicinity of the existing mining project during 1992. The current mine operational procedures continue to completely avoid the remaining known sites.

Reclamation review was completed by Lorraine Van Kekerix, an independent consultant, formerly with the California Division of Mines and Geology. Her report provides a review of seed mixes and general reclamation practices as well as an area by area review. In general, revegetation efforts have been successful in establishing plant cover adequate to stabilize disturbed sites and control erosion. Most of the areas revegetated to date are adjacent to undisturbed areas and native species from undisturbed sites have started to invade the revegetated areas. The 1991-1992 revegetation program was implemented on eighty acres of disturbed land and was successful in controlling erosion.

Large scale reclamation research has been conducted in the form of test plantings of shrubs and woody species on waste rock dumps. The trial plantings have been installed and monitored by Circuit Rider Productions, Inc., and are designed to evaluate individual species and planting methods. This program has provided valuable information on the use of selected species at the site.

7.0 Wildlife

The Wildlife Monitoring Program includes documentation of wildlife observations, wildlife use of Davis Creek Reservoir, and an annual search for golden eagle nests. The Davis Creek Reservoir has added a feature to the area wildlife habitat that did not

previously exist. Monitoring indicates wildlife use of the Reservoir and resulting beneficial effects.

An aerial helicopter search for raptor nests was conducted on April 27, 1992 by wildlife biologist Thomas Roberts of Biosystems Analysis, Inc. The project area was covered flying for approximately 1-1/2 hours. An active golden eagle nest, with a bird in incubation posture, was observed along Hunting Creek south of the mine property. A second potential golden nest site, at the south end of Davis Creek Reservoir, was investigated and found to be empty. A mature golden eagle was observed approximately one mile to the northeast of this location, however, nesting activity was not noted at the nest during a subsequent daylong monitoring of the site. One occupied prairie falcon nest was observed on Big Blue Ridge this year. A second mature prairie falcon was observed near the established nest site southwest of the Tailings impoundment.

The Plecotus townsendii townsendii (Townsend's Big-eared Bat) colonies continue to use the protected roost sites prepared for them in 1988 and 1989. The electronic monitoring system, installed at the first protected maternity site in 1988, has provided researchers with continuous data on nightly and seasonal activity patterns as well as data on roost temperature and light levels. The record of activity patterns in addition to visual observations confirm the continued successful use of these sites by the maternity colonies as well as usage by some individuals as hibernaculums.

A preliminary radio tracking program was conducted in the fall of 1991 in an effort to learn more about late season activities and hibernaculum sites of Plecotus. Although the program raised some interesting questions, confirmation through further studies will need to be conducted before conclusions are drawn. Ongoing studies conducted and implemented by Drs. Elizabeth "Dixie" Pierson and William Rainey in conjunction with HMC personnel continue with Dr. Thomas Tracy Allen providing technical support on monitoring equipment development and modification.

A hack box site was constructed on Homestake property during the spring of 1992 in conjunction with the Bird Rescue Center from Santa Rosa. The hack box, which allows young birds to be cared for and released back into the wild, was established for young birds of prey that have for one reason or another been displaced from their nests. Locating large expanses of habitat for their release has been a limiting factor in the success of the rescue centers' release program for these birds. This year, Homestake volunteers assumed feeding responsibilities for three Great Horned Owlets which, when old enough, were successfully released.

The approved Contiguous Lands Management Plan (CLMP), was developed as an extension of the mine's Environmental Monitoring Program for the management of nonmined lands. In order to better administer CLMP, six different programs were established within the Plan's framework. A brief summary describing the program objectives and the work performed and/or programs initiated to date has been incorporated into this year's wildlife section.

8.0 Geotechnical

The Geological and Geotechnical Monitoring Program monitors the integrity of dams and embankments. The structures reviewed include the Tailings Dam, M-1 Dam, Davis Creek Dam, the Waste Rock Sediment Control Facility, and the East Waste Rock Disposal Facility Pond. All structures are performing as designed.

RECOMMENDATIONS

The following recommendations are made for the 1992-1993 monitoring year:

Water Quality

1. Continue to monitor surface and groundwater quality according to the current Water Quality Monitoring Program as approved by the California Regional Water Quality Control Board, Central Valley Region and the Responsible Agencies.

2. Continue to scrutinize data from monitoring stations associated with the Waste Rock Disposal Facilities for trends.

3. Continue to monitor station DC-06 monthly during the winter runoff season to provide additional data on Davis Creek below the Reservoir. This monitoring is above and beyond the requirement for quarterly monitoring and is in response to a recommendation made by Ecological Research Associates in their review of the 1987-1988 Annual Monitoring Report.

4. Continue the QA/QC program in its present format.

Air Quality and Meteorology

1. The high volume air sampling station at the pit, AQ-3, should be removed from the air network. AQ-3 was initially sited to operate for two years. We are currently in our seventh year of monitoring. AQ-3 does not describe any impacts to ambient air quality or exposure to the general public. Continued operation of

this station will not add to the understanding of particulate spatial distributions at McLaughlin and therefore should be eliminated from the network. This recommendation was originally made in the 1987 annual report.

2. Asbestos monitoring has demonstrated that mining activities have not increased asbestos fiber concentrations in the ambient air. Only one crysotile fiber greater than 5 microns in diameter was detected during the seven years of monitoring. The greatest concentration measured during those seven years is 0.0086 fibers/cc, which is significantly less than the 2 fibers/cc OSHA standard. We recommend, as we have in the last annual report, that asbestos monitoring at this location be discontinued.

Geotechnical

1. As recommended in both the Annual Monitoring Reports since 1988-1989, and the Geotechnical Data Review completed by D.P. Engineering, Inc., it is recommended that M-1 Dam be eliminated from the Geotechnical Monitoring Program.

I-ll
Napa Permits
RK

NAPA COUNTY

CONSERVATION -- DEVELOPMENT AND PLANNING DEPARTMENT

JEFFREY REDDING
Director

1195 THIRD STREET, ROOM 210 • NAPA, CALIFORNIA 94559-3092
AREA CODE 707/253-4416

May 8, 1992

Raymond E. Krauss
Environmental Manager, McLaughlin Mine
Homestake Mining Company
P.O. Box 1010
Lower Lake, CA 95457

Dear Mr. Krauss:

At their January 8, 1992 meeting, The Conservation, Development and Planning Commission accepted the Department's review of the 1990-91 Homestake Annual Environmental Monitoring Report, and determined that the report was consistent with Condition #16 of Use permit # U-198283.

The Commission approved the requested changes to the environmental monitoring program as recommended by Homestake Mining Company and listed in the staff report dated January 8, 1992. The remainder of the monitoring program shall follow the approved format consistent with Condition #16 of Use Permit 198283.

If you have any questions, do not hesitate to contact me at (707)253-4416.

Sincerely,

Therese Armlin

Therese Armlin
Planner II

Copy DK File Napa Permits

NAPA COUNTY
CONSERVATION, DEVELOPMENT AND PLANNING DEPARTMENT

DEPARTMENT REPORT

Meeting of January 8, 1992

Agenda Item: # 14

SUBJECT: 1990-1991 ANNUAL REPORT REVIEW OF THE ENVIRONMENTAL MONITORING PROGRAM FOR THE McLAUGHLIN GOLD MINE PROJECT

FILE: Use Permit # U-198283, CONDITION # 16

OWNER: HOMESTAKE MINING COMPANY

BACKGROUND:

The Conservation, Development and Planning Commission (CDPC) approved the Use Permit and Surface Mining Permit for the Homestake Mining Company (# U-198283) on December 7, 1983, subject to specific conditions, including Condition # 16 which requires submittal of an annual report on the Environmental Monitoring Program to the Conservation, Development and Planning Department summarizing the monitoring data collected during the year.

In accordance with Condition # 16 of Homestake's Use Permit/SMARA Permit, the Planning Division has prepared this report for the Conservation, Development and Planning Commission as a general summary of the findings presented in the Executive Summary of the 1990-1991 Annual Monitoring Report submitted by Homestake Mining Company on September 1, 1991. The attached report discusses the monitoring results for the 1990-1991 monitoring year, and contains recommendations by Homestake to modify certain aspects of the current Monitoring Program. The Planning Department's Review is included as Attachment A, and the Homestake Mining Company Annual Environmental Monitoring Report for 1990-1991 is attached as Attachment B.

Homestake Mining Company submitted a copy of the Environmental Monitoring Manual, revised November 1991, which describes the methodology for sampling, and fundamentals of the monitoring program. A copy of the manual has been placed in the Department's library for reference.

RECOMMENDATION:

That the Conservation, Development and Planning Commission take the following actions:

1. Accept the Department's attached review as adequate.(Attachment A)

2. Approve the requested changes to the Environmental Monitoring Program as recommended by Homestake in the 1991 report as follows, with the remainder of the monitoring program to follow the approved format:

Water Quality

1. Continue surface and groundwater quality monitoring in accordance with current WQMP as approved by the Central Valley Regional Water Quality Control Board, and other responsible agencies.

2. Continue to scrutinize monitoring station data from the waste rock disposal area for trends.

3. Continue to monitor station DC-6 monthly during the winter runoff season to provide additional data on Davis Creek below the Reservoir.

4. Continue the Quality Assurance/ Quality Control (QA/QC) program in its present format with review and implementation as recommended by Ecological Research Associates, including

   a. In the calculation of percent difference for the certified stock standards for metals in water samples the APD rather than the RPD should be used.

   b. Chromium, copper, and mercury should be added to the commercially prepared metals in water reference material presently being used.

Other Monitoring:

1. In addition to the standard QA/QC work performed by the contract lab for sediment analyses, an appropriate reference material will be reviewed as appropriate per the recommendation made by Ecological Research Associates in their annual report in the volume "Annual Monitoring Report, July 1, 1990 - June 30, 1991.

Air Quality

1. The high volume air sampling station at the pit, AQ-3, should be removed from the air network. This sampling station was targeted for two years. Homestake indicates that this station does not describe any impacts to ambient air quality or exposure to the general public. Continued operation of this station will not add to the understanding of spatial distributions at McLaughlin and should be eliminated from the network.

2. Asbestos monitoring has demonstrated that the mining activity has not increased asbestos fiber concentrations in the ambient air. Only one occurrence of a crysotile fiber measured greater than 5 microns in diameter was detected during the seven years of monitoring. Homestake recommends deletion of asbestos monitoring at this station.

Geotechnical Review

1. The M-1 dam should be eliminated from the Geotechnical Review Program. This was originally recommended in the 1988-89 Annual Monitoring Report.

hstk91.st

ATTACHMENT A

REVIEW OF THE ANNUAL 1990-1991 ENVIRONMENTAL MONITORING PROGRAM McLAUGHLIN PROJECT

The 1990-1991 Annual Monitoring Report represents the eighth report submitted by Homestake Mining Company in fulfillment of the requirement to report annually the results of the McLaughlin Mine Environmental Monitoring Program. The objective of the monitoring program is to measure compliance with environmental performance standards recognized in the regulatory permits issued for the project. The monitoring program also requires the assessment of trends indicative of potential impacts attributable to the McLaughlin Project.

Monitoring data presented in the 1991 annual report covers the 12 month period from July 1, 1990 to June 30, 1991. Quarterly data reports were presented through the year summarizing the data collected each quarter of the monitoring year. The purpose of the annual report is to provide the reviewer with an analysis of the data collected during the previous monitoring year.

This report summarizes the Executive Summary Conclusions and significant findings for each monitoring discipline presented by Homestake in the Annual 1991 report. The Executive Summary is attached.

WATER QUALITY

The Water Quality Monitoring Program consists of surface and groundwater monitoring of the hydrologic system surrounding the McLaughlin Mine facilities. The program is designed to monitor ambient or background water quality and regional water quality as well as waters closely adjacent to project facilities. There are nine (9) surface water stations, twenty-three (23) groundwater stations, and three (3) wasterock underdrain stations. Monitoring occurs on a quarterly basis.

Analyses of the water quality monitoring program (WQMP) concluded that quality of the waters in the vicinity of the processing facility, tailings impoundment, Davis Creek Reservoir, and the mine pit area remain essentially the same as described prior to the project's operation.

An upward trend in the concentration of sulfate in the waste rock area is continuing as predicted in the EIR and the 1986-1987 through the 1989-1990 reports. Homestake indicates that changes in water quality are apparent for certain parameters associated with sulfide oxidation at specific monitoring stations in the waste rock areas. Homestake reports that the pumpback drains they installed to contain flows from the wasterock facility back to the processing station have worked effectively since the 1988-89 season.

No significant changes in overall water quality (metal concentrations) have been observed in Hunting Creek or in Knoxville Creeks, as was previously predicted in the EIR.

Homestake reported that only 10 of 710 water quality data points (one percent) exceeded the maximum likely concentration of water quality variables tested. Five of the "exceedences" were associated with "first flush" samples, values reflecting the elevated concentration of total suspended solids in the stream during the season's first flush of the watershed.

Summary and Conclusions

- No change in surface or groundwater quality relative to elements and compounds identified in regulatory requirements have been identified. Analytic emphasis was focused on the elements most likely to be affected by mining: cyanide, arsenic, boron, chromium, copper, lead, mercury, nickel, and zinc.

- Initial trends identified in the 1986-87 through the 1989-90 Environmental Monitoring Reports continue based on the data in the 1990-1991 report. Surface water monitoring at one downstream Hunting Creek station shows an upward trend for hardness and sulfate, as well as continuing trends for calcium and magnesium.

- Several groundwater quality monitoring stations at the wasterock sediment ponds noted trends for hardness, TDS, specific conductance, sulfate, calcium, magnesium, ammonia, potassium,and sulfate. No identified trends for metals were observed at any of these sites.

- An additional groundwater monitoring station was installed during the 1990-1991 monitoring year in association with the Tailings lift construction.

- Apparent "exceedences" of maximum likely concentrations were observed during the reporting period. No trends associated with the exceedences were observed. Homestake reports that the exceedences are a result of the statistical 99% confidence level. They also indicate that the exceedences may be the result of natural hydrological events causing concentrations to rise over normal annual maximum values.

Recommendations:

1. Continue surface and groundwater quality monitoring in accordance with current WQMP as approved by the Central Valley Regional Water Quality Control Board, and other responsible agencies.

2. Continue to scrutinize monitoring station data from the waste rock disposal area for trends.

3. Continue to monitor station DC-6 monthly during the winter runoff season to provide additional data on Davis Creek below the Reservoir.

4. Continue the Quality Assurance/ Quality Control (QA/QC) program in its present format with review and implementation as recommended by Ecological Research Associates, including

   a. In the calculation of percent difference for the certified stock standards for metals in water samples the APD rather than the RPD should be used.

   b. Chromium, copper, and mercury should be added to the commercially prepared metals in water reference material presently being used.

NPDES DATA

The collection of NPDES data is required by the Central Valley Regional WQCB Order No. 88-181 to analyze the discharge of sediment control dams and receiving waters. Homestake reports that normal stormwater discharges occurred from Pond 7 of the Waste Rock Sediment Control System.

Two additional sediment ponds were added to the Waste Rock Sediment Control System during the 1990-1991 monitoring year. The two new ponds provide additional storage capacity for storm water runoff to Hunting Creek. Discharged water to Hunting Creek were measured via a fresh water diversion ditch.

Discharges were in compliance with applicable discharge limits. Receiving water quality parameters were also in compliance and remained within the range of natural variability.

OTHER MONITORING

Sampling required in the Environmental Monitoring Program but not included in routine sample sets for surface and groundwater are included in this section. Data summarized include the semiannual sediment data for four locations, quarterly composite of samples of the tailings, domestic well samples, and sampling of the tailings seepage return sump.

Homestake reports that the cooling pond and tailings seepage return sump reflect expected operational values. Tailings samples reflect expected concentrations of tested constituents, and continue to test as nonhazardous.

Recommendations:

1. In addition to the QA/QC work for sediment analyses, use of an appropriate reference material will be reviewed as appropriate per the recommendation made by Ecological Research Associates.

AIR QUALITY / METEOROLOGY

The Air Quality Monitoring Program is conducted in accordance with the requirements of the Bay Area Air Quality Management District, Lake County Air Quality Management District, and Yolo-Solano Air Pollution Control District. The focus of the air quality monitoring program is on documenting Total Suspended Particulate Concentrations (dust). The program supplies values for particulates and measurements of particulate mercury, particulate arsenic, and asbestos in the air near the mine. In the processing area, the program supplies data on source emissions from process vents, stacks, tanks, and ponds. Meteorological measurements are taken continuously at four locations to assist in the interpretation of the air sampler data.

Homestake reports that the existing road dust suppression measures, baghouses, scrubbers, and other air quality control measures have been effective in controlling emissions. Compliance with all regulatory requirements have been met.

Rainfall was again below normal reflecting the five-year drought. Most of the year's precipitation occurred in March 1991, with a total rainfall of 20.56 inches.

Homestake reports that compliance was maintained with all ambient air standards and operating permit conditions.

Conclusions

1) Dust suppression techniques have been used effectively to reduce fugitive emissions due to mining activities.

2) The level of monitoring is sufficient to describe air quality impacts at the McLaughlin Mine.

3) Compliance with ambient air quality standards has been demonstrated during the 1990 through 1991 reporting year.

Recommendations:

1) The high volume air sampling station at the pit, AQ-3, should be removed from the air network. This sampling station was targeted for two years. Homestake indicates that this station does not describe any impacts to ambient air quality or exposure to the general public. Continued operation of this station will not add to the understanding of spatial distributions at McLaughlin and should be eliminated from the network.

2) Asbestos monitoring has demonstrated that the mining activity has not increased asbestos fiber concentrations in the ambient air. Only one occurrence of a crysotile fiber measured greater than 5 microns in diameter was detected during the seven years of monitoring. Homestake recommends deletion of asbestos monitoring at this station.

AQUATIC ECOLOGY

The Aquatic Ecology Monitoring Program supplements the chemical water quality monitoring program. Data is collected on benthic macroinvertibrate community structure and diversity, fish community structure and population density, and levels of heavy metals in fish.

Hunting and Knoxville Creeks

Bodega Research Associates performed the annual monitoring for Hunting and Knoxville Creeks. Their summary of conclusions indicated that no meaningful trends in trace element concentrations can be identified as resulting from the Homestake mining operations. They indicated that the reduced and focused monitoring system, implemented in 1986, has functioned efficiently and productively, and should be continued without major alteration through 1992. The growing data base resulting from the 1986 modification was sufficient to detect statistically significant annual changes in the benthic macroinvertebrate communities at each sampling station. Changes appeared to relate to annual variation in rainfall and stream hydrology, rather than to changes associated with the Homestake mining operation.

Low rainfall from 1987-1990 resulted in rich benthic macroinvertibrate spring communities, probably due to reduced winter scouring. The drought continued through the winter of 1990-91, however the erratic pattern of monthly precipitation resulted in heavy stream flows in March, with a resulting decrease in the benthic macroinvertibrate community and population parameters. (Benthic species richness, mean species richness per sample, and mean density.)

Reestablishment of benthic invertebrates lost in 1986 has occurred in Knoxville Creek. The loss may have been due to an accidental discharge from sediment pond M-1 in 1986, or drainage from the new East Waste Disposal site in 1987-88, or may have been the result of hydrologic changes. Of 15 species that were present in 1985 prior to the spill, fourteen had recolonized the site by 1990.

California Roach populations have been declining at all sites for the past six to seven years, most probably a result of the drought. Concentrations of metals in fish tissue do not suggest a chemical basis for the decline of population. Monitoring should continue to focus on mercury concentrations. The continuing drought is the more probable cause of Roach population decline on Knox Creek. If this is so, a return to average rainfall in future years should

Davis Creek and Davis Creek Reservoir

Davis Creek and Davis Creek Reservoir sampling was conducted by Ecological Research Associates and U.C. Davis under the direction of Dr. Charles Goldman. Reservoir sampling commenced in April of 1985 and has continued as specified in the Environmental Monitoring Manual, with an additional thirty six (36) annual mercury analyses.

Ecological Research and U.C. Davis concluded that the water quality and aquatic ecology monitoring aspects of the McLaughlin Project in Yolo County are operating in an orderly, logical and timely manner.

Concentrations of the seven priority pollutant metals measured routinely include arsenic, chromium, copper, mercury, lead, nickel, and zinc. Concentrations of all metals sampled during the 1990-1991 sampling season for Davis Creek were low and typically below detection. The researchers concluded that there is no indication that Davis Creek is a source of metals downstream. The reservoir has had no detrimental impacts on downstream water quality, and since many of the metals tested are transported in the particulate fraction, the reservoir has and should continue to act as a trap and improve downstream water quality.

The seven priority pollutant metals monitored at Davis Creek Reservoir were measured at or below their respective levels of detection during the 1990-1991 sampling period. The researchers concluded that the levels of these metals in the reservoir pose no threat to downstream water quality to date.

VEGETATION MONITORING

The Vegetation Monitoring Program includes monitoring of previously reclaimed areas (reclamation success), sensitive plants and the management of contiguous lands. Reclamation research and test plantings to determine most suitable reclamation methods are also included in the program.

Sensitive Plants

In general, Homestake reported that all populations of sensitive plants observed during the 1991 monitoring season were smaller than normal in number and size, with many absent altogether. This is most likely attributable to the fifth year of drought.

Sensitive plant monitoring was conducted by Biosystems Analysis, Inc. and the Napa Chapter of the California Native Plant Society. (CNPS) Seven new populations of sensitive plants were located in the project vicinity. On the whole, 29 of 59 numbered sensitive plant occurrence sites were monitored during the 1990-1991 field season.

Enlargement of the Tailings impoundment to the permitted size occurred in the 1990-1991 season. This resulted in at least partial impact to nine sensitive plant site, which was noted in the EIR process. Two sites were identified as potential problem areas; an erosion channel was noted at site 46 to be repaired prior to winter rains, and seepage of high conductance water at the east waste rock facility. Plans were made to collect and pump back the water for processing. No other impacts to sensitive plants were observed in the vicinity of the existing mining project in 1991.

Reclamation Review

Reclamation review was completed by Lorraine Van Kekerix, an independent consultant formerly with Cal Division of Mines and Geology. Revegetation efforts have been successful in establishing plant cover adequate to stabilize disturbed sites and control erosion. Native species from undisturbed sites have started to invade the revegetated areas. Successful

revegetation in the 1990-1991 season was completed on 130 acres of disturbed land, including the east and west waste rock disposal areas, reshaped mine wastes at the abandoned Reed Mine, the new tailings dam face, the tailings dam borrow area and the waste rock file just west of the tailings dam.

Weather during the year was not average. Rainfall was 20.5 inches from July 1, 1990 to June 30, 1991, approximately 80% of average rainfall. Of the 20.5 inches, 8.3 fell in the fall, with 12.2 inches in March 1991. Record low temperatures occurred in December 1990.

The seed mix used in the 1990-1991 season was the same mix used since 1987-88, and are recommended for the 1991-1992 season. Soil amendments and mulch recommendations that were used since 1985-86 have provided good results and are recommended for the next season.

Species composition on reclaimed sites has changed over time with annual grasses predominant in the first year, followed by emerging perennial grasses, and clover in the second year. In the third year, perennial grasses are predominant, with native grasses more abundant, and in the fourth and fifth years, the invasion of native plants increases. Over time, the native species are expected to replace the seeded species.

The revegetation evaluations over the past three years indicate that plant cover was sparse on three types of areas: serpentine areas, rocky cut slopes, and some waste rock areas. Serpentine soils are difficult to revegetate due to the chemical composition of the soil and rock. The slopes are often geologically unstable, and unable to support plants. Rock cut slopes are difficult to revegetate due to few fracture areas where plant roots can take hold, and the fractures hold little water or plant nutrients. The waste rock areas have experience less regermination than other revegetated areas due in part to the low concentration of plant nutrients in waste rock.

This is the fifth year of drought, and plants were stunted and few plants set seed in the spring of 1991. There was less seed set than in any other year since 1984. The lack of seed will have little effect on the areas that are stabilized by perennial plants. There may be a change of species composition in areas that are stabilized by annual plants due to reduced quantities of seed. The March 1991 rain increased the species diversity invading the revegetated sites compared to April of last year.

WILDLIFE

The Wildlife Monitoring Program includes documentation of wildlife observations made on the Homesake property including the tailings impoundment, wildlife use of Davis Creek Reservoir, and an annual golden eagle nest survey. The Wildlife data base consists of wildlife observation cards submitted by project employees, contractors, researchers, and wildlife monitoring by Ecological Research Associates at Davis Creek Reservoir.

The Davis Creek Reservoir Wildlife Monitoring Program reported the findings of the 1990-1991 monitoring season with a summary of the long term data set collected to date 1985-1991. The Program documents usage of the reservoir by native wildlife and tracks species that could be

potentially affected by the current levels of mercury in reservoir fish. Seventy-two species of birds were recorded in or around the reservoir over the year, including 22 species of water-oriented birds. The 1990-1991 census was similar to previous years in terms of species present, seasonality, and numbers. However, the climate difference in 1990-1991 affected some bird populations during the monitoring year, with reduced number of species and individual choosing to remain at the reservoir for wintering as compared to previous years.

Most wildlife sightings outside the Davis Creek Reservoir study were viewed from automobiles. An aerial helicopter search for raptor nests was conducted in April of 1991, and resulted in the sighting of one occupied prairie falcon nest. This nest has been used alternately by prairie falcons and common ravens since 1986. No other active nests were observed.

Through the monitoring year, sightings of mature and immature golden eagles and an occasional bald eagle occurred.

The Townsend's big eared bat (Plecotus townsendii) continued to use the protected roost sites prepared in 1988-1989. The electronical monitoring system installed in the maternity site in 1988 continues to provide data on nightly and seasonal activity patterns, data on roost temperature and light levels. Ongoing studies by scientists in conjunction with Homestake personnel are being conducted at the site.

Two, possibly three pronghorn antelope were sighted on the property in June and sightings of the female continued through the summer. The antelope were part of a release program conducted by the California Dept of Fish and Game. The release consisted of approximately 20-30 individuals just west of Williams.

Homestake recommends continuation of the Wildlife Monitoring programs in their present format for the 1991-1992 year. The wildlife program will be reviewed with the Contiguous Lands Unit Management Plan implementation.

GEOTECHNICAL MONITORING

The Geotechnical Monitoring Program monitors the integrity of dams and embankments. Structures reviewed include the Tailings Dam, M-1 Dam, Davis Creek Dam, the Waste Rock Sediment Control Facility, and the East Waste Rock Disposal Facility Pond. Homestake reports that all structures are performing as designed.

The Tailings lift was constructed to full height this season. Eight new observation wells were drilled in conjunction with the final lift, and three additional piezometers were installed. Four new sediment ponds were constructed during the 1990-1991 season.

Recommendation:

1. The M-1 dam should be eliminated from the Geotechnical Review Program. This was originally recommended in the 1988-89 Annual Monitoring Report.

ATTACHMENT B

HOMESTAKE MINING COMPANY

McLAUGHLIN MINE

ANNUAL ENVIRONMENTAL MONITORING REPORT

JULY 1, 1990 THROUGH JUNE 30, 1991

EXECUTIVE SUMMARY

Introduction

The Executive Summary lists the findings of the analyses conducted on monitoring data collected during the reporting period of July 1, 1990 through June 30, 1991. The summary is organized in sections by monitoring topic.

1.0 Water Quality

In accordance with the requirements of California Central Valley Regional Water Quality Control Board Waste Discharge Order No. 89-107 for the McLaughlin Mine, a summary and analysis of the water quality data collected for the Mine's Water Quality Monitoring Program over the preceding twelve-month period (July 1990 through June 1991) has been prepared. The analysis is focused on changes in water quality over time (temporal analyses) and comparisons of the data to statistically calculated maximum likely concentrations.

No changes in surface or groundwater quality in terms of those elements or compounds which are fundamental to compliance with regulatory requirements have been identified. Analytical emphasis has been on those parameters most likely to be impacted by mining: cyanide, arsenic, boron, chromium, copper, lead, mercury, nickel, and zinc.

Water quality of waters in the vicinity of the processing facility, tailings impoundment, Davis Creek Reservoir, and the mine pit area remains essentially as it was described prior to the project's operation.

Water quality trends associated with sulfide oxidation in the waste rock areas were identified and discussed in the 1986-1987 through 1988-1989 Annual Environmental Monitoring Reports and also predicted in the Environmental Impact Report. The 1990-1991 monitoring data indicate that these trends are continuing. Changes in water quality are apparent for certain parameters associated with sulfide oxidation at specific monitoring stations in the waste

rock areas. It should be noted that no significant changes in overall water quality have been observed in Hunting or Knoxville Creeks particularly with respect to metals concentrations. The waste rock underdrain pumpback systems designed, installed, and operated by Homestake in response to initial trends identified through environmental monitoring, have operated effectively through the rainy seasons of 1988-1989 through 1990-1991. These systems contain and pump back to the process circuits, flows from the waste rock underdrains.

For the reporting period only ten (or one percent) of the 710 water quality data points evaluated for stream monitoring stations and groundwater wells exceeded the statistically derived maximum likely concentrations. Five of those exceedances were associated with first flush samples. No trends or changes associated with these "exceedances" have been identified.

2.0 NPDES Data

NPDES data are collected from the discharge of sediment control dams and from receiving waters as required by California Central Valley Regional Water Quality Control Board Order No. 88-181. Normal storm water discharges occurred from Pond 7 of the Waste Rock Sediment Control System (discharge point 003 and receiving waters HC-05R and HC-10R). No discharge occurred from the East Waste Rock Facility Pond (discharge point 001 and receiving stream station KC-03R).

Two additional sediment ponds were added to the Waste Rock Sediment Control system during the 1990-1991 monitoring year. The two new ponds, designated Ponds 8 and 9, provide additional storage capacity for storm water runoff. Discharged waters to Hunting Creek via the fresh water diversion ditch were sampled in accordance with the California Central Valley Regional Water Quality Control Board Order No. 88-181 (discharge point Pond 9R and receiving waters HC-05R, and HC-15R or HC-10R).

Discharge points 003 from Pond 7 and Pond 9R were in compliance with applicable discharge limits. Receiving water quality parameters were also in compliance and remained within the range of natural variability.

3.0 Other

Sampling required in the McLaughlin Project Environmental Monitoring Manual but not included in the routine sample sets for surface and groundwater are presented in this section. Data summarized include sampling of the cooling pond in March and June, semiannual sediment data for four locations, quarterly composite samples of the tailings, domestic well sampling, and sampling of the tailings seepage return sump.

The cooling pond (CP-01) and tailings seepage return sump (TRS-01) reflect expected operational values for monitored parameters.

Sediment data collected reflect ambient stream conditions.

Tailings samples reflect concentrations expected during operations for total and filtered values. The tailings continue to test as nonhazardous.

Data for domestic wells show no unusual variations.

4.0 Air Quality and Meteorology

The Air Quality Monitoring Program is conducted in accordance with the requirements of the Bay Area Air Quality Management District, Lake County Air Quality Management District, and Yolo-Solano Air Pollution Control District. It is evident that road dust suppression measures, baghouses, scrubbers, and other air quality control measures have been effective in controlling emissions as evidenced by air quality data collected at our compliance monitoring stations.

Rainfall was again below normal, reflecting the five-year drought being experienced in California. Most of the precipitation occurred during March 1991. Total rainfall was 20.56 inches.

Compliance was maintained with all ambient air standards and operating permit conditions.

The level of monitoring currently employed under the McLaughlin Mine Air Quality Monitoring Program is more than adequate to describe operation conditions and to monitor compliance at the McLaughlin facility.

5.0 Aquatic Ecology

5.1 Hunting and Knoxville Creeks

Aquatic ecology monitoring on Hunting and Knoxville Creeks is conducted by Bodega Research Associates. Their report is reproduced in full in the volume entitled "Annual Monitoring Report, July 1, 1990 - June 30, 1991, Aquatic Ecology". The report Summary of Conclusions is reproduced below:

Summary of Conclusions

The reduced and focused monitoring program implemented in 1986 for Hunting and Knoxville Creeks has functioned efficiently and productively through 1991, and should be continued without major alteration in 1992. The cumulative increase in the data base from April sampling at the four primary sites (HC-5, HC-7A, HC-10, KC-3;

and August benthic sampling at HC-7A will make the program more effective each year, as long as a consistent, careful, and appropriate methodology is maintained. Already this growing data base has become sufficient to detect statistically significant annual changes in the benthic macroinvertebrate communities at each of the sampling stations. These changes appear to relate to annual variation in rainfall and stream hydrology rather than to changes associated with the Homestake mining operation. Low rainfall during 1987-1990 had resulted in richer spring communities because of the reduced winter scouring. The 1990-1991 winter continued the long drought, but with an exceptionally erratic pattern of monthly precipitation that included very heavy rainfall during March, producing heavy spring flows. As a result, benthic macroinvertebrate community and population parameters (total species richness, mean species richness per sample, and mean density) declined in 1991 from the high levels reached in 1990 at all four sites.

Chemical changes produced by the accidental discharge from Sediment Pond M-1 in 1986 and further changes in 1987-1988 evidenced by a reddish iron precipitate on the stream bottom at KC-3, produced by drainage from the new East Waste Disposal site, remain as possible causes of changes in invertebrate communities at KC-3 in during 1985-1989. Alternatively, hydrologic events might be responsible. However, in 1990 and 1991, we can conclude that recovery of benthic macroinvertebrate community at KC-3 is essentially complete, with species richness, diversity, and density showing no significant differences over the years of this study. Of fifteen species present in 1985, but absent after the spill in 1986, fourteen had recolonized the site by 1990.

California roach populations have been declining at all sites for the past six or seven years; several different factors may be contributing to this decline. The continuing drought is certainly an important factor, with the potential to influence fish populations in several different ways. Since rainfall over the five-year period totalled only slightly above one-half normal, the cumulative rainfall deficit is very large, producing a continuous series of summer flow conditions which have been very low (at HC-5 and HC-10), intermittent (at HC-7A), or nonexistent (at KC-3). As flow decreases, water temperature rises, oxygen levels decrease, and conductivity rises. These conditions probably decrease survival and reproduction in California roach at all sites, and may have also been responsible for the declines in Sacramento squawfish and Sacramento sucker at HC-10.

Low rainfall is probably also the cause of increasing emergent and streamside vegetation at all Hunting Creek sites. The resultant change in habitat may have altered conditions for California roach; heavy winter scouring will be needed to return the streambed to conditions similar to those of 1984-1986.

Homestake mining operations probably exacerbated the effects of the drought at HC-7A, through the isolation of the tailings reservoir from the watershed of Hunting Creek. This isolation minimizes the possibility of contamination of Hunting Creek, but has removed 11% of the original watershed draining into Hunting Creek above HC-7A. This loss is probably unimportant under most rainfall conditions, but under the stress of the current five-year drought, it may be a contributing factor in the increase in vegetation and decrease in roach at HC-7A.

California roach populations may also have been affected by increases in predation of two kinds. At HC-10, populations of green sunfish, which prey on small roach, have been increasing since 1984 as roach populations have been declining. The absence of small roach at this site is consistent with the interpretation that green sunfish predation has contributed to the decline in California roach populations at HC-10. At HC-7A in 1991, a minnow trap was discovered in the stream. Minnow trapping near monitoring sites would affect measured roach populations, and should be prohibited.

At KC-3, the decline in roach populations since 1985, previously confirmed to the immediate sampling site, has now spread downstream. In April 1991, roach were difficult to find at the alternate site 1.6 miles downstream of KC-3 where they have remained abundant in recent years. Concentrations of metals in fish collected at that site do not suggest a chemical basis for the decline, however. Mercury levels, which were high in 1988, have declined for four years in a row, and are now at levels similar to those of HC-5 and HC-10. The monitoring program should continue to focus on these mercury concentrations in future years, but the continuing drought is a more probable cause of the roach population decline in Knoxville Creek. If this is the case, a return to average or heavy rainfall in future years should be accompanied by increasing roach populations.

Within the limits of reliability of the laboratory analytical results, no meaningful trends in trace element concentrations can be identified as arising from Homestake Mining operations. As the data base of measured concentrations in fish tissues from the monitoring sites expands each year, the extent of natural biological variability and of analytical variability inherent in the monitoring program will become better defined, and identification of underlying trends will become easier. The archiving of frozen samples of fish tissue each year, added to the monitoring program in 1990, will make possible future reanalysis of samples to corroborate any suspected trends.

5.2 Davis Creek and Davis Creek Reservoir

Davis Creek and Davis Creek Reservoir sampling was conducted by Ecological Research Associates and U.C. Davis respectively under

the direction of Dr. Charles Goldman. Reservoir sampling commenced in April 1985 and has continued as specified in the Environmental Monitoring Manual with an additional thirty-six mercury analyses authorized annually. The report is reproduced in full in the volume entitled "Annual Monitoring Report, July 1, 1990 - June 30, 1991, Aquatic Ecology". The executive summary of that report is reproduced below:

Summary of Conclusions

Section 1 - Introduction

This is our sixth Annual Report documenting water quality in Davis Creek Reservoir and the stream stations located in Davis Creek. A five-year summary report was issued for the period January 1982 - June 1989 in September 1989. This was followed by our July 1989 - June 1990 Annual Report (issued September 1990) which presented and analyzed the entire data base to that time. The 1990-1991 Annual Report which is presented here, specifically focuses on the data collected this past year; July 1990 through June 1991. We provide plots of the entire 6+ to 9+ data base and discuss/evaluate the July 1990-1991 findings in light of the historical record and regulatory criteria.

The major issues addressed in the current report include:

- *Detailed review and evaluation of 1990-1991 quality assurance and quality control (QA/QC) data. This includes "in-house" laboratory QA/QC protocol, field samples taken for QA purposes, and estimates of the accuracy and precision on fish mercury and sediment metals analyses (Section 2).*

- *Long-term and seasonal trends of general water quality constituents (Section 3.1) and heavy metals (Section 3.2) in Davis Creek.*

- *Long-term and seasonal trends of heavy metals in the biota and sediments of Davis Creek (Section 4).*

- *Impact of the Reed Adit closure on water quality, biota and sediments at DC-5 (Sections 3 and 4).*

- *Long-term and seasonal trends of general water quality constituents (Section 5.1) and heavy metals (Section 5.2) in Davis Creek Reservoir.*

- *Concentrations of mercury and other metals in Davis Creek Reservoir sediments (Section 6.1).*

- *Mercury accumulation by fish in Davis Creek Reservoir (Section 6.2).*

As we have entered the second five-year period of the post-reservoir phase of the project, data collection includes an irreducible list of parameters and sampling schedule which would insure us that changes in surface water quality would be identified. These parameters were recommended in the 1989-1990 Annual Report and have been incorporated in to sampling and data reporting program. As always, HMC and the County will be immediately notified if we have reason to believe that additional parameters should be added.

It is our conclusion that the water quality and aquatic ecology monitoring aspects of the McLaughlin Project in Yolo County are operating in an orderly, logical, and timely manner. Continued discussions between ERA, UCD, HMC, and the Yolo TRP continue to be productive and we are very pleased that within the past year, a significant amount of the TRP's efforts have focused on the scientific research aspects of the project.

Section 2 - QA/QC

1. A reliable and comprehensive QA/QC plan forms the cornerstone of a sound environmental monitoring program. It provides us with assurance that the data base is accurate and precise and allows us to proceed to the interpretation phase of the process. While all analytical laboratories are required to meet certain QA/QC standards, the exact nature of a QA/QC plan is dependent on the questions being asked of the environmental monitoring program. The ultimate goal is to be able to detect changes in water quality should they occur.

2. During 1990-1991 the following QA/QC samples were sent to NET by HMC and ERA and UCD (note: these are in addition to the lab QA/QC tests which are routinely done by NET as part of their internal QA/QC plan): replicated intralaboratory samples, replicated interlaboratory samples for both surface and groundwater, field blanks, and aqueous certified stock standard metals samples prepared by a commercial laboratory.

3. A total of four surface water samples were analyzed as interlaboratory replicates. Each sample was tested for the full suite of water quality constituents as outlined by the current sampling plan. The purpose of these samples is to check on the precision or reproducibility of the contract lab's methodology. The data yielded a total of 56 paired comparisons. Of all the parameters, nitrate, ammonia, chromium (T/F), copper (T/F), iron (T/F), lead (T/F), mercury (T/F), nickel (T/F), and zinc (T/F) were generally below detection, making quantitative comparisons difficult. Even with stricter RPD exceedence criteria suggested for intralaboratory comparisons, surface water data were never outside the criteria. Indeed, there were no cases in which an intralaboratory RPD exceedence was found.

4. Of the 322 paired analyses run as interlaboratory replicates, 238 pairs or 74% were below detection. These largely corresponded to the metals which are naturally low. Of the seven Priority Pollutant metals (As, Cr, Cu, Pb, Hg, Ni and Zn) only 20 of the 196 data pairs were above the limit of detection. Using a value of 80% agreement as a cutoff for acceptable interlaboratory comparability (i.e. for any parameter, the two labs were in agreement on ≥80% of the fourteen samples), the parameters could be grouped into five categories:

- Adequate number of sample pairs above detection ($n \geq 7$) and high agreement (≥80%): these included hardness, TDS, sulfate, and T-arsenic.
- Adequate number of sample pairs above detection ($n \geq 7$) and low agreement (<80%): this included only T-iron.
- Inadequate number of sample pairs above detection ($n < 7$) and high agreement (≥80%): these included boron, manganese, T-mercury, T-nickel, F-arsenic, and F-mercury.
- Inadequate number of sample pairs above detection ($n < 7$) and low agreement (<80%): these included ammonia, and F-iron.
- No data pairs above detection: these included, T-chromium, T-copper, T-lead, T-zinc, F-chromium, F-copper, F-lead, F-zinc.

In general, there was good agreement between the two labs. While most of the heavy metals concentrations were below detection, an important question is, can the laboratory accurately measure higher concentrations of metals in the water should they occur. The fact that the average NET spike-recovery values on matrix samples were always close to 100% indicates that over the period of record, this lab would have had the ability to detect high concentrations of metals if they occurred.

5. HMC submitted quarterly sets of a commercially prepared reference material for metals in water. In general, NET's agreement with the certified stock standards was good. On one of the four dates, As exceeded its criterion by 18% i.e. 32% APD vs. allowable 15% APD). The only other time an exceedence was found was in June 1991 when Fe was just 5% higher than the allowable APD.

6. On the basis of all this information, we conclude that NET has the ability to measure water chemistry constituents at adequate levels for this project.

7. For sediment metals, NET uses US EPA methods for both the digestion and analytical phases. Details of these methods have been provided in the past. Blanks, external standards, method

standards, spike-recoveries, and matrix duplicates were run and were all within project control limits. The individual QC samples were all within the control limits established by NET and we consider the values to be good.

8. Since the mercury content of reservoir and creek fish remains the single most environmental concern related to water quality and aquatic ecology in Yolo County, it is very important that the QA/QC for these samples be rigorous. At our recommendation, UCD took over the responsibility for making mercury measurements in all fish samples.

The 1990-91 fish samples were run in four batches. Between 9 and 11 standard solutions were included in each run ranging from 4-40 ng Hg/2 ml injection. For each of the runs, the r^2-value for the regression equation was always greater than 0.99 and typically around 0.995. During 1990-1991 a total of 51 project samples were analyzed. On top of these there were 35 standards, 4 blanks, 11 NBS Reference Material and 27 duplicates. This corresponded to a duplication rate of greater than 50% for fish samples and of the 128 total individual analyses, 77 or 60% were for QA/QC. This is an extraordinary amount of QA/QC work for a monitoring program and because of it we have complete faith in the fish mercury data.

Individual measurements of NBS RM 50 tuna material ranged from 0.92-1.03 ppm with a coefficient of variation (mean/SD) of just 3%. The mean of all four runs combined was 0.99 ppm Hg and no run differed from the known concentration by more than ±5%. Sample replication was also excellent. For all 27 replicates, the relative percent difference ranged from 0.7-9.6% with a mean (±SD) of 4.2% ±2.3%. In terms of the absolute ppm difference between samples, this corresponded to a range of 0.00-0.30 ppm Hg with a mean (±SD) of 0.07±0.07 ppm Hg.

Section 3 - Davis Creek Water Quality

A 9+ year data record now exists for water chemistry in Davis Creek at stations DC-5 and DC-6. During the period July 1990 - June 1991, samples were collected on five dates; the four routine quarterly dates and in March 1990, the month of first-flush flow conditions.

The hydrologic characteristics of Davis Creek during this past monitoring year were dominated by the large February-March rain storms which dropped a total of 15 inches of water (mostly in March) and were directly responsible for the extremely high creek flows measured in March. Flow at DC-5 was approximately 80,000 gpm and four times higher than any previously measured flow. Water did not spill over the Reservoir during this past year despite the high runoff. Flow at DC-6 was due to runoff from the watershed downstream of the dam. In this regard, the water chemistry at DC-6

during this period reflected release and transport of material from the watershed and creek channel and not the quality of water coming to this location from the Reservoir. Temperature, dissolved oxygen and pH were within the historic range of the 8+ year data base and levels of these parameters did not interfere with creek biota.

Concentrations of total suspended solids (TSS) are very important with regard to metals transport, since these elements are associated with the particulate versus the dissolved phase in the water. The only sampling date when TSS was significantly high was on 30 March during the first-flush period. At that time TSS was 7,800 mg/L at DC-5 and approximately 4.5 times higher than any other sampling point in the long-term data base. On this data TSS was also high at DC-6, at 900 mg/L. The distribution of total iron followed that of TSS and this has been observed in previous years. The distribution of the remaining water quality parameters was not different from that observed in the historical data base and concentrations did not interfere with the beneficial uses of the creek. The concentrations of total iron and manganese, ammonia, and, as mentioned below, perhaps filtered nickel and total zinc appeared to show a decrease following the closure of the Reed Adit in November 1989. Further monitoring will be required before a conclusive trend will become apparent.

For most of the priority pollutant metals (As, Cr, Cu, Hg, Pb, Ni, and Zn), the absolute concentrations and seasonal distribution was consistent with the historical data base. The extremely large flows at DC-5 in March 1990 were a dominant feature of metals transport at this site. All seven metals were above detection on that date whereas they were typically below detection on all other sampling dates during the period July 1990 - June 1991. As a result of either transport in surface runoff, or resuspension of bottom and bank material, MLC concentrations for Cr, Cu, Pb, Ni, and Zn, but not As and Hg, were exceeded at DC-5 in March 1990. Given the very high flows, these MLC exceedences were certainly not unexpected. Concentrations were also above detection at DC-6 but only in March 1990. MLC levels were not exceeded at that location. The importance of hydrologic flow to metals transport is once again shown by this data. The data also show that when elevated concentrations at DC-6 occur, they are primarily the result of erosion and resuspension of sediments downstream of the dam and not due to water coming in from the reservoir. The reservoir continues to act as an effective trap for upstream metals. Beneficial uses of DC-6 water were not negatively impacted.

Closure of the Reed Adit in November 1989 by HMC did not appear to have an obvious effect on heavy metals concentrations at DC-5 with the possible exception of filtered-Ni and total-Zn. However, given the low concentration of dissolved metals in the creek, this result is not unexpected and could be more a function of analytical limits of detection rather than the result of no true

effect. As shown by the work of Gill and Bruland (1990), mercury was present in Davis Creek water even though it was well below the project's limit of detection. Consequently, a reduction in mercury concentrations following the closure of the adit would not have been detected by the EMP data base. The relationship between the adit closure and the complete reduction of filtered-Ni and total-Zn at DC-5 requires further monitoring. Taking our understanding from this project into account, we feel justified in concluding that the closure of the Reed Adit provided a positive impact to Davis Creek and the Davis Creek Reservoir.

Section 4 - Davis Creek Aquatic Ecology - Heavy Metals

1. California roach were collected at DC-5 in July, October 1990 and February, May 1991. As a result of the extreme low flow conditions at DC-6, roach were only able to be collected in July 1990. Since that date fish have been unavailable at this station. Creek bottom sediments continued to be sampled on a bi-annual schedule in the fall and spring.

2. When the entire 1985-1991 data base is considered, the difference in roach mercury content between DC-5 and DC-6 was statistically significant ($p=0.014$). However, in 1990, the mean annual Hg content of roach increased at DC-6 and decreased at DC-5. In 1990 samples were collected in April, July, and October. The annual mean at DC-5 was 0.18 ± 0.06 ppm and was 50% lower than the mean of the previous five years. At the same time roach mercury at DC-6 was 0.36 ± 0.07 which was 71% higher than the previous five years. The increased values at DC-6 began in mid-1989 and were relatively consistent through the last quarterly sampling in 1990, after which no fish were present; it is still too early to identify this as a trend.

3. The absolute levels of roach-Hg at DC-5 and DC-6 are still below the California Department of Health Services 0.5 ppm criteria for edible fish.

4. During the 1990-1991 sampling year, sediment mercury concentrations in Davis Creek ranged from 0.39 to 2.8 mg/kg (dry wt.) with 75% of the samples less than 1.0 mg/kg. This is consistent with the historical, post-1987 data base which shows that with the single exception of spring 1988 when mercury at DC-5 was 39 mg/kg, sediment mercury at both stations has been consistently less than 5 mg/kg.

5. The limits of detection for As, Cr, and Ni in roach were lowered relative to previous years. The closure of the Reed Mine in November 1989 did not appear to have a major influence on levels of the priority pollutant metals in DC-5 roach. While the adit closure may have been responsible for the decline in roach-Hg at DC-5 in the early part of 1990, between late 1990 and 1991, mercury

concentrations rose to pre-November 1989 levels. The 1990-1991 data did not reveal any significant changes to the long-term, historical data base. Previous conclusions concerning the lack of significant environmental impact, vis-a-vis Davis Creek roach metals concentrations are unchanged by the 1990-1991 data.

6. Concentrations of priority pollutant metals in Davis Creek sediment were generally consistent with other measures made since the change in sampling procedure which took place in October 1987. None of the metals showed meaningful deviations from the existing data base, and consequently there was no need for concern.

Section 5 - Davis Creek Reservoir - Water Quality

DCR general water quality parameters basically behaved as in previous years with the system being dominated by the seasonal cycle of spring-fall thermal stratification followed by isothermal aerobic mixing. Depletion of oxygen in the deep water layer (hypolimnion) during the stratified season, progressed as in prior years, again allowing the buildup of several parameters to temporarily high levels (hydrogen sulfide, iron, manganese) before fall overturn and isothermal mixing returned the entire water column to aerobic conditions.

In 1990, the consequences of the five-year California drought were apparent; (1) surface elevation dropped to 1393 feet which was the lowest lake level since DCR was completely filled by the February 1986 storms and (2) the contribution of water by winter storms in 1990 was the lowest on record. A total of 15 inches of rain fell in the watershed in February and March, raising the surface elevation by 20 feet but still ±14 feet below the spillway. This hydrologic inflow was second only to the massive February 1986 storms.

Seasonal patterns of temperature and oxygen were similar to previous years. As a result of thermal stratification and bacterial respiration in the hypolimnion and on the bottom sediments, hypolimnetic oxygen was rapidly depleted in the spring and summer, reaching near-zero values by late summer. The characteristic buildup of H_2S was again observed June-July and reaching into the upper hypolimnion by August-September.

Total suspended solids remained low while iron and manganese exhibited their typical patterns which are driven by redox conditions. Hypolimnetic concentrations of manganese were nearly double those found in previous years. The explanation for this was that the volume of the hypolimnion was reduced as a result of the shallow lake depth. The significantly increased peak soluble Mn concentrations which resulted, however, occurred in a relatively small volume of water as compared to earlier years, when the absolute amount of Mn in solution was probably equal or greater.

Boron, an element of concern to downstream water users, continued to demonstrate a slight upward trend in concentrations within the reservoir over the course of 1990, presumably as a result of drought-related evaporative concentration, and again exhibited no distinct seasonal trends. Boron inexplicably peaked at approximately 0.800 ppm on the midwinter sampling before the March 1991 storms. Though evaporative concentration was at its greatest level since 1986 at this point, the difference in that factor between this sample date and the one previous is not enough to explain the relatively large increase. Also surprising to us is the fact that, after the 20 foot increase in reservoir surface level and associated dilution in March 1991, boron levels, though dropping significantly from the midwinter spike, did not drop below previous drought concentrations.

It should be noted that concentrations of most monitored water quality components have remained at levels in DCR that are considerably lower than those typically or periodically found in the creek, and consequently pose no hazard to downstream water quality. It should also be noted that DCR has not spilled water into Davis Creek since the spring of 1986.

Secchi transparency was less during the last two years than in previous years, indicating that recent conditions may have favored an increase in algal biomass within the mixed water layer.

The seven priority pollutant metals monitored at DCR were at or below their respective levels of detection in the great majority of samples during the past year as well as throughout the entire six-year data record. When they appeared at detectable concentrations, these concentrations generally were well below the ranges encountered in the creek. Levels of these metals in the reservoir can thus be seen to have posed no threat to downstream water quality to date.

Of the seven priority pollutant metals currently monitored at DCR, six (As, Cr, Cu, Pb, Ni,Zn) were not detected at all in DCR water during the past year. Mercury alone was slightly above its 0.2 parts per billion level detection on two dates.

Though the relevant chemistry of the metal of importance at DCR, mercury, occurs at concentrations well below the analytical capabilities of contract laboratories, we were fortunate to have trace mercury expert Dr. Gary Gill do some work at DCR. Between 1987 and 1989 he measured mercury in Cinnabar Bay and the spillway. Concentrations for total-Hg ranged from 26-32 pM (0.005-0.0006 ug/l). Typically the dissolved and particulate fractions were present in equal concentrations with organo-Hg accounting for 30-40% of the total. In addition, Gill's unpublished findings indicate that the seasonally anoxic bottom water accumulates significantly higher concentrations of methyl mercury than does the aerobic, mixed layer.

Section 6 - Davis Creek Reservoir Aquatic Ecology Metals

DCR bottom sediments have been collected at least semiannually (spring and fall) each year since impoundment, for analysis of the seven priority pollutant metals (As, Cr, Cu, Pb, Hg, Ni, and Zn). Additional sediment samples have been taken for mercury in the summer and winter of each year since 1987. Each sediment collection has consisted of composite bottom samples taken from three locations in the reservoir, along a transect leading from the dominant water input source, Davis Creek, to the Dam and spillway. This past year's collections mark the initiation of a new, fourth sediment sampling station, which is located in the South Arm of the reservoir.

The long-term mercury record indicates that the main inflowing stream to DCR, Davis Creek, has gone from being the major source of elevated particulate mercury in the system to being a source of relatively clean sediment. When the reservoir began to fill in 1985, sediment-Hg was relatively low throughout the basin, ±1 ppm wet wt. The Inlet station record shows that Davis Creek was initially the source of considerably higher-mercury sediment (5-6 ppm), which blanketed the Reed Arm and, to a slightly lesser extent, the Midlake region during the massive 1986 storms. Levels decreased during the drought years as autochthonous (within-lake) production of algal detritus dominated the material sedimenting out to the bottom. A significant decrease in Inlet station mercury is apparent in the data after 1988, when the Reed Mine cleanup began. Between 1987 and 1991, there was a statistically significant decline in DCR sediment mercury content at the Inlet ($p=0.002$) and Midlake ($p=0.009$). While levels at the Dam have also declined, the level of significance was only $p=0.092$ and largely the result of the fact that initial concentrations were already low (Figure 58). We consider it very significant and positive that the very large March 1991 storms did not deposit a measurable load of mercury on the bottom similar to the winter 1986 storms. It appears as though the Reed Mine cleanup efforts have been successful in reducing the transport of mercury to the reservoir.

The new South Arm station, which does not have a significant inflowing stream, had higher levels of sediment mercury this monitoring year (1.8-2.5 ppm) than did the other stations, though less than was historically present at the Inlet and Midlake stations. This could be a function of higher "natural" background levels at this site. However, extensive source studies by Homestake found little mercury on this arm of the reservoir. A likely explanation is that, due to the South Arm's isolated nature as a relatively backwater region of the reservoir, it responds less quickly to changes in sediment inputs to DCR in general. While we are very pleased to see both the apparent long-term decline in DCR sediment mercury, and the observation that the large March 1991 storms did not transport large amounts of mercury to the reservoir

bottom, we are extremely interested in the dynamics of sediment mercury in the South Arm. Indeed, the whole question of sediment mercury will be part of the new UCD research program.

Nickel and chromium also exhibit a decrease in bottom sediment concentration along the transect from the inlet to the Dam, suggesting a Davis Creek source. Arsenic does not show a similar distribution, suggesting Davis Creek is not an important source for this metal. Lead continued to be low and copper has remained uniform throughout the reservoir since monitoring began. Zinc has undergone a slight increase over time but sediment levels are normal compared to global averages.

Measurement of mercury in fish tissue from DCR forms the cornerstone of the EMP in this water body. The current fish monitoring includes the following required annual samples: (1) 30 individual fish for analysis of mercury in muscle, (2) 2 semiannual composites of both bass and bluegill livers (4 total) for analysis of 7 metals. In addition to the required monitoring, UCD has been collecting and performing mercury analyses on many additional DCR fish during the entire time that fish have been stocked in the reservoir. Finally, UCD has collected juvenile bass throughout each of the past 3 July-October spawning seasons, and has perfected a technique which permits the accurate analysis of muscle mercury in individual young fish as small as 0.5 g. Over 180 of these young-of-the-year have been analyzed.

The new bass muscle mercury data continues the declining trend of the past 6 years: since the peak mercury levels of the very first summer, all subsequent samples have been lower, and all but the peak 1986 sample have been statistically lower. Whether levels will continue to decline, or are indeed approaching a steady state, will only be determined by continued additions to the adult bass data set and further study of young-of-the-year fish. The range of DCR adult bass mean mercury levels in the past year has been approximately 1.6-2.1 ppm (wet wt.). While these levels are still well above the Health Advisory level of 0.5 ppm, it is notable that they are a full 50% lower than the 1985 peak levels of over 4 ppm. The higher levels found in the stocker cohort of fish, rather than representing the ever-increasing result of gradual accumulation of more mercury, may in fact be at a higher equilibrium concentration due to the extremely high-mercury diet of this size bass, which feed almost exclusively on other fish.

In addition to demonstrating a general decline, the adult bass data continue to suggest a seasonal cycle of methyl mercury availability. The hypothesis is that the higher levels of methyl mercury, which have been shown to accumulate in the seasonally anoxic DCR hypolimnion, may deliver a significant pulse of increased methyl mercury to DCR fish as fall mixing transports this higher mercury water into the upper waters.

The bluegill-Hg data conforms generally to the same seasonal distribution as the bass. For the first time since 1988, it was possible to make a collection of Sacramento suckers, which were part of the monitoring program initially, but which became too scarce to collect in sufficient numbers, due to lack of stream spawning opportunities for this species in recent drought years. The sucker muscle mercury record indicates that this species, similar to the bass and bluegill, has not increased in mercury levels since it was last sampled in 1988.

All three large DCR fish species appear to be converging on essentially identical mercury concentrations. Because these species have different food habits, it appears that direct uptake from the water may be an important pathway for mercury to enter fish.

Young-of-the-year bass in 1988, 1989, and 1990 accumulated lower concentrations of mercury than did the 1984 year class. While they are not truly comparable due to the great difference in growth rates, even young fish which approached the size range of the 1985 young had far lower mercury. The young-of-the-year fish, while accumulating considerably less mercury than the adult bass, had concentrations near or above the 0.5 ppm Health Standard on all dates. A comparison of similar-sized young from the first possible sampling (late June/early July) of each of the last three summers found significantly lower mercury levels in 1989 (0.44 ppm) as compared to 1988 (0.66 ppm) for these first-spawn samples, and even lower concentrations in 1990 (0.35 ppm).

Concentrations of mercury in bass livers have ranged from 1.4 to 5.9 ppm. Similar to mercury in bass flesh, these concentrations are considerably higher than levels in the stocker bass (0.16 ppm). With few exceptions, liver-Hg levels were higher than muscle-Hg levels by a factor of 0.5-2.0. Concentrations of As, Cr, Pb, and Ni were nearly always below the limit of detection in bass livers.

Section 7 - Aquatic Ecology Monitoring in Davis Creek

As recommended (and approved) in last year's report, aquatic ecology sampling was reduced to collection of roach for metals analysis and visual analysis of water and creek bed conditions (e.g. algal cover, iron oxide precipitate and organic floc, bank modification, bottom sediment distribution, emergent and submergent plants, etc.). This was done on four, quarterly surveys, July and October 1990, and February and May 1991. The intensive fish and benthic invertebrate population censusing which was done during the 5-6 years of the project was eliminated because the upstream ("control") versus downstream ("modified") comparison was considered invalid due to the presence of the reservoir which changed conditions.

The most striking observation during this past year was at DC-5 where, following the closure of the adit, the iron impregnated organic floc which was common and abundant on the rocks at DC-5 virtually disappeared. This material had been present since we first visited the project site in 1984 before the dam was built. At that time, it is interesting to note that this material was a localized phenomenon in that it was not found downstream at DC-6 even though flow was continuous between DC-5 and DC-6. DC-5 became a clear-water reach of the creek with healthy populations of macroinvertebrates. Indeed, populations of snakes and amphibians began to recolonize this area. Very low flow during the early midwinter of 1990-1991 resulted in the occurrence of isolated pools as late as February 1991. This drought-related condition was relieved in late February and March by large rainstorms which greatly increased flow. Significant movement of sediment bedload was apparent, with evidence of local scouring and redeposition.

During the past 5 years of drought conditions, flow at DC-6 has come entirely from dam seepage and local springs, both of which sources provided a relatively consistent, nonturbulent flow, and from runoff in the watershed upstream of DC-6, but downstream of the dam. The result has been the gradual transition of the former pool and riffle stream channel into a long stretch of cattail marsh. Because of the extremely low flow, roach were not present after July 1990. It should be emphasized that, before impoundment of Davis Creek to create Davis Creek Reservoir, this section of creek was normally dry throughout the summer and fall. In constructing the dam, several small aquifers were intercepted and the reservoir itself became an additional permanent light source of seepage. This allowed a remnant population of California roach to persist where they previously had been absent for much of each year. With a future spill over from the reservoir, roach are expected to quickly recolonize the creek from downstream populations.

PROJECT RECOMMENDATIONS

Section 1 - Introduction

1.The 1990-1991 data base did not indicate any major changes to the current annual schedule for water quality and aquatic ecology sampling in Davis Creek or Davis Creek Reservoir.

Section 2 - QA/QC

1. It is important that the QA/QC program be continued throughout the life of the monitoring program and that an evaluation of these data be part of each Annual Report. In addition to the routine laboratory QA/QC samples (e.g. lab blanks, matrix spike-recoveries, method standards, external standards, calibration curves, interlaboratory duplicates), HMC should

continue to send quarterly water samples (as blind samples) to NET and another independent analytical lab for interlaboratory comparison. Recently, these samples have been sent to ENSECO (CAL Labs) and we recommend that this be continued. In addition, HMC should continue to collect field blanks.

2. Since metals are such an important part of the monitoring effort, and since their concentration in creek and reservoir water is normally at or below detection, we recommend that HMC continue to send samples of the commercially prepared metals in water reference material to NET as blind samples. However, we also recommend that this prepared metals solution also contain chromium, copper, and especially mercury.

3. The laboratory running sediment mercury analyses should run three replicate samples of an appropriate SRM (such as NBS material #2704 - Buffalo River Sediment) along with each batch of sediment samples.

4. In the calculation of percent difference for the certified stock standards for the metals in water samples, the APD rather than the RPD should be used.

Section 3 - Davis Creek Water Quality

1. Continue sampling as presented in the Environmental Monitoring Program and as presented in Table 2 of this report.

2. No new changes to this aspect of the monitoring program are required.

3. The published work of Gill and Bruland (and UCD, Section 6 of this report) shows the importance of conducting basic research on mercury cycling in Davis Creek and Davis Creek Reservoir. We recommend that the Yolo TRP, as an official representative of Yolo County, focus their efforts to petition state and federal water resource agencies to fund such studies. To date the TRP has not functioned in this role, and we believe that further discussions on this are necessary.

Section 4 - Davis Creek Aquatic Ecology - Heavy Metals

1. Quarterly sampling for roach metals at DC-5 and DC-6 should continue. An extra effort will be made to locate fish at DC-6; however, this is most dependent on the nature of the next precipitation year and creek hydrology. If possible we will collect roach at other locations in Davis Creek to make up for the lack of fish at DC-6 should this condition persist into the 1991-1991 monitoring year.

2. Measurement of metals in Davis Creek sediment should be continued, but it should be realized that comparison with pre-October 1987 data is not appropriate.

3. Maintain the new limits of detection initiated during the 1990-1991 monitoring year.

Section 5 - Davis Creek Reservoir - Water Quality

1. Continue the reservoir monitoring program with the existing parameter list of seven priority pollutant metals in water (As, Cr, Cu, Pb, Hg, Ni, Zn). Though As, Cr, Cu, and Pb continue to be below detection in reservoir water, that information in itself is of interest, and it is always possible that, with continued drought-related concentrations, these metals could reach higher levels. In addition, while we continue to analyze for these metals in fish, we need a record of water concentrations even if they are below detection. Zinc, nickel, and of course mercury, have been important in the system and should definitely be retained.

Section 6 - Davis Creek Reservoir Aquatic Ecology Metals

1. Continue sediment and biota samples at the current schedule.

2. Further investigate the South Arm, vis-a-vis sediment mercury content.

3. UCD should develop its own analytical procedure for sediment mercury and begin synoptic sampling throughout the year.

4. If Davis Creek discharge is high during the winter or spring, studies should focus on mercury transport with these flows.

5. Continue to investigate mercury dynamics in juvenile bass.

Section 7 - Aquatic Ecology Monitoring in Davis Creek

1. Continue monitoring program as specified in Table 2.

2. See Section 4.4 Recommendations concerning sampling of roach for metals analysis.
Hunting and Knoxville Creeks

6.0 Vegetation

The Vegetation Monitoring Program includes monitoring of previously reclaimed areas (reclamation success), sensitive plants and the management of contiguous lands. Reclamation research and test plantings to determine reclamation methods best suited for the site are also an integral part of the program.

Sensitive Plants

In general, all populations of sensitive plants observed during the 1991 monitoring studies were smaller than normal in number and size. Many populations were absent altogether. This again, is probably attributed to continued below normal rainfall in the region resulting in a fifth year of drought. Seven previously undocumented populations of various sensitive species were observed at sites monitored in 1991. On the whole 29 of 59 numbered sensitive plant occurrence sites were monitored by Biosystems and CNPS during the 1991 field season. These sites were chosen for their proximity to existing facilities. Many sites were not inventoried since they have not been impacted by the project since 1985.

Enlargement of the Tailings impoundment to its permitted size, during the 1990-1991 monitoring year, resulted in at least partial impact to nine sites. This disturbance was previously identified and approved during the original permitting and EIR process as part of the Tailings impoundment construction.

Two other sites were identified as potential problem areas. Seepage of high conductance water, at the toe of the 1350 bench of the site 5 waste rock disposal facility, was identified as a potential problem for two monitoring sites in that area. In response, plans are being made to collect and pump back the water for use in the process. Also, an erosion channel was noted near site 46 which will be reviewed and assessed prior to onset of winter rains.

No other new or significant impacts to sensitive plant occurrences were observed in the vicinity of the existing mining project during 1991. The current mine operational procedures continue to completely avoid the remaining known sites.

Sensitive plant monitoring was conducted by Glen Clifton of Biosystems Analysis, Inc., and Joe Callizo of the Napa Chapter of the California Native Plant Society. Recommendations made this year, as listed below, will be reviewed and implemented as appropriate: 1) The removal of the protective fences surrounding the three Fritillaria pluriflora populations. 2) Selected populations be monitored and inventoried to establish climatic trends. 3) A new, comprehensive sensitive plant survey be conducted in the project area. 4) The Pogogyne douglasii var. parviflora be fenced at the swale adjacent to the County Road between Knoxville and the junction of Devilhead Road. 5) The CNPS requests, and HMC approves, the opportunity to collect Fritillaria purdyi bulbs from those sites that will be impacted by the filling of the Tailings impoundment.

Reclamation Review

Reclamation review was completed by Lorraine Van Kekerix, an independent consultant, formerly with the California Division of Mines and Geology. Her report provides a review of seed mixes and general reclamation practices as well as an area by area review. In general, revegetation efforts have been successful in establishing plant cover adequate to stabilize disturbed sites and control erosion. Most of the areas revegetated to date are adjacent to undisturbed areas and native species from undisturbed sites have started to invade the revegetated areas. The 1990-1991 revegetation program was implemented on one hundred thirty acres of disturbed land and was successful in controlling erosion.

Species composition has been observed to change over time with annual grasses being predominant in the first year, followed by emerging perennial grasses, and clover in the second year. By the third year perennial grass is predominant, with native grasses becoming more abundant, and in the fourth through sixth years the invasion of native plants continues to increase.

In the revegetation evaluations performed the past three years, plant cover was sparse on three types of areas: serpentine areas, rocky cut slopes, and some waste rock areas.

Revegetation of serpentine soils or rock is difficult because of the plant nutrient imbalance due to the chemical composition of the soil and rock. Neither the Soil Conservation Service nor Cal Trans have had much success in seeding serpentine slopes and maintaining a stand of plants without continued refertilization. Serpentine slopes are also often geologically unstable, and thus not able to support plants.

Plant cover was sparse on rock cut slopes. Rock slopes are generally not conducive to plant growth as there are few fractures for plant roots to grow into on slopes of consolidated rock, and little water and few nutrients can be held in the fractures.

The seed mixes used since 1987-1988 are recommended for the 1991-1992 plantings. Soil amendments and mulch recommendations which have been used since 1985-1986 have provided good results and are recommended for the 1991-1992 revegetation program.

Large scale reclamation research has been conducted in the form of test plantings of shrubs and woody species on waste rock dumps. The trial plantings have been installed and monitored by Circuit Rider Productions, Inc., and are designed to evaluate individual species and planting methods. This program has provided valuable information on the use of selected species at the site.

7.0 Wildlife

The Wildlife Monitoring Program includes documentation of wildlife observations, wildlife use of Davis Creek Reservoir, and an annual search for golden eagle nests. The Davis Creek Reservoir has added a feature to the area wildlife habitat that did not previously exist. Monitoring indicates wildlife use of the Reservoir and resulting beneficial effects.

An aerial helicopter search for raptor nests was conducted on April 29, 1991 by wildlife biologist Jack Barclay of Biosystems Analysis, Inc. The project area was covered flying for approximately one hour. One occupied prairie falcon nest was observed this year. This same site has been used alternately by prairie falcons and common ravens since 1986. No other active nests were observed during the flight. Although no eagles were observed during the survey, sightings of mature and immature golden eagles foraging near Post 1 continue, with occasional sightings also occurring at DCR. An occasional bald eagle is reported at DCR during the winter months.

The Plecotus townsendii townsendii (Townsend's Big-eared Bat) colonies continue to use the protected roost sites prepared for them in 1988 and 1989. The electronic monitoring system, installed at the first protected maternity site in 1988, has provided researchers with continuous data on nightly and seasonal activity patterns as well as data on roost temperature and light levels. The record of activity patterns and confirmation by visual observations confirm the continued successful use of these sites by the maternity colonies, as well as usage by some individuals as hibernaculums. Ongoing studies conducted and implemented by Drs. Elizabeth "Dixie" Pierson and William Rainey, in conjunction with HMC personnel, continue with Dr. Thomas Tracy Allen providing technical support on monitoring equipment development and modification.

Two, possibly three, pronghorns (antelope) were sighted on HMC property and adjacent lands in June with sightings of one female continuing throughout the summer. The pronghorns are part of a release program coordinated and conducted by California Department of Fish and Game. The release took place south of Highway 20 just west of Williams in February 1990. The release group of animals, taken from Modoc County, consisted of 20 to 30 individuals.

8.0 Geotechnical

The Geological and Geotechnical Monitoring Program monitors the integrity of dams and embankments. The structures reviewed include the Tailings Dam, M-1 Dam, Davis Creek Dam, the Waste Rock Sediment Control Facility, and the East Waste Rock Disposal Facility Pond. All structures are performing as designed.

Tailings lift construction, which raised the embankment to full height, was completed during the 1990-1991 monitoring year. Completed in conjunction with the final lift was the drilling of eight observation wells (OW-01A through OW-04A and OW-06 through OW-09), one N-series well (N-06A), and three additional piezometers (P-07 through P-09).

Four new sediment control ponds were also completed during the 1990-1991 monitoring year. All four ponds are nonjurisdictional structures under the California Department of Water Resources, Division of Safety of Dams.

RECOMMENDATIONS

The following recommendations are made for the 1991-1992 monitoring year:

Water Quality

1. Continue to monitor surface and groundwater quality according to the current Water Quality Monitoring Program as approved by the California Regional Water Quality Control Board, Central Valley Region and the Responsible Agencies.

2. Continue to scrutinize data from monitoring stations associated with the Waste Rock Disposal Facilities for trends.

3. Continue to monitor station DC-06 monthly during the winter runoff season to provide additional data on Davis Creek below the Reservoir. This monitoring is above and beyond the requirement for quarterly monitoring and is in response to a recommendation made by Ecological Research Associates in their review of the 1987-1988 Annual Monitoring Report.

4. Continue the QA/QC program in its present format with review and implementation as appropriate of the following recommendations made by Ecological Research Associates in their annual report found in the volume entitled "Annual Monitoring Report, July 1, 1990 - June 30, 1991, Aquatic Ecology".

    a) In the calculation of percent difference for the certified stock standards for metals in water samples, the APD rather than the RPD should be used.

    b) Chromium, copper, and mercury should be added to the commercially prepared metals in water reference material presently being used.

Other Monitoring

1. *In addition to the standard QA/QC work performed by the contract lab in association with sediment analyses, the use of an appropriate standard reference material (for example: NBS material #2704 - Buffalo River Sediment) will be reviewed and implemented as appropriate as per the recommendation made by Ecological Research Associates in their annual report found in the volume entitled "Annual Monitoring Report, July 1, 1990 - June 30, 1991, Aquatic Ecology".*

Air Quality and Meteorology

1. *The high volume air sampling station at the pit, AQ-3, should be removed from the air network. AQ-3 was initially sited to operate for two years. We are currently in our seventh year of monitoring. AQ-3 does not describe any impacts to ambient air quality or exposure to the general public. Continued operation of this station will not add to the understanding of particulate spatial distributions at McLaughlin and therefore should be eliminated from the network. This recommendation was originally made in the 1987 annual report.*

2. *Asbestos monitoring has demonstrated that mining activities have not increased asbestos fiber concentrations in the ambient air. Only one crysotile fiber greater than 5 microns in diameter was detected during the seven years of monitoring. The greatest concentration measured during those seven years is 0.0086 fibers/cc, which is significantly less than the 2 fibers/cc OSHA standard. We recommend, as we have in the last annual report, that asbestos monitoring at this location be discontinued.*

Geotechnical

1. *As recommended in both the 1988-1989 Annual Monitoring Report and the 1989-1990 Geotechnical Data Review completed by D.P. Engineering, Inc., it is recommended that M-1 Dam be eliminated from the Geotechnical Monitoring Program.*

NAPA COUNTY
CONSERVATION, DEVELOPMENT AND PLANNING DEPARTMENT

RECEIVED
DEC 17 1990
Ans'd.

DEPARTMENT REPORT

Meeting of December 19, 1990

Agenda Item: # 12

SUBJECT: **1989 ANNUAL REPORT REVIEW OF THE ENVIRONMENTAL MONITORING PROGRAM FOR THE McLAUGHLIN GOLD MINE PROJECT**

FILE: **Use Permit # U-198283, CONDITION # 16**

OWNER: **HOMESTAKE MINING COMPANY**

BACKGROUND:

The Conservation, Development and Planning Commission (CDPC) approved the Use Permit and Surface Mining Permit for the Homestake Mining Company (# U-198283) on December 7, 1983, subject to specific conditions, including Condition # 16 which requires submittal of an annual report on the Environmental Monitoring Program.

In accordance with Condition # 16 of Homestake's Use Permit/SMARA Permit, the Planning Division has prepared this report for the Conservation, Development and Planning Commission as a general summary of the findings presented in the Executive Summary of the 1989 Annual Monitoring Report submitted by Homestake Mining Company on October 1, 1989. The attached report discusses the monitoring results for 1989, contains recommendations by Homestake to modify certain aspects of the current Monitoring Program, and also includes comments and recommendations from technical review agencies.

RECOMMENDATION:

That the Conservation, Development and Planning Commission take the following actions:

1) Accept the Department's attached review as adequate.

2) Approve changes to the Environmental Monitoring Program as recommended by Homestake in the 1989 report as follows:

WATER QUALITY

1) Continue surface and groundwater quality monitoring in accordance with current WQMP as approved by the Central Valley Regional Water Quality Control Board, and other responsible agencies.

2) Continue to scrutinize monitoring station data from the waste rock disposal area for trends.

3) Discontinue water quality monitoring of 3 stations downstream of Davis reservoir on Davis Creek, at the confluence of Davis Creek and Cache Creek, and upstream on Cache Creek. These three stations are not affected by the Homestake activities, and six years of data exists, providing a sufficient data base for future comparisons. The Central Valley RWQCB has eliminated these stations from their monitoring requirements.

AIR QUALITY

1) Delete sampling at the high volume air sampling station at the pit, AQ-3. This sampling station was targeted to be sampled for two years. This station does not describe any impacts to ambient air quality or to the general public.

2) The asbestos monitoring station should be deleted from the Monitoring Program. Asbestos monitoring to date has demonstrated that the mining activity has not increased asbestos fiber concentrations in the ambient air.

GEOTECHNICAL

1) The M-1 Dam should be eliminated from the Geotechnical Monitoring Program.

CONSENT AGENDA - items *5, *12,

These items listed for the Consent Agenda will be acted upon by the Commission on one motion at the beginning of the meeting, regardless of their numbered position on the agenda. Each item recommended for the Consent Agenda will be described individually by the Chairman. Persons wishing to speak to any items listed on the Consent Agenda should so indicate to the Chairman when he describes the item of interest.

Public Hearings:

*5. JACK CHANDLER/RMR VINEYARD CO. - REVIEW OF THE STATUS OF USE PERMIT #U-89-18
Use Permit #U-89-18 was approved on December 20, 1989 to convert portions of two residences to professional offices as home occupations, located on the north side of Oakville Cross Road at its intersection with State Highway 29 within an AP (Agricultural Preserve) District. (APN 31-020-08) 1190 Oakville Cross Road. BA

6. APPEAL BY SECURITY OWNERS CORPORATION, to a decision by the Conservation, Development and Planning Department on September 6, 1990, to require an EIR (Environmental Impact Report) on Rezoning Request #R-89-6, proposing to rezone a 325.2 acre parcel from the Agricultural Watershed District (AW) to the Industrial District (I). The parcel is located on the east side of State Highway 29 north of its intersection with Paoli Loop Road. (Assessor Parcel # 57-090-15)
(Continued from December 5, 1990) TA

7. SHIRLEY MCQUEENEY - TENTATIVE PARCEL MAP REQUEST #2518-PM
ENVIRONMENTAL DETERMINATION: Negative Declaration prepared and recommended for adoption
REQUEST: Approval of a division of property of three (3) parcels of 149, 435 and 541 acres into seven (7) parcels of 40, 42, 48.8, 80.6, 120, 248 and 270.28 acres with 260 acres of remaining lands located on both sides of Wooden Valley Road approximately 4.0 miles southeast of Monticello Road (State Highway 121) within an AW (Agricultural Watershed) District. (Assessor's Parcels #33-130-12, 15, 16 SFAP and 17 SFAP)
PC

8. SOSCOL FERRY INVESTORS - TENTATIVE PARCEL MAP REQUEST #2524-PM
ENVIRONMENTAL DETERMINATION: Negative Declaration prepared and recommended for adoption
REQUEST: Approval of a division of property into three (3) parcels of 5.158 acres each located on the south side of Soscol Ferry Road approximately 900 feet west of Devlin Road within a GI (General Industrial) District. (Assessor's Parcel #57-170-13)
WB

9. **BURT AND LOIS RAYNES -TENTATIVE PARCEL MAP REQUEST #2528-PM**
ENVIRONMENTAL DETERMINATION: Negative Declaration prepared and recommended for adoption
REQUEST: Approval of a division of property into three (3) parcels of 40, 40 and 69 acres located to the south of the City of Napa approximately 1000 feet west of Foster Road and its intersection with Imola Avenue within an AW (Agricultural Watershed) District. (Assessor's Parcel #43-061-01) BA

10. **COUNTY-INITIATED ZONING ORDINANCE AMENDMENT #ORD-90-5**
Proposed ordinance amending Section 12412 of the Napa County Code relating to the size of second units.
ENVIRONMENTAL DETERMINATION: Exempt from CEQA JR/MM

Other Business: (The following matters, unless otherwise noted, may be heard at any time during the meeting at the discretion of the Chairman).

11. **REFERRAL FROM LAFCOM** of proposed annexation of portion of Domaine Chandon Winery to Town of Yountville. (Continued from November 17 and December 5, 1990) JR

*12. **REVIEW AND DISCUSSION** of 1989 Annual Report on Environmental Monitoring Program for McLaughlin Gold Mine (Homestake Mining Co. #U-198283) TA

13. **CITY REFERRALS:** None.

14. **DISCUSSION OF ITEMS FOR THE JANUARY 9, 1991 MEETING.**

15. **COMMISSIONER COMMENTS**

16. **DIRECTOR'S REPORT ON BOARD OF SUPERVISORS' ACTIONS**

17. **FUTURE AGENDA ITEMS**

COMMISSION CALENDAR

January 9, 1991	• Regular Commission Meeting and Airport Land Use Commission Meeting	9:00 AM
January 23, 1991	• Regular Commission Meeting	9:00 AM

1989 REVIEW OF THE ANNUAL ENVIRONMENTAL MONITORING PROGRAM McLAUGHLIN PROJECT

The 1989 Annual Monitoring Report represents the sixth report submitted by Homestake Mining Company in fulfillment of the requirement to report annually the results of the McLaughlin Mine Environmental Monitoring Program. The objective of the monitoring program is to measure compliance with environmental performance standards recognized in the regulatory permits issued for the project. The monitoring program also requires the assessment of trends indicative of potential impacts attributable to the McLaughlin Project.

Monitoring data presented in the 1989 annual report covers the 12 month period from July 1, 1988 to June 30, 1989. Quarterly data reports were presented through the year summarizing the data collected each quarter of the monitoring year. The purpose of the annual report is to provide the reviewer with an analysis of the data collected during the previous monitoring year.

This report summarizes the Executive Summary Conclusions and significant findings for each monitoring discipline presented by Homestake in the Annual 1989 report. The Executive Summary is attached.

WATER QUALITY

Analyses of the water quality monitoring program (WQMP) concluded that quality of the waters in the vicinity of the processing facility, tailings impoundment, Davis Creek Reservoir, and the mine pit area remain essentially the same as described prior to the project's operation.

An upward trend in the concentration of sulfate in the waste rock area is continuing as predicted in the EIR and the 87-88 annual report. Homestake indicates that changes in water quality are apparent for certain parameters associated with sulfide oxidation at specific monitoring stations in the waste rock areas. They have responded to the trends by installing an underdrain pumpback system to contain flows from the wasterock underdrains and pump back to the process circuits. Homestake reports that the drains have worked effectively in the 1988-89 season. As a result, no significant changes in overall water quality have been observed in Hunting Creek, as was previously predicted in the EIR. They reported that only 16 of 880 water quality test points (two percent) exceeded the maximum likely concentration of water quality variables tested.

Summary and Conclusions

- No change in surface or groundwater quality relative to regulatory requirements have been identified. Specifically re: cyanide, arsenic, boron, chromium, copper, lead, mercury, nickel, and zinc.

- Surface water monitoring in the waste rock area confirms initial trends in increased concentrations of sulfate and calcium at specific monitoring stations.

- Apparent "exceedences" of maximum likely concentrations were observed during the reporting period. No trends associated with the exceedences were observed.

Recommendations:

1) Continue surface and groundwater quality monitoring in accordance with current WQMP as approved by the Central Valley Regional Water Quality Control Board, and other responsible agencies.

2) Continue to scrutinize monitoring station data from the waste rock disposal area for trends.

3) Discontinue water quality monitoring of 3 stations downstream of Davis reservoir on Davis creek, at the confluence of Davis Creek and Cache Creek, and upstream on Cache Creek. These three stations are not affected by the Homestake activities, and six years of data exists, providing a sufficient data base for future comparisons. The Central Valley RWQCB has eliminated these stations from their monitoring requirements.

The Central Valley Regional Water Quality Control Board reviewed the 1989 Annual Monitoring Report and the proposed recommendations for modifications. In their letter dated May 21, 1990, the Board indicated that there were no evident changes in surface water quality except Hunting Creek, which has increased in calcium and sulfate at Station DC-10, as predicted in the initial environmental document. The Board determined that the data indicate no significant trends in overall surface or groundwater quality. The exceedences in Maximum Likely Concentrations in surface water and ground water also did not show any significant trends. The Board found that, overall, monitoring during the 1988-1989 period has shown discharge to be in compliance with Board Orders 88-181, and 89-107.

NPDES DATA

The collection of NPDES data is required by the Central Valley Regional WQCB Order No. 88-181 to analyze the discharge of sediment control dams and receiving waters. Homestake reports that discharge from two points occurred and were in compliance with applicable discharge limits. Review by the Central Valley Regional Water Quality Control Board confirmed compliane with their Board Order.

AIR QUALITY / METEOROLOGY

The Air Quality Monitoring Program is conducted in accordance with the requirements of the Bay Area Air Quality Management District, Lake County Air Quality Management District, and Yolo-Solano Air Pollution Control District. The focus of the air quality monitoring program is on documenting Total Suspended Particulate Concentrations (dust). Homestake reports that the

existing road dust suppression measures, baghouses, scrubbers, and other air quality control measures have been effective in controlling emissions. Compliance with all regulatory requirements have been met.

Recommendations:

1) The high volume air sampling station at the pit, AQ-3, should be removed from the air network. This sampling station was targeted for two years. Homestake indicates that this station does not describe any impacts to ambient air quality or to the general public.

2) Asbestos monitoring has demonstrated that the mining activity has not increased asbestos fiber concentrations in the ambient air. The concentration found measured 0.0014 fibers/cc, significantly less than the OSHA standard of 2 fibers/cc. Homestake recommends deletion of asbestos monitoring.

The Bay Area Air Quality Management District was notified of the proposed modification in their annual review of the Monitoring Program, and no objection to the modification was received.

AQUATIC ECOLOGY

Hunting and Knoxville Creeks

Bodega Research Associates performed the annual monitoring for Hunting and Knoxville Creeks. Their summary of conclusions indicated that no meaningful trends in trace element concentrations can be identified as resulting from the Homestake mining operations. They indicated that the reduced and focused monitoring system, implemented in 1986, has functioned efficiently and productively, and should be continued without major alteration through 1990. The growing data base resulting from the 1986 modification was sufficient to detect statistically significant annual changes in the benthic macroinvertebrate communities at each sampling station. Changes appeared to relate to annual variation in rainfall and stream hydrology, rather than to changes associated with the Homestake mining operation.

Reestablishment of benthic invertebrates lost in 1986 has occurred. The loss may have been due to an accidental discharge from sediment pond M-1 in 1986, or drainage from the new East Waste Disposal site in 1987-88, or may have been the result of hydrologic changes.

Fish populations remain within the range of previous years at all sample sites, except one (HC-7A), where roach populations seem to be declining. The decline appears to be from natural causes from poor reproduction due to low flow, and an increase in emergent vegetation also due to low flow. Fish remain abundant in Knoxville and Hunting Creek, and most metal concentrations are within the range of the previous year's measurements. However, mercury concentrations have been high. This may be due to changes in analytical procedures. The possible trend warrants close attention in future years.

The California Department of Fish and Game (CDFG) reviewed the Aquatic Ecology Monitoring report and suggested that fish abundance may be better measured by the number of fish per surface area of water rather than comparison of fish population with streamflow. In addition, CDFG commented on the relationship between the roach and insect populations. The Homestake report addresses the decline in roach population on page xiii.

Davis Creek and Davis Creek Reservoir

Davis Creek and Davis Creek Reservoir sampling was conducted by Ecological Research Associates and U.C. Davis under the direction of Dr. Charles Goldman. The 1989 report used a different format from the three previous years, and summarized the long-term water quality and aquatic ecology data base. Water quality measurements include a 7+ year record for Davis Creek (1982-1989), and a 4+ year record for Davis Creek Reservoir (1985-1989). For aquatic ecology-metals measurements, a 4+ year data record exists for both Davis Creek and Davis Creek Reservoir.

Ecological Research and U.C. Davis concluded that the reservoir has not had a negative impact on downstream water quality. They indicated that Homestake's upstream activities have not impacted Cache Creek water quality. Downstream water quantity has been impacted by the reservoir. There has been a significant reduction of water flow at the downstream station (DC-6) which has caused habitat modification, however they conclude that the reduction in flow has not significantly changed the water budget of Cache Creek due to the low flow measured prior to the reservoir construction.

Concentrations of the seven priority pollutant metals measured routinely include arsenic, chromium, copper, mercury, lead, nickel, and zinc. Concentrations of all metals sampled during the 7+ year monitoring program for Davis Creek were low and typically below detection at the confluence of Davis and Cache Creek. The researchers concluded that there is no indication that Davis Creek is a source of metals downstream. The reservoir has had no detrimental impacts on downstream water quality, and since many of the metals tested are transported in the particulate fraction, the reservoir has and should continue to act as a trap and improve downstream water quality.

The seven priority pollutant metals monitored at Davis Creek Reservoir were measured at or below their respective levels of detection in the majority of samples over the 4+ year sampling period. When metals appeared at detectible concentrations, they were generally well below concentrations found in the creek. The researchers concluded that the levels of these metals in the reservoir pose no threat to downstream water quality to date.

Bottom sediment, zooplankton, and fish (livers) have been collected semiannually for seven metals analysis since the reservoir was created. The long-term reservoir data revealed that both zooplankton and benthic invertebrates contained considerably lower mercury levels than the reservoir fish. All reservoir spawned fish have contained >0.5ppm Hg (the California health standard for edible flesh), these levels have apparently stopped increasing, and may be in the process of decline.

VEGETATION MONITORING

The Vegetation Monitoring Program includes monitoring of previously reclaimed areas (reclamation success), sensitive plants and the management of contiguous lands. Reclamation research and test plantings to determine most suitable reclamation methods are also included in the program.

Sensitive plant monitoring was conducted by Glen Clifton of Biosystems Analysis, Inc. and Joe Callizo of the Napa Chapter of the California Native Plant Society. Five new populations of sensitive plants were located in the project vicinity. No new disturbances of sensitive plants were observed. No populations in the project vicinity exhibited signs of toxicity from air or water borne pollutants caused by mining operations. The reviewers recommended that the protective fencing around the three Fritillalrua plufora populations be removed , and selective populations monitored and inventoried to establish climatic trends.

Reclamation review was completed by Lorraine Van Kekerix, an independent consultant formerly with Cal Division of Mines and Geology. Revegetation efforts have been successful in establishing plant cover adequate to stabilize disturbed sites and control erosion. Native species from undisturbed sites have started to invade the revegetated areas. Successful revegetation in the 1988-1989 season was completed on 54 acres of disturbed land.

Ms. Van Kekerix reported that species composition on reclaimed sites has changed over time with annual grasses predominant in the first year, followed by emerging perennial grasses, and clover in the second year. In the third year, perennial grasses are predominant, with native grasses more abundant, and in the fourth and fifth years, the invasion of native plants increases. Over time, the native species are expected to replace the seeded species.

Large scale reclamation research of test plantings of shrubs and woody species on the waste rock was conducted in the 1988-1989 season, installed and monitored by Circuit Riders Productions, Inc.

WILDLIFE

The Wildlife Monitoring Program data indicated the continues abundance of wildlife within the project region. Data base consists of wildlife observation cards submitted by project employees, contractors, researchers, and wildlife monitoring by Ecological Research Associates at Davis Creek Reservoir.

The Townsend's big eared bat (Plecotus townsendii) relocation project continued in 1988-1989 with an increase in the size of the returning maternity colony from 60 to 85 individuals. Young have been reared successfully for the second year at the new roost site. Homestake has also installed protective gates at another maternity site where a second colony resides.

An aerial helicopter search for raptor nests was conducted in April of 1989 and revealed three stick nests, one inhabited by prairie falcons. The other two showed no sign of recent use.

Continued regular sightings of golden eagles and an occasional bald eagle, indicate that the site is still within the hunting range of birds using Cache Creek and Lake Berryessa habitat.

Homestake recommends continuation of the Wildlife Monitoring programs in their present format for the 1989-1990 year. The wildlife program will be reviewed with the Contiguous Lands Unit Management Plan implementation.

GEOTECHNICAL MONITORING

The Geotechnical Monitoring Program monitors the integrity of dams and embankments. Structures reviewed include the Tailings Dam, M-1 Dam, Davis Creek Dam, the waste rock Sediment Control structures.

Recommendation:

Homestake recommends that the M-1 Dam be eliminated from the Geotechnical Monitoring Program, based on the geotechnical review for the McLaughlin dams prepared by D.P. Engineers, Inc., dated August 31, 1989.

TRAFFIC MONITORING

Traffic on Knoxville-Berryessa Road has been monitored in accordance with Napa County Agreement #2055. Data was collected with an electric traffic control counter at the southern end of the county road constructed in 1984. Daily trip data collected over the four week test period indicate levels well below the 125 ATD threshold. When the threshold is reached, an origin and destination survey as agreed to in the Napa County Road Agreement will be initiated.

HOMESTAKE MINING COMPANY

McLAUGHLIN MINE

ANNUAL ENVIRONMENTAL MONITORING REPORT

JULY 1, 1988 THROUGH JUNE 30, 1989

EXECUTIVE SUMMARY

Introduction

The Executive Summary lists the findings of the analyses conducted on monitoring data collected during the reporting period of July 1, 1988 through June 30, 1989. The summary is organized in sections by monitoring topic.

1.0 WATER QUALITY

In accordance with the requirements of California Regional Water Quality Control Board Waste Discharge Order 89-107 for the McLaughlin Mine, a summary and analysis of the water quality data collected by the Mine's Water Quality Monitoring Program over the preceding twelve-month period (July 1988 through June 1989) has been prepared. The analysis is focused on changes in water quality over time (temporal analyses) and comparisons of the data to statistically calculated maximum likely concentrations.

No changes in surface or groundwater quality in terms of those elements or compounds which are fundamental to compliance with regulatory requirements have been identified. Analytical emphasis has been on those parameters most likely to be impacted by mining: cyanide, arsenic, boron, chromium, copper, lead, mercury, nickel and zinc.

Water quality of waters in the vicinity of the processing facility, tailings impoundment, Davis Creek Reservoir, and the mine pit area remains essentially as it was described prior to the project's operation.

Water quality trends associated with sulfide oxidation in the waste rock areas were identified and discussed in the 1986-1987 and 1987-1988 Annual Environmental Monitoring Reports and also predicted in the Environmental Impact Report. The 1988-1989 monitoring data indicate that these trends are continuing. Changes in water quality are apparent for certain parameters associated with sulfide oxidation at specific monitoring stations within the waste rock areas. Homestake has implemented a response to initial trends identified through environmental monitoring. Homestake has designed, installed, and operated waste rock underdrain pump back systems which contain and pump

back to the process circuits, flows from the waste rock underdrains. These systems operated effectively through the rainy season of 1988-1989. No significant changes in overall water quality have been observed outside of the waste rock area or in Hunting Creek, particularly with respect to metals concentrations. Preliminary trends identified this year indicate declining concentrations for key parameters in Knoxville Creek.

For the reporting period only sixteen (or two percent) of the 880 water quality data points evaluated exceeded the statistically derived maximum likely concentrations. No trends associated with these "exceedances" have been identified.

2.0 NPDES DATA

NPDES data are collected from the discharge of sediment control dams and from receiving waters as required by Central Valley Regional Water Quality Control Board Order No. 88-181. Normal storm water discharges occurred from Pond #7 of the Waste Rock Sediment Control System (discharge point 003 and receiving waters HC-5R and HC-10R). Limited discharge occurred from the East Waste Rock Facility Pond (discharge point 001 and receiving stream station KC-03R).

Discharge point 003, from Pond #7 and discharge point 001 from the East Waste Rock Facility Pond were in compliance with applicable discharge limits. Receiving water quality parameters were also in compliance and remained within the range of natural variability.

3.0 OTHER MONITORING

Sampling required in the McLaughlin Project Environmental Monitoring Manual, but not included in the routine sample sets for surface and groundwater are presented in this section. Data summarized include sampling of the cooling pond in March and June, semiannual sediment data for four locations, quarterly compsite samples of the tailings, domestic well sampling, and sampling of the tailings seepage return sump.

The cooling pond monitoring station (CP-01) reflects expected operational values for monitored parameters.

Sediment data collected showed no meaningful trends. The usefulness of the sediment data is questioned given the variations in stream sediment deposition and runoff patterns from year to year, and the variability within samples collected at the same time at the same site.

Tailings samples reflect concentrations expected during operations for total and filtered values. The tailings continue to test as nonhazardous.

Data for domestic wells show no unusual variations.

4.0 AIR QUALITY AND METEOROLOGY

The Air Quality Monitoring Program is conducted in accordance with the requirements of the Bay Area Air Quality Management District, Lake County Air Quality Management District, and Yolo-Solano Air Pollution Control District. It is evident that road dust suppression measures, baghouses, scrubbers, and other air quality control measures have been effective in controlling emissions as evidenced by air quality data.

Compliance was maintained with all ambient air standards and air quality management district rules, regulations and operating permit conditions.

The level of monitoring currently employed under the McLaughlin Mine Air Quality Monitoring Program is more than adequate to describe operation conditions and to monitor compliance at the McLaughlin facility.

5.0 AQUATIC ECOLOGY

Hunting and Knoxville Creeks

Aquatic ecology monitoring on Hunting and Knoxville Creeks is conducted by Bodega Research Associates. Their report is reproduced in full in the volume entitled "Annual Monitoring Report July 1, 1988 - June 30, 1989, Aquatic Ecology Hunting and Knoxville Creeks". The report Summary of Conclusions is reproduced below:

Summary of Conclusions

The reduced and focused monitoring program implemented in 1986 has functioned efficiently and productively through 1989, and should be continued without major alteration in 1990. The cumulative increase in the data base from April sampling at the four primary sites (HC-5, HC-7A, HC-10, KC-3) and August benthic sampling at HC-7A will make the program more effective each year, as long as a consistent, careful, and appropriate methodology is maintained. Already this growing data base has become sufficient to detect statistically significant annual changes in the benthic macroinvertebrate communities at each of the sampling stations. These changes appear to relate to annual variation in rainfall and stream hydrology rather than to changes associated with the Homestake mining operation. At high flow sites (HC-5 and HC-10), low rainfall apparently results in richer spring communities because of the reduced winter scouring. At low flow sites (KC-3 and HC-7A), low rainfall in the preceding year may reduce spring species richness because of drought-related effects during the previous summer.

11

Chemical changes produced by the accidental discharge from Sediment Pond M-1 in 1986 and further changes in 198[illegible] 1988 evidenced by a reddish iron precipitate on the stre[illegible] bottom at KC-3, produced by drainage from the new East Waste Disposal site, remain as possible causes of changes in invertebrate communities at KC-3 in recent years. Alternatively, hydrologic events might be responsible. Reestablishment of most species of benthic invertebrates lost in 1986 has already occurred, and total recovery may just await a sequence of years of normal or above average rainfall.

Variability in fish populations remains within the range of previous years at all sites except HC-7A, where roach populations seem to be declining. This decline is probably natural, resulting from poor reproduction in years of low flow, and from increasing emergent vegetation at the site, also related to the low flow in recent years. At HC-10, similar decline in roach density may relate to these rainfall effects and also to a simultaneous increase in numbers of green sunfish.

At KC-03, the nonrecovery of roach populations following the 1986 decline probably relates to recent hydrology and to a small waterfall barrier rather than to any persistent chemical changes. Fish remain abundant downstream of the site, and most metal concentrations in fish at that locati[illegible] are within the range of previous years' measurements a[illegible] Knoxville Creek and Hunting Creek monitoring sites. Reported mercury concentrations, however, have been high at this site in 1988 and 1989, although changes in analytical procedures may be largely responsible for this apparent change. This possible trend warrants close attention in future years.

Within the limits of reliability of the laboratory analytical results, no meaningful trends in trace element concentrations can be identified as arising from Homestake mining operations. Interpretation of these data has been unfortunately obscured by greater variability in laboratory analytical procedures and results than had been anticipated. Tighter QA/QC requirements may reduce this source of analytical error. In addition, we recommend a program of archiving frozen samples of fish tissue each year for possible future analysis to corroborate any suspected trends.

Davis Creek and Davis Creek Reservoir

Davis Creek and Davis Creek Reservoir sampling was conducted by Ecological Research Associates and U. C. Davis respectively under the direction of Dr. Charles Goldman. Reservoir samplin[illegible] commenced in April 1985 and has continued as specified in the Environmental Monitoring Manual with an additional thirty-six

mercury analyses authorized annually. The report is reproduced in full in the volume entitled "Annual Monitoring Report, July 1, 1988 - June 30, 1989, Aquatic Ecology, Davis Creek and Davis Creek Reservoir". The Executive Summary of that report is reproduced below:

Executive Summary

1. This is our fourth Annual Report documenting water quality conditions in Davis Creek Reservoir and the stream stations located in the Davis Creek watershed. As initiated last year, we have combined the reports from Ecological Research Associates (ERA) and the University of California-Davis (UCD). This 1989 Annual Report has a significantly different format from the previous reports, which have focused on water quality data collected during each specific monitoring year. As we discussed last year, we felt that it was now in the best interest of the County to change this format and summarize the long-term water quality and aquatic ecology data base. For water quality measurements (i.e. water chemistry), a 7+ year record (1982-1989) now exists for Davis Creek and a 4+ year record (1985-1989) exists for Davis Creek Reservoir. For aquatic ecology-metals measurements, a 4+ year data record exists for both Davis Creek and Davis Creek Reservoir. Our analysis includes all years of sampling, and with respect to everything except QA/QC issues, the July 1988-June 1989 data is not singled out for evaluation. The ERA/UCD project team formally entered this project in 1985. While this report covers the long-term water quality data base, it is not intended to be our final five-year project report. This will be submitted next year and will include other topics such as the final results of the UCD mercury food chain study, recommendations for fisheries management and recommendations for future UCD research projects.

The present report,

- provides a summary of the data record for the Environmental Monitoring Program, primarily in the form of time series graphs,

- discusses the meaning and implications of seasonal and long-term trends in the data in terms of (a) regulatory criteria,(b) beneficial uses of downstream water and (c) general water chemistry patterns, and

- provides recommendations for modifications to the Environmental Monitoring Program.

2. The major issues addressed in this report include:

- Detailed review and evaluation of 1988-1989 quality assurance and quality control (QA/QC) data. This includes "in-house" laboratory QA/QC protocol, field samples taken for QA purposes, and estimates of the

accuracy and precision on fish mercury analyses (Section 2).

- Long-term and seasonal trends of general water quality constituents (Section 3.1) and heavy metals (Section 3.2) in Davis Creek.

- Long-term and seasonal trends of heavy metals in the biota and sediments of Davis Creek (Section 4).

- Long-term and seasonal trends of general water quality constituents (Section 5.1) and heavy metals (Section 5.2) in Davis Creek Reservoir.

- Mercury accumulation by fish in Davis Creek Reservoir (Section 6).

- Recommendations for modification of the Environmental Monitoring Program (contained in Sections 3-6).

3. An extensive review of all relevant laboratory and field quality control and quality assurance (QA/QC) data during the period July 1988-June 1989 was conducted. During 1988-1989 the following field QA/QC samples were sent to NET by HMC and ERA/UCD (note: these are in addition to the lab QA/QC tests which are routinely done by NET as part of their internal QA/QC plan): replicated intralaboratory analyses, replicated interlaboratory analyses for both surface and groundwater, analyses of field blanks, analyses of National Bureau of Standards material for Metals in Water (#1643b), and analyses of NBS RM 50 for fish mercury content. Four surface water samples were analyzed as interlaboratory replicates; only 7% of which exceeded acceptable criteria. For interlaboratory replicates, TSS, chloride, ammonia, and total and filtered-iron had low agreement. This was similar to last year as well as previous years. Since concentrations of metals in the creek were low, as usual, it was difficult to directly compare the two labs' abilities to measure above detection concentrations of these parameters. We examined each of the lab's internal QA/QC data for metal matrix spike-recoveries and found that both CAL Labs (previous analytical lab) and NET (current analytical lab) were able to accurately measure concentrations of metals in water when they were above detection. Also, routine QA/QC surface and groundwater samples submitted by HMC both last year and this year show that NET and CAL Labs generally agree on measurements of arsenic, copper, nickel, and zinc. We believe that both labs have the analytical ability to measure metals in creek water if they were above detection. NET continued to demonstrate its ability to recover metals from internal spikes and NBS water standards. This year, as last, ERA/UCD insisted that an extensive QA/QC protocol be followed for fish mercury measurements. In general, while NET's performance was adequate for the purposes of this project, there was some degree of variation in their analytical results. Four out of

thirty EMP fish samples, or 13% analyzed by NET had mercury values which differed from UCD by more than 20%. These samples are being submitted to NET for reanalysis. We recommend a procedure which may eliminate this variation.

4. Data on general water quality parameters have been collected at DC-5 and DC-6 since 1982, and at DC-4 since 1983. The average concentrations of most ionic salts in Davis Creek are 8-13 times greater than the global average for river water. This is a direct reflection of the geologically rich watershed soils and is natural for this region of California. The preponderance of magnesium results from the serpentine nature of the watershed soils. The seasonal pattern of most ions at DC-5 follows a distinct pattern of a summer maximum and winter minimum. This is the result of evaporative concentration and is caused by the extremely low flows and high temperatures during the summer.

Water chemistry at DC-6 has been greatly influenced by the change in the hydrologic regime at this site since the dam was built. While flows at DC-5 and DC-6 were nearly identical until the reservoir became operational, since that time flows at DC-6 have typically been minimal and less than 125 gpm. A major event in the life of this hydrologic system occurred in February 1986 when a record high of 17.13 inches of rain fell on the Davis Creek watershed in one month's period. Until that time the reservoir had not been full and indeed was, at most, at 15% of full capacity. Within a one week period, the reservoir rose 44 feet to full capacity and spilled for the next two to three months. Since this sudden discharge of water into the reservoir was characterized more by relatively clean rain water versus the more enriched DC-5 water, water quality in Davis Creek Reservoir has remained relatively good. This is reflected in the generally higher quality water at DC-6 since February 1986. At no time did the concentration of any water quality constituent exceed regulatory criteria as a result of either the reservoir or other HMC activities.

Given all the above, our conclusion remains that the reservoir has not had a negative impact on downstream water <u>quality</u> and, indeed, for most constituents it has improved conditions. Furthermore, it appears as though water quality at DC-4 has not changed since the dam was constructed and that the chemistry at this site is more indicative of natural baseline conditions. As a result, we do not believe that any upstream activities by HMC have impacted Cache Creek water quality. Downstream water <u>quantity</u> has been impacted by the reservoir. There has been a significant reduction of water flow at DC-6, which has caused some inevitable habitat modification at this site. However, given that the total volume of flow from Davis Creek to Cache Creek, even under prereservoir conditions, is so low, the reduction of discharge at DC-6 has not significantly changed the water budget for Cache Creek.

5. The seven priority pollutant metals routinely measured during the 7+ years of the EMP divide into three groups. The first group consists of arsenic, chromium, copper, mercury, and lead. These metals were found almost exclusively in the particulate fraction and occur periodically during periods of high total suspended solids. These metals are infrequently above detection, making preoperational versus operational comparisons difficult (i.e. low number of samples). In spite of this, since these metals are transported in the particulate fraction, and since the reservoir will act as a trap for particulate matter, downstream water quality has and should continue to improve. These metals rarely exceed the MLC (maximum likely concentrations) values calculated for this project and are below US EPA criteria for the protection of freshwater life.

The second grouping consists of nickel. Filtered (dissolved) nickel constitutes the bulk of the total-Ni pool at DC-5 and shows a regular seasonal distribution with a winter baseline of 2-100 ug/l and a consistent year to year summer maximum of 600-650 ug/l. Filtered-Ni is well related to creek temperature and the distinct season pattern is caused by a "concentration effect". Occasional peaks of particulate-Ni are measured in the winter and, again, their occurrence is related to an increase in the suspend solids load.

The third group consists of zinc. While it is frequently measured at above detection concentrations and is found primarily in the filtered fraction there were no clear seasonal patterns of distribution.

The number of times that concentrations exceeded the updated MLC values was almost always between 0-5%.

Concentrations of all metals were always low and typically below detection at the confluence of Davis Creek and Cache Creek. As a result there is no indication that Davis Creek is a source of metals downstream. On the basis of all this information, we conclude that the reservoir has had no detrimental impacts on downstream water quality either at DC-6 and DC-4 and indeed, since many of the metals are transported in the particulate fraction, the reservoir has and should continue to act as a trap and improve downstream water quality, vis-a-vis priority pollutant metals.

6. Concentrations of seven priority pollutant metals have been measured in periphyton, benthic invertebrates, fish (California roach) and sediments at DC-5 and DC-6. Since California roach rely heavily on periphyton as a food source, this is a potential mechanism for transfer between trophic levels. The measurements made for periphyton metals include both cellular metals which have been assimilated into algal protoplasm, and metals which are bound to the surface of the algal filaments. From the perspective of algal physiology, these two pools are different, however, for fish grazing on this

material the distinction has little consequence. Concentrations of metals in periphyton and benthos, while generally above detection, were not indicative of contaminated waters.

As observed for lead, Davis Creek roach never contained arsenic and only limited and occasional levels of chromium. While roach-Cu was typically measured, concentrations were mostly within a range of 2-3 times the detection limit. Levels of nickel in roach were similarly just above detection at DC-6; however, much higher values were found at DC-5. Nickel was the only fish metal which showed a clear and consistent seasonal pattern, with a summer maximum and a winter minimum. It was not surprising that this pattern was also found for nickel in the creek water and periphyton. Mercury was found in the majority of samples and almost always above the limit of detection.

Concentrations at DC-5 (above the reservoir) were nearly twice those at DC-6 (downstream). No seasonal pattern of distribution was found and there have only been four times when roach-Hg exceeded the 0.5 ppm California Department of Health Services criterion for edible fish; and each time was in a fish from DC-5. Concentrations of zinc in roach were relatively high when compared to natural waters with low ambient zinc concentrations. This is no doubt related to the naturally higher zinc concentrations in Davis Creek. While DC-6 was higher in roach zinc that DC-5, we do not believe this is environmentally significant.

As expected, sediment metals were high for those metals found in the natural serpentine soils. These included nickel, chromium, mercury, and arsenic. The most unique trend in the sediment metals data has been a significant increase in most metals since October 1987. This date corresponds to the first set of sediment metals samples analyzed by NET. However, given that this increase was not consistent between stations or uniform in magnitude, it is difficult to determine whether these increases were due to changes in laboratory procedure or resulted from bottom sediment heterogeneity caused by deposition and scouring processes. In all, sediment metals data have not been very useful to us in assessing the environmental status of Davis Creek.

7. DCR water chemistry is driven by classic seasonal stratification. During each spring, the surface water warms to a point that it becomes separated from the lower water strata as a result of density stratification. From this point on each year, the surface layer (epilimnion) warms and then cools in conjunction with the seasonal change in ambient air temperature. Over the entire period of thermal stratification (April-November), this layer mixes internally and maintains communication with the atmosphere, thus staying aerated. The lower water layer (hypolimnion) during this time becomes isolated from the epilimnion and the atmosphere, and with sufficiently large pools of organic matter and bacteria, becomes seasonally

depleted of oxygen. This occurs each summer and fall at DCR, and the resulting seasonal plunge in redox conditions in the hypolimnion promotes the formation and accumulation of high levels of hydrogen sulfide, ammonium, phosphate, iron, manganese, and additional compounds.

These seasonal changes influence most DCR water chemistry. In the summer the epilimnion is subject to evaporation, and thus evaporative concentration of dissolved water constituents, including most ions, alkalinity, and conductivity. Winter storm inflows of creek water bring in suspended sediments, but this water inflow generally acts to dilute existing reservoir water constituents. The historic February 1986 storms which filled the reservoir diluted nearly all water constituents to significantly lower levels. Concentrations of essentially all monitored water quality components have, since that date, remained at levels in DCR that are considerably lower than those typically or periodically found in the creek.

8. The seven priority pollutant metals monitored at DCR were at or below their respective levels of detection in the majority of samples during the five year data record; 1985-1989. When they appeared at detectable concentrations, these concentrations generally were well below the ranges periodically encountered in the creek. Levels of these metals in the reservoir can thus be seen to have posed no threat to downstream water quality to date.

Mercury occasionally was found above its 0.2 ppb level of detection in the reservoir, with virtually all of these occurrences being attributable to particulate-bound Hg. The majority of these were in surface samples, and were found for nearly one year following the large 1986 storms which filled the reservoir. The range of detectable Hg in DCR was 0.2-0.5 ppb, with the exception of a single-date particulate surface spike of 1.2 ppb. As all of the detectable Hg has been in the particulate-bound fraction, and Hg levels in the reservoir sediment are routinely 3 orders of magnitude higher (i.e. 1-13 ppm), these occasional particulate-bound Hg occurrences in the water would appear to be of little importance in general reservoir mercury dynamics. The mercury chemistry that directly affects Hg accumulation in DCR fish (i.e. methyl Hg production and distribution) happens at trace levels far below our level of detection. Fortunately, U.C. Santa Cruz researchers have been persuaded to bring their pioneering ultra-trace methods to Davis Creek Reservoir and are studying this very phenomenon.

9. Bottom sediment, zooplankton, and fish (livers) have been collected, when available, semiannually for seven-metals analysis for as long as the reservoir has existed. Fish have been an integral part of the monitoring program since the first reservoir year. Following the stocking of the reservoir in May of 1985 with largemouth bass and bluegill, bass quickly spawned in DCR, and reservoir-spawned bass have been available for

collection and Hg analysis from August 1985 to the present. Native Sacramento suckers moved into the reservoir from Davis Creek and were added to the monitoring program in early 1986. This species has subsequently drastically declined in numbers due to its inability to reach stream spawning habitat in each of the past three years, and had to be discontinued in the program in 1988. Fortunately, the third large DCR fish species, the introduced bluegill, reached a sufficiently stable population size to allow its own culling for monitoring purposes, commencing in 1987. Therefore, over the life of DCR, bass and either Sacramento suckers or bluegill have been collected semiannually for metals analysis.

The long-term reservoir data set indicates the following points:

- Both zooplankton and benthic invertebrates contained considerably lower mercury levels than did the reservoir fish.

- Sediment Ni, Cr, and Hg were elevated relative to average lake sediments, reflecting the enrichment of these metals in the watershed. All demonstrated a fallout pattern consistent with the fact that Davis Creek is a source of particulate material to the reservoir, with sediment concentrations of many metals decreasing with distance from the DC-5 inflow. Mercury alone is accumulating in the DCR biota. Mercury has been present in DCR sediments at <1-13 ppm over both extremes of inflow conditions, as compared to sediment Hg levels in the hundreds of parts per million in the Clear Lake Oaks Arm, where fish Hg levels are lower. This indicates that inorganic Hg levels in the sediment are not as important as the rate of actual methylation of mercury in those sediments, vis-a-vis fish Hg accumulation.

- While virtually all reservoir-spawned fish have contained >0.5 ppm Hg (the California health standard for edible flesh), these levels have apparently stopped increasing and may be in the process of decline. A statistical analysis of all the fish Hg data allowed the following statements to be conclusively made.

  -- Since the fall of 1986, mean levels of Hg in size-comparable DCR bass (<260 g) have not risen

  -- Mean sucker Hg levels did not rise in DCR after 1987

  -- Bluegill mercury levels have not risen in DCR since 1987

- Though the concentrations are still of concern (1.5-3.0 ppm), it is clear that the peak in this trend has

passed already (1987) and that, since that time, DCR fish Hg levels have either levelled off or ar dropping.

10. A population study of fish and benthic invertebrates was done by Dr. Dana Abell for ERA. He has submitted a separate report which is reproduced in the Aquatic Ecology Report, Section 7.

11. A detailed list of ERA/UCD recommendations is found in their report.

Please see the above referenced reports for additional detail and discussion.

6.0 VEGETATION

The Vegetation Monitoring Program includes monitoring of previously reclaimed areas (reclamation success), sensitive plants and the management of contiguous lands. Reclamation research and test plantings to determine reclamation methods best suited for the site are also an integral part of the program.

Sensitive plant monitoring was conducted by Glen Clifton of Biosystems Analysis, Inc., and Joe Callizo of the Napa Chapter of the California Native Plant Society. Five new populations were located in the project vicinity during the 1989 monitorin surveys. No new disturbances of sensitive plants were observed. No populations in the project vicinity exhibited signs of toxicity from air or waterborne pollutants caused by mining operations. No significant direct or indirect impacts were observed. It was recommended that protective fences around the three Fritillaria plurifora populations be removed and that selected populations be monitored and inventoried to establish climatic trends.

Reclamation review was completed by Lorraine Van Kekerix, an independent consultant, formerly with the California Division of Mines and Geology. Her report provides a review of seed mixes and general reclamation practices as well as an area by area review. In general, revegetation efforts have been successful in establishing plant cover adequate to stabilize disturbed sites and control erosion. Most of the areas revegetated to date are adjacent to undisturbed areas and native species from undisturbed sites have started to invade the revegetated areas. The 1988-1989 revegetation program was implemented on fifty-four acres of disturbed land and was successful in controlling erosion.

Species composition has been observed to change over time with annual grasses being predominant in the first year, followed by emerging perennial grasses, and clover in the second year. By the third year perennial grass is predominant, with native grass becoming more abundant, and in the fourth and fifth years the invasion of native plants continues to increase.

Increased occurrence of legumes were noted in 1988 and 1989. This is attributed in part to the weather/rainfall patterns. Nitrogen fixed by the legumes will improve the nutrient status of the revegetated areas and should increase the number of plants which can invade and become established. Over time the native species are expected to replace the seeded species.

The seed mixes, soil amendments and mulch used in 1988-1989 provided good results, and are recommended for the 1989-1990 revegetation work.

Large scale reclamation research has been conducted in the form of test plantings of shrubs and woody species on waste rock dumps. The trial plantings have been installed and monitored by Circuit Rider Productions, Inc., and are designed to evaluate individual species and planting methods. This program has provided valuable information on the use of species at the site. Plantings received a spring maintenance treatment consisting of weeding and maintenance of screen and collar enclosures.

The Contiguous Land Use Management Plan, initiated by Homestake and prepared by a group of private consultants and graduate students under the direction of their major professors from U. C. Berkeley has been completed and approved. The plan provides an opportunity to further the research and educational programs as provided in the project reclamation plan.

7.0 WILDLIFE

Data collected under the Wildlife Monitoring Program demonstrate the continued abundance of wildlife within the project area. Wildlife observation cards submitted by project employees, contractors, researchers, and wildlife monitoring conducted by Ecological Research Associates at Davis Creek Reservoir comprise the data base.

The success of last year's Plecotus townsendii townsendii (Townsend's big-eared bat) relocation project continued in 1988-1989 with an increase in the size of the returning maternity colony from 60 to approximately 85 individuals, as well as the successful rearing of young for the second year at the newly gated roost site. Encouraged by this success, protective gates were installed by Homestake at another maternity site where a second colony of Plecotus resides.

The ongoing population and behavioral studies of these colonies have included the study of foraging behavior through light tagging, confirmation of colony size and exodus patterns through the use of night vision equipment, and study of roost requirements through the use of monitoring equipment and field measurements. Studies are being conducted and implemented by Drs. Elizabeth "Dixie" Pierson and William Rainey in conjunction with HMC personnel.

An aerial helicopter search for raptor nests was conducted on April 28, 1989 by wildlife biologist Jack Barclay of Biosystems Analysis, Inc. The project area was covered flying for approximately one and one-half hours. Of the three stick nests located, one was inhabited by prairie falcons. The remaining two sites showed no sign of recent use. Although no eagles were observed on the survey, continued regular sightings of golden eagles and an occasional bald eagle, as reported by HMC personnel and University researchers, indicate that the site is still within the hunting range of birds utilizing Cache Creek and Lake Berryessa habitat.

The HMC and ERA Wildlife Monitoring Programs will continue through the 1989-1990 monitoring year in their present formats. The wildlife program will be reviewed as the Contiguous Lands Unit Management Plan is implemented.

8.0 GEOTECHNICAL

The Geotechnical Monitoring Program monitors the integrity of dams and embankments. The structures reviewed include the Tailings Dam, M-1 Dam, Davis Creek Dam, and the Waste Rock Sediment Control structures. All structures are performing as designed.

9.0 TRAFFIC MONITORING

Traffic on the Knoxville-Berryessa Road was monitored utilizing an electric traffic control counter placed at the southern end of the county road constructed in 1984. The traffic data indicate levels well below the threshold level of 125 average daily trips for a period of four consecutive weeks. The threshold level, if reached, would initiate origin and destination surveys as detailed in the Napa County Road Agreement.

10.0 RECOMMENDATIONS FOR 1988-1989 MONITORING PROGRAM

Water Quality

1) Continue to monitor surface and groundwater quality according to the current Water Quality Monitoring Program as approved by the Water Quality Control Board, Central Valley Region, and other responsible agencies.

2) Continue to scrutinize data from monitoring stations associated with the Waste Rock Disposal Facilities for trends.

3) The water quality data base collected over the last six years at station DC-04 on Davis Creek at the confluence with Cache Creek, station CC-01 on Cache Creek upstream of the confluence with Davis Creek, and station CC-02 on Cache Creek downstream of the confluence is presented graphically for the period of record in this year's

annual report. This data has been reviewed in the following context:

- Starting at the Reservoir and going downstream, one encounters monitoring station DC-06 a few hundred yards downstream of the Reservoir spillway. If one continues downstream approximately 5 miles to the confluence of Davis and Cache Creeks one finds monitoring station DC-04.

- Homestake has no activities in this 5 mile stretch on Davis Creek between monitoring station DC-06 and station DC-04 downstream.

- Monitoring station DC-06 characterizes waters in Davis Creek leaving the area of Homestake's activities (i.e. the Davis Creek Reservoir area).

- Homestake has agreed to monitor station DC-06 monthly during the winter runoff season to provide additional data on Davis Creek below the Reservoir. This monitoring is above and beyond the requirement for quarterly monitoring and is in response to a recommendation made by Ecological Research Associates in their review of the 1987-1988 Annual Monitoring Report.

- Six years of data base exist for station DC-04, CC-01, and CC-02.

Given the above, it is reasonable to discontinue monitoring of stations DC-04, CC-01, and CC-02. The waters of Davis Creek are well characterized by the monitoring program currently in place at station DC-06. There are no Homestake activities between stations DC-06 and DC-04, and in fact minimal human activity of any kind along that remote stream stretch. A six year data base exists for stations DC-04, CC-01, and CC-02 characterizing water quality at those locations. This data base is available for future comparisons of water quality should a need arise.

The Central Valley Regional Water Quality Control Board has eliminated monitoring at stations DC-04, CC-01, and CC-02 from their monitoring requirements. Homestake recommends discontinuance of monitoring at these stations for the above reasons.

Air Quality

1) The high volume air sampling station at the pit, AQ-3, should be removed from the air network. AQ-3 was initially sited to operate for two years. We are currently in our fifth year of monitoring. AQ-3 does not describe any impacts to ambient air quality or exposure

to the general public. Continued operation of this station will not add to the understanding of particulate spatial distributions at McLaughlin and therefore should be eliminated from the network. This recommendation was originally made in the 1987 annual report.

2. Asbestos monitoring, has demonstrated that mining activities have not increased asbestos fiber concentrations in the ambient air. Only one crysotile fiber greater than 5 microns in diameter was detected during the five years of monitoring. The concentration measured of 0.0014 fibers/cc is significantly less than the 2 fibers/cc OSHA standard. We recommend, as we have in the last annual report, that asbestos monitoring at this location be discontinued.

Geotechnical

1) It is recommended that M-1 Dam be eliminated from the Geotechnical Monitoring Program.

MODIFICATIONS TO THE ENVIRONMENTAL MONITORING PROGRAM

1988 - 1989 MONITORING YEAR

WATER QUALITY

- Monthly sampling at monitoring station DC-06 on Davis Creek was conducted monthly during the period from November to April when higher flow conditions are expected. This monitoring is voluntary and is in addition to the routine quarterly sampling conducted at this station.

- Asbestos monitoring in water is no longer conducted.

STATE OF CALIFORNIA
GEORGE DEUKMEJIAN Gover
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD—
CENTRAL VALLEY REGION
3443 ROUTIER ROAD, SUITE A
SACRAMENTO, CA 95827-3098

RECEIVED
MAY 1990

11 May 1990

Homestake Mining Company
of California
26775 Morgan Valley Road
Lower Lake, CA 95457

REPORT OF RECENT INSPECTION - HOMESTAKE MINING COMPANY OF CALIFORNIA, LAKE, NAPA, AND YOLO COUNTIES

Enclosed for your information is a copy of a report covering a recent inspection of your facilities.

Please contact me at (916) 361-5652 if you have any questions.

Edwin Z. Crawford

EDWIN Z. CRAWFORD
Area Representative

EZC:gs

Enclosure

cc: U. S. Environmental Protection Agency, Region 9, San Francisco
U. S. Bureau of Land Management, Ukiah
Napa County Planning Department, Napa
Lake County Planning Department, Napa
Yolo County Planning Department, Woodland
Solano Irrigation District, Vacaville
Western Yolo Grange, Brooks

CENTRAL VALLEY REGIONAL WATER QUALITY CONTROL BOARD

INSPECTION REPORT

8 May 1990

DISCHARGER: HOMESTAKE MINING COMPANY OF CALIFORNIA

LOCATION & COUNTY: Lake, Napa, and Yolo Counties

CONTACT(S): Phil Barnes, Senior Environmental Engineer

INSPECTION DATE: 18 April 1990

INSPECTED BY: Edwin Z. Crawford

ACCOMPANIED BY: Delora Koontz, Biologist

OBSERVATIONS AND COMMENTS:

This facility is regulated by Waste Discharge Requirements (WDRs) Order Nos. 89-107 and 88-181 (NPDES No. CA0081477).

There was no discharge from the mine, mill, shop, sewage treatment pond, crushing area, low grade stockpile area, or tailings disposal facility to surface drainage courses. There also was no discharge from the East Waste Rock Disposal Area (Outfall 001) to Knoxville Creek or from the Main Waste Rock Disposal Area (Outfalls 002 and 003) to Hunting Creek.

Water from the tailings disposal facility is recycled in the mill circuit. Estimated freeboard below the tailings dam spillway was 10 feet. Seepage water from the waste rock disposal area is being recycled in the grinding circuit.

I collected samples from Knoxville Creek and Hunting Creek. The results of measurements are:

Knoxville Creek at Knoxville Road

Time: 0830 pst
Temperature: 64°F
Specific conductance (field): 2,000 micromhos/cm
pH (field): 8.5
Estimated flow: 0.1 cfs
Remarks: Water clear

Hunting Creek above waste rock disposal area Sta. HC-5

Time: 0945 pst
Temperature: 64°F
Specific conductance (field): 720 micromhos/cm
pH (field): 8.7
Estimated flow: 0.2 cfs
Remarks: Water clear

Hunting Creek downstream of all operations, Sta. HC-10

Time: 1000 pst
Temperature: 64°F
Specific conductance (field): 970 micromhos/cm
pH (field): 8.5
Flow: 126 gpm (0.28 cfs)
Remarks: Water clear, algal growth, fish in pool on upstream side of stream gage control structure

All solid waste located in the tailings disposal area consists of metal, plastic, and wood. There was no evidence of hazardous or sanitary waste at the site.

INSPECTION SUMMARY:

Based on the above, Homestake Mining Company of California is in compliance with the Board's requirements.

Edwin Z. Crawford

EDWIN Z. CRAWFORD, Area Representative

cc: Environmental Protection Agency, Region 9, San Francisco
Solano Irrigation District, Vacaville
Western Yolo Grange, Brooks

STATE OF CALIFORNIA
GEORGE DEUKMEJIAN Governo
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD—
CENTRAL VALLEY REGION
3443 ROUTIER ROAD, SUITE A
SACRAMENTO, CA 95827-3098

21 May 1990

RECEIVED
MAY 2[illegible] 1990

Ms. Therese Armlin, Planner II
Napa County Conservation-Development
and Planning Department
1195 Third Street, Room 210
Napa, CA 94559-3092

HOMESTAKE MINING COMPANY OF CALIFORNIA, NAPA, LAKE, AND YOLO COUNTIES

We reviewed the Homestake McLaughlin Mine 1988-89 Annual Monitoring Report.

There were no evident changes in surface water quality except Hunting Creek (Station HC-10). The increase in calcium and sulfate at Station HC-10 were predicted in the initial environmental document. The data indicate no significant trends in overall surface or ground water quality. The exceedances of Maximum Likely Concentrations in surface water and ground water also did not show any significant trends.

Overall, the monitoring for this period has shown the discharge to be in compliance with Order Nos. 88-181 and 89-107.

Please contact me at (916) 361-5652 if you have any questions.

Edwin Z. Crawford

EDWIN Z. CRAWFORD
Area Representative

EZC:gs

cc: Homestake Mining Company, Lower Lake

GEORGE DEUKMEJIAN, Governor

DEPARTMENT OF FISH AND GAME
POST OFFICE BOX 47
YOUNTVILLE, CALIFORNIA 94599
(707) 944-5500

July 12, 1990

RECEIVED
JUL 1990
NAPA CO
DEVELOPMENT

Terry Armlin
Planner II
Napa County Planning Department
1195 Third Street
Napa, CA 94559

Dear Terry:

In response to your recent request, I have reviewed the Homestake McLaughlin Mine 1988-1989 Annual Aquatic Ecology Monitoring Report for Hunting and Knoxville Creeks, Napa County. Fish and Game Wildlife Biologist Allan Buckmann will be reviewing the sampling report for the Davis Creek drainage.

It is interesting that the insect abundance at Site KC-3 was high, whereas there were no fish caught there during 1989. It would be valuable to sample sites near KC-3 to determine whether migration of roach or other fish species upstream to KC-3 actually occurred.

The insect sampling should be done in conjunction with an analysis of sediment composition, especially at Site KC-3, below where sediment basin M-1 overflowed in 1986. In earlier surveys at each sampling site, photos were used to determine bottom composition. A better approach would be to take core samples at each site and determine the percent composition of the stream bottom, especially of small diameter "fines." With large percentages of "fines," the abundance and diversity of insect populations will probably be reduced.

An approach worth considering is the expression of fish abundance in terms of the number of fish per surface area of water. Kilograms/hectare is a common indicator. Comparisons of fish populations with streamflow, as is done in the report, does not accurately account for the numbers of fish relative to the amount of habitat. This is especially true with California roach, which may be present in large pools where there is virtually no streamflow.

If you have any questions, please contact me at (707) 944-5531.

Sincerely,

Frank Gray

Frank Gray
Fishery Biologist
Region 3

FG/dcf

30

McLAUGHLIN GOLD MINE PROJECT
USE PERMIT/SURFACE MINING PERMIT (#U-198283)

PROJECT REPORT: PHASE II-A

June 1, 1988

The Conservation, Development and Planning Commission (CDPC), on December 7, 1983, approved the Use Permit and Surface Mining Permit for development of the McLaughlin Gold Mine Project. The Use Permit issued to Homestake Mining Company (hereafter "Homestake"), was subject to a total of 23 Conditions of Approval and 131 mitigation measures. For permitting purposes, the Project was separated into three phases:

Phase I - Initial Construction and Pre-construction activities.

Phase II - Operations:

A. - Initial Operations (first three years of operation).

B. - Ongoing Operations (21 years following completion of initial operations phase.

Phase III - Reclamation:

A. - Ongoing Reclamation (year 1 through 24).

B. - Post-mining Reclamation (monitoring of reclaimed areas up to 50 years).

Prior to proceeding from one phase to another, the Use Permit provides that a general review of both the project status and conditions of approval be conducted by the Commission. On February 6, 1985, the Commission completed a review of Phase I activities, and approved Homestake's request to proceed with Initial Operations (Phase II-A).

This Project Report has been prepared to permit the Commission to review the McLaughlin Gold Mine Project, and associated conditions of approval, prior to commencement of Ongoing Operations. The report includes a review of general conditions of approval applicable to the Operation Phase (Section I), and a review of the 1987 Environmental Monitoring Report (Section II). The report concludes with the Planning Division's proposed revisions to use permit conditions of approval and mitigation measures (Section III).

SECTION I

REVIEW OF USE PERMIT CONDITIONS OF APPROVAL APPLICABLE TO THE OPERATIONS PHASE

McLaughlin Gold Mine Project
Use Permit #U-198283

The following discussion provides an update of the Conditions of Approval (COA) applicable to operation activities at the McLaughlin Gold Mine Project. Staff recommendations for Commission action are provided as necessary.

PROJECT REVIEW: (COA #4)
PERMIT REVIEW: (COA #5)

The Use Permit for the McLaughlin Project requires that prior to proceeding from Phase II-A to Phase II-B, the Commission review the status of project activities to date, the monitoring program results and such additional information as may be relevant to the projects ongoing activities. In this regard, the Mining Plan, Monitoring Program, Conditions of Approval and Reclamation Plan are to be reviewed by the Commission, should any modifications or changes be proposed by Homestake, the County or other public agencies.

As detailed in the following discussion, since 1983 when the McLaughlin Project was originally approved, the Conservation, Development and Planning Commission (CDPC) has on many different occasions reviewed and approved numerous modifications to the Gold Mine Project. The Commission has also reviewed and approved changes to the Monitoring Program.

For purposes of this review, no changes to the Mining Plan have been proposed by Homestake. Modifications to the Monitoring Program, however, have been proposed and are discussed in Section II of this report. An update of the Reclamation Program is provided to Commission in the following discussion. No changes to the Reclamation Plan beyond those previously approved by the Commission are proposed. With respect to proposed revision to Conditions of Approval and mitigation measures discussed in Section III, the objective has been to update the Use Permit/Surface Mining Permit, while eliminating conditions/mitigation measures that have been met and therefore, no longer need be identified for the operations phases. In this regard, Homestake is currently revising the Environmental Monitoring Manual and the Reclamation Plan to incorporate all approved changes as of June 1, 1988.

Recommendation

The Commission approve Homestake's request that it be permitted to proceed to Phase II-B (Ongoing Operations), subject to the revised Conditions of Approval and Mitigation Measures presented herein.

MINING PLAN/SITE PLAN REVIEW (COA #1/COA #2) AMENDMENTS (COA #(9)

The Use Permit and Surface Mining Permit applications approved by the Conservation, Development and Planning Commission on December 7, 1983, related to the following project facilities:

a) Mine Pit (80% in Napa County)
b) Crushing and Grinding Facilities
c) Mill Building/Thickner/Pump House
d) Mine Truck Shop/Office and Warehouse
e) Waste Rock Disposal
f) Sewage Treatment Facility and Oxidation Ponds
g) Sediment Control Ponds M-1, M-2, W-1 & W-3
h) Low Grade Ore Stockpile Pads
i) Topsoil Stockpile "A"
j) Slurry Pipeline/Waterline
k) 115 KV High Voltage Main Electrical Substation
l) Tank Farm and Fuel Dispensing Island

Other project modifications made by Homestake, were identified by staff upon review of the "as built" overall Site Plan, dated January 9, 1985 (Map #00-11-001 (Rev. 17), Davey McKee) and the "as built" Grinding Area and Mine Pit Area Plot Plan, dated January 9, 1985 (Map #00-21-029 (Rev. 10), Davy McKee). These modifictions were reviewed and approved by the Commission on February 6, 1985 as part of the approval to commence Phase II-A, Initial Operations.

Subsequent to Phase II-A start-up, Homestake has received approval from the County to modify the McLaughlin Project in several important aspects. The most recent being a 20 million dollar expansion of the crushing and grinding circuit. Table 1 summarizes all modifications to the McLaughlin Project as of June 1, 1988.

At the request of the Planning Division, Homestake has updated Attachment C to their Use Permit which provides information for all Napa County facilities "as built" or "as approved" (see Section III of this report).

ANALYSIS

As originally approved, a total of 666 acres was proposed for McLaughlin Project Napa County facilities. As built, an additional 90 acres have been disturbed. The additional area of disturbance is limited primarily to the redesign of the sediment control facilites for the wast rock dump (17 acres), and the east waste rock dump (63 acres).

Changes in project facilties location and design have added to the reclamation costs to be incurred over the life of the McLaughlin Project. The Agreement for Financial Assurances for reclamation has been adjusted accordingly.

TABLE 1
MODIFICATIONS TO THE MCLAUGHLIN PROJECT
APPROVED BY THE COUNTY

Project Facility	Description	As Approved	As Proposed/Built	Status
Modification No. 1	Proposal to use a six (6) acre portion of the former Barker property (AP#15-020-05) as a laydown/office area for construction purposes.	-	6.0 acres	Approved as a minor change by Director on May 2, 1984, with use limited to the Construction Phase. On July 24, 1985, Commission approved Homestake's request that use of the area be permitted through the Operations phase.
Modification No. 2	Redesign of the W-1 Dam: sediment control structure for the Waste Rock Dump.	Size: 8.0 acres Capacity: 226 ac. ft. No. Impoundments: 1	17.4 acres 171.3 ac. ft. 7 Ponds	Approved as a minor change by Director (with review by the Commission) on Sept. 17, 1984.
Modification No. 3	Replacement of Sediment Pond M-2 (temporary sediment control for mine pit area) with a diversion ditch.	Size: 4.7 acres Capacity: 100.4 ac. ft. No. Impoundments: 1	1.0 acre+ - (drainage to M-1)	Approved as a minor change by the Director (with review by the Commission) on February 6, 1985.
Modification No. 4	Elimination of Sediment Pond W-3, with diversion to Sediment Pond M-1.	Size: 4.0 acres Capacity: 81.0 ac. ft. No. Impoundments: 1	- - (drainage to Pond M-1)	Approved as a minor change by the Director (with review by the Commission) on February 6, 1985.
Modification No. 5	Temporary lifting of Mitigation Measure #99.	-	-	Withdrawn by applicant on Nov. 30, 1984.
Modification No. 6	Relocation of Magazine Storage Area from Yolo County to Napa County.	-	3.0 acres	Approved by the Commission on June 19, 1985.

Table 1
Modifications to the McLaughlin Project

Modification No. 7	Changes in Project facilities location and/or design made in the Construction Phase.	within confines of Grinding Area	no change in area of disturbance	Approved by the Director as minor changes (with review by the Commission) on February 6, 1985.
Modification No. 8	Addition of Lube Building	-	400 sq. ft. located in Grinding Area	Approved as minor change by the Director on February 13, 1985.
Modification No. 9	Addition of secondary Portable Crusher	-	located in Grinding Area	Approved as minor change by the Director (with Commission review) on June 20, 1986.
Modification No. 10	Recycle Water to Grinding Circuit	-	use of existing spare slurry pipeline	Approved by the Commission on a limited term basis, on April 1, 1987. Limited term condition removed under approval of #U-158788.
Use Permit #U-628586	Empire Mine Tailings	-	8,000 sq. ft. storage pad located in Grinding Area	Approved as minor change by the Commission on May 6, 1987, on a limited term basis.
Use Permit #U-648586	East Waste Rock Dump	-	63 acres	Approved by the Commission on July 15, 1987.
Use Permit #U-158788	Add parallel Grinding Circuit to process low-grade ores; Add above ground recycle pipeline to Grinding Circuit	-	no change in area of disturbance	Approved by the Commission on February 17, 1988.
Modification No. 11	Parallel M-1 Pipeline to Grinding Circuit	-	no change in area of disturbance	Approved as minor change by Director on April 21, 1988.
Modification No. 12	Replacement of Temporary Maintenance Shop Building	-	1,800 sq. ft. located in Grinding Area	Approve as minor change by Director on April 21, 1988.

:jm.8

RECLAMATION PLAN (COA #6)

Homestake's Reclamation Plan is centered on the use of the McLaughlin Gold Mine site as an environmental studies field research station, to be developed in cooperation with regional colleges and universities.

Homestake filed a description of the proposed research field program with the Conservation, Development and Planning Department on January 17, 1985. The Conservation, Development and Planning Commission reviewed the contents of the proposal at their regualr meeting on February 6, 1985 and granted conditional approval, requiring that Homestake submit an annual report to the Department in this regard, on January 1 of each calendar year.

Reports submitted by Homestake indicate that the McLaughlin Project is continuing to be used for research on fish and wildlife management, as well as revegetation of serpentine soils. Institutions currently conducting research include U.C. Davis and U.C. Berkeley.

RECLAMATION REVIEW (COA #7)

Annual inspections of reclamation activities have been conducted by the Director in accordance with Condition of Approval No. 7. These inspections have included representatives from the Bureau of Land Management, Lake County and Yolo County.

To date, over 900 acres of lands disturbed by construction of the McLaughlin Project, have been successfully revegetated. In 1986, based upon prior years' experience, changes in the seed mix were approved by the Commission. Separate seed mixes are now used on serpentine areas and non-serpentine areas. In addition, a wild flower mix is also used in some areas to enhance aesthetic quality. In 1986, the Commission approved performance standards to be used to determine successful revegetation of the Project site.

The results of the Revegetation Program are discussed in detail in the annual report from the Director (to the Commission) on the McLaughlin Project Environmental Monitoring Program. Revegetation of the waste rock dump areas is expected to be the largest area to be reclaimed during the Operations Phase. At present, Homestake is investigating the use of run-of-mine fines rather than topsoil, as a means to revegetate waste rock benches. Based upon a low survival rate for both grasses and woody plants noted in 1987 on some waste rock areas, Homestake expects to conduct a soils testing program in 1988 on waste rock materials to ascertain the feasibility of using run-of-mine fines for reclamation.

FINANCIAL SECURITY REVIEW (COA #8)

The Agreement for Financial Assurances for reclamation and emergency clean-up and abatement work was approved by the Napa County Board of Supervisors on January 24, 1984. In that regard, Homestake has established a trust with Bank of America. Under the Trust Agreement, Bank of America has issued a

Letter of Credit (No. 112020). The maximum size of the letter of credit applicable to the beneficiaries of the trust is $9,159,772. The Letter of Credit is automatically renewed for successive one-year periods, with the drawdown amount set according to that necessary to accomplish reclamation activites in any one particular year, up to the year 2009. Procedures exist to increase the amount of the Letter of Credit after notice and hearing before the Board of Supervisors. The Financial Assurances Agreement is in conformance with the Napa County SMARA Ordinance requirements.

As part of this Project Review, the Agreement is to be reviewed by the Board of Supervisors. Review by the Board is tentatively scheduled for their regular meeting of June 21, 1988.

MONITORING PROGRAM (COA #12)

In response to concerns raised on the adequacy of Homestake's Environmental Monitoring Program, a review and evaluation of Homestake's proposed monitoring program was conducted by the firm of Brown & Caldwell. The review teams report entitled Report on Review of the Environmental Monitoring Plan: McLaughlin Project (November 1983), and recommendations presented therein, were adopted by the Conservation, Development and Planning Commission at their regular meeting on December 7, 1983. Homestake, in accordance with Condition #12, revised the Project's Environmental Monitoring Manual to incorporate all recommendations of the Brown & Caldwell review team. Currently, Homestake is revising the manual to incorporate all modifications approved by the Commission through June 1, 1988.

Recommendation

That the Deputy Planning Director report to the Commission on the adequacy of the McLaughlin Project Environmental Monitoring Manual, once Homestake has revised the document to incorporate approved changes through June 1, 1988.

AQUATIC ECOLOGY MONITORING PROGRAM (COA #12.1 through 12.3)

In its review of Phase I activities, staff determined that Homestake had not conducted the initial monitoring for aquatic ecology in accordance with conditions of approval. The Commission on February 6, 1985, conditioned its approval of Phase II-A start-up, requiring Homestake to complete monitoring of aquatic ecology for four consecutive quarters prior to initiating a focused operation monitoring program.

Homestake has complied with the conditions set by the Commission in regard to the aquatic ecology monitoring program, and completed its second year of a focused operations monitoring effort in 1987.

ENVIRONMENTAL MONITORING PROGRAM REVIEW PANEL (COA #12.4)

On May 15, 1985, the Commission approved a proposal for establishing an Environmental Program Review Panel, and directed staff to evaluate the program and report back to the Commission prior to commencement of Phase II-B (Ongoing Operations). The Panel is composed of representatives from responsible permit agencies, as well as public agencies with relevant expertise, i.e., California Native Plant Society, California Department of Fish and Game, Bureau of Land Management. Throughout the past three years, staff has met individually with agency representatives to review findings and recommendations in the Annual Monitoring Reports prepared by Homestake. An informal working relationship has been maintained with these agencies, which has served Napa County well.

Recommendation

That the Commission retain the Environmental Monitoring Program Review process initiated in 1985.

MONITORING MANUAL (COA #13)

A draft of the McLaughlin Project Environmental Monitoring Manual, revised to reflect changes approved by responsible agencies, was provided to the Conservation, Development and Planning Department on May 27, 1988. Upon acceptance of the revised Manual by the Deputy Planning Director, it will stand as the controlling document for the Environmental Monitoring Program for the McLaughlin Project.

VIOLATIONS (COA #17)

The Director is to report any significant violation of an adopted standard to the Conservation, Development and Planning Commission at the earliest possible date for Commission review and action.

To date, only one violation, pertaining to discharge from Pond M-1 during the spring of 1986, has been reported. The Commission reviewed the Director's report on this matter at their regular meeting of June 18, 1986.

FEE (COA #18)

Under the terms of the Use Permit, Homestake has deposited an annual fee of $16,550 to cover administration costs incurred by the County in connection with the McLaughlin Project. The fee was set to expire at the end of the first full year of ongoing operations (Phase II-B).

Homestake has agreed to continue to deposit an annual fee in this regard. As proposed in Section III of this report, the fee would be reduced to $8,500.

Recommendation

The Commission approved the modification to Condition #18, as discussed in Section III of this report.

ENVIRONMENTAL MITIGATION MEASURES (COA #19)

The Use Permit and Surface Mining Permit for the McLaughlin Project was approved by the Conservation, Development and Planning Commission subject to a total of 131 mitigation measures. A review of the status of each measure, together with proposed revisions is provided in Section III of this report.

PARCEL MERGER (COA #23)

To minimize the prospect for confusion in the future in identifying parcels owned by Homestake, the Conservation, Development and Planning Commission adopted Condition #23 which requires that upon obtaining fee title to lands covered by mill site claims, Homestake shall file a Tentative Parcel Map with the County to merge the existing parcels in the crushing and grinding area and the mine pit area so as to place these facilities on one parcel.

Homestake is continuing to obtain fee title to lands covered by mill claims. Upon acquisition of said titles, Homestake will file a Tentative Parcel Map application to merge the existing parcels, as required by Condition #23.

In summary, the following recommendations to the Commission have been presented in Section I.

1) The Commission approve Homestake's request that it be permitted to proceed to Ongoing Operations (Phase II-B), subject to the revised conditions of approval and mitigation measures.

2) That the Deputy Planning Director report to the Commission on the adequacy of the McLaughlin Project Environmental Monitoring Manual, once Homestake has revised the document to incorporate changes approved through June 1, 1988.

3) That the Commission retain the Environmental Monitoring Program Review process intiated in 1985.

4) The Commission approve the change in the annual fee under Condition #18 from $16,500 to $8,500.

SECTION II

REVIEW OF THE MCLAUGHLIN PROJECT 1987 ENVIRONMENTAL MONITORING REPORT

The Conservation, Development and Planning Commission (CDPC), at their meeting of December 7, 1983, approved the Use Permit and Surface Mining Permit of the Homestake Mining Company (#U-198283) for the McLaughlin Gold Mine Project, subject to the condition that upon submission of an annual report by the applicant, the Director will report to the CDPC on the results of the environmental monitoring program for the Project.

Pursuant to Condition #16 of Homestake's Use Permit, staff has reviewed the 1987 Annual Monitoring Report for the McLaughlin Project, received on September 28, 1988. The Director's report entitled, Review of the 1988 Environmental Monitoring Program for the McLaughlin Project, is provided to the Commission under separate cover.

RECOMMENDATION:

That the Conservation, Development and Planning Commission take the following actions:

1) **AT THE JUNE 1, 1988 MEETING, REVIEW AND ACCEPT THE DIRECTOR'S 1987 ANNUAL REPORT ON THE ENVIRONMENTAL MONITORING PROGRAM.**

   Discussion - The environmental monitoring program for the McLaughlin Project provided for comprehensive data collection under preoperational monitoring which was conducted through January 1985. Operational monitoring commencing thereafter, and was designed to narrow the focus of environmental monitoring, limiting the program to those items which were beneficial in reviewing or assessing potential project impacts. Whereas preoperational monitoring was conducted in an effort to characterize baseline conditions, operational monitoring has focused on (1) measuring compliance with environmental performance standards established by regulatory agencies, and (2) monitoring trends indicative of present or future environmental impacts.

   Monitoring data presented in the 1987 Annual Report covered a twelve-month period from July 1, 1986 through June 30, 1987. These data were collected as specified in the McLaughlin Project Environmental Monitoring Manual.

   Finding - Based on historical monitoring data, and the results from the 1987 Operational Monitoring Program, project operations do not appear to have resulted in any significant deterioration to environmental values in the study area.

2) **APPROVE CHANGES TO THE OPERATIONS MONITORING PROGRAM AS PROPOSED BY HOMESTAKE IN THE 1987 ANNUAL MONITORING REPORT, AS MODIFIED BY RESPONSIBLE REVIEW AGENCIES.**

Discussion - Homestake has proposed that the following elements of the Operations Monitoring Program be modified: Water Quality, Air Quality and Vegetation. Each of the proposals affecting monitoring protocal within Napa County is briefly described below (for a detailed discussion see the Director's 1987 Annual Report to the Commission provided under separate cover).

a) **Water Quality:**

Homestake has proposed to eliminate monitoring for asbestos fibers in local area streams. It is suggested that the date does not provide information useful in determining project impacts.

The proposed modification to the Water Quality Monitoring Program has been reviewed by staff, in association with the Central Valley Regional Water Quality Control Board. The Board has notified Homestake of its concurrence that monitoring for asbestos does not yield meaningful results due to the ubiquitous serpentine in the region. The Board has proposed to delete such monitoring when Homestake's waste discharge permit is renewed.

Staff has indicated to Homestake its concern that monitoring for asbestos be deleted entirely from the program. In response, Homestake has agreed to continue monitoring of asbestos on an annual basis at Station HC-10, located downstream of all project facilities.

b) **Air Quality:**

Homestake has proposed the following changes be made to the Air Quality Monitoring Program:

- That high volume air sampling stations at the mine pit (AQ-3) and in Rumsey (AQ-4), both located in Yolo County, be removed from the sampling network. As in 1986, it is suggested that substantial redundancy in the air quality sampling network has been demonstrated.
- Asbestos monitoring at Station AQ-2, located in Yolo County, be discontinued based on three years of data which demonstrates no asbestos in the air.
- At the completion of 24 months of monitoring, both ambient air and source monitoring in Lake County should be reviewed and the monitoring frequency reduced to annual sampling.

As indicated, Homestake has made no recommendations to modify the Air Quality Monitoring Program as it relates to Napa County.

Focus of air quality monitoring in Napa County is on documenting Total Suspended Particulate (TSP), as required by the Permit to Operate issued by the Bay Area Air Quality Management District. Based on information gathered in 1987, the District determined that the McLaughlin Propject remained in compliance with current air quality standards.

c) **Vegetation:**

The consultant retained by Homestake to conduct the revegetation monitoring program has recommended that the two seed mixes used in the 1985 planting season be used for the 1987-88 program. No change in soil amendments and type of mulch are recommended. In addition, no remedial seeding or fertilizing was recommended. The consultant recommended that grazed areas be examined in the early spring of 1988 to determine how much grazing revegetated areas can withstand and still remain stable in terms of erosion. Recommendations with respect to seed mix changes to reduce fuel load in areas around the mine building and to limit competition with shurbs and trees were provided by the consultant.

Revegetation of the waste rock dump area is expected to be the largest areas to be reclaimed in future years. Currently, two waste rock dumps have been permitted: the east waste rock dump south of the mine pit adjacent to M-1 Pond; and the main waste rock dump west of Berryessa-Knoxville Road. Based upon the low survival rate for both grasses and woody plants on waste rock areas using run-of-mine fines rather than topsoil, the consultant has recommened a soils testing program leading to the establishment of test plots on certain waste rock locations for the 1987-88 program.

Biosystems Analysis, Inc. has recommended that a total of 15 of 59 sensitive plant monitoring sites be dropped from the monitoring program due to total displacement by facilities or no evidence of impacts by development of the McLaughlin Project. One site was identified by BSAI for use in monitoring grazing activities on sensitive plant populations. Further, BSAI recommended that fencing around the exisitng T. brachycarpum population be repaired.

The U.S. Bureau of Land Management has reviewed the recommendations regarding the 1987-88 Vegetation Monitoring Program and has advised the Planning Division that it finds them acceptable. The California Native Plant Society concurs with the recommended changes to the sensitive plant monitoring program.

SECTION III

COMMENCEMENT OF ONGOING OPERATIONS (PHASE II-B)

The basis for review at this time of the Use Permit/Surface Mining Permit issued to Homestake Mining Company for the McLaughlin Gold Mine Project (#U-198283), is to determine compliance with all conditions of approval, prior to commencement of Phase II-B (Ongoing Operations). This review, as presented in Section I of this report indicates that compliance has been achieved. Homestake is therefore seeking Commission approval to proceed with commencement of Ongoing Operations.

In regard to Homestake's request to proceed to ongoing operations, the list of conditions of approval and mitigation measures have been proposed to be revised. Proposed revisions are such that remaining conditions and mitigation measures relate exclusively to ongoing operations. Conditions of approval and mitigation measures proposed to be deleted, revised or retained, have been identified in Attachment A and Attachment B, together with the basis for the proposed change. In addition, Attachment C of the original Use Permit has been updated to reflect project facilities as approved through June 1, 1988.

RECOMMENDATION:

The Commission approve Homestake's request that it be permitted to proceed to Phase II-B (Ongoing Operations), subject to the revised list of Conditions of Approval and mitigation measures setforth in Attachment A and Attachment B.

ATTACHMENT A

McLAUGHLIN GOLD MINE PROJECT
PROPOSED REVISED CONDITIONS OF APPROVAL

JUNE 1, 1988

ATTACHMENT A

McLAUGHLIN GOLD MINE PROJECT
USE PERMIT #U-198283 CONDITIONS
OF APPROVAL

DECEMBER 7, 1983

MINING PLAN

1. All mining operations shall be conducted in accordance with the proposed Mining Plan as contained in the Project Description/Environmental Assessment Report (PD/EA) dated February, 1983, prepared by D'Appolonia, subject to the Supplemental Information Sheet - Attachment C and to requirements of applicable Federal, State, Regional and Local public agencies - Attachment D.

SITE PLAN

2. Project facilities shall be located in accordance with the Overall Site Plan dated October 3, 1983 (Map #00-11-001, - Rev 12 Davy McKee) and the Grinding Area and Mine Pit Area Plot Plan dated September 8, 1983 (Map #00-21-029, - Rev 10 Davy McKee). Homestake shall provide a reproducible milar of each map prior to the issuance of building permits and copies of all subsequent revisions thereafter.

PERMIT PHASING

3. For permit purposes, the project shall be separated into the following phases:

PHASE I - Initial Construction and Pre-Construction Activities

PHASE II - Operations

A. Initial Operation - First 3 years of production commencing with the operation of the crushing and grinding facilities.

B. Ongoing Operation - 21 years ± following the completion of the initial operations phase

PHASE III - Reclamation Phase

A. Ongoing Reclamation - Year 1 through 24 ±

B. Post Mining Reclamation (monitoring of reclaimed areas) - 50 year

PROJECT REVIEW

4. Prior to proceeding from Phase I to Phase II-A, and from Phase II-A to Phase II-B, the Conservation, Development and Planning Commission (CDPC) will receive a project report from the Planning Director describing the status of the project activities to date, the Monitoring Program results to date and such additional information as may be relevant to the project's ongoing activities.

PERMIT REVIEW

5. Prior to conclusion of Phase II-A (Initial Operation), the Mining Plan, Monitoring Program, Conditions of Approval and Reclamation Plan will be reviewed by the CDPC in regard to any modifications or changes proposed by the applicant, the County, or other public agencies.

McLAUGHLIN GOLD MINE

USE PERMIT #U-198283
PROPOSED REVISED CONDITIONS OF APPROVAL

JUNE 1, 1988

1. Revise

Mining operations shall be conducted in accordance with the approved mining plan as described in the Project Description/ Environmental Assessment, D'Appolonia, 1983 as amended by subsequent approvals of modifications by the Deputy Planning Director and/or Planning Commission and subject to the Supplemental Information Sheet, Attchment C and to the requirements of applicable federal, state, regional and local public agencies.

2. Revise

Project facilities shall be located in accordance with the Overall Site Plan dated (Drawing # , Revision _____, As Built). Homestake shall provide a reproducible milar of each drawing (and all subsequent revisions) to the Department.

3. Retain

4. Delete

No longer relevant. Subsequent review of the project to be achieved in accordance with conditions of approved Nos. 7, 16, and 17.

5. Delete

Same as #4.

RECLAMATION PLAN

6. Homestake shall conduct all reclamation activities in accordance with Sec. 4.0 of the Project Description/Environmental Assessment Report (PD/EA) dated February, 1983, as supplemented November, 1983, subject to requirements by applicable Federal, State, Regional and Local public agencies. Prior to commencing with initial operations of the mine facility, Homestake shall provide the CDPC with working details of the environmental studies field research station program which shall include the names of the educational institutions that will participate in the research station program and details of its ongoing operation, maintenance and financing. In absence of a detailed program approved by the CDPC, Homestake shall provide the Conservation, Development and Planning Department (CDPD) with an alternate reclamation plan to be reviewed and approved by the CDPC under separate use permit application by Homestake.

RECLAMATION REVIEW

7. Homestake shall apply for a Special Inspection by the Planning Director in accordance with Sec. 10530 of the Napa County Code (SMARA Ordinance), with respect to the ongoing reclamation activities. The first inspection shall commence at the start-up of initial operations and shall be conducted annually thereafter.

The Planning Director shall submit a report for review by the CDPC describing the results of all reclamation activities. The first report shall be prepared prior to commencement of ongoing operations and not less than once every five years thereafter.

FINANCIAL ECURITY EVIEW

8. A Financial Security Agreement for reclamation and emergency clean-up and abatement work shall be approved by the Napa County Board of Supervi (BOS) prior to commencement of initial construction activities. The agreement shall be reviewed by the BOS prior to commencement of ongoing operations and every year thereafter for the life of the project.

AMENDMENTS

9. Any amendments to the approved Surface Mining Permit shall be handled in accordance with Sec. 10537 and 10538 of the Napa County Code (Napa County SMARA Ordinance).

ABONDONMENT

10. Abandonment of the mining operation shall be handled in accordance with Sec. 10535 of the Napa County Code. (Napa County SMARA Ordinance)

TEMPORARY INE LOSURE

11. Temporary Mine Closure - For the purposes of the McLaughlin Project, a temporary mine closure shall be defined to mean the non-operation of project facilities for a period of not less than six (6) calendar months or more than five calendar years. The applicant shall notify the Planning Director in advance of all such temporary mine closures and shall submit a plan to the CDPD for review and approval that provides for the maintenance of the site, structures and other project facilities in such a manner as to protect the public health, safety and welfare. A mine closure whic exceeds five calendar years shall constitute abandonment of mining operations and the applicant shall begin final reclamation of the project site pursuant to Sec. 10535 of the Napa County Code (SMARA).

6.	Revise	Homestake shall conduct all reclamation activities in accordance with Section 4.0 of the Project Description/Environmental Assessment, D'Appolonia 1983, as supplemented November, 1983 and as amended by subsequent approvals of modifications by the Deputy Planning Director and/or Planning Commission and subject to the requirements of applicable federal, state, regional and local public agencies. Prior to the conclusion of Phase IIB (ongoing operations) the Reclamation Plan and work completed to date will be reviewed by the CDPC in regard to details of the postmining land use and monitoring program.
7.	Revise	Change Planning Director to Deputy Planning Director.
8.	Retain	
9.	Retain	
10.	Retain.	
11.	Revise	Change Planning Director to Deputy Planning Director.

MONITORING PROGRAM

12. Homestake shall conduct detailed monitoring on the McLaughlin Project in accordance with the McLaughlin Project Environmental Monitoring Manual dated November, 1983. The manual shall be revised to incorporate the recommendations contained in the report entitled "Report on Review of the Environmental Monitoring Plan - McLaughlin Project" dated November, 1983, prepared by Brown and Caldwell, Consulting Engineers of Sacramento, California, as supplemented in their letter of December 6, 1983, subject to the following modifications:

Aquatic Ecology Monitoring:

1. The aquatic monitoring program proposal of Brown and Caldwell shall be used to initiate the aquatic monitoring program in April, 1984.

2. Homestake's aquatic monitoring program shall be used for annual aquatic monitoring beginning in April, 1985.

3. Homestake shall retain an independent qualified public health exp acceptable to the Napa County Division of Environmental Health, to review the monitoring results. The finding of the public health expert shall be filed with the County's Division of Environmental Health on or before June 1 of each calendar year commencing in calendar year 1984.

Environmental Monitoring Program Review Panel:

4. The Planning Director shall review the concept of an ongoing monitoring program review process and report back to the CDPC. The Director's report shall be submitted to the CDPC for action prior to the commencement of initial operations.

ONITORING ANUAL

13. Two copies of the McLaughlin Project Environmental Monitoring Manual as revised by Brown and Caldwell (see condition 12) shall be provided by Homestake to the office of the Conservation, Development and Planning Department and one copy shall be provided to the office of the Napa County Division of Environmental Health.

EVISIONS) MONITORING ROGRAM

14. The Planning Director may approve minor revisions to the McLaughlin Project Environmental Monitoring Manual. All proposed major revisions to the manual shall be approved by the CDPC under separate Use Permit application by Homestake.

ONITORING DATA

15. Homestake shall provide the CDPD with copies of all quarterly reports on the monitoring data collected during the life of the project.

ONITORING ROGRAM EVIEW

16. Homestake shall on ~~September~~ 1st of each calendar year, provide the CDPD with an annual report on the monitoring program summarizing the monitoring data collected. The report shall include a comparison of all data collected in compliance with required adopted standards and with the

12. Revise

Homestake shall conduct detailed environmental monitoring of the McLaughlin Project as specified in the approved Environmental Monitoring Manual.

The Deputy Planning Director shall review the McLaughlin Mine Annual Monitoring Report, solicit and assemble the evaluations of the responsible agencies constituting the Monitoring Program Review Panel.

13. Revise

Homestake shall provide two copies of the Environmental Monitoring Manual revised to reflect modifications approved by Responsible Agencies through June 1, 1988 to the office of the Conservation, Development and Planning Department and one copy to the office of the Napa County Division of Environmental Health.

14. Revise

Change Planning Director to Deputy Planning Director.

15. Retain

16. Revise

Homestake shall on October 1st of each calendar year, provide the CDPD with an annual report on the monitoring program summarizing the monitoring data collected. The report shall include a comparison of all data collected in compliance with required adopted standards and with the projected levels described in the Final EIR/EIS. The first report shall be filed with the CDPD on September 1, 1984. The Deputy Planning Director shall provide an annual summary report to the CDPC on the results of the monitoring program and any modifications or changes proposed by the Applicant or the Responsible Agencies.

projected levels described in the Final EIR/EIS. The first report shall be filed with the CDPD on September 1, 1984. The Planning Director shall provide an annual report to the CDPC on the results of the monitoring program.

VIOLATIONS

17. The Planning Director shall report any significant violation of an adopted standard to the CDPC at the earliest possible date for Commission review and action.

FEE

18. During the construction and initial operation phase, Homestake shall deposit with the CDPD an annual fee of $16,550 to cover the costs incurred by the County in connection with the administration of Homestake's McLaughlin Project. Payment of said fee shall begin on the first regular working day in January, 1984, and then shall be paid annually thereafter through the first full year of ongoing operations (Phase II-B).

ENVIRONMENTAL MITIGATION MEASURES

19. The Use Permit and Surface Mining Permit shall be subject to the recommended environmental mitigation measures described in Attachment B. Prior to the issuance of building permits, Homestake shall provide to the CDPD, in writing, a report describing the status of Homestake's compliance with each mitigation measure.

OTHER PERMIT REQUIREMENTS

20. The Use Permit and Surface Mining Permit shall be subject to all requirements of County departments and agencies and all applicable Federal, State, Regional and Local agencies (see Attachment D). The applicant shall comply with all applicable building codes and County zoning standards. The applicant shall comply with County SMARA regulations as set forth in the Napa County Code (Sec. 10500) and the California Surface Mining and Reclamation Act of 1975.

BARKER/GAMBLE PROPERTY

21. Homestake shall provide the County with a hold harmless agreement acceptable to the County Counsel's Office to defend and indemnify the County the cost resulting from any future litigation by the owners of the Barker property (Assessor's Parcel #15-020-05) and the Gamble property (Assessor's Parcel #15-100-01) stemming from the mining operation, or submit documentation that Homestake has purchased the two parcels.

PROJECT COORDINATOR

22. To provide the ongoing coordination with Homestake, Lake and Yolo Counties, BLM and other public agencies, the Planning Director shall be designated as the McLaughlin Project Coordinator for Napa County for the life of the project.

PARCEL MERGER

23. Upon obtaining fee title to lands covered by mill site claims in the mine pit and crushing and grinding area, Homestake shall file a tentative parcel map application to merge the existing parcels so as to include all of the crushing and grinding facilities and mine facilities on one parcel. Upon approval of the tentative parcel map by the County, Homestake shall record a final map in accordance with requirements of the Department of Public Works.

17.	Revise	Change Planning Director to Deputy Planning Director.
18.	Revise	Homestake shall deposit with CDPD on or before July 1, 1988 an annual fee of $8,500 to cover the costs incurred by the County in connection with the ongoing administration of the McLaughlin Mine Monitoring Program Review Panel and preparation of the annual summary report.
19.	Revise	The Use Permit and Surface Mining Permit shall be subject to the revised Environmental Mitigation Measures described in Attachment B.
20.	Revise	Delete (see Attachment D) from line 3.
21.	Delete	Completed
22.	Retain	
23.	Retain	

ATTACHMENT B

McLAUGHLIN GOLD MINE PROJECT
PROPOSED REVISED ENVIRONMENTAL MITIGATION MEASURES

JUNE 1, 1988

A total of 131 mitigation measures were adopted by Napa County as part of its approval of Use Permit/Surface Mining Permit #U-198283. Implementation of the mitigation measures were to be accomplished during one or more of the following project phases:

Pre-construction	21 mitigation measures
Construction	65 mitigation measures
Pre-operation	22 mitigation measures
Operation	61 mitigation measures
Post-mining/Reclamation	13 mitigation measures

Mitigation measures involved in Pre-construction, Construction and Pre-operation have been accomplished, as indicated in the revised listing of mitigation measures (Attachment B). Where applicable, cross reference is made to environmental documents that were prepared in response to mitigation measures, and which remain in effect. These documents include the aproved Environmental Monitoring Manaual, Emergency Response Plan, Transportation Spill Prevention Control and Countermeasures Plan, Reclamation Plan, and the Contiguous Lands Management Plan.

Mitigatin measures which remain applicable to the Operation and Post-mining/Reclamation phase of the project shall be completed by Homestake Mining Company.

SEISMICITY

1.* Evaluate the postulated extension of the Green Valley Fault (Hunting Creek Fault) to ascertain its activity within recent time and its potential location with respect to the project area. The seismic design criteria for project dams should comply with the requirements of the Division of Safety of Dams regarding maximum peak ground acceleration.
Effectiveness: P Application: Y, L, N, BLM Project Phase: PC

2. Develop a dam failure prevention or warning system including daily monitoring and visual inspection. This could also include: telescoping and vertical and horizontal inclinometer casings for internal horizontal movement; strain meters for crest strain; surface monumentation for crest movement; piezometers for induced pore pressure and seepage pressure; soil pressure cells for earth pressures; and self-triggering seismic recorders for earthquake response. The State Division of Dam Safety shall determine the specific measures to be included.**
Effectiveness: P Application: Y, L, N, BLM Project Phase: POP

3.* Install monument markers (to measure slope instability) along the slurry pipeline trench if the corridor would cross the traces of established potential active faults, and monitor semi-annually for potential movement.
Effectiveness: C Application: L, N, BLM Project Phase: POP

4.* Provide secondary containment for fuel and toxic materials containers.
Effectiveness: C Application: L, N Project Phase: OP

5. Mapping of all foundation excavations for critical structures shall be performed by a California Certified Engineering Geologist including detailed mapping of the trench walls and evaluation of the data obtained for geohazard potential. Such data shall be submitted to the design engineer and responsible agencies for determination of the geotechnical adequacy of facility design.
Effectiveness: B Application: Y, N, L, BLM Project Phase: PC

6. A disaster plan shall be prepared for projected catastrophic failures due to a seismic event. The plan shall consider all critical facilities including each state-sized dam, the slurry pipeline, the milling facilities, the crushing and grinding facilities, and the fuel/chemical storage facilities. Substantial changes in operation or facility design shall automatically cause this plan to be updated. Current disaster plans shall be kept not only with the company safety officer, but with those public agencie having emergency powers.
Effectiveness: P Application: Y, N, L, BLM Project Phase: POP

EROSION

7. Perform geotechnical investigation for those landslides that may impact on the project which could threaten public health and safety to determine failure type and failure depth.

* Included in project by Homestake
** Proponent's choice

PROPOSED REVISIONS TO ENVIRONMENTAL
MITIGATION MEASURES: JUNE 1, 1988

SEISMICITY

1.	Delete	Completed preconstruction. Design and construction approved by Division of Safety of Dams.
2.	Substitute	"Monitor dams as specified in approved Environmental Monitoring Manual and maintain dams as required by the Division of Safety of Dams."
3.	Delete	Completed preoperation. Included in Environmental Monitoring Manual.
4.	Retain	
5.	Delete	Completed preconstruction and provided to design engineer and responsible agencies.
6.	Substitute	"Maintain emergency response preparedness as provided in the approved Emergency Response Plan."

EROSION

7.	Delete	Completed preconstruction and implemented during construction.

Resulting recommendations for reparation of affected slide materials should be implemented prior to or during construction.
Effectiveness: P Application: Y, L, N, BLM Project Phase: PC

8. Perform slope stability mapping to determine areas of potential unstability. The slope stability maps shall be used to determine where it is necessary to perform geotechnical investigations for those landslides that may threaten public health and safety to determine failure type and failure depth. Resulting repairs should be implemented prior to or during construction.
Effectiveness: P Application: Y, L, N, BLM Project Phase: PC

9. Install slope markers (four monuments in a row, optically in line) in slide areas that might affect operations of the proposed facilities. The markers should be monitored quarterly to measure potential movement. After greater than normal storms, the markers should be surveyed. If significant movements are identified, remedial measures should be implemented.
Effectiveness: C Application: Y, L, N, BLM Project Phase: POP

10.* Conduct all construction grading activities to meet minimum requirements of the Uniform Building Code, Chapter 70, or local ordinances, whichever is more restrictive, under the supervision of a registered engineering geologist or engineer.
Effectiveness: B Application: Y, L, N, BLM Project Phase: C

11.* Implement temporary erosion control measures during construction activities, such as percolation pits with filter cloth liners, well-maintained straw bale dikes, installation of erosion mats, or hydro-mulching.
Effectiveness: B Application: Y, L, N, BLM Project Phase: C

12.* Revegetate exposed areas in phases and complete as soon as construction has ceased.
Effectiveness: B Application: Y, L, N, BLM Project Phase C

13.* Require issuance of grading permits to be contingent on submittal of erosion control plan for individual project component areas differentiated by pre- and post-mining phases.
Effectiveness: P Application: Y, L, N, BLM Project Phase: PC

14. Construct all cut and fill slopes in excess of five feet with "brow" drainage ditches if determined to be required by the Department of Public Works.**
Effectiveness: B Application: Y, L, N, BLM Project Phase: C

* Included in project by Homestake
** Recommended changes

8.	Delete	Completed preconstruction and implemented during construction.
9.	Substitute	"Monitor project area slopes as specified in approved Environmental Monitoring Manual. Implement engineered remedial measures as required."
10.	Delete	Completed during construction.
11.	Delete	Same as #10.
12.	Delete	Same as #10.
13.	Delete	Completed preconstruction, implemented during construction.
14.	Delete	Completed during construction.

15.* Install slurry pipeline shut-down system to minimize flows in trench in case of rupture.
Effectiveness: B Application: L, N, BLM Project Phase: C

16. Monitor slopes in the waste rock dump area for potential reactivation of existing landslide masses or internal slope failure.
Effectiveness: C Application: N, BLM Project Phase: OP

17.* Construct sedimentation basins downslope from project facilities.
Effectiveness: B Application: Y, L, N, BLM Project Phase: C

18. Remove sediments within sediment ponds as necessary, but not less than every three years, to prevent decrease in holding capacity.
Effectiveness: B Application: Y, L, N, BLM Project Phase: OP

19.* Locations, specifications, and standards for access roads, construction roads, maintenance roads, construction yards, chemical treatment of right-of-ways, vegetation removal, erosion control and off-road use shall be approved by the appropriate planning and public works departments prior to commencement of construction.
Effectiveness: B Application: Y, L, N Project Phase: PC

20.* Locate public roads so that they do not affect the stability of property owned by others or cause soil to be deposited on lands of others.
Effectiveness: B Application: Y, L, N, BLM Project Phase: PC

21.* Where practicable on cross slopes of 50 percent or less, public roads shall be located such that the toe of fill is at least 50 feet from any stream except for necessary stream crossings. Distance is to be measured horizontally, not along surface of ground.
Effectiveness: B Application: Y, L, N, BLM Project Phase: C

22.* No fill sections shall be constructed on cross slopes over 50 percent unless an adequate retaining wall or other methods approved by applicable agencies are applied.
Effectiveness: B Application: Y, L, N, BLM Project Phase: C

23. If gullying occurs along the public road corridor, corrective measures should be undertaken immediately including, but not limited to, energy dissipators of rock rip-rap or other inorganic material.
Effectiveness: B Application: Y, L, N, BLM Project Phase: C

24. Provide berms of no less than two-foot width and one-foot height on the outer edge of roads of more than 7 percent slope gradient if determined to be required by the Department of Public Works.
Effectiveness: B Application: Y, L, N, BLM Project Phase: C

* Included in project by Homestake
** Recommended changes

15.	Delete	Completed preoperation.
16.	Retain	
17.	Delete	Completed during construction.
18.	Substitute	"Remove sediments from sediment ponds as necessary to maintain design holding capacity."
19.	Delete	Completed preconstruction.
20.	Delete	Same as #19.
21.	Delete	Completed preconstruction, implemented during construction.
22.	Delete	Same as #21.
23.	Delete	Completed during construction.
24.	Delete	Same as #23.

25. * The ruling gradient for public roads shall comply with requirements of the Department of Public Works.
Effectiveness: B Application: Y, L, N Project Phase: C

26. * Clear fill areas of brush or other woody vegetation prior to the start of earth moving. Removed vegetation should be disposed of as follows:

a. Brush and debris may be buried in waste areas as designated by the applicable agency if the brush is no closer than three feet from the surface of the waste material. When brush is included in waste areas it should be placed in layers, crushed with crawler tractor equipment to a thickness of no more than three feet and covered with at least three feet of dirt over each layer. Or,

b. Burning within the road clearing under conditions meeting regulations of the Regional Air Pollution Control Board, Division of Forestry, and all other applicable regulations and laws. Vegetation should be cleared to the toe of fill.

Effectiveness: B Application: Y, L, N, BLM Project Phase: C

27. * Fill slopes should not be steeper than 1-1/2:1 and cut slopes should not be steeper than 3/4:1 except on approval by permit-issuing agency.
Effectiveness: B Application: Y, L, N, BLM Project Phase: C

28. * Slide material removed as a maintenance measure, either during or after road construction should be disposed of in a manner satisfactory to the permit-issuing agency.
Effectiveness: B Application: Y, L, N, BLM Project Phase: C

29. * Needed material and aggregate for replacement of washouts, etc., should not be taken from the immediate cut bank, but from a borrow area approved by the permit-issuing agency.
Effectiveness: B Application: Y, L, N, BLM Project Phase: C

SURFACE WATER QUALITY

30. Schedule construction involving removal of vegetation and surface disturbances during the dry season to minimize increased sedimentation in surface streams. If earthmoving were to occur at other times, it should be subject to approval from applicable agencies.
Effectiveness: E Application: Y, L, N, BLM Project Phase: C

31. * Use runoff accumulated in the mine pit for process water. Provisions (such as holding tanks) could be included in the event that there is more water in the mine pit than needed for process water at any given time (such as during rainstorms); or, during these times, water accumulated in the pit bottom should remain there while mining is confined to benches, to avoid discharges to Knoxville Creek in violation of NPDES permit.
Effectiveness: B Application: Y, N Project Phase: C

32. * Construct sediment ponds and diversion channels in the mine pit area during operations to assure that runoff complies with NPDES permit.
Effectiveness: B Application: N, Y, BLM Project Phase: C

* Included in project by Homestake

25.	Delete	Completed during construction.
26.	Delete	Same as #25.
27.	Delete	Same as #25.
28.	Delete	Same as #25.
29.	Delete	Same as #25.

SURFACE WATER QUALITY

30.	Delete	Same as #25.
31.	Delete	Completed preoperation. Pit water is pumped to M-1 and from there to Process. M-1 cannot discharge to Knoxville Creek.
32.	Delete	Completed preoperation.

33. * Monitor water quality of Knoxville Creek at least quarterly for the following parameters at a minimum: flow rate, specific conductance, ph, alkalinity, hardness, total dissolved solids, chloride, nitrate, sulfate, aluminum, antimony, arsenic, boron, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, selenium, vanadium, and zinc. Monitoring should be conducted at the perimeter of the mine pit (KC-5) and at least at one station downstream (KC-3).
Effectiveness: C Application: L, N, BLM Project Phase: PC

34. Construct surface water diversion ditches, underdrains, and sedimentation ponds, at the waste rock facility to minimize increased sedimentation to Hunting Creek.
Effectiveness: B Application: N, BLM Project Phase: C

35. Add flocculents to the sediment control pond below the waste rock dump as necessary to comply with NPDES permit.
Effectiveness: B Application: N, BLM Project Phase: C

36. Sample Hunting, Nevada and Adams creeks for bacteria and heavy metals to establish background levels in accordance with an adopted monitoring program by Napa County.**
Effectiveness: D Application: Y, L, N, BLM Project Phase: PC

37. Collect water samples in Davis, Knoxville, Hunting and Cache Creeks prior to operation, and analyze for boron, asbestos, mercury and lead. Continue sampling on a quarterly basis or in accordance with an adopted monitoring program by Napa County.**
Effectiveness: C Application: Y, L, N, BLM Project Phase: PC

38. Collect water samples from Soda Creek Adjacent to the realigned Morgan Valley Road and analyze for TDS, metals, cyanide, and asbestos to establish background levels. Continue monitoring on an annual basis.
Effectiveness: C Application: N, L Project Phase: PC

39. * Construct waste rock benches with "reverse slope" so that runoff drains toward the hillside for temporary ponding and sediment trapping.
Effectiveness: B Application: N, BLM Project Phase: C

40. * Reclaim and vegetate benches immediately following completion. If additional waste rock disposal capacity is required and additional elevation is to be used on the benches, remove vegetation and topsoil and reclaim/revegetate a second time after additional waste rock is deposited.
Effectiveness: B Application: N, BLM Project Phase: OP, REC

41. * Surround potentially acid producing material with alkaline material during waste rock disposal.
Effectiveness: B Application: N, BLM Project Phase: OP

* Included in project by Homestake
** Recommended changes

33.	Substitute	"Monitor surface water quality as specified in the approved Environmental Monitoring Manual."
34.	Delete	Completed preoperation.
35.	Retain	
36.	Substitute	"Monitor surface water quality as specified in the approved Environmental Monitoring Manual."
37.	Delete	Completed preconstruction.
38.	Delete	Completed preoperation. No activity in Soda Creek watershed since road construction completed.
39.	Substitute	"Construct, reclaim and revegetate waste rock benches as specified in the approved Reclamation Plan."
40.	Substitute	Same as #39.
41.	Retain	

42.* Comply with NPDES permit requirements for discharging runoff collected in waste rock area sedimentation ponds to Hunting Creek.
Effectiveness: B Application: N, BLM Project Phase: OP

43.* Monitor runoff collected in sediment ponds at waste rock dump and tailings site and water quality at six locations on Hunting Creek at least quarterly: HC-5 (upstream of waste rock), HC-2 (immediately downstream of waste rock) and HC-10 (downstream of the project area); HC-7 (upstream of tailings site), HC-9 (downstream of tailings site), HC-X (downstream of where slurry line crosses creek) for parameters previously described and cyanide. The specific locations of each sampling site are outlined in D'Appolonia (1982A). Monitoring should be weekly during the first year and during and following major storm events.
Effectiveness: C Application: L, N, BLM Project Phase: OP

44.* Develop and implement Transportation Spill Prevention and Spill Contingency Plan. Complete plan prior to start-up of operation. Train emergency spill response team, and familiarize all employees with the plan and the procedures to follow in case of an emergency. Make plan readily available to employees and conduct annual "refresher" courses and periodic dri
Effectiveness: P Application: Y, L, N, BLM Project Phase: POP

45. The Transportation Spill Prevention and Spill Contingency Plan should be submitted to and approved by the Sanitary Engineering Branch of the Environmental Health Division Department of Health Services.
Effectiveness: P Application: N, L, Y, BLM Project Phase: POP

46.* Manage the leachate from waste rock dump in the sediment ponds to reduce acid conditions if encountered during monitoring.
Effectiveness: B Application: N, BLM Project Phase: OP

47. A Potable water supply should be provided at the project site and approved by Health Departments as meeting California Domestic Water Quality and Monitoring Regulations (Title 22).
Effectiveness: A Application: L, N Project Phase: C, OP

48.* All sites should be cleared of all solid waste materials not less than once a week and the refuse should be disposed of at an approved dump site.
Effectiveness: B Application: L, N, Y, BLM Project Phase: C, OP

49.* Monitor downstream surface waters for contamination by spilled material in the event of spill or accident along the transportation corridor, and continue monitoring weekly until complete dispersal is evident.
Effectiveness: C Application: Y, L, N, BLM Project Phase: C, OP

50. *Vegetate topsoil stockpiles to prevent erosion.
Effectiveness: B Application: L, N, BLM Project Phase: OP

*Included in project by Homestake
**Recommended changes

42. Retain

43. Substitute — "Monitor surface water quality as specified in the approved Environmental Monitoring Manual."

44. Delete — Completed preoperation. Maintained as part of approved Emergency Response Plan.

45. Delete — Completed preoperation.

46. Retain

47. Substitute — Maintain a potable water supply on-site which meets California Domestic Water Quality and Monitoring Regulations (Title 22).

48. Retain

49. Retain

50. Substitute — Vegetate topsoil stockpiles as specified in the approved Reclamation Plan.

51.* Schedule transit of incompatible chemicals (such as cyanide and acids) at different times.
Effectiveness: B Application: Y, L, N, BLM Project Phase: OP

52. Review Transportation Spill Prevention Control and Counter Measure Plan following any accident and revise as necessary. Review plan twice yearly to ensure it is up-to-date.
Effectiveness: B Application: Y, L, N, BLM Project Phase: OP

53.* Develop a site-specific spill contingency plan for facilities where hazardous materials are used and stored.
Effectiveness: P Application: L, N Project Phase: OP

54. If potable water supply wells are impaired downstream from project components as a result of project activities, the applicant should provide alternative potable water supplies.
Effectiveness: B Application: L, Y, N, BLM Project Phase: OP

GROUNDWATER QUALITY

55.* Monitor groundwater wells downgradient of mine pit, waste rock area, tailings disposal facility, water supply reservoir and mill site quarterly, a minimum of two wells per project component and four wells at the tailings disposal facility. Parameters should include: water level, cyanide, and the parameters listed under surface water quality. In addition, the wells proximal to the tailings disposal facility should be monitored monthly for the first year.
Effectiveness: C Application: L, Y, N, BLM Project Phase: OP

56. Monitor the BLM well quarterly for constituents of concern and statistically compare with background readings. In the event project induced deterioration occurs, provide replacement potable supply.
Effectiveness: B Application: BLM, N Project Phase: OP

AQUATIC WILDLIFE

57.* Prepare a plan for complete containment of all hazardous or potentially hazardous materials from the tailings, mill and slurry pipeline facilities, and submit the plan to responsible agencies for approval. The plan should address methods of spill containment for predictable events, degree of difficulty of containment, likely travel times and distances of travel downstream.
Effectiveness: P Application: Y, L, N, BLM Project Phase: POP

58. Prepare plans for remedial measures for use if groundwater monitoring indicates seepage into the groundwater, downstream of the mill and tailings facilities, and submit plans to responsible agencies for approval.
Effectiveness: P Application: L, N Project Phase: POP

* Included in project by Homestake
** Recommended changes

51.	Substitute	"Manage the transportation of incompatible chemicals as specified in the approved Transportation Spill Prevention Control and Countermeasure Plan."
52.	Substitute	"Review Emergency Response Plan following any accident and revise as necessary. Review Plan annually or as required by regulatory changes to ensure it remains up-to-date."
53.	Substitute	Manage hazardous materials as specified in the spill contingency plan.
54.	Retain	

GROUNDWATER QUALITY

55.	Substitute	"Monitor groundwater as specified in the approved Environmental Monitoring Manual."
56.	Delete	The BLM campground water supply is a small surficial spring sufficiently distant from project activities to remain unimpacted.

AQUATIC WILDLIFE

57.	Delete	Completed preoperation.
58.	Delete	Same as #57.

59. Rip-rap banks along stream alterations resulting from construction at stream crossings to the approximate natural contours of the existing stream channel. Temporary erosion controls should be implemented, followed closely by permanent revegetation and stabilization. Specific measur to be approved by the State Department of Fish & Game.
Effectiveness: B Application: Y, L, N, BLM Project Phase: C

60. Monitor the development of wildlife and fish populations to ensure that pre- and post-project levels are similar.
Effectiveness: C Application: N, Y, L, BLM Project Phase: OP

61. A comprehensive fish and wildlife management plan shall be developed per the April 7, 1983 letter from the California Department of Fish and Game to the California State Clearinghouse and Napa County.
Effectiveness: P Application: N, L, Y, BLM Project Phase: PC

TERRESTRIAL WILDLIFE

62.* Develop a grazing management program that would reduce cattle stocking rates in the project area.
Effectiveness: D, P Application: Y, L, N, BLM Project Phase: POP

63. Establish watering locations in remote canyons to compensate for the loss of natural springs, seeps and small ponds in accordance with a fish and wildli management plan approved by the Department of Fish & Game.
Effectiveness: D Application: Y, L, N, BLM Project Phase: OP

64. Establish small (approximately one acre), fenced food plots containing millets, sunflower seeds, corn, etc. along the perimeter of grassland-woodland areas to accommodate songbird and small mammal use during the life of the project in accordance with a fish and wildlife management plan approved by the State Department of Fish & Game.
Effectiveness: D Application: Y, L, N, BLM Project Phase: OP

VEGETATION

65.* Flag and avoid sensitive plant populations during realignment of Morgan Valley Road.
Effectiveness: E Application: L, N, BLM Project Phase: C

66.* Minimize the areas of unnecessary plant disturbance and removal for all project facilities. Particularly avoid grassy areas in brushlands. Oak trees should be avoided whenever possible.
Effectiveness: B Application: Y, L, N, BLM Project Phase: C

67.* Locate support facilities, roadway, pipeline, and electrical transmission corridors, borrow areas, and topsoil stockpile areas away from sensitive plant populations. Conduct surveys by foot to locate and flag each population in each general facility area.
Effectiveness: E Application: Y, L, N, BLM Project Phase: C

* Included in project by Homestake
** Recommended changes

59.	Delete	Same as #57.
60.	Substitute	"Monitor fish and wildlife populations as specified in the approved Environmental Monitoring Manual."
61.	Delete	Completed and approved by the Department of Fish and Game.

TERRESTRIAL WILDLIFE

62.	Substitute	"Manage grazing as specified in the approved Contiguous Lands Management Plan."
63.	Substitute	"Manage wildlife habitat as specified in the approved Contiguous Lands Management Plan."
64.	Substitute	Same as #63.

VEGETATION

65.	Delete	Completed preoperation.
66.	Delete	Completed during construction.
67.	Delete	Same as #66.

68. Enhance undisturbed plant communities to raise the general level of plant diversity, productivity, and/or vigor to compensate for community losses by project facilities. Feasible enhancement measures could include supplemental fertilizer applications; changes in land use to remove or reduce cattle grazing pressure; fencing; supplemental watering with excess sanitary wastewater; and planting mixtures of shrubs in even-aged oak stands. This could be implemented on applicant-owned land; negotiations with BLM could establish potential coordination for implementation on lands under BLM jurisdiction.
Effectiveness: D Application: Y, L, N, BLM Project Phase: C, OP, REC

69. Application of fertilizers should not be used in areas along stream banks where vegetative buffer zones have been removed.
Effectiveness: B Application: Y, L, N, BLM Project Phase: C, OP, REC

70.* Mulch denuded soils as rapidly as possible. Revegetation of the mulched soils shall take place in the fall before the rains. Reseeding programs and maintenance of reseeded areas should be administered by a qualified person familiar with local plants and conditions.
Effectiveness: E Application: Y, L, N, BLM Project Phase: C, OP, REC

71.* To the extent possible, locate project facilities in plant communities that are most readily restored. In this case, the introduced grasslands are the most readily restored.
Effectiveness: B Application: Y, L, N, BLM Project Phase: C, OP, REC

72. If feasible, provide fencing around newly revegetated areas for establishmen of plant growth without interference from deer or cattle grazing. Fencing shou be removed once plants are established. All areas unfenced shall be monitore for establishment of plant communities and revegetated, if necessary.
Effectiveness: B Application: Y, L, N, BLM Project Phase: C, OP, REC

CLIMATE AND AIR QUALITY

73. Use water emulsion or slow cure asphalts for road pavements not subject to heavy equipment, to mitigate both short-term volatile organic compound emission and long-term particulate emissions impacts if determined to be required by the Department of Public Works.**
Effectiveness: C Application: Y, L, N, BLM Project Phase: C, OP

74.* Use gravel and chemical suppressants as often as necessary for roads used by heavy equipment to mitigate particulate emission impacts.
Effectiveness: C Application: Y, L, N, BLM Project Phase: C, OP

75. Use watering of working areas, storage pile surfaces and traffic areas to mitigate particulate emission impacts.
Effectiveness: C Application: Y, L, N, BLM Project Phase: C, OP

76. Maintain mobile equipment on a regular basis for low emission operation to mitigate hydrocarbons, nitrogen oxides and carbon monoxide emission impacts.
Effectiveness: C Application: Y, L, N, BLM Project Phase: C, OP

* Included in project by Homestake
** Recommended changes

68.	Substitute	"Managed nonmined lands as specified in the approved Contiguous Lands Management Plan."
69.	Delete	Completed during construction or regulated by approved Reclamation Plan.
70.	Substitute	"Manage reclamation as specified in the approved Reclamation Plan."
71.	Delete	Completed during preconstruction and construction.
72.	Substitute	Same as #70.

CLIMATE AND AIR QUALITY

73.	Delete	Completed during construction.
74.	Substitute	"Manage haul roads as specified in the approved Air Quality Permits."
75.	Substitute	"Conduct mining activities in accordance with the approved Air Quality Permits."
76.	Retain	

77. When replacing heavy mobile equipment, use state-of-the-art emission controlled equipment. Retrofit with emission controls to mitigate hydrocarbon, nitrogen oxides and carbon monoxide emission impacts if required by the Bay Area Air Quality Management District.
Effectiveness: B Application: Y, L, N, BLM Project Phase: C, OP

78. Install Best Available Control Technology (BACT) to control all air pollutant emissions.
Effectiveness: B Application: Y, L, N, BLM Project Phase: OP

79. Wet operating surfaces to reduce dust.
Effectiveness: B Application: Y, L, N, BLM Project Phase: C, OP

80. Establish an on-site air quality monitoring program in consultation with agencies having jurisdiction to monitor emission concentrations in the atmosphere. The program could include monitoring for inhalable particulates, lead, asbestos, mercury, hydrogen cyanide, acid rain, SO_2, and NO_x.
Effectiveness: P Application: Y, L, N, BLM Project Phase: OP

81. Collect background air quality data for asbestos, inhalable particulates, lead, mercury and hydrogen cyanide prior to operation at the project site and in Capay Valley.
Effectiveness: C Application: L, Y, N, BLM Project Phase: PC

82. Establish regular maintenance inspection program for above-ground fuel pipeline leaks to reduce volatile organic compound emissions.
Effectiveness: P Application: N, L Project Phase: POP

83. Provide appropriate respirator gear for workers exposed to inhalable particulates.
Effectiveness: A Application: L, N Project Phase: C, OP

84. Use only non-serpentine rocks for rocking of haul roads.
Effectiveness: B Application: N, L, Y, BLM Project Phase: C, OP

NOISE AND VIBRATION

85. Schedule truck traffic to weekdays and daytime hours whenever possible. If complaints are received by responsible agency, adhere to agency requirements for noise abatement.
Effectiveness: B Application: Y, L, N Project Phase: C, OP

86. Prepare a traffic management plan which considers the time that would be least objectionable by local residents in the project area for truck traffic.
Effectiveness: E Application: Y, L, N Project Phase: PC, OP

87. Homestake shall attempt to negotiate with the property owners the purchase of the Barker property to eliminate noise impacts on private properties near the mine area.
Effetiveness: A Application: N Project Phase: POP

* Included in project by Homestake
** Recommended chances

77.	Substitute	"Employee heavy equipment equipped with emission controls as specified in the approved Air Quality Permits."
78.	Delete	Completed during construction.
79.	Substitute	"Conduct mining activities in accordance with the approved Air Quality Permits."
80.	Substitute	"Monitor air quality as specified in the approved Environmental Monitoring Manual."
81.	Delete	Completed preconstruction.
82.	Delete	Completed preoperation.
83.	Delete	Regulated by Mine Health and Safety Administration.
84.	Delete	Completed during construction. Serpentine rock is physically unusable as road rock.

NOISE AND VIBRATION

85.	Delete	Noise has not been a problem because of remoteness of operations. There are no residential parcels along the access road in Napa County.
86.	Delete	Completed preoperation. Regulated more appropriately on an ongoing basis by Lake County.
87.	Delete	Completed preoperation.

88. Specify that trucks used for construction and operation of project facilities meet California Motor Vehicle regulations.
Effectiveness: E Application: L, N, Y Project Phase: C, OP

89. Advise campers at Hunting Creek campground of construction and blasting activities by posting appropriate signs.
Effectiveness: F Application: N, BLM Project Phase: PC, OP

90. Use best available control technology to reduce noise levels.
Effectiveness: B Application: Y, L, N, BLM Project Phase: C, OP

TRANSPORTATION AND CIRCULATION

91.* Improve Morgan Valley Road from the project area to Lower Lake.
Effectiveness: E Application: N, L Project Phase: C

92.* Provide bus or van service from Lower Lake to project area.
Effectiveness: B Application: N, L Project Phase: C, OP

93. Minimize use of public roads in construction area for heavy equipment movement on Fridays, Saturdays, Sundays, all legal holidays, and on those days which are officially designated as non-working days for legal holidays.
Effectiveness: B Application: Y, L, N Project Phase: C, OP

94.* Use County roads such as not to result in excessive damage. Repair any damage to roads beyond normal wear resulting from construction operations and as further required by the Department of Public Works. These routes, if altered, in the future, would only be allowed after notification of and approval by the various counties who receive the traffic load. If allowed to alter their proposed routes, Homestake would enter into a maintenance agreement for extraordinary maintenance of those roadways.
Effectiveness: B Application: Y, L, N Project Phase: C, OP

95.* Adhere to any reasonable restrictions on heavy equipment routes, times and dates that the counties may deem necessary to prevent hazardous conditions during school busing times or from damage to county roads.
Effectiveness: E Application: Y, L, N Project Phase: C, OP

96.* Adhere to the requirements of the counties to provide additional traffic signs and/or flagmen to eliminate any hazards to traffic on public roads.
Effectiveness: B Application: Y, L, N Project Phase: C, OP

97.* Obtain encroachment permits from the county(ies) engineering department - prior to any construction and/or operation of facilities on or over county (ies) road right-of-ways.
Effectiveness: Not applicable Application: N, L Project Phase: C, OP

* Included in project by Homestake
** Recommended changes

88.	Delete	All equipment is new and meets current regulations. Manufacturers are required to meet regulations on all replacement equipment.
89.	Delete	Campers at Hunting Creek campground are not affected by operations.
90.	Delete	Completed preoperation.

TRANSPORTATION AND CIRCULATION

91.	Delete	Completed preoperation.
92.	Delete	Utilized during construction. Demand for bus service low, road capacity more than adequate. No longer needed as permit requirement.
93.	Substitute	Manage movement of oversized loads as specified by the Responsible Agencies.
94.	Substitute	Same as #93.
95.	Substitute	Same as #93.
96.	Delete	Completed during construction. Not applicable to operation.
97.	Delete	Same as #96.

98. Enter an agreement to pay for extraordinary maintenance prior to construction for all county roads which could be impacted.
Effectiveness: A Application: Y, L, N Project Phase: PC, POP

99.* Require that trucks delivering materials, hazardous or non-hazardous, to the project area use only Route 20 to Clear Lake from I-5, and not Route 16. The applicant should submit to the counties for approval a plan outlining enforcement procedures to ensure that only Route 20 be used for deliveries.
Effectiveness: To Route 16: B & To Route 20, Route 53 & Morgan Valley Rd: -
Application: Y, L, N Project Phase: C, OP

100. Monitor settlement of future employees south of the project area. Should significant number of employees choose to reside there, a van service to the project area should be investigated in consultation with Napa County.
Effectiveness: C Application: N Project Phase: OP

101. Homestake should dispatch a Hazardous Spill Clean Up team in the event of any spill of hazardous materials in Lake, Napa, or Yolo Counties bound for Homestake. Responsible agencies should be contacted immediately in order to assess the types of materials and direct the level and type of clean up to assure protection of the environment.
Effectiveness: E Application: L, Y, N, BLM Project Phase: C, OP

VISUAL RESOURCES

102. Screen visible portions of the mine pit area and waste rock dump with strategically placed native vegetation. The screening effect would be the most successful if vegetation were placed along the Berryessa-Knoxville-Morgan Valley Roads rather than near the facilities. This placement would provide the most immediate screening, and be the most successful in preventing tangential views of the facilities. Vegetation of the type currently growing in the area should be used because conditions preclude the successful long-term use of other species and because they would be the most visually consistent choice.
Effectiveness: E Application: Y, L, N, BLM Project Phase: POP

103. Contour the visible portions of the mine pit in irregular bench-like forms to imitate surrounding land forms, and revegetate with compatible vegetation. subject to work safety considerations and good engineering practice.
Effectiveness: E Application: N, Y, BLM Project Phase: OP

104. To the extent feasible for maintenance of structural stability, vary the bench heights and linear continuity of the waste rock dump to repeat the surrounding landscape and to provide textural diversity on an otherwise planar mass.
Effectiveness: E Application: N, BLM Project Phase: OP

105.* Seed or reseed scars, cuts, fills and other areas disturbed during construction, or at the proper time to ensure germination, to restore a natural appearance of the land.
Effectiveness: B Application: Y, L, N, BLM Project Phase: C, POP, OP, hc

* Included in project by Homestake
** Recommended changes

98.	Delete	Completed preconstruction.
99.	Substitute	Construction phase complete. Use of state highways for routine commerce not subject to local regulation, thus: "Transport of acid, caustic and cyanide shall be routed to the Mine via Interstate 5 and Routes 20 and 53 to Morgan Valley Road."
100.	Delete	Completed. No HMC employees commute from Napa County at this time. Future use of and management of employee traffic on the Knoxville/Berryessa Road is subject to the County Road Agreement No. 2055.
101.	Substitute	"Implement as required the provisions of the approved Emergency Response Plan."

VISUAL RESOURCES

102.	Delete	Completed during construction. Further maintenance and management is provided in the approved Reclamation Plan.
103.	Substitute	"Reclaim portions of the mine pit as specified in the approved Reclamation Plan."
104.	Substitute	"Construct and reclaim waste rock as specified in the approved Reclamation Plan."
105.	Substitute	"Revegetate and monitor areas disturbed during construction as specified in the approved Reclamation Plan."

106.* Eliminate roads not required for future project maintenance to the fullest extent possible and revegetate the areas with compatible vegetation.
Effectiveness: B Application: Y, L, N, BLM Project Phase: POP, OP, R

107.* Use non-reflective earth-tone colors for facilities whenever possible.
Effectiveness: E Application: Y, L, N, BLM Project Phase: C

108. Align the Knoxville-Berryessa-Morgan Valley Road realignments around large trees and shrubs when possible. Replant the disturbed areas with native vegetation. The visual disruption of the transmission lines and supporting poles could only be successfully mitigated by burial of utility lines. This would, however, in itself cause significant impacts regarding disturbed land surfaces, and potential maintenance problems.
Effectiveness: E Application: L, N Project Phase: C

109.* Use of contour grading along the transmission line and road corridor to approximate slopes in surrounding areas. Revegetation with adapted and visually consistent vegetation to mitigate the effects of inconsistently graded adjacent slopes.
Effectiveness: B Application: Y, L, N, BLM Project Phase: C

LAND USE AND SOCIOECONOMICS

110.* Implement a van service from the Lower Lake area to the project area for construction workers.
Effectiveness: B Application: Y, L, N Project Phase: C, OP

111.* Provide security guards in the project area to eliminate dependence on County Sheriff Departments.
Effectiveness: B Application: Y, L, N Project Phase: C, OP

CULTURAL RESOURCES

112. Conduct detailed testing of 24 of 26 prehistoric and 3 of 12 historic sites, c fence off sites subject to approval of the State Office of Historic Preservati identified as being potentially eligible for inclusion in the National Regis e of Historic Places (NRHP) to ascertain the integrity and research potential of each site if adverse impacts cannot be avoided (see also Appendix B); the numb of sites to be tested should be subject to approval by the lead agency.
Effectiveness: P Application: Y, L, N, BLM Project Phase: PC

113. Submit Request for Determination of eligible sites to the keeper of the NRHP. (Y, L, N, BLM)
Effectiveness: Not applicable Application: Y, L, N, BLM Project Phase:

114. Submit Determination of Effect status for each cultural resource to be directly or indirectly affected by the project. (Y, L, N, BLM)
Effectiveness: Not applicable Application: Y, L, N, BLM Project Phase:

* Included in project by Homestake
** Recommended changes

106.	Substitute	Same as #105.
107.	Delete	Completed during construction.
108.	Delete	Completed preconstruction.
109.	Delete	Completed during construction.

LAND USE AND SOCIOECONOMICS

110.	Delete	Completed preoperation.
111.	Retain	
112.	Delete	Completed preconstruction.
113.	Delete	Same as #112.
114.	Delete	Same as #112.

115. Develop a data recovery program for significantly impacted cultural resources sites at which adverse impacts could not be avoided. Completion of the data recovery program would change an "Adverse Effect" status to "No Adverse Effect" and would complete the process of mitigation. This program should be subject to the review and approval of the State Office of Historic Preservation.
Effectiveness: P Application: Y, L, N, BLM Project Phase: PC

PUBLIC HEALTH AND SAFETY

116.* Provide fire extinguishing equipment and facilities in project areas.
Effectiveness: B Application: Y, L, N, BLM Project Phase: C, OP

117.* Develop site-specific hazardous waste spill contingency plans for clean-up and restoration if spills were to occur.
Effectiveness: P Application: Y, L, N, BLM Project Phase: POP

118. The Transportation Spill Prevention and Spill Contingency Plan should clearly state that in the event of a release of hazardous materials into the environment, the responsible party will immediately notify the National Response Center at 800/424-8802, providing details of the incident and responsive measures taken.
Effectiveness: B Application: Y, L, N Project Phase: C, POP

119. The Transportation Spill Prevention and Spill Contingency Plan shall state that, in the event of a spill, any chemicals and contaminated materials which are regulated as hazardous waste under the Resource Conservation and Recovery Act (RCRA) will be managed according to that Act. Specifically, the waste must be manifested and transported by a hauler, who has notified EPA of its hazardous waste activity, to a hazardous waste management facility which is under interim status according to RCRA.
Effectiveness: B Application: Y, L, N Project Phase: C, POP

ENERGY

120. Avoid transmission line poles in intermittent drainages and ridge tops, when possible.
Effectiveness: B Application: Y, L, N, BLM Project Phase: C

121. Rip or disc the soil around the poles for better revegetation and soil permeability.
Effectiveness: B Application: Y, L, N, BLM Project Phase: C

RECLAMATION/REVEGETATION

* Included in project by Homestake
** Recommended changes

115.	Delete	Same as #112.
116.	Delete	Completed during construction. Maintained in accordance with manufacturers' recommendations and insurance requirements and MSHA.
117.	Delete	Completed preoperation.
118.	Delete	Same as #117.
119.	Delete	Same as #117.

ENERGY

120.	Delete	Completed during construction.
121.	Same as #120.	

122. Develop a clearly defined and detailed set of performance standards and general methods for achieving the standards, which meet the originally intended revegetation goals, as part of the Revegetation Plan to ensure the success of revegetation of disturbed areas. This plan should be submitted to responsible agencies. Progress on reclamation efforts could be monitored in conjunction with other monitoring efforts in the project area. The nature of future field planting, soil amendment requirements, supplemental seeding requirements, changes in seed mixtures, and other technical details of the Revegetation Plan could then be evaluated and modified in light of the performance requirements.
Effectiveness: P Application: Y, L, N, BLM Project Phase: POP

123. Establish achievement standards for the following parameters: plant community type(s); percent plant cover; shrub density; species composition; minimum plant productivity; and preferred final life form.
Effectiveness: P Application: Y, L, N, BLM Project Phase: POP

124. For livestock grazing and wildlife habitat, that has been proposed as post-mining land uses, the achievement standards would determine whether (1) adequate cover (for soil protection), (2) suitable species composition (for forage or shelter requirements), and (3) adequate productivity or density (for forage) have been achieved.
Effectiveness: P Application: Y, L, N, BLM Project Phase: POP

125. The most practical method for establishing threshold or acceptable minimum values for each parameter is to establish reference or control plots on undisturbed portions of the area against which the adequacy of future revegetation can be compared. Successful revegetation is achieved where the values of the parameters are equivalent in the control plot and on the restored area. Several randomly selected control plots should be established in grassland areas to provide the necessary reference data. If feasible, each plot should be fenced (to exlude livestock large enough to minimize edge effects and provide representative data (generally one acre). Additional, although fewer, control plots should be established in chaparral and oak woodlands to provide comparative data for these community types. The trees and shrubs should be analyzed each year for survival rate and if they are approaching the 20 percent loss value reanalysis of the conditions and replanting should be done.
Effectiveness: P Application: Y, L, N, BLM Project Phase: POP, OP, REC

126.* Testing is currently under way at several locations throughout California to develop reliable procedures, including an experimental program proposed by the applicant at the project site. The results of such testing should be monitored to ensure that testing continues until satisfactory results are achieved and that the results are incorporated into the revegetation program.
Effectiveness: P Application: Y, L, N, BLM Project Phase: OP, REC

127.* The restoration and/or mitigation of sensitive plant populations lost because of the project presents a special problem. Studies of the environmental growth requirements of the sensitive plants are recommended.
Effectiveness: P Application: Y, L, N, BLM Project Phase: OP, REC

* Included in project by Homestake
** Recommended changes

122.	Delete	Completed preoperation.
123.	Delete	Completed preoperation and/or included in approved Reclamation Plan.
124.	Delete	Same as #123.
125.	Substitute	"Monitor revegetated areas for performance as specified in the approved Environmental Monitoring Manual. Supplement or repair areas as needed to achieve specified performance levels."
126.	Substitute	"Review revegetation procedures annually and recommend adjustments for approval consideration."
127.	Substitute	"Monitor sensitive plant populations as specified in the approved Environmental Monitoring Manual. Manage sensitive plant populations in accordance with the approved Contiguous Lands Management Plan."

128.* Develop a set of standards outlining criteria for removal and stockpiling soils prior to site development to insure proper collection and quality of stockpile.
Effectiveness: P Application: N, L, Y, BLM Project Phase: PC

129.* Stockpile topsoil during construction and other earthmoving tasks for later use in revegetation; stockpile soils from serpentine areas separately from soils from sedimentary areas.
Effectiveness: B Application: Y, L, N, BLM Project Phase: C, OP

130. Provide temporary fencing to protect young plants from grazing animals during revegetation efforts. Security fencing already present at the tailings, waste rock, mine, low grade ore storage, and mill areas could be used for this purpose. Road cuts, fills or unstable slopes and barrow areas, including Hobit Mountain, could be fenced for a three to five year period to enhance revegetation efforts.
Effectiveness: D Application: Y, L, N, BLM Project Phase: REC

131. Abandoned roads should be ripped to loosen the soil and increase the success of revegetation.
Effectiveness: D Application: Y, L, N, BLM Project Phase: REC

* Included in project by Homestake
** Recommended changes

128.	Delete	Completed preconstruction.
129.	Delete	Completed during construction.
130.	Substitute	Provided temporary protection to revegetated areas as specified in the approved Reclamation Plan.
131.	Substitute	Prepare seedbeds for abandoned roads as specified in approved Reclamation Plan.

ATTACHMENT C

REVISED
SUPPLEMENTAL INFORMATION SHEET

McLaughlin Gold Mine Project
Napa County Facilities

June 1, 1988

ATTACHMENT C
SUPPLEMENTAL INFORMATION SHEET

McLaughlin Gold Mine Project
Napa County Facilities

May 18, 1988

PROJECT FACILITIES

1. Mine Pit (Approximately 80%) (AP #15-010-19, HMC; 15-010-07, HMC; 15-020-04, HMC; and 15-010-20, USA)

2. Sediment Control Ponds

   M-1 (AP #15-020-04, HMC)

   Size: 9.4 acres

   Capacity: 264 acre feet

3. Crushing and Grinding Facilities

   A. Truck Shop/Office Building (AP #15-020-03, USA)

      Height: 48 feet Number of Stories: 2

      Total Square Feet: 19,880

      General Use: Vehicle maintenance; tools and parts supply storage; office for mine engineer, geologist, mine foreman, maintenance foreman, and general office; and lunch room and change room for mine employees.

   B. Warehouse (AP #15-020-03, BLM)

      Height: 24 feet

      Total Square Feet: 24,000

      General Use: Tire storage; mine equipment storage.

   C. Maintenance Building (AP #15-020-04, HMC)

      Height: 19 feet Number of Stories: 1

      Total Square Feet: 1,800

      General Use: Storage for tools and supplies.

   D. Fuel Dispensing Islands (AP #15-020-04, HMC)

E. Tank Farm (AP #15-020-04, HMC)

1) Waste Oil Storage Tank

Height: 15 feet Diameter: 12 feet

Capacity: 12,000 gallons

2) One Diesel Oil #2 Oil Storage Tank

Height: 24 feet Diameter 24 feet

Capacity: 80,000 gallons

3) Engine Oil Storage Tank

Height: 12 feet Diameter: 12 feet

Capacity: 10,000 gallons

4) Hydraulic Oil Storage Tank

Height: 12 feet Diameter: 12 feet

Capacity: 10,000 gallons

5) Anti-Freeze Storage Tank

Height: 12 feet Diameter: 12 feet

6) Solvent Storage Tank

Height: 6 feet Diameter: 6 feet

Capacity: 1,000 gallons

F. Truck Wash Pad Recycle Tank (AP #15-020-04, HMC)

Height: 6 feet Diameter 6 feet

Capacity: 1,000 gallons

G. Treated Sewage Holding Pond (AP #15-020-03, USA)

Size: 500'L x 100'W x 5'D (Plus 3 feet/freeboard)

Capacity: 250,000 cubic feet

H. Propane Storage Tank (AP #15-020-04, HMC)

Size: 36'L x 4'D

Capacity: 3,000 gallons

I. Run of the Mine Stockpiles

60,000 tons (AP #15-020-04, HMC)
30,000 tons (AP #15-020-04, HMC & 15-020-03, USA)

J. (a) Crusher Building (AP #15-020-04, HMC)

Height: 70 feet below finished grade

13 feet above finished grade

Total Square Feet: 4,012

(b) Crusher Building (AP #15-020-04, HMC)

Height: 50 feet

Total Square Feet: 4,000

K. (a) Transfer Conveyor (AP #15-020-04, HMC)

Height: 23 feet

(b) Divertor Conveyor (AP #15-020-04, HMC)

Height: 20 feet

L. (a) Radial Stacker (AP #15-020-04)

Height: 52 feet

(b) Stacker (AP #15-020-04, HMC)

Height: 59 feet

M. (a) Crushed Ore Stockpile (AP #15-020-04, HMC)

30,000 tons

(b) Oxide Ore Stockpile (AP #15-020-04, HMC)

15,000 tons

N. (a) Ore Reclaim Building (AP #15-020-04, HMC)

Height: 44 feet below finished grade

10 feet above finished grade

Total Square Feet: 1,144

(b) Oxide Ore Reclaim Building (AP #15-020-04, HMC)

Height: 20 feet below finished grade

10 feet above finished grade

Total Square Feet: 1,000

O. (a) Mill Feed Conveyor (AP #15-020-04, HMC)

Height: 42 feet

(b) Oxide Mill Feed Conveyor (AP #15-020-04, HMC)

Height: 42 feet

P. (a) Grinding Building (AP #15-020-04, HMC & 15-020-03, USA)

Height: 76 feet

Total Square Feet: 11,375

(b) Grinding Building (AP #15-020-04, HMC & 15-020-03, USA)

Height: 76 feet

Total Square Feet: 9,785

Q. (a) Electric Building/Control Room Building (AP #15-020-03, USA)

Height: 32 feet Number of Stories: 2

Total Square Feet: 3,100

(b) Electric Building/Change Room (AP #15-020-03, USA)

Height: 16 feet Number of Stories: 1

Total Square Feet: 2,160

R. (a) Grinding Thickener (AP #15-020-04, HMC & 15-020-03, USA)

Height: 22 feet Diameter: 150 feet

Total Area: 17,662 square feet

(b) Grinding Thickener (AP #15-020-04, HMC)

Height: 16 feet Diameter: 150 feet

Total Area: 17,662 square feet

S. (a) Mill Water Tank (AP #15-020-03, USA)

Height: 24 feet Diameter: 24 feet

Capacity: 72,753 gallons

(b) Mill Water Tank (AP #15-020-04, HMC)

Height: 17 feet Diameter: 30 feet

Capacity: 70,500 gallons

T. Potable Water Tank (AP #15-010-04, Harrison)

Height: 12 feet Diameter: 12 feet

Capacity: 10,000 gallons

U. (a) Slurry Pump House (AP #15-020-03, USA)

Height: 24 feet

Total Square Feet: 1,752

(b) Slurry Pump House (AP #15-020-03, USA)

Height: 24 feet

Total Square Feet: 1,752

V. (a) Surge Tanks (2) (AP #15-020-03, USA)

Height: 35 feet Diameter: 32 feet

Capacity: 197,000 gallons each

(b) Surge Tanks (2) (AP #15-020-03, USA)

Height: 35 feet Diameter: 32 feet

Capacity: 197,000 gallons each

W. Run-Off Pond (AP #15-020-03, USA)

Size: 88'L x 58'W x 10'D (Plus 4 feet/freeboard)

Capacity: 25,500 cubic feet

X. (a) 115 KV High Voltage Main Electrical Substation (AP #15-020-03, USA)

(b) 115 KV High Voltage Main Electrical Substation (AP #15-020-03, USA)

Y. (a) Electric Building (AP #15-020-03, USA)

Height: 15 feet

Total Square Feet: 800

(b) Electric Building (AP #15-020-03, USA)

Height: 15 feet

Total Square Feet: 800

Z. (a) Flocculant Storage Building (AP #15-020-04, HMC)

Height: 15 feet

Total Square Feet: 620

(b) Flocculant Storage Building (AP #15-020-04, HMC)

Height: 15 feet

Total Square Feet: 620

AA. (a) Tramp Screen (AP #15-020-04, HMC)

Height: 26 feet

Total Square Feet: 630

(b) Tramp Screen (AP #15-020-04, HMC)

Height: 26 feet

Total Square Feet: 630

BB. Pyrite Storage Pad (AP #15-020-04, HMC)

Height: 6 feet below finished grade

Size: 80'W x 100'L

CC. Lube Building (AP #15-020-04, HMC)

Height: 14 feet Number of Stories: 1

Total Square Feet: 400

General Use: Lubricant Storage

4. Low Grade Ore Stockpile Pads (AP #15-010-19, HMC; 15-010-20, USA; 15-010-05, HMC; 15-020-03, USA; and 15-010-04, Harrison)

5. Water Tank/Grinding Area (AP #15-010-05, HMC)

Height: 36 feet Diameter: 60 feet

Capacity: 740,000 gallons

6. Water Tank Break (AP #15-010-04, Harrison)

Height: 12 feet Diameter: 12 feet

Capacity: 10,000 gallons

7. Slurry Pipeline/Waterline to Mill Site (AP #15-020-03, USA; 15-020-01, USA; 15-010-04, Harrison; 15-010-03, USA; 15-010-15, HMC; 15-010-6, Wilson; 15-010-17, HMC; 15-010-11, HMC)

Number of Lines: 4

Size: 8 inches

8. P.G.&E. 115 H.V. Transmission Line (AP #'s - same as Item 7, Slurry Pipeline)

9. a. West Waste Rock Disposal Dump (AP #15-020-07, USA; 15-020-03, USA; 15-020-06, HMC)

   b. East Waste Rock Disposal Dump (AP #15-020-05, HMC)

10. Topsoil Stockpile A (AP #15-010-05, HMC; 15-010- , HMC; 15-020-01, USA; 15-020-03, USA)

    Stockpile B (AP #'s 12-015-09, HMC; 12-016-05, HMC; 12-017-04, HMC: 12-018-01, HMC)

    Stockpile C (AP #'s 12-017-05, HMC; 12-017-07, HMC)

11. Sediment Pond W-1 (AP # 13-018-11, HMC)

    Size: 2.0 acres Capacity: 26 acre feet

12. Sediment Pond W-2 (AP #13-018-11, HMC)

    Size: 2.6 acres Capacity: 40 acre feet

13. Sediment Pond W-3 (AP #15-020-03, USA)

    Size: 2.4 acres Capacity: 27 acre feet

14. Sediment Pond W-4 (AP #'s 13-018-11, HMC; 15-020-03, USA)

    Size: 2.8 acres Capacity: 28 acre feet

15. Sediment Pond W-5 (AP #13-018-11, HMC)

    Size: 1.9 acres Capacity: 21 acre feet

16. Sediment Pond W-6 (AP #15-020-07, USA)

    Size: 2.8 acres Capacity: 14.6 acre feet

17. Sediment Pond W-7 (AP #15-020-07, USA)

    Size: 2.9 acres Capacity: 14.7 acre feet

UTILITIES

1. Water Supply Service

   Domestic: Reservoir (in Yolo County) Process Water: Reservoir, wells, and reprocessed water

2. Method of Domestic Sewage Disposal: Package treatment plant/holding pond

AVERAGE OPERATION

Hours of Operation: 24 *Days of Operation/Week: 7

Number of Shifts: 3

Employees Per Shift: Day: 77 Swing: 37 Night: 32 Total: 146
(Napa County Facilities)

*Mine Pit/Blasting will operate 5 days/week.

ANNUAL REPORT
REVIEW OF THE

1987 ENVIRONMENTAL MONITORING PROGRAM

McLAUGHLIN PROJECT

MAY 1988

PREPARED BY THE NAPA COUNTY
CONSERVATION · DEVELOPMENT
AND PLANNING DEPARTMENT

The Napa County Planning Division has prepared this report for the Conservation, Development and Planning Commission as a general summary of the findings presented in the 1987 Annual Monitoring Report prepared by Homestake Mining Company. The report details proposals made by Homestake to modify the current Environmental Monitoring Program and also contains comments and recommendations received on Homestake's Annual Report from technical review agencies.

It is the intent of the Planning Division that this report:

1. Form the basis for Commission action on proposals put forth by Homestake to change monitoring protocols.

2. Serve as an informational document to assist the Commission, and the public, in reviewing the environmental aspects of the McLaughlin Project.

REPORT ON REVIEW OF THE 1987 ENVIRONMENTAL MONITORING PROGRAM FOR THE MCLAUGHLIN PROJECT

TABLE OF CONTENTS

	EXECUTIVE SUMMARY	i
1.0	INTRODUCTION	1
1.1	Background	1
1.2	Overview: General Monitoring Objectives	1
2.0	SUMMARY OF FINDINGS AND RECOMMENDATIONS: 1987 MONITORING PROGRAM	3
2.1	Water Quality	3
2.2	Air Quality and Meterology	9
2.3	Aquatic Ecology	11
2.4	Vegetation	16
2.5	Wildlife	23
2.6	Geotechnical	26
2.7	Traffic	27
	Appendix A	

EXECUTIVE SUMMARY

REVIEW OF THE MCLAUGHLIN PROJECT
1987 ENVIRONMENTAL MONITORING PROGRAM

The 1987 Annual Monitoring Report represents the fourth report submitted by Homestake Mining Company (hereafter "Homestake") in fulfillment of the requirement to report annually the results of the McLaughlin Mine Environmental Monitoring Program. The objective of the monitoring program is to measure compliance with environmental performance standards recognized in regulatory permits. The monitoring program also requires the monitoring and assessment of trends indicative of potential impacts attributable to the McLaughlin Project.

Monitoring data presented in the 1987 Annual Report covered a twelve month period from July 1, 1986 through June 30, 1987. As required, comparisons to compliance standards and EIR/EIS projections, as well as recommendations for program modification are included in the Report. Emphasis of the statistical analysis is on assessing compliance with standards and criteria, and trends analyses.

WATER QUALTIY MONITORING

The 1987 Water Quality Monitoring Program (WQMP) included the measurement of 35 water quality variables at 12 surface water and 23 groundwater locations, with additional measurements at sediment control ponds and within the process (tailings) streams. The water quality monitoring effort is conducted at locations principally in Lake and Napa Counties, in the Hunting Creek Watershed.

Analysis of WQMP data collected over the 1987 reporting period provided the basis for the following findings, as reported by Homestake:

- No changes in surface or groundwater quality in terms of those elements or compounds which are fundamental to compliance with regulatory requirements were identified. Analytical emphasis was on those parameters most likely to be impacted by mining: cyanide, arsenic, boron, chromium, copper, lead, mercury, nickel and zinc.

- Seven apparent exceedences of "Maximum Likely Concentrations" (MLC's) were observed throughout the July 1986 - June 1987 period. All were associated with monitoring stations in the waste rock area in Napa County. Four of these involved multiple parameters in one sample where an elevated level of total suspended solids was reported which impacted total metal concentrations. The remaining three cases were at diffent monitoring sites, each involving a single parameter. No recurring exceedances were identified nor were increasing trends at the monitoring stations for the parameters in question observed.

- Several water quality trends were identified which it was suggested are primarily of scientific interest, but which are not indicative of adverse impacts. Of the trends identified, only an upward trend in the concentration of sulfate in the waste rock area was considered of significance. This trend was predicted in the McLaughlin Mine EIR/EIS, and reflects the oxidation of sulfide sulphur in the waste rock producing acid which is subsequently neutralized by alkaline rock. As this process continues, Homestake expects sulfate levels to continue to rise, increasing Total Dissolved Solid (TDS) levels in Hunting Creek, as previoulsy predicted. To date, the drinking water standard for sulfate (240 Mg/L) has not been exceeded. Continued monitoring of this trend is proposed by Homestake.

Specific findings with respect to monitoring for impacts from project facilities located in Napa County indicate that compliance was maintained with criteria established by the Central Valley Regional Water Quality Control Board.

Homestake has proposed the following changes for the 1987-88 monitoring year:

- Continue monitoring surface and groundwater quality in accordance with the current Water Qulity Monitoring Program, as modified in April 1987, with the exception of monitoring for asbestos.

- Eliminate monitoring for asbestos fibers in water.

- Continue to scrutinize sulfate, calcium and TDS at monitoring stations associated with the Waste Rock Dump Facility.

The Regional Water Quality Control Board has reviewed the 1987 Annual Water Quality Monitoring Report and the proposed recommendations contained therein. In a letter dated January 20, 1988, the Board notified Homestake of the following findings (see Appendix A):

- Concurrence that the McLaughlin Project has operated within all permit and waste discharge conditions.

- Sediment monitoring should continue, given the nature of the project.

- Concurrence that monitoring for asbestos does not yield meaningful results, due to the ubiquitous serpentine in the study area. (The Board proposed to delete such monitoring when the NPDES permit is renewed.)

In conclusion, the Regional Board reiterated the need for continued trends analysis of water quality parameters at sites in the waste rock areas, with particular attention given to sulfate, calcium and TDS.

AIR QUALITY/METEROLOGY MONITORING

The 1987 Operational Air Quality Monitoring Program in Napa County has focused on documenting Total Suspended Particulate (TSP) concentrations (i.e., dust), as required by the Permit to Operate issued by the Bay Area Air Quality Management District. Data collected over the reporting period indicate that TSP levels have remained within the national primary and secondary standard.

Homestake has made no recommendations to modify the air quality monitoring program as it relates to Napa County.

AQUATIC ECOLOGY MONITORING

Initially designed to characterize baseline conditions, the 1987 Aquatic Ecology Monitoring Program reflected a focused program tailored to detect and evaluate potential impacts from Project operations. The focused operations monitoring effort included sampling in April 1987 at four primary sites considered to be the most useful for monitoring operation activities. The 1987 Program included monitoring of fish and benthic macroinvertebrate populations, as well as trace metal concentrations in fish.

Results from the 1987 monitoring effort substantiate earlier findings regarding adaptation of aquatic communities to stresses steming from local hydrologic and geologic conditions. Diversity of fish species was again found to be low in 1987, with only four species collected over the entire study area. This low diversity of fish species is typical of California Coastal streams. California Roach, a minnow with a wide tolerance for physical conditions remains the only abundant and wide-spread species of fish in Hunting and Knoxville Creeks, where high temperatures and low flow rates are the usual late summer condition. As in previous years, the highest diversity of species was at site HC-10 on Hunting Creek, located downstream from all project facilities, where the flow rate is highest and pools are deeper.

Apart from providing additional data on species diversity and density, results from the 1987 benthic macroinvertebrate monitoring effort continue to depict a high degree of annual variability in the composition and abundance of the local benthic community. The annual changes have been found to be typical of streams in the Northern California Coast Range, and are related to patterns of precipitation and resultant stream discharge, rather than to changes associated with project activities.

In 1986, the study team from Bodega Research Associates (BRA) reported a statisically significant decline in both richness of benthic macroinvertebrate species and fish density at site KC-3 on Knoxville Creek. Two possible causes were identified by BRA for those changes: (1) natural hydrologic events, and (2) a discharge from the M-1 Sediment Pond into Knoxville Creek that occurred in February - March 1986.

The 1987 data indicates a strong recovery of invertebrate populations at site KC-3 had occurred. However, fish density remained very low with only one California roach collected. Although the data are inconclusive, BRA continues to suggest that natural hydrological events are responsible for the persistance of the decline in fish density at site KC-3. BRA noted that water quality appears not to be a factor in preventing recovery of fish populations. As in 1986, high densities of California roach were found to be present within 200 feet downstream of the KC-3 site. BRA therefore believes that California roach invade Knoxville Creek at the KC-3 site when conditions permit, but that hydrologic factors periodically cause the fish to become locally extinct.

Concentrations of seven elements analyzed in California roach samples pooled in 1987, add to the base of data describing sample variability and annual variability in these elements at the four primary monitoring sites. Comparing all four sites across years, BRA found no marked changes in trace element concentrations. BRA concluded that date collected over the study period to date, do not indicate any detrimental increase in environmental levels of heavy metals in Hunting Creek and Knoxville Creek caused by mining operations.

Homestake has proposed that the focused monitoring program implemented in 1986, continue without modification in 1988. Citing the detection and interpretation of changes in the aquatic ecology of project area streams, BRA believes that the reduced monitoring program has functioned efficiently and productively. The California Department of Fish and Game, in its review of the 1987 Annual Aquatic Monitoring Report, concurs with these findings.

VEGETATION MONITORING

The 1986 Vegetation Monitoring Program included monitoring of previously reclaimed areas (reclamation success), sensitive plants, and the management of contiguous lands unaffected by mining.

To date, a total of 87 sensitive plant populations have been directly impacted by construction and operation of the McLaughlin Mine Project. This number represents a reduction of nearly 30 percent from the 126 sensitive plant populations predicted to be directly impacted by the project in the EIR/EIS. A total of 36 sensitive plant populations were surveyed in 1987. No new disturbances to plant populations were reported in the 1987 monitoring period, stemming from plant operations. Several new populations were located in the project area during the 1987 monitoring surveys. None of these populations were threatened by any of the ongoing operations at the mine. On the contrary, some of these populations appear to have resulted from perturbations associated with the facility construction. These species often respond favorably to reduced competition and reoccupy newly bared serpentine soils. No populations in the mine vicinity exhibited signs of toxicity from air or water born pollutants caused by mining operations. No significant indirect impacts were observed to be continuing from the previous year. No other indirect impacts were observed on populations in close proximity to the project operations.

Efforts to re-establish the Thelypodium brachycarpum in areas outside the waste rock dump area continued in 1987. Data collected to date regarding transplant efforts indicates that this species can be successfully re-established elsewhere. Homestake continued to provide protection of the existing stand of T. brachycarpum located in the main waste rock area, and has indicated that the site may not be removed for at least another three years, and may not be disturbed during the life of the project.

Biosystems Analysis, Inc. has recommended that a total of 15 of 59 sensitive plant monitoring sites be dropped from the monitoring progam due to total displacement by facilities, or no evidence of impacts by development of the McLaughlin Project. The Califoria Native Plant Society concurs with this recomendation.

Revegetation (reclamation) efforts in 1987 were focused on completing the seeding of approximately 75 acres of disturbed lands and was found to be successful in controlling erosion. Focus of the revegetation effort was on slopes along the reconstructed portion of the Morgan Valley Road near Lower Lake (Lake County), the area northeast of the processing plant which was converted from Chapparral to grassland to reduce fuel load, and the west facing slope of the waste rock pile adjacent to the sewage treatment pond in Napa County. In addition, a major effort to evaluate the success of the planting of some 6,300 liner trees and shrubs was conducted in October 1986.

In the 1987 revegetation evaluations, plant cover was found to be sparse on three types of areas: some waste rock piles, serpentine areas and rocky cut slopes. A limited revegetation effort was established by Homestake to test alternate reclamation methods on portions of the waste rock dump in 1985-86 using run- of-mine fines, rather than topsoil. In 1986, plant cover on waste rock was sufficient to prevent erosion. The 1987 Survey indicated that very little regermination on the waste rock plantings had occurred, although it was noted that the sparse vegetation did continue to prevent erosion.

Plant cover on serpentine rock and soils has been sparse since the start of the revegetation program. Revegetation of serpentine soils and rocks at the site without continued refertilization has met with little success. The experience at the McLaughlin Project site is consistent with efforts and success rates noted by the Soil Conservation Service and CalTrans. Plant cover was also noted as sparse on rock cut slopes. Rock slopes are generally not conducive to plant growth as there are few fractures for plant roots to grow into on slopes of consolidated rock, and little water and few nutrients can be held in the fractures.

The seed mixes, soil amendments and mulch used in the 1986-87 program are recommended for the 1987-88 revegetation effort. No remedial seeding or fertilizing was recommended.

Based upon the low survival rate for both grasses and woody plants on some waste rock areas using run-of-mine fines, rather than topsoil, Homestake's consultant has recommended a soils testing program leading to the establishment of test plots on certain waste rock locations for the 1987-88 program.

In January 1986, a total of 6,373 woody plants and shrubs were installed in the project area to establish visual screening. Monitoring of survival rates in October 1986, indicated a low overall success rate of 43%. An additional survey of survival success in the Spring 1987 indicated that certain plants thought to have died, had in fact regerminated. Thus the actual survival rate is thought to be slightly higher for woody plants than initially reported in October 1986. Reasons for the low survival rate identified by the consultant included mismatching of species to soils/sites, and competition from grasses. Adjustments have been made to the planting program to better match species to given soils types/sites, and success rates are expected to be higher in future years.
To maintain the shrubs density specified in the Project Master Reclamation Plan (1500 tublings/ac) a program of replacement by replanting has been initiated.

In response to a requirement imposed by regulatory agencies, a plan for the management of more than 7,000 acres of non-mined lands owned by Homestake was proposed by a group of private consultants, including participants from both U.C. Berkeley and U.C. Davis. The Management Plan contains recommendations for (1) fire hazard reduction around project facilities, (2) shoreline development around Davis Creek Reservoir, (3) sensitive plant restoration, (4) pasture land use, (5) habitat restoration and improvement, and (6) use of the project site by regional education institutions for research into fish and wildlife management.

The California Department of Fish and Game has reviewed the McLaughlin Mine Contiguous Land Management Plan and found the plan acceptable. The U.S. Bureau of Land Management has reviewed the revegetation monitoring results for 1987 and has advised the Conservation, Development and Planning Department that it finds them aceptable. The California Native Plant Society has reviewed the recommendations regarding sensitive plant monitoring and concurs with the proposed modifications.

WILDLIFE MONITORING

The objective of the Wildlife Monitoring Progam is to detect changes in the abundance or health of wildlife populations. The focus of the program is on identification of changes that can be attributed to the McLaughlin Project, potentially avoidable and sufficiently important to require remedial action. Impacts addressed by the Monitoring Program include: exposure to potentially hazardous wastes, disturbance of Golden Eagle nests, and roadkills.

Monitoring of potentially contaminated waterbodies in the project area was initiated in the spring 1985. Through the 1985-86 reporting period, focus of the monitoring effort was on Davis Creek Reservior, a fresh water reservior. Beginning in 1987, pedestrian surveys conducted by Ecological Research Associates (ERA) were used to document wildlife use of both Davis Creek Reservoir (Yolo County) and the tailings impoundment (Lake County). Documentation of wildlife use of the waste rock sediment control ponds and the mine pit area was based upon intermittent, casual observation by Homestake personnel, contractors and researchers.

Data collected in 1986-87 continued to show a wide diversity of species present in the project study area. Species diversity in 1987, however, was not as great as in 1986. Reasons for all reported species from previous years not being observed in 1987 was attributed by Homestake to a less rigorous study of wildlife during the operations phase, the purpose of which is to monitor relative abundance and health of the more common resident species, rather than documentation of all species present.

As reported by Homestake, the distribution of recorded sightings in 1986-87 among project area waterbodies varied considerably. Not surprisingly, a much higher diversity of bird species were recorded on or around Davis Creek Reservoir as compared to the tailings pond, which is of low habitat value. Actual usage of the reservoir and the tailings pond was reported to follow a pattern which correlates exacty with the scarcity of the other water sources. Usage peaked in summer and fall and was reported as minimal during the wet winter months.

Homestake has proposed that the Wildlife Monitoring Program continue in its present form, as modified in 1987.

The California Department of Fish and Game, (CDFG) has reviewed the 1987 Wildlife Monitoring Report and has found it, as well as the Contiguous Land Management Plan, to be acceptable.

GEOTECHNICAL MONITORING

The Geotechnical Monitoring Program entails monitoring the integrity of embankments and natural or induced slope movements for each of four separate water storage or waste impoundment facilities. The Monitoring Program with respect to facilities in Napa County became effective in 1985, was established and is conducted in accordance with the requirements of the California Division of Safety of Dams. The Division has indicated their satisfaction that all dams are functioning safely.

TRAFFIC MONITORING

Taffic on Knoxville-Berryessa Road has been monitored in accordance with Napa County Agreement #2055. The traffic data for the 1986-87 period indicate levels well below the threshold level of 125 average daily trips for a period of four (4) consecutive weeks. This threshold level, if reached, would trigger origin and destination surveys as detailed in the Napa County Road Agreement.

REVIEW OF THE MCLAUGHLIN PROJECT ENVIRONMENTAL MONITORING PROGRAM

1.0 INTRODUCTION

1.1 BACKGROUND

The Conservation, Development and planning Commission, at their meeting of December 7, 1983, approved the Use Permit and Surface Mining Permit applications of the Homestake Mining Company (#U-198283) subject to Conditions of Approval, including:

> **"Homestake shall on September 1st of each calendar year, provide the cdpd with an anuual report on the monitoring program summarizing the monitoring data collected. the rport shall include a comparison of all data collected in compliance with required adopted standards and with the projected levels described in the final EIR/EIS"** (FEIR-548, hereinafter "EIR/EIS"). **The Planning Director shall provide an Annual Report to the CDPC on the results of the monitoring program".**

The 1987 Annual Monitoring Report prepared by Homestake Mining Company was received September 28, 1987. Data presented in the report covers the period from July 1, 1986 to June 30, 1987.

The following report is submitted in fulfillment of the permit requirement that the Director report annually to the CDPC on results of the McLaughlin Gold Mine Project Monitoring Program. The report begins with an overview of the general monitoring objectives for the McLaughlin Project. The overview is followed by a summary of findings and recommendations regarding the 1987 Operational Monitoring Program. This summary presents findings according to environmental descipline, and is consistent with the format presented in the report prepared by Homestake Mining Company. Recommendations discussed in the report are those presented by Homestake for consideration and approval by applicable permit agencies, including the Conservatiohn, Development and Planning Commission.

1.2 OVERVIEW: GENERAL MONITORING OBJECTIVE

The Environmental Monitoring Program for the McLauglin Gold Mine Project has four major objectives: (1) to detect changes, (2) to assess the importance of changes, (3) to determine the cuase of changes, and (4) to trigger action to correct problems. If appropriately applied, the monitoring program will measure compliance with standards recognized in regulatory permits, as well as monitor trends indictive of present or future environmental damage or benefit.

Monitoring for the year 1987 has been conducted in accordance with the provisions for "Operational Monitoring" specified in the McLaughlin Project Environmental Monitoring Manual as modified in 1987. The environmental monitoring sites are shown in Figure 1.

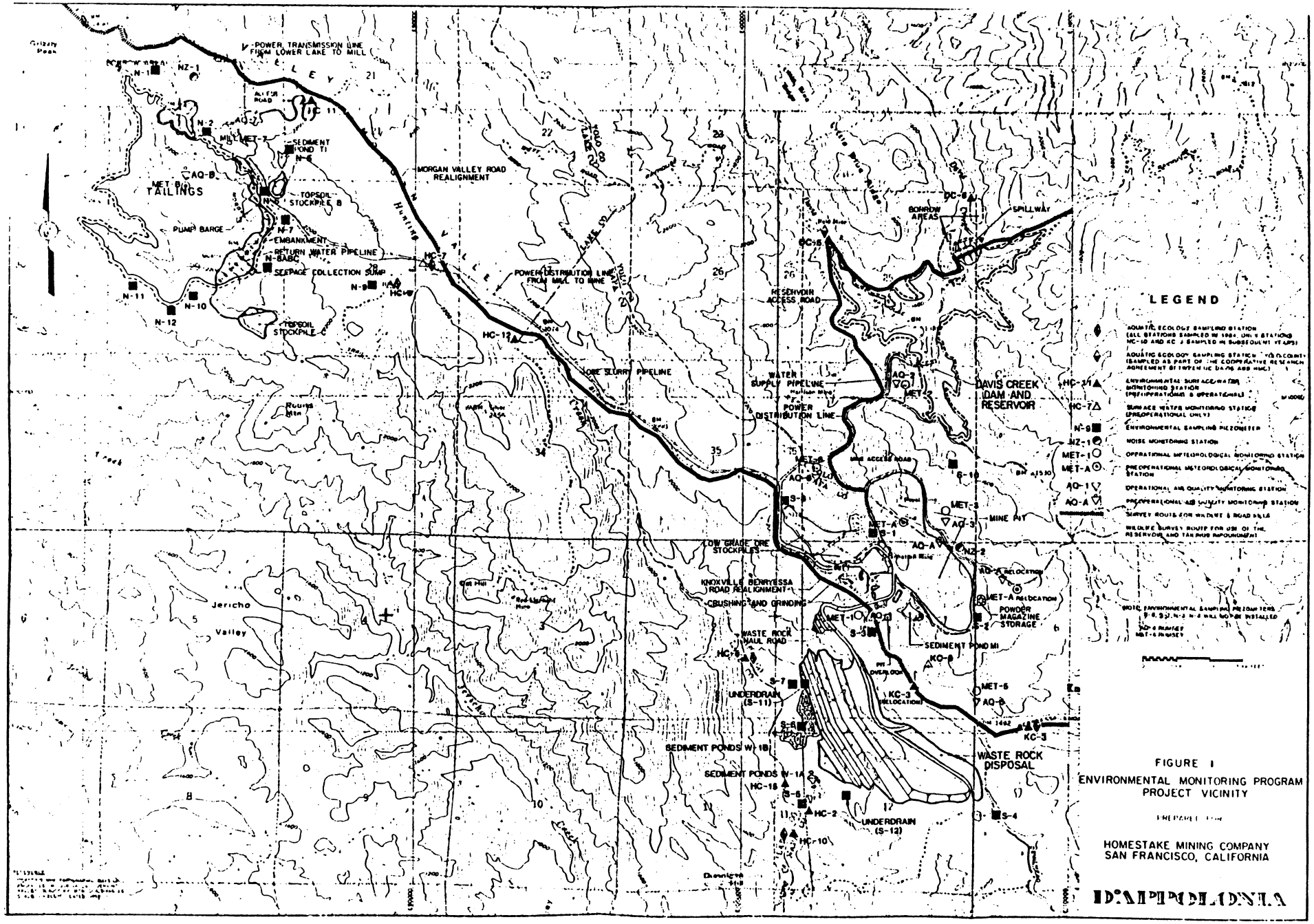


FIGURE 1
ENVIRONMENTAL MONITORING PROGRAM
PROJECT VICINITY

PREPARED FOR

HOMESTAKE MINING COMPANY
SAN FRANCISCO, CALIFORNIA

2.0 SUMMARY OF FINDINGS AND RECOMMENDATIONS: 1987 MONITORING PROGRAM

2.1 WATER QUALITY

The Water Quality Monitoring Program (WQMP) consists of surface and groundwater monitoring of the hydrologic system surrounding the McLaughlin Gold Mine Project. The monitoring program includes stations designed to monitor ambient or background water quality and regional water quality, as well as waters adjacent to the mine, the milling facilities and the water supply reservoir.

The 1987 WQMP involved the quarterly measurement of some 35 water quality variables (see Table 2-1 and Table 2-2) at 12 surface water stations and 23 groundwater stations, with additional measurements at sediment control ponds and within the process (tailings) stream. As indicated in Table 2-3, surface monitoring stations are located on Hunting Creek, Davis Creek, Knoxville Creek, Cache Creek and Putah Creek. Groundwater monitoring is conducted at wells and subsurface drains located principally in the Hunting Creek watershed.

In accordance with the requirements of California Regional Water Quality Control Board Waste Discharge Order 85-031, a summary and analysis of the water quality data collected over the preceding twelve month period (July 1986 through June 1987), was prepared by Homestake and presented in the 1987 Annual Report. The analysis focused on changes in water quality over time (temporal analyses) and comparison of data to statistically calculated maximum likely concentrations, as required under the Waste Discharge Order. These analyses also included an update of the water quality data base incorporating the 1987 measurements; a determination of water quality trends and whether variations represented significant changes in the character of waters being monitored; and recalculation of the maximum likely concentrations using the expanded data base.

2.1.1 Findings

2.1.1.1 Routine Surface & Groundwater Monitoring

Analysis of the most recent twelve months of water quality data provided the basis for the following findings, as reported by Homestake:

- No changes in surface of groundwater quality in terms of those elements or compounds which are fundamental to compliance with regulatory requirements were identified. Analytical emphasis was on those parameters most likely to be impacted by mining: cyanide, arsenic, boron, chromium, copper, lead, mercury, nickel and zinc.

- Seven apparent exceedances of maximum likely concentrations (MLC) were observed during the reporting period. All were associated with monitoring stations in the the waste rock area in Napa

TABLE 2-1

McLAUGHLIN MINE
OPERATIONAL MONITORING PARAMETERS

PARAMETER	GROUNDWATER SAMPLE TYPE N SERIES	S SERIES
Field Measurements		
pH	x	x
Temperature	x	x
Specific Conductance	x	x
Dissolved Oxygen	-	-
Flow Estimate	-	-
Groundwater Level	x	x
Oil and Grease Visual	x	x
Lab Measurements		
TDS	x	x
TSS	x	x
Total Alkalinity	x	x
Hardness	x	x
Chloride	x	x
Ammonia	x	x
Nitrate	x	x
Sulfate	x	x
MBAS	x	x
Total Cyanide	x	-
Free Cyanide	x	-
Thiocyanate	x	-
Arsenic	x	x
Barium	x	x
Boron	x	x
Calcium	x	x
Chromium	x	x
Copper	x	x
Iron	x	x
Lead	x	x
Magnesium	x	x
Manganese	x	x
Mercury	x	x
Nickel	x	x
Potassium	x	x
Sodium	x	x
Zinc	x	x
Ion Balance	Calculated by Contractor	Calculated by Contractor

x = Analyzed
- = Not Analyzed
Note: Total Metals Only in Groundwater

TABLE 2-2

McLAUGHLIN MINE
OPERATIONAL MONITORING PARAMETERS

PARAMETER	SURFACE WATER SAMPLE TYPE	
	WQMP	WQMP Plus Cyanide Series (HC-09, HC-10)
Field Measurements		
pH	x	x
Temperature	x	x
Specific Conductance	x	x
Dissolved Oxygen	x	x
Flow Estimate	x	x
Groundwater Level	-	-
Oil and Grease Visual	x	x
Lab Measurements		
TDS	x	x
TSS	x	x
Total Alkalinity	x	x
Hardness	x	x
Chloride	x	x
Ammonia	x	x
Nitrate	x	x
Sulfate	x	x
Total Cyanide	-	x*
Free Cyanide	-	x*
Thiocyanate	-	x*
Arsenic	x	x
Boron	x	x
Calcium	x	x
Chromium	x	x
Copper	x	x
Iron	x	x
Lead	x	x
Magnesium	x	x
Mercury	x	x
Nickel	x	x
Potassium	x	x
Sodium	x	x
Zinc	x	x
Ion Balance	Calculated by Contractor	Calculated by Contractor

*Additional Parameters for WQMP Plus Cyanide Series
x = Analyzed
- = Not Analyzed
Note: Total and Dissolved Metals in Surface Water

TABLE 2-3

WATER QUALITY MONITORING STATIONS

SURFACE WATER

Putah Creek

PC-01 PC-02

Hunting Creek

HC-05 HC-09 HC-10 HC-11

Knoxville Creek

KC-03

Cache Creek

CC-01 CC-02

Davis Creek

DC-04 DC-05 DC-06

GROUNDWATER

N-Series Wells - Process and Tailings Impoundment

N-01 N-02 N-05 N-06 N-07 N-08A

N-08B N-08C N-09 N-10 N-11 N-12

S-Series Wells - Mine and Waste Rock Area

S-01 S-02 S-03 S-04 S-05

S-06 S-07 S-08 S-10

S-11 and S-12 monitor waste rock underdrains

County. Four of these involved multiple parameters in one sample at underdrain station S-11, where an elevated level of total suspended solids was reported which impacted total metal concentrations. The remaining three cases were at different monitoring wells, each involving a single parameter. No recurring exceedances were identified nor were increasing trends at these stations for the parameters in question observed.

- Several water quality trends were identified which are primarily of scientific interest but which are not indicative of adverse impacts. Of the trends identified, only sulfate in the waste rock area was considered of sufficient significance.

  Both surface and groundwater water monitoring stations in the waste rock area exhibited varying levels of upward trends in the concentration of sulfate. This trend was predicted in the McLaughlin Mine EIR/EIS, and reflects the oxidation of sulfide sulphur in the waste rock producing acid which is subsequently neutralized by alkaline rock. As this process continues, Homestake expects sulfate levels to continue to rise, increasing Total Dissolved Solid (TDS) levels in Hunting Creek, as previously predicted. To date, the drinking water standard for sulfate (240 Mg/L) has not been exceeded. Continued monitoring of this trend is proposed by Homestake.

2.1.1.2 NPDES

NPDES data is collected from the discharge of sediment control dams and from receiving waters, as required by the Central Valley Regional Water Quality Control Board Order No. 85-031. Currently, two NPDES discharge points are permitted and require routine monitoring: T-1 Sediment Control Pond located below the revegetated topsoil stockpile adjacent to the Mill in Lake County, and Pond No. 7 of the Waste Rock Sediment Control System in Napa County.

Normal storm water discharges occurred from both T-1 Pond and No. 7 Pond during the 1986-1987 sampling period. Summary reports of the discharges submitted to the Water Quality Control Board indicate that compliance was maintained with criteria applicable to receiving waters for all stations. All point discharges from the waste rock area sediment control system complied with applicable discharge standards.

2.1.1.3 Other Monitoring

In 1987, sampling required in the McLaughlin Project Environmental Monitoring Manual but not included in the routine quarterly monitoring included:

- two domestic wells in Morgan Valley (Lake County).
- sampling of cooling and evaporation ponds in March and June.

- Semiannual sediment sampling at four locations.

- monthly monitoring for cyanide at five observation wells in the tailings dam (Lake County).

- quarterly composite sampling of tailings and tailings seepage return sump (Lake County).

- quarterly tailings CAM-WET analysis for non-hazardous determination.

Data collected in 1987 continued to show no presence of cyanide within the tailings embankment, and that the tailings dam continued to function as designed. Tailings samples continued to test as non-hazardous, with concentrations within levels expected during operations for total and filtered values.

Sediment data collected in 1987 showed no clear trends. Homestake suggested that the usefulness of these data may be questioned given the annual variations in stream sediment deposition and runoff patterns, and the variability within samples collected at the same time at the same site. Homestake expects that as additional data are added to the record and further formal analysis is conducted, the usefulness (or lack thereof) of sediment data to monitoring project related impacts should become clear.

The cooling pond and evaporation pond generally reflect expected operational values for metals and volatile organics.

Data for domestic wells showed no unusual variations in 1987 and generally met drinking water standards.

2.1.2 Recommendations

Homestake has proposed the following recommendations for the 1987-88 monitoring year:

- Continue monitoring surface and groundwater quality in accordance with the current Water Quality Monitoring Program, as modified in April 1987, with the exception of monitoring for asbestos.

- Eliminate monitoring for asbestos fibers in water. Homestake suggested that the data do not provide information useful in determining potential project impacts.

- Continue to scrutinize sulfate, calcium and TDS at monitoring stations associated with the Waste Rock Dump Facility.

2.1.3 Technical Review

The Regional Water Quality Control Board has reviewed the 1987 Annual Water Quality Monitoring Report and the proposed recommendations contained therein. In a letter dated January 20, 1988, the Board notified Homestake of the following findings (see Appendix A):

- Concurrence that the McLaughlin Project has operated within all permit and waste discharge conditions.
- Sediment monitoring should continue, given the nature of the project.
- Concurrence that monitoring for asbestos does not yield meaningful results, due to the ubiquitous serpentine in the study area. (The Board proposed to delete such monitoring when the NPDES permit is renewed.)

The Regional Board also reiterated the need for continued trends analysis of water quality parameters at sites in the waste rock areas, with particular attention given to sulfate, calcium and TDS. The Board noted that exceedance of the MLC's will not be construed as a violation of waste discharge requirements. The MLC's function only as a statistical reference to predict initial indications of change.

2.2 AIR QUALITY AND METEROLOGY

The Air Quality Monitoring Program (AQMP) documents air quality effects of project activities. Included in the program are meterology, ambient air quality, and source emission monitoring, and quality assurance programs. These programs are responsive to requirements established by the local air districts: the Bay Area Air Quality Management District (BAAQMD), Lake County Air Quality Management District, and Yolo-Solano Air Pollution Control District.

The objective of the AQMP is to collect Total Suspended Particulate (TSP) and PM-10 particulates, and meterological data to characterize climatological, meterological, and ambient air quality conditions during project operation. Based upon these data, the nature and extent of impacts to the existing air resources from the McLaughlin Project are determined.

The Air Quality Monitoring Network was designed in consultation with the local air pollution control agencies. The monitoring network is composed of seven stations, three of which are located in Napa County. Homestake personnel are responsible for day to day operations of the AQMP, while contractors provide technical support both in the laboratory and in the field.

2.2.1 Findings

Focus of the air quality monitoring in Napa County is on documenting TSP levels, as required by the Permit to Operate issued by the BAAQMD. As in

prior years, project activities in 1987 did not exceed either the TSP standard of 150 micrograms/cubic meter or the PM-10 standard of 50 micrograms/cubic meter. The Air Quality Management District determined that the McLaughlin Project has remained in compliance with its Permit to Operate.

Particulate mercury and arsenic is measured at four air quality stations around the mine. The 1987 data indicate that concentrations remained very low, with the only apparent trend showing a decrease in values over those reported in 1986. Asbestos monitoring during the 1987 reporting period indicated no detectable levels were recorded.

No significant meterological events occurred during the reporting period for 1987. Rainfall was one-third below normal for the year. Low rainfall from October through January, coupled with agricultural burning was suggested as responsible for poor visibility. Local controlled burning was purported as the cause of high particulate measurements in the last three weeks of April 1987.

Wind frequency distribution monthly data revealed that the wind blew from the mine toward Rumsey (Yolo County) for an avererage of 3% of the reporting year.

The Air Quality Monitoring Assurance Program of the McLaughlin Project consists of three major components: operations, calibrations and audits. The operation of the Air Quality Network is conducted in accord with the Environmental Monitoring Manual. Calibrations are provided quarterly by Homestake personnel and verified by an independent contractor. In 1987, all calibrations were completed on schedule and were verified.

The firm Environmental Research and Technology (ERT) conducted an initial quality assurance audit for verification of the data collection and measurement systems during April 1987. This audit assessed the siting of all the monitoring stations, and performance audit checks at Station AQ-2 were conducted. In addition, the central data collection system, data files, log books and maintenance/calibration records were examined. Areas for improvement were reported by ERT, particularly in regard to documentation of procedures which ERT reported are being addressed by Homestake.

2.2.2 Recommendation

Homestake has proposed the following changes be made to the Air Quality Monitoring Program:

- That high volume air sampling stations at the mine pit (AQ-3) and in Rumsey (AQ-4), both located in Yolo County, be removed from the sampling network. As in 1986, it is suggested that substantial redundancy in the air quality sampling network has been demonstrated.

- Asbestos monitoring at Station AQ-2 , located in Yolo County, be discontinued based on three years of data which demonstrates no asbestos in the air.

- At the completion of 24 months of monitoring, both ambient air and source monitoring in Lake County should be reviewed and the monitoring frequency reduced to annual sampling.

2.2.3 Technical Review

Focus of air quality monitoring in Napa County is on documenting TSP and PM-10 levels, as required by the Permit to Operate issued by the BAAQMD. Based on information gathered in 1987, BAAQMD determined that the McLaughlin Project has been in compliance with current PM-10 and TSP standards.

Homestake has made no recommendations to modify the air quality monitoring program as it relates to Napa County.

2.3 AQUATIC ECOLOGY

The 1987 Aquatic Ecology Monitoring program included monitoring of fish and benthic macroinvertebrate populations at select locations in Knoxville Creek and Hunting Creek. In addition, trace element concentrations in fish were monitored.

The current monitoring program reflects refinements made to the sampling program over the past four years. Initially designed to characterize baseline conditions, the program was reduced and focused in 1986, with sampling primarily in April of each year and concentrating on four monitoring sites: HC-5, HC-7A, HC-10 and KC-3 (see Figure 2-1). While adding to the data base, the 1987 monitoring effort permitted an even more rigorous analysis of the normal variability among samples, sites, seasons and years. This information is essential to answering meaningful questions regarding potential pollutant effects on biota of Knoxville and Hunting Creeks.

Bodega Research Associates (BRA) has conducted the aquatic monitoring program since 1984. BRA designed the initial baseline monitoring program and has worked closely with Homestake, as well as the California Department of Fish and Game, in tailoring the ongoing monitoring effort to meet operation program objectives. Findings reported by BRA for the 1987 monitoring effort are summarized below:

2.3.1 Findings

2.3.1.1 Benthic Macroinvertebrates

The four sites examined in April 1987 contained 85 different taxa of aquatic macroinvertebrates, all typical of that found in upland streams of the Northern California Coast Range. Both the number of taxa collected and the mean number of individuals collected varied between monitoring sites, with

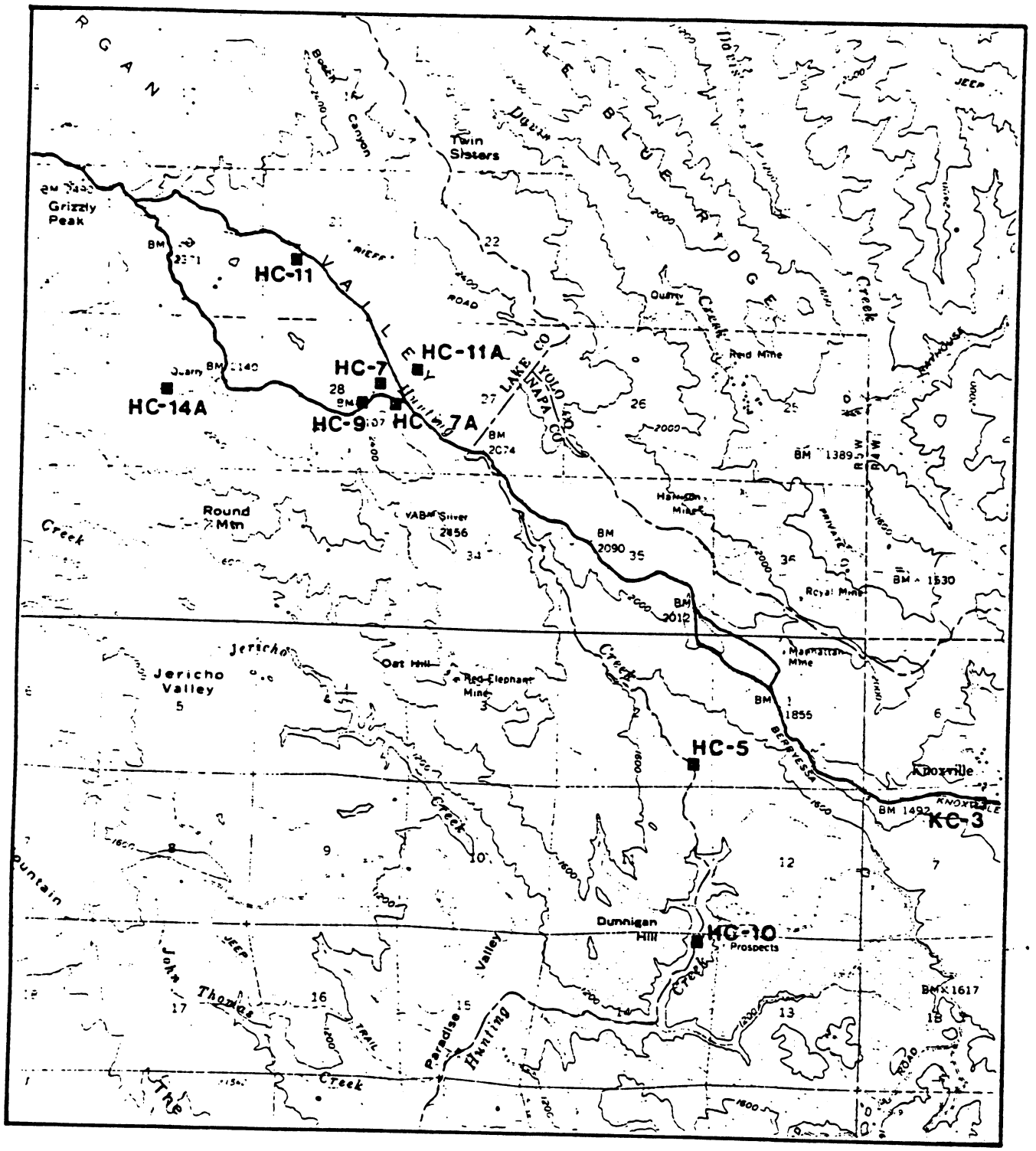


Figure 2-1. Locations of aquatic ecology monitoring sites in Lake and Napa Counties. Scale approximately 1 inch equals 1 mile. From USGS 15 minute series Morgan Valley Quadrangle.

highest species richness found at HC-10. Whereas species richness parameters were found to be highly variable, the direction of annual variability was found to be very similar among sites. Three of the four sites recorded their highest total species richness in 1987, as well as their highest mean taxa per sample. In terms of annual variability in densities, values were higher in 1987 than in all previous years at KC-3 and HC-10, lower than in previous years at HC-7A, and intermediate to previous years at HC-5. Annual variability in density was noted as greater at HC-5 than at the other three sites.

Numbers of taxa that were present in the different years of the monitoring program have varied greatly. The highest percentage of taxa occuring in all four years was found at Site HC-10 (32%), the lowest at KC-3 (15%). In contrast to the variability in the benthic community between sites noted above, similar species of macroinvertebrates have numerically dominated the community.

Apart from providing additional data on species diversity and density, results from the 1987 benthic macoinvertebrate monitoring effort continue to depict a high degree of annual variability in the composition and abundance of the local benthic community. The annual changes have been found to be typical of streams in the Northern California Coast Range, and are related to patterns of precipitation and resultant stream discharge, rather than to changes associated with project activities. BRA suggested that low rainfall at high flow sites (HC-5 and HC-10) results in richer spring community because of reduced winter scouring. At low flow sites (KC-3 and HC-7A), low rainfall in the preceding year appears to reduce spring species richness because of drought-related effects from the previous summer.

In 1986, BRA reported a statistically significant decline in the mean number of taxa/sample at site KC-3. At the time, BRA was unable to ascertain from the date which of two events - below average rainfall in 1985/discharge from sediment Pond M-1 into Knoxville Creek -- produced the decline in the benthic community noted in April 1986. The 1987 data indicate that, whichever the case, a strong recovery of invertebrate populations at KC-3 has occurred.

2.3.1.2. Fish Populations

In 1987, a total of four different fish species were collected over the entire study area. Consistent with prior years data, this low diversity of fish species is typical of California Coast Range streams of the size range found in the project area. California roach, a minnow with a wide tolerance for physical conditions remains the only widespread and abundant species in Hunting and Knoxville Creeks, where high temperatures and low flow rates are the usual late summer and fall conditions. As in previous years, the highest diversity of species was at site HC-10 on Hunting Creek, located downstream from all project activities, were the highest flow rate and deepest pools were observed.

In general, California roach populations in Hunting Creek were found to be healthy and maintaining densities which are typical for the area. The April densities of roaches in HC-10 have been found to be quite stable over the period 1984 through 1987. Densities at HC-5 have fluctuated much more widely, while moderate variation in densities were noted at HC-7A.

As in 1986, only one California roach was collected at the Knoxville Creek site. In 1984, 90 California roach were collected per 100 foot station, and in 1985, the density was 36 per station. BRA suggests that this dramatic decline in densities at KC-3 may have resulted from recent hydrological events relating to rainfall patterns, or from the discharge from Sediment Pond M-1 in February-March 1986. This discharge caused temporary localized chemical changes in Knoxville Creek, including a lowering of pH. The data are inconclusive, however, BRA continues to believe natural hydrological events are responsible for the persistance of the decline in roach populations.

BRA noted that water quality appears not to be a factor in preventing recovery of California roach populations at the KC-3 site, as evidenced by the persistance of high densities of roach immediately downstream of the station. As in 1986, high densities of California roach were found to be present within 200 feet downstream of the KC-3 site. BRA therefore believes that California roach invade Knoxville Creek at the KC-3 site when conditions permit, but that hydrologic factors periodically cause the fish to become locally extinct. There is a small barrier, a waterfall approximately 18 inches high immediately below the KC-3 station, which BRA believes may only be passable under moderate flow conditions. Water flow at KC-3 in 1987, although low, appeared to be sufficient to support fish.

As in prior years, BRA found that the size distribution of California roach varied among sampling sites, due in part to their short lifespan (3-5 years). However, other contributing factors, including spawning dates, recruitment rates and growth rates may also vary among sites.

Condition factors for roach at all sites have exceeded 1.3 since BRA began reporting these data in 1985. In 1985, BRA noted that condition factors could be used as an indicator of general status of the fish population, and recommended that any factor below 1.1 be regarded as indicating a population under stress. The condition factors of the roach in 1987, indicate that the population is healthy and in good condition. In addition, BRA noted that an increase in abundance of three other fish species at HC-10 in 1987 was indicative that conditions remain well within physicological tolerance levels.

2.3.1.3 Trace Element Monitoring

Concentration of seven elements analyzed in California roach samples pooled in 1987 add to the base of data describing sample variability and annual variability in these elements at the four primary monitoring sites. Comparing all four sites across years, BRA found no marked changes in trace element concentrations. Chromium (Cr) and Nickel (Ni) concentrations were

found to run counter to the correlation between the two metals observed in 1984 and 1985. The relatively small magnitude of change noted for these metals - Cr concentrations lower in 1986 and 1987 and Ni concentrations generally higher - occurred at all sites, irrespective of nearness to mining operations. At this time, BRA remains uncertain whether these indicate real changes in environmental levels, sampling variability, or analytical artifacts.

Mercury concentrations in pooled fish samples showed no consistent trend in 1987. Throughout the study, mercury levels have been low at HC-7A, while at HC-5 and KC-3 they have been low to moderate. At HC-10, mercury levels increased in 1986 and 1987, reaching the highest level (.50 ppm in one sample) yet recorded for the study. BRA noted that even this level remained within the range of concentrations reported for fish tissues in Northern California streams.

Trace element monitoring of fish collected downstream of KC-3 in April 1986 and 1987, did not show highly elevated concentrations of heavy metals. As noted, the study team believes that the level of metals concentration detected in Knoxville Creek confirm that hydrologic conditions and not chemical changes related to the M-1 Pond discharge, are responsible for annual variability of fish population density. Finally, BRA concluded that data collected over the study period to date, do not indicate any detrimental increase in environmental levels of heavy metals in Hunting Creek and Knoxville Creek caused by mining operations.

2.3.2 Recommendations

Homestake is proposing that the focused monitoring program implemented in 1986, continue without moification in 1988. Citing the detection and interpretation of changes in the aquatic ecology of project area streams, BRA believes that the reduced monitoring program has functioned efficiently and productively.

2.3.3 Technical Review

The California Department of Fish and Game has been directly involved in the Aquatic Monitoring Program, providing on-site field inspection and technical review of the annual report. The CDFG has reviewed the 1987 Annual Aquatic Monitoring Report and found the report to be acceptable (see Appendix A). California Department of Fish and Game concurs with Homestake that the focused monitoring program implemented in 1986 should continue unaltered. In addition, CDFG suggests that monitoring on Knoxville Creek downstream of KC-3 at the site BRA visited in April 1986 and 1987 should continue in 1988. The basis for this recommendation follows from BRA's belief that given a return to normal flow conditions at KC-3, recovery and recolonization of the site will occur. Until such time as measurements taken during the April sampling period substantiate that recovery at KC-3 has occurred, CDFG believes that supplemental monitoring (as conducted by BRA in 1986 and 1987) will be needed.

2.4 VEGETATION

The 1987 Vegetation Monitoring Program included monitoring of previously reclaimed areas (reclamation success), sensitive plants and the management of contiguous lands unaffected by mining. Results of the monitoring program are discussed below, together with recommendations for the 1988 monitoring effort.

2.4.1 Findings

2.4.1.1 Sensitive Plants

The Sensitive Plant Monitoring Program has been designed to evaluate the direct and indirect effects of project construction and operation on sensitive plant populations in close proximity to project operations (including roads). To accomplish this goal, Biosystems Analysis Inc. (BSAI) in consultation with the Napa Chapter of the California Native Plant Society (CNPS) began, in the Spring of 1985, surveys of selected sensitive plant populations and the establishment of reference monitoring plots. Monitoring of these selected sensitive plant populations continued during the 1987 spring survey period.

A total of 36 sensitive plant occurrence areas were visited by BSAI. All populations surveyed are in close proximity to the main Project features including: tailings pond, mill site, access roads, slurry pipelines, mine site, waste rock area, and Davis Creek Reservoir. Several new populations were located in the project area during the 1987 monitoring surveys. None of these populations were threatened by any of the ongoing operations. On the contrary, as in 1986, some of these populations appear to have resulted from perturbations associated with facility construction. BSAI noted that the new plant species identified often respond favorably to reduced competition and reoccupy newly bared serpentine soils.

In general, all populations of sensitive plants observed during the 1987 monitoring surveys were found to be smaller in number or absent all together, in comparison to 1986. BSAI suggested that this was not unexpected due to below normal rainfall in the region and hot early spring temperatures. It was noted that this was the general response observed for annual vegetation throughout the State in 1987. The declining population trends appeared to be proportionally equal between fenced and unfenced populations suggesting that grazing or the lack of grazing may not be selectively impacting the populations. Both fenced and unfenced populations showed no evidence of wind or water born pollution or an inordinate increase in insect damage.

The 1987 monitoring surveys indicated that no new disturbances to sensitive plant populations had occurred from operation of the McLaughlin Project. Construction of the East Waste Rock Dump, approved in July 1987 was expected to result in the displacement of certain plant occurrences.

Construction of the East Waste Rock Dump facility is also expected to result in the salvage of sensitive plant site No. 51, the stand of Thelypodium brachycarpum located adjacent to the main waste rock area.

No sensitive plant population in the vicinity of the mine in Napa County exhibited signs of toxicity from air or water born pollutants caused by mining operations. No significant indirect impacts were observed to be continuing from previous years. No other indirect impacts on the sensitive plant populations in close proxmity to project facilities were observed.

Efforts to re-establish the Thelypodium brachycarpum in areas outside the waste rock dump continued in 1987. The CNPS has continued with its program of seed collection and plantings at sites identified during monitoring studies as good potential transplant locations. A total of 11 T.brachycarpum plants were collected on-site in 1987 and transplanted elsewhere in the mine area, with good success. Homestake continued to provide protection of the existing stand of T. brachycarpum located in the main waste rock area, and has indicated that the site may not be removed for at least another three years, and may not be disturbed during the life of the project.

2.4.1.2 Reclamation Success

Revegetation efforts in 1987 focused on completing the seeding on disturbed lands, monitoring of some 6300 liner trees and shrubs planted in January 1986 to establish visual screening, and ongoing reclamation research and test plantings to evaluate reclamation methods.

The 1986-87 revegetation program was implemented on 75 acres of disturbed land and was found to be successful in controlling erosion, the primary objective of revegetation. Focus of the revegetation effort was on slopes along the reconstructed portion of the Morgan Valley Road near Lower Lake (Lake County), the area northeast of the processing plant which was converted from Chaparral to grassland to reduce fuel load, and the west-facing slope of the waste rock pile adjacent to the sewage treatment pond in Napa County. In addition, a major effort to evaluate the success of the woody planting program was conducted in October 1986.

In the 1987 revegetation evaluations, plant cover was found to be sparse on three types of areas: waste rock piles, serpentine areas and rocky cut slopes. Portions of the waste rock dump adjacent to Berryessa-Knoxville Road were revegetated in 1985-86 using run-of-mine fine materials rather than topsoil, as required. This limited revegetation effort was established by Homestake to test alternate reclamation methods. In 1986, plant cover on waste rock was sufficient to prevent erosion. The 1987 Survey indicated that very little regermination on the waste rock plantings had occured. In the May 1987 evaluation, it was noted that the sparse vegetation did prevent erosion. As discussed in the recommendation section below, testing of the waste rock and refertilization experiments to improve long term sucess is proposed.

Plant cover on serpentine rock and soils has been sparse since the start of the revegetation program. Revegetation of serpentine soils and rocks, at the site without continued refertilization has met with little success. Serpentine slopes are often geologically unstable, and thus not able to support plants. The experience at the McLaughlin Project site is consistent with efforts and success rates noted by the Soil Conservation Service and Cal Trans.

Plant cover was also noted as sparse on rock cut slopes. Rock slopes are generally not conducive to plant growth as there are few fractures for plant roots to grow into on slopes of consolidated rock, and little water and few nutrients can be held in the fractures.

In May 1987, an on-site evaluation of revegetation on areas planted from 1983 through 1986 was completed. It was observed that species composition has changed over time, with annual grasses being predominant in the first year, followed by emerging perennials grasses and clover in the second year. By the third year perennial grass is predominant with native grasses becoming more abundant.

The focus of the tree and shrub planting effort through the 1986-87 monitoring period was to evaluate survival rates of plantings placed in 1986. As indicated below, a total of 6373 woody plants were installed in January 1986.

County	Planting Area	No of Plants (Jan 86)	Survival (Oct 86)	Percent Survival
Napa	Sewage Treatmant Pond and Truck Ramp	1,698	790	47%
Napa	Berms around Storage Area	620	62	10%
Napa	Waste Rock Dump	2,251	857	38%
Napa	Tunnel Area	987	549	56%
Lake	Morgan Valley Roadsides	475	244	51%
Lake	Pinic Area	342	265	77%
	Total:	6,373	2,767	43%
	Napa	5,556	2,258	40%
	Lake	817	509	62%

Trial plantings were installed and monitored by Circuit Riders Poductions, Inc. and designed to evaluate individual species and planting methods. Initial monitoring of success in October 1986, in terms of

percent survival indicated a low overall success rate of 43%. In Napa County where the majority of plantings were placed, and where serpentine soils are more pervalant, only 40% survival was reported. An additional survey of survival success in the Spring 1987 indicated that certain plants thought to have died, had in fact regerminated. Thus the actual survival rate for woody plants is thought to be slightly higher than initially reported in October 1986. Reasons for the low survival rate identified by the consultant included mismatching of species to soils/sites, and competion from grasses (Ciruit Riders Productions, Lisa Bush, pers. comm. April 1988). Adjustments have been made to the planting program to better match species to given soils types/sites, and success rates are expected to be higher in future years. To maintain the shrub density specified in the Project Master Reclamation Plan (1500 tublings/ac) a program of replacement by replanting has been intiated.

In general, revegetation efforts have been successful in establishing grass cover adequate to stabilize disturbed areas and control erosion. Program modifications on the use of woody species at the site are expected to result in a higher survival rate for trees and shrubs. Most areas reclaimed to date are adjacent to undisturbed areas and native species from undisturbed sites have noticeably invaded the revegetated areas.

2.4.1.3 Management of Contiguous Lands

The McLaughlin Project Study Area encompasses approximately 8,500 acres of land under Homestake's jurisdiction. Of this total, approximately 1,200 acres is associated with mining activities and is managed under the Master Reclamation Plan approved for the Project. The remaining 7,000+ acres of land are proposed to be managed in accord with goals and objectives established in the McLaughlin Mine Continguous Land Management Plan (CLMP). The Management Plan was developed in response to Use Permit requirements and was prepared by a group of private consultants, including participants from both U.C. Berkeley and U.C. Davis.

Several management programs have been established within CLMP, each with a different set of objectives. These Programs include:

1) Hazard Reduction: responds to the need to protect personnel and facilities by reducing wild fire hazards.

2) Shoreline Development: consider management of ecological system changes resulting from introduction of large reservoir into an otherwise dry environment.

3) Sensitive Plant Restoration

4) Pastureland Use

5) Habitat Restoration and Improvement: focus is on brushland and woodland habitat management and development of water resources.

6) Education and Research: The CLMP program is organized to provide the necessary basis for research activites by regional education institutions.

To enable successful administration of these six programs, CLMP has been structured to allow for flexible implementation. Rather than immediate intervention, CLMP has been built around an ongoing evaluation of management needs. The Plan is not regarded as standing above, but rather is seen as integral with other environmental programs at the mine. Foremost among these are the monitoring and reclamation programs.

Incorporation of monitoring feedback as input to management decisions is a key factor of CLMP. By design, the initial management thrust is to eliminate or minimize human intervention in the natural sucessional process and to systematically collect data on the consequences of this approach. Decision to intervene are to be based on this feed back.

The organization of CLMP recognizes the need for coordination with federal and state agencies. The Bureau of Land Management (BLM) manages large land holdings adjacent to the CLMP area, the California Division of Forestry provides assistance with controlled burning, and the California Department of Fish and Game lends technical expertise in the area of fire and wildlife management. The CLMP was prepared based in part on input from these and other agencies and is structured to allow these agencies to work with Homestake, as the company implements various management programs to effectively manage their property.

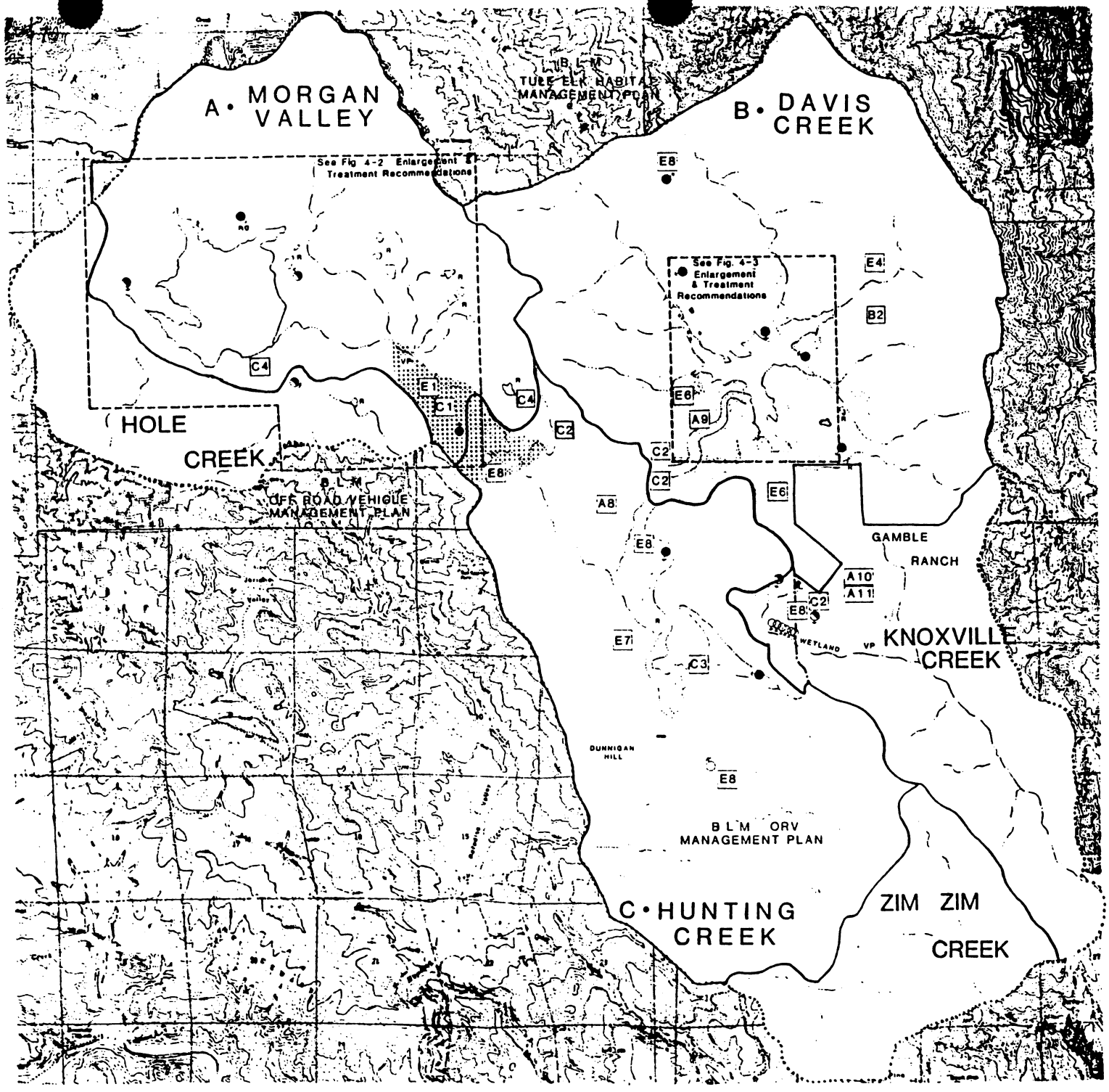
In this regard, the CLMP identifies three (3) Management Units which encompass a total area of some 17,300 acres of land (Figure 2-2). These management areas include lands managed by BLM, as well as by large private ranching concerns. The management units were established to guide Homestake as it implements recommendations for lands management set forth in CLMP. Inclusion of adjoining lands not directly controlled by Homestake was done to permit the realization of joint opportunities while avoiding conflicts with the management plans of neighbors.

CLMP will be administered by the McLaughlin Mine Environmental Management Department. Activities to be undertaken by Homestake to implement the various programs detailed in CLMP are listed on Figure 2-3.

2.4.2 Recommendations

Biosystems Analysis Inc. has recommended that a total of 15 of 59 sensitive plant monitoring sites be dropped from the monitoring program due to total displacement by facilties or no envidence of impacts by development of the McLaughlin Project. One site was identified by BSAI for use in monitoring grazing activities on sensitive plant populations. Further, BSAI recommended that fencing around the existing T. brachycarpun population be repairea.

The consultant retained by Homestake to conduct the revegetation monitoring program has recommended that the two seed mixes used in the 1985 planting season be used for the 1987-88 program. No change in soil amendments and type of mulch are recommended. In addition, no remedial seeding or fertilizing was recommended. The consultant recommended that grazed areas



HOMESTAKE MINING COMPANY

CONTIGUOUS LANDS MANAGEMENT PLAN

for the

McLAUGHLIN MINE
Lower Lake California

Compiled December 1987

ELGAR HILL
Environmental Planning &Analysis
Penngrove, California

MANAGEMENT UNITS & TREATMENT AREAS

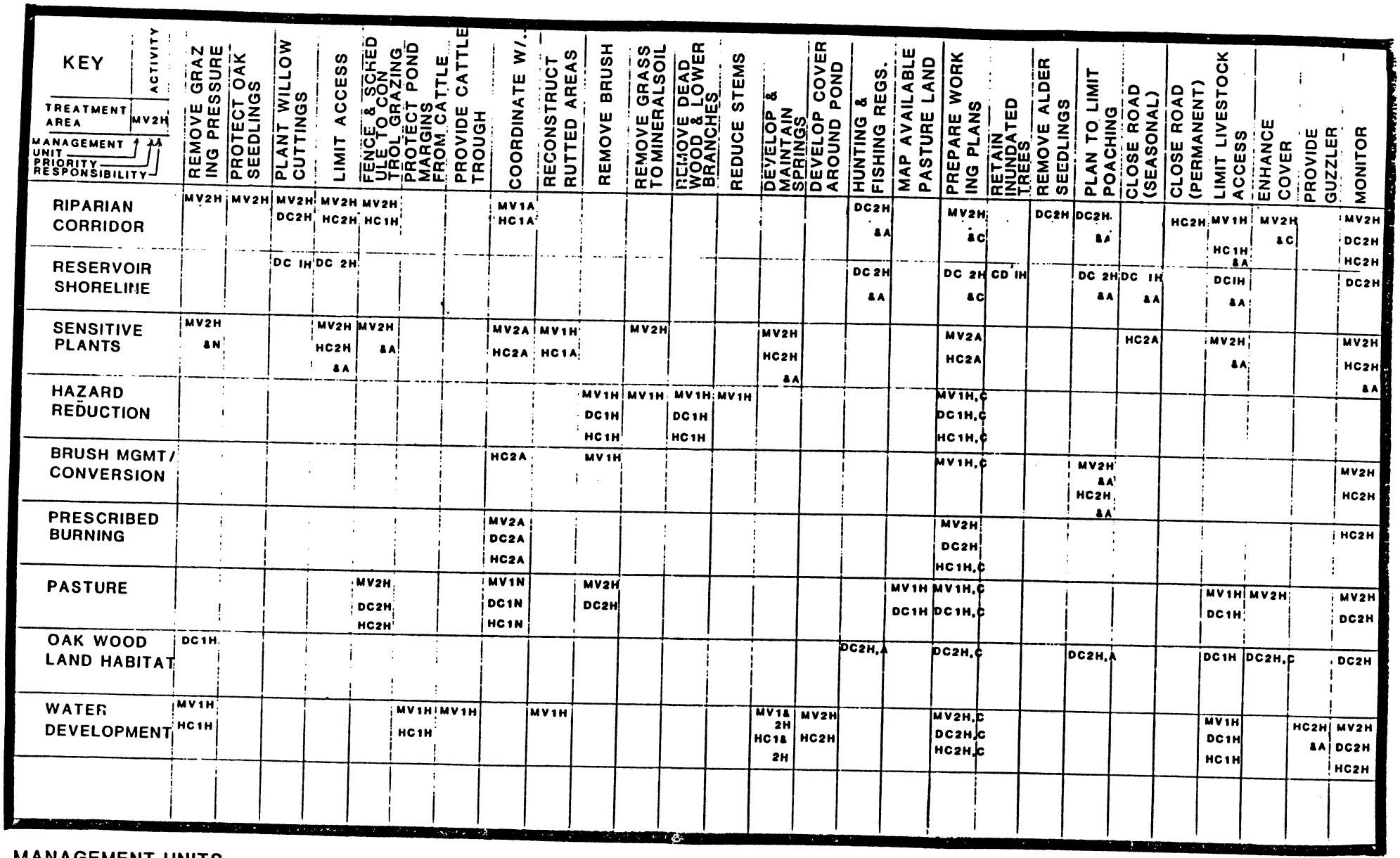
LEGEND

- SEE SENSITIVE PLANT MAINTENANCE PLAN
- DRY WOODLANDS
- TREATMENT AREAS See Table 5-1
- PERENNIAL SPRINGS
- INTERMITTENT SPRINGS
- SEEPS
- R PONDS & RESERVOIRS
- VP VERNAL POOLS
- PERENNIAL STREAMS
- SEASONAL STREAMS

100 ACRES

SCALE IN FEET

FIGURE 2-2



MANAGEMENT UNITS

- MV MORGAN VALLEY
- DC DAVIS CREEK
- HC HUNTING CREEK

PRIORITIES

- 1 IMMEDIATE ACTION
- 2 LONG TERM ACTIVITY MONITOR RESULTS

RESPONSIBILITY

- H HOMESTAKE PERSONNEL
- C CONSULTANT/CONTRACTOR
- A AGENCY
- N NEIGHBOR

ACTIVITY CHART

FIGURE 2-3

be examined in the early spring of 1988 to determine how much grazing revegetated areas can withstand and still remain stable in terms of erosion. Recommendations with respect to seed mix changes to reduce fuel load in areas around the mine building and to limit competition with shrubs and trees were provided by the consultant. Revegetation of the waste rock dump area is expected to be the largest area to be reclaimed in future years. Currently, two waste rock dumps have been permitted: the east waste rock dump south of the mine pit adacent to M-1 Pond; and the main waste rock dump west of Berryessa-Knoxville Road. Based upon the low survival rate for both grasses and woody plants on some waste rock areas using run-of-mine fines rather than topsoil, the consultant has recommended a soils testing program leading to the establishment of test plots on certain waste rock locations for the 1987-88 program.

2.4.3 Technical Review

The U.S. Bureau of Land Management has reviewed the recommendations regarding the 1987-88 Vegetation Monitoring Program and has advised the Planning Division that is finds them acceptable. The California Native Plant Society concurs with the recommended changes to the sensitive plant monitoring program. The California Department of Fish and Game has reviewed the CLMP and the recommendations contained therein and finds them acceptable (see Appendix A).

2.5 WILDLIFE

The objective of the Wildlife Monitoring Program is to detect changes in the abundance or health of wildlife populations. Specifically, the program design provides for identification of changes that are attributable to the McLaughlin Project, potentially avoidable, and sufficiently important to require corrective measures.

As identified in the McLaughlin Project EIR/EIS, potentially avoidable impacts that justify monitoring and corrective measures, if necessary, include:

1. Exposure of wildlife to hazardous wastes.
2. Disturbance to Golden Eagle nests.
3. Road kills

In 1986, the Wildlife Monitoring porgram was modified with the addition of systematic monitoring in the tailings impoundment area in Lake County. The Wildlife Monitoring Program was further amended based on recommendations from the California Department of Fish and Game, calling for an in-depth survey of wildlife use at Davis Creek Reservoir and the tailings impoundment for a two-year period with certain monitoring protocols to be conducted at a limited frequency thereafter.

2.5.1 Findings

2.5.1.1 Exposure of Wildlife to Hazardous Wastes

Exposure to hazardous wastes is potentially the most immediate danger posed to wildlife from the McLaughlin Project. The wildlife monitoring program has therefore been designed to document wildlife exposure to project waterbodies identified as potentially hazardous. Given the chemical composition of the tailings and waste rock deposits, use by wildlife, particularly water fowl, of the tailings impoundment, sediment control basins and water collected in the mine pit is of particular concern. Data collected to date indicate that none of these waterbodies can be considered hazardous.

Monitoring of potentially contaminated waterbodies in the project area was initiated in the spring 1985. Through the 1985-86 reporting period, focus of the monitoring effort was on Davis Creek Reservoir. Beginning in 1987 (and continuing in 1988), pedestrian surveys conducted by Ecological Reserarch Associates (ERA) have been used to document wildlife use of both Davis Creek Reservoir (Yolo County) and the tailings impoundment (Lake County). Documentation of wildlife use of the waste rock sediment control ponds and the mine pit area is based upon intermittent, casual observation by Homestake personnel, contractors and researchers. Data collected in 1986-87 continued to show a wide diversity of species present in the project study area. Species diversity in 1987, however, was not as great as in 1986. Fourty-three bird species document in 1986 were not sighted in 1987. However, an additional five bird species were newly observed. Ten previously sighted mammal and herptile species were not sighted in 1987; five new species were observed. Reasons for all reported species from previous years not being observed in 1987 was attributed by Homestake to a less rigorous study of wildlife during the operations phase. The purpose of the wildlife monitoring during operations is to monitor relative abundance and health of the more common resident species rather than documentation of all species present.

As reported by Homestake, the distribution of recorded sightings in 1986-87 among project area waterbodies varied considerably. Not surprisingly, a much higher diversity of bird species were recorded on or around Davis Creek Reservoir (85) as compared to the tailings pond (31), which is essentially devoid of life. Common mammals tracked at both the Davis Creek Reservoir and the tailings pond include mule deer, coyotes and raccoons. Actual usage of the reservoir and the tailings pond was reported to follow a pattern which correlates exactly with the scarecity of other water sources. Usage peaked in summer and fall and was reproted as minimal during the wet winter months.

The tailings pond continued to be classified as a non-hazardous waste impoundement by the California Division of Health Services in 1987. This condition is verified by water quality tests on a quarterly basis. Wildlife usage of the tailings pond is discouraged by (1) the clearing of shoreline vegetation, creating an unattractive barren habitat zone surrounding the

pond; and (2) the erection of a chain link and barbed wire wildlife exclusion fence around the tailings compound. Usage of the tailings pond in 1987, in relation to smaller peripheral ponds, was reported as low; the peripheral ponds being the preferable habitat for waterfowl. It is suggested by ERA that mammals tracked at the tailings pond indicate that the wildlife exclusion fence is largely ineffectual.

2.5.1.2 Disturbance of Golden Eagle Nests

One objective of the wildlife monitoring program is to determine whether the Federally-protected Golden Eagle has established nests near project facilities. If so, protective buffer zones are to be established around active nests.

Surveys of both project lands and surrounding areas were conducted in 1982 (pre-project) and again in 1984 (pre-operations). Since 1985, aerial surveys of the project area have been conducted by biologists from Biosystems Analysis, Inc. Results of the 1987 survey continue to confirm earlier findings:

1) While the country surrounding the project site contains suitable breeding habitat for golden eagels, no active eagle nests have been located in the project area.

2) Although no eagles were observed during the 1987 survey, continued casual sightings by Homestake personnel indicate that the project site remains within the hunting range of birds nesting in the Cache Creek and Lake Berryessa areas.

As with prior surveys, results from 1987 indicate that breeding habitat for the golden eagle remains distance from project features. The wildlife surveys conducted by ERA throughout 1986-87 did highlight the attraction that Davis Creek Reservoir has had on fish-eating birds. The researcher from ERA noted, however, that eagles were not observed fishing. This was attributed to the fact that while eagles may winter in the region, the possibility of feeding at the reservoir is essentially precluded by the fact that during winter months, both the reservoir bass and suckers reside in deep water.

2.5.1.3 Roadkills

Increased vehicular traffic due to development of the McLaughlin Project was identified in the EIR/EIS as a potential cause for increased levels of mortality and injury to wildlife. No pre-project data on roadkills in the project area exist, therefore, the monitoring program was initially designed simply to provide for a determination of the rate of roadkills by species.

Limited data on roadkills has been presented in Annual Reports prepared by Homestake. In 1987, the monitoring program was modified, dropping the requirement for monthly surveys and providing for routine collection of data, documenting all kills discovered by employees traveling Morgan Valley and Berryessa-Knoxville Road on a daily basis. The latter is the procedure specified in the Environmental Monitoring Manual, and is recommended by the California Department of Fish and Game.

Limited data on roadkills is presented in the 1987 Annual Report. No indication of excessive species mortality rates and/or identification of localized areas where roadkills were prevalent was noted. Traffic data for 1987, as in prior years since project development, indicate an increase in average daily traffic on Morgan Valley and Berryessa-Knoxville Road. It is therefore assumed that roadkills have increased in the project area along with the increase in traffic.

2.5.2 Recommendations

Homestake has proposed that the Wildlife Monitoring Program continue in its present form, as modified in 1987.

2.5.3 Technical Review

The California Depatment of Fish and Game (CDFG) has reviewed the 1987 Annual Monitoring Report on wildlife, and finds the report acceptable. The CDFG also reviewed the Contiguous Land Management Plan. The Plan was part of the mitigation requirements for the project and was prepared in response to a specific request by the Department of Fish and Game. The Management Plan, including recomendations for wildlife management and habitat restoration have been found to be acceptable (see Appendix A).

2.6 GEOTECHNICAL

The Geotechnical Monitoring Program entails monitoring the integrity of embankments and natural or induced slope movements for each of four separate water storage or waste impoundment facilities as listed below:

- Tailings Impoundment (Lake County)
- Davis Creek Dam and Reservoir (Yolo County)
- M-1 Dam and Reservoir (Napa County)
- Waste Rock Disposal Sediment Control Facility (Napa County)

Monitoring data has been collected by Homestake for each of the structures from the time each structure began operating. Most of the dams and impoundments have undergone complete reservoir filling and lowering cycles since the start of operations.

Monitoring data for 1987 has been reviewed and analyzed by the firm of Steffen, Robertson & Kirsten (SRK), a Geotechnical Engineers. Subsequent to data analysis, SRK completed a field inspection of each structure and an evaluation of structure performance relative to design criteria and permit requirements. Based upon its findings, SRK indicated that the structures are performing as designed. No remedial work or special monitoring is recommended for the 1987-1988 operating period.

The 1987 Monitoring Program was conducted in April 1987, subsequent to Homestake obtaining approval from the Division of Safety of Dams for a revised monitoring schedule. The report prepared by SRK was transmitted to the Division of Safety of Dams in compliance with reporting requirements for Geotechnical Monitoring. The division has indicated their satisfaction that all dams are functioning safely.

2.7 TRAFFIC

Traffic on the Knoxville-Berryessa Road was monitored utilizing an electric traffic control counter placed at the southern end of the county road constructed in 1984. The traffic data indicate levels well below the threshold level of 125 average daily trips for a period of four consecutive weeks. The threshold level, if reached, would trigger origin and destination surveys, as detailed in the Napa County Road Agreement.

.jm8

APPENDIX A

REVIEW COMMENTS FROM PERMITTING AGENCIES

STATE OF CALIFORNIA
GEORGE DEUKMEJIAN, *Governor*

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD—
CENTRAL VALLEY REGION
3443 ROUTIER ROAD
SACRAMENTO, CA 95827-3098

20 January 1988

Mr. Paul Barnes
Homestake Mining Company
P. O. Box 1010
Lower Lake, CA 95451

HOMESTAKE MINING COMPANY, LAKE, NAPA, AND YOLO COUNTIES - ANNUAL MONITORING REPORT, 1 JULY 1986 - 30 JUNE 1987

We reviewed the subject report and concur that the facility has operated within all permit and waste discharge conditions. We agree that sediment data has not shown any clear trends and sediment loading varies with year-to-year runoff patterns. However, we believe, given the nature of the operation, continued sediment monitoring is necessary. We agree that, due to the ubiquitous serpentine in the area, monitoring for asbestos does not yield meaningful results. We, therefore, propose to delete such monitoring when the NPDES permit is renewed.

We agree with your conclusions on sulfate, calcium, and total dissolved solids associated with the waste rock disposal. We also will monitor these constituents for evidence of any major significant trends.

The Most Likely Concentrations (MCLs) are intended to serve only as a statistical tool to predict initial indicators of change. They are not to be construed as absolute values. Also, exceedence of the MCLs is not to be construed as a violation of waste discharge requirements.

Please contact me at (916) 361-5652 if you have any questions.

Edwin Z. Crawford

EDWIN Z. CRAWFORD
Area Representative

EZC:gs

cc: Napa County Planning Department, Napa
Lake County Planning Department, Lakeport
Yolo County Planning Department, Woodland
Solano Irrigation District, Vacaville
City of Fairfield

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD—
CENTRAL VALLEY REGION
443 ROUTIER ROAD
ACRAMENTO, CA 95827-3098

3 December 1987

Mr. Ray Krauss
Homestake Mining Co.
P. O. Box 1010
Lower Lake, CA 95457

REPORT OF RECENT INSPECTION

Enclosed for your information is a copy of a report covering a recent inspection of your waste disposal facilities.

Edwin Z. Crawford

EDWIN Z. CRAWFORD
Area Representative

EZC:gs

Enclosure

cc: Napa County Planning Department, Napa
Lake County Planning Department, Lakeport
Yolo County Planning Department, Woodland
Solano Irrigation District, Vacaville

DEC 7 1987

INSPECTION REPORT

3 December 1987

DISCHARGER: HOMESTAKE MINING CO. (ORDER NO. 85-032)

LOCATION & COUNTY: Napa, Lake, and Yolo Counties

CONTACT(S): -----

INSPECTION DATE: 16 November 1987

INSPECTED BY: Edwin Z. Crawford

ACCOMPANIED BY: Mr. Ray Krauss, Environmental Manager

OBSERVATIONS AND COMMENTS:

There was no fugitive dust from the mine pit or waste rock disposal areas. There was no evident significant erosion of roadways, except for an area between Morgan Valley Road and Hunting Creek. The area, which had been revegetated, was rutted by vehicle traffic not associated with the mining operation. Mr. Krauss explained that the company has been unable to prevent the soil disturbance; therefore, the area will be fenced in the near future to preclude access.

The cooling water pond on the south side of the mill has been taken out-of-service because of excessive calcium sulfate accumulation. A new cooling water pond has been installed on the west side of the mill adjacent to the tailings disposal reservoir. In the future, excess calcium sulfate will be discharged to the reservoir.

I looked at the solid waste disposal area situated at the north end of the tailings reservoir. Slit trenches are dug, filled, and covered on a regular basis. During inclement weather, refuse is temporarily stockpiled on the surface. Waste which consisted of construction debris and used grinding mill iron balls was contained in the designated area.

The pump back facility below the tailings dam was operational, with standby power. Recent, incipient erosion of the left abutment groin of the tailings dam has been repaired. There was no surface runoff from the mill area or tailings disposal to surface drainage courses.

Sewage effluent from the mill is discharged to the tailings reservoir. Sewage effluent from the mine area is discharged to an evaporation pond adjacent to and on the west side of Morgan Valley Road. There was no direct discharge from the facility to surface drainage courses.

INSPECTION SUMMARY:

Based on the above Homestake Mining Company is in compliance with the Board's requirements.

Edwin Z. Crawford

EDWIN Z. CRAWFORD, Area Representative

EZC:gs

REVIEWED BY:			

State of California

The Resources Agen

Memorandum

To : Mr. Frank Roddy
State Water Resources Control Board
Division Water Rights
P.O. Box 2000
Sacramento, CA 95810

Date: March 14, 1988

From : Department of Fish and Game

Subject: Homestake Mining Company, Contiguous Land Management Plan Compliance, McLaughlin Mine, Lake, Napa, and Yolo Counties

We were pleased to receive and review the McLaughlin Mine Contiguous Land Management Plan on this date. The Plan was part of the mitigation requirements for this project, and we are the designated party responsible for the determination of compliance.

The Plan is an on-going evaluation of environmental parameters which will direct specific management actions as new information becomes available. The Plan is dynamic, and actions will be modified through consultation with our Department.

Homestake Mining Company has prepared one of the most comprehensive data base and management plans we know of. They have more than met their obligation, and we have no reason to believe they will not continue to be at the leading edge in project land management.

Thank you for your concerns for future compliance, but Homestakes is committed to their present course of action, and we are satisfied with their results.

If you have further questions, please contact Allan Buckmann, Wildlife Biologist, at (707) 944-5500.

Brian Hunter
Regional Manager
Region 3

cc: Raymond Krauss
Project Environmental Manager
Homestake Mining

RECEIVED
MAR 1988

STATE OF CALIFORNIA—THE RESOURCES AGENCY GEORGE DEUKMEJIAN, *Governor*

DEPARTMENT OF FISH AND GAME
POST OFFICE BOX 47
YOUNTVILLE, CALIFORNIA 94599
(707) 944-5500

RECEIVED
MAY 10 1988
NAPA COUNTY CONSERVATION
DEVELOPMENT & PLANNING DEPT.

May 9, 1988

Mr. Jim Cool
Napa County Planning Department
1195 Third Street
Napa, California 94559

Dear Mr. Cool:

Subject: McLaughlin Mine, Annual Aquatic Monitoring Report Review

I have reviewed the 1987 Annual Aquatic Monitoring Report based upon the work done by Bodega Reserach Associates.

The following are recommendations for further studies:

1. Stream Electrofishing

   a. Wear rubber gloves at all times.
   b. Reduce the amount of time between electrofishing station passes as much as possible. This will help avoid the escape of fish from the sampling area.
   c. Compatibility with other activities - i.e. people collecting insects should not do so in close proximity to those electrofishing.

2. Streamflow Measurement

   a. Have the adjustment on the pivot screw for the pygmy meter properly adjusted.
   b. Measure the streamflow beginning in the middle of each cell.
   c. Measure streamflow in riffles or areas of the stream channel with sufficient velocity to turn the bucket-wheel of the pygmy meter.

If you have any questions, please call me at (707) 944-5500.

Sincerely,

Frank Gray
Fishery Biologist
Region 3

FG/cp

STATE OF CALIFORNIA—THE RESOURCES AGENCY GEORGE DEUKMEJIAN, *Governor*

DEPARTMENT OF FISH AND GAME
POST OFFICE BOX 47
YOUNTVILLE, CALIFORNIA 94599
(707) ~~944-2811~~ 944-5500

May 24, 1988

Mr. Jim Cool
Napa County Planning Department
1195 Third Street, Room 210
Napa, CA 94558

Dear Mr. Cool:

Subject: McLaughlin Mine, Annual Monitoring Report 1987, Wildlife Review

I have reviewed the annual monitoring report and find it complete.

The revegetation program is going well. Riparian growth in waterway units has taken and is producing excellent results, with erosion abatement and habitat development. The trend of grassland species succession from annuals to perrenials in some three years is most interesting. Further plantings in the serpentine areas may be a waste of time except for sensitive species.

The sensitive plant monitoring project has provided a good baseline of information for colony changes, which supports the request for dropping some 15 sites from monitoring, since there have been no recorded impacts from project operations. Special thanks should go to Joe Callizo for his efforts on this program.

The wildlife surveys continue to add new mammal and herp species and will be of long-term interest for annual changes in types and densities as regional baseline information.

Thank you for the opportunity to comment.

Sincerely,

RECEIVED
MAY 25 1988
NAPA CO. CONSERVATION
DEVELOPMENT & PLANNING DEPT

Allan Buckmann
Clearlake Unit Manager
Region 3

GEORGE DEUKMEJIAN, Governor

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD—
CENTRAL VALLEY REGION
3443 ROUTIER ROAD
SACRAMENTO, CA 95827-3098

23 May 1988

RECEIVED
MAY 25 1988
NAPA CO. RESOURCE CONSERVATION
DEVELOPMENT & PLANNING DEPT

Mr. Ray Krauss
Homestake Mining Co.
P. O. Box 1010
Lower Lake, CA 95457

REPORT OF RECENT INSPECTION

Enclosed for your information is a copy of a report covering a recent inspection of your facilities.

Edwin Z. Crawford

EDWIN Z. CRAWFORD
Area Representative

EZC:gs

Enclosure

cc: U. S. Bureau of Land Management, Ukiah
Environmental Protection Agency, San Francisco
Lake County Planning Department, Lakeport
Napa County Planning Department, Napa ✓
Yolo County Planning Department, Woodland
Mr. Rick Wood, City of Fairield
Solano Irrigation District, Vacaville

CENTRAL VALLEY REGIONAL WATER QUALITY CONTROL BOARD

INSPECTION REPORT

DISCHARGER: HOMESTAKE MINING COMPANY 19 May 1988

LOCATION & COUNTY: Napa and Lake County

CONTACT(S): Messrs. Ray Krauss and Phil Barnes

INSPECTION DATE: 30 March 1988

INSPECTED BY: Edwin Z. Crawford and Pat Hannon

ACCOMPANIED BY: Delora Koontz

OBSERVATIONS AND COMMENTS

There was no flow in the surface drainage course below the new East Waste Rock disposal area. The area is stable, with no visible evidence of slippage or wind or water incurred erosion. There are three sediment catchment basins in the drainage below the disposal area. There was no evidence of significant sediment in any of the basins or the water course below the lowest basin.

We made measurements of Knoxville Creek 1 (below KC-3) at the upstream side of the Knoxville-Berryessa Road. The results are:

Time: 0945 pst
Temperature: 56°F
Specific conductance (field): 1938 micromhos
Estimated flow: 8.2
Remarks: Water clear, sediment deposits in streambed are from natural erosion. Roadway is stabilized and maintained. No evidence of sediment attributable to mining activities.

There was no direct discharge from the sewage stabilization pond at the mine site to surface drainage courses. There was only an estimated one foot to two feet of water in the M-1 pond. Any excess water in this pond is diverted into the mine pit and, as available, subsequently pumped into the ore circuit.

The soil and vegetation above pond T-1 remain stable and the pond has become a habitat for waterfowl.

The main waste rock disposal area is stable with no evidence of slippage or erosion. The revegetation is now so lush it is a major food source for local deer.

We made measurements of Pond No. 7, the drainage from Pond No. 7 and Hunting Creek at Stations HC-7A, 10, 11, 12, and 500 feet upstream of the confluence with the drainage from Pond No. 7 (see attached map). We also traversed the stream between HC-11, the station above all operations, and HC-10, the station below all

REVIEWED BY: WCC

operations in an effort to determine the source of the increase in specific conductance between HC-7A and HC-10. There are numerous side streams entering Hunting Creek from both banks in this reach, but there is no evidence of mine waste entering any of the drainages.

The results of measurements and analyses are:

1. Hunting Creek (HC-11), near Reif Road, uppermost monitoring station, above all mining operations:

   Time: 1200 pst
   Temperature: 58°F
   Specific conductance (field): 456 microhomos
   Specific conductance (field)(Homestake): 430 micromhos
   pH (field): 8.3
   Calcium: 24 mg/l
   Sulphate: 190 mg/l
   Flow: 0.14 cfs
   Remarks: Water clear

2. Hunting Creek (HC-7A), at road crossing to Red Elephant Mine, upstream side of road:

   Time: 1254 pst
   Temperature: 60°F
   Specific conductance (field): 627 micromhos
   Specific conductance (field)(Homestake): 640 micromhos
   pH (field): 8.1
   pH (field)(Homestake): 8.4
   Remarks: Water clear, algal growth, fish (appear to be Roach).

3. Hunting Creek (HC-12), approximately 0.5 miles downstream of HC-7A:

   Time: 1300 pst
   Temperature: 61°F
   Specific conductance (field): 627 micromhos
   Specific conductance (field)(Homestake): 640 micromhos
   pH (field): 8.5
   pH (field)(Homestake): 8.6
   Remarks: Water clear

4. Hunting Creek about 500 feet upstream of confluence with discharge from Pond No. 7:

   Time: 1345
   Temperature: 62°F
   Specific Conductance (field): 817 micromhos
   Specific conductance (field)(Homestake): 830 micromhos
   pH (field): 8.7
   pH (field)(Homestake): 8.7
   Remarks: Water clear

5. Pond No. 7 at spillway:

Time: 1400 pst
Temperature: 62°F
Specific conductance (field): 1520 micromhos
Specific conductance (field)(Homestake): 1600 micromhos
pH (field): 8.6
pH (field)(Homestake): 8.6
Remarks: Water clear. No discharge over spillway

6. Discharge from Pond No. 7, approximately 3 yards below end of spillway:

Time: 1340 pst
Temperature: 60°F
Specific conductance (field): 1046 micromhos
Specific conductance (field)(Homestake): 1430 micromhos
pH (field): 8.6
Estimated flow: 20 gpm (0.04 cfs)
Remarks: Water clear, iron stain on rocks

7. Hunting Creek (HC-10), lower most monitoring point, below all mining operations:

Time: 1325 pst
Temperature: 62°F
Specific conductance (field): 874 micromhos
Specific conductance (field)(Homestake): 900 micromhos
pH (field): 8.6
pH (field)(Homestake): 8.7
Calcium: 41 mg/l
Sulphate: 86 mg/l
Flow: 378 gpm (0.84 cfs)
Remarks: Water clear, light iron stain visible on rocks

The major source of increase in specific conductance between Station HC-11 and HC-10 is attributable to side stream discharge not related to Homestake's operations.

INSPECTION SUMMARY:

Based on the above, Homestake Mining Company is in compliance with permit conditions.

Edwin Z. Crawford

EDWIN Z. CRAWFORD, Area Representative

EZC:gs

cc: per cover letter

ANNUAL REPORT
REVIEW OF THE

1986 ENVIRONMENTAL MONITORING PROGRAM

McLAUGHLIN PROJECT

MARCH 1987

PREPARED BY THE NAPA COUNTY
CONSERVATION · DEVELOPMENT
AND PLANNING DEPARTMENT

INTRODUCTION

The Napa County Planning Division has prepared this report for the Conservation, Development and Planning Commission as a general summary of the findings presented in the four volume 1986 Annual Monitoring Report prepared by Homestake Mining Company. The report details proposals made by Homestake to modify the current Environmental Monitoring Program established for the operations phase of the McLaughlin Project. The report also contains comments and recommendations received on Homestake's Annual Report from technical review agencies.

It is the intent of the Planning Division that this report

1. form the basis for Commission action on proposals put forth by Homestake to change monitoring protocols.

2. serve as an informational document to assist the Commission, and the public, in reviewing the environmental aspects of the McLaughlin Project after eighteen months of operation.

REPORT ON REVIEW OF THE 1986 ENVIRONMENTAL MONITORING PROGRAM FOR THE MCLAUGHLIN PROJECT

TABLE OF CONTENTS

		Page
	EXECUTIVE SUMMARY	i
1.0	INTRODUCTION	1
1.1	Background	1
1.2	Overview: General Monitoring Objectives	1
2.0	SUMMARY OF FINDINGS AND RECOMMENDATIONS: 1986 MONITORING PROGRAM	3
2.1	Water Quality	3
2.2	Air Quality and Meterology	8
2.3	Aquatic Ecology	10
2.4	Vegetation	13
2.5	Wildlife	16
2.6	Geotechnical	18
2.7	Cultural Resources	19
2.8	Noise	19
2.9	Socioeconomics	19

Appendix A

EXECUTIVE SUMMARY

REVIEW OF THE MCLAUGHLIN PROJECT
1986 ENVIRONMENTAL MONITORING PROGRAM

The environmental monitoring program for the McLaughlin Project provided for comprehensive data collection under preoperational monitoring, which was conducted through January 1985. The operational monitoring program commencing thereafter, was designed to narrow the focus of the monitoring program, limiting the program to those items which were beneficial in reviewing or assessing potential project impacts. Whereas preoperational monitoring was conducted in an effort to characterize ambient (or baseline) conditions, operational monitoring has focused on (1) measuring compliance with environmental performance standards established by regulatory permit agencies, and (2) monitoring trends indicative of present or future environmental impacts.

Monitoring data presented in the 1986 Annual Report covered a twelve month period from July 1, 1985 through June 30, 1986. These data were collected in accordance with the provisions specified in the McLaughlin Project Environmental Monitoring Manual. As required, comparisons of recently collected data with adopted standards are made in the Annual Report. In view of the relatively short period of record for operations monitoring (18 months), trends analysis is understandably limited. Data collected to date appear to continue to represent the natural phenomenon and variation observed within the project area. Emphasis of the statistical analyses, while focused on identifying operations related impacts, has continued to assess the degree to which the more recent data collected over the 1985-1986 period reflect natural changes in the regional and local environment.

WATER QUALITY MONITORING

The 1986 Water Quality Monitoring Program (WQMP) included the measurement of 41 water quality variables at 13 surface water and 23 groundwater locations, with additional measurements at sediment control ponds and within process (tailings) streams. The water quality monitoring effort is conducted at locations principally in Lake and Napa Counties, in the Hunting Creek Watershed.

Analysis of WQMP collected over the 1986 reporting period provide the basis for the following findings, as reported by Homestake:

- No changes in surface or groundwater quality in terms of those elements or compounds which are fundamental to compliance with regulatory requirements have been identified. Analytical emphasis has been on cyanide, arsenic, boron, cadmium, chromium (total), copper, lead, mercury, nickel, selenium, and zinc.

- Changes in water quality continue to occur from time-period to time-period. Many of these changes appear at upstream and downstream locations such that most also appear to reflect the normal variations in ambient water quality. There have, as yet, been no project activities identified as causing the observed changes.

- Some of the water-quality parameters exist at concentration levels consistently below the accepted analytical detection and reporting limits. Examples are silver, antimony, beryllium, molybdenum, lead, cadmium, and cyanide. In these cases, other than that of cyanide, continued measurements appear unnecessary.

- Thirty-one apparent exceedences of "Maximum Likely Concentrations" (MLC's) were observed throughout the July 1985 - June 1986 period. There are strong indications that most of these "exceedences" are caused by the change in laboratory analytical procedures that took place early in 1985. This, coupled with the limited size of the data base available for the original establishment of MLC's, demonstrates that the MLC's should be recalculated. This recalculation may be combined with further analysis of statistical distributions of the measurements.

- The early projections of water quality for the area, principally those made based on surface-water quality data collected during the 1960's up to the early 1980's, appear to have been generally borne out by the WQMP data. Recognizing that these earlier projections were based on limited sampling, there are few substantive differences between the projections in the Environmental Impact Statement for the McLaughlin Project and average, maximum, minimum, and median concentrations derived from the WQMP data base.

Specific findings with respect to monitoring for impacts from project facilities located in Napa County indicate no significant trends have been observed to date. As reported at the time of occurrance, sediment control Pond M-1 located downstream from the Mine and Grinding Area in Napa County, did discharge to Knoxville Creek during February and March 1986, when extremely heavy precipitation was recorded. While this discharge was in violation of the Regional Water Quality Control Board's Order No. 85-032, upon review of data collected in this regard, the Regional Board found no impacts to Knoxville Creek resulted from the M-1 Pond discharge. Corrective actions have been taken by Homestake to prevent future discharges from occuring from M-1 Pond.

The Regional Water Quality Control Board has reviewed the 1986 Annual Water Quality Monitoring Report and the proposed recommendations contained therein. Action taken by the Board to date include:

- Approval for Homestake to recalculate the mean concentration and associated statistical descriptions on the basis of an expanded data base (see Appendix A).

- Removal of Pond T-1 as a point source discharge under the NPDES Permit (see Appendix A).

- Approval of revisions to Monitoring and Reporting Program No. 85-032, including reduction in parameters list, sampling stations and frequency; tentative approval of revisions to Program No. 85-031 (see Appendix A).

The Solano Irrigation District (SID) has also reviewed the proposed changes to the Water Quality Monitoring Program and has found them acceptable.

AIR QUALITY/METEROLOGY MONITORING

The 1986 Operational Air Quality Monitoring Program in Napa County has focused on documenting Total Suspended Particulate (TSP) concentrations (i.e., dust), as required by the Permit to Operate issued by the Bay Area Air Quality Management District. Data collected over the reporting period indicate that TSP levels have remained within the national primary and secondary standard.

Based upon a review of air quality siting criteria and current data to determine applicability, Homestake has proposed that the following changes to the ACMP be implemented:

- That Stations AQ-3 and AQ-4, both located in Yolo County be dropped from the sampling network. It is suggested that a comparison of data collected demonstrates substantial redundancy in the air quality sampling network.

- That only PM-10 data be collected during periods of extended precipitation.

- That all air quality sampling be placed on a six day schedule.

In response to Homestake's proposed modifications to the air quality monitoring program as it relates to Napa County, the BAAQMD has requested additional data to support the proposal to eliminate TSP sampling during periods of extended precipitation. The District has informed Homestake that it will concur with the request that air sampling be placed on a six day schedule during the Summer 1987, in accordance with Condition 9.C of the Permit to Operate.

AQUATIC ECOLOGY MONITORING

The year 1986 marked the transition from a comprehensive Aquatic Monitoring Program through which baseline data covering the period 1984 and 1985 was collected, to a focused program designed to optimize detection of environmental disturbances which may result from operation of the McLaughlin Project. The focused Operations Monitoring Program includes annual sampling (primarily in April) at four primary sites (HC-5, HC-7A, HC-10, KC-3) considered to be the most useful for monitoring operations activities.

Results from the 1986 monitoring effort substantiate earlier findings regarding adaptation of aquatic communities to stresses stemming from local hydrologic and geologic conditions. Diversity of fish species was again found to be low in 1986, with only five species collected over the entire study area. This low diversity of fish species is typical of California Coastal streams. California Roach, a minnow with a wide tolerance for physical conditions remains the only abundant and wide-spread species of fish in Hunting and Knoxville Creeks, where high temperatures and low flow rates are the usual late summer condition.

Changes in several aspects of the aquatic ecology of Hunting and Knoxville Creeks were noted in 1986. These include: (1) a decline in the richness of benthic macroinvertebrate species at each site from previous years, with density of individuals increasing at two sites and remaining within the previous 2-year range at the other sites and, (2) a decline in California Roach densities at all sites compared with 1985 densities. In 1986, these changes were most notable at site KC-3 on Knoxville Creek, where only one California Roach was observed in April and no fish in June; the mean number of benthic macroinvertebrate taxa had the highest statistical significance of all annual changes observed; and, where the concentrations of Chromium and Nickel in fish tissue did not follow the previously observed pattern of correlation. The study team from Bodega Research Associates (BRA) identified two possible causes for these changes in the aquatic ecology: (1) natural hydrologic events, and (2) a discharge from the M-1 Sediment Pond into Knoxville Creek that occurred in February and March 1986.

BRA believes that changes in the aquatic ecology at KC-3 were the result of natural hydrologic events: low winter rainfall leading to severe drying in late summer 1985, followed by heavy 1986 winter rainfall producing high flow conditions which affected recolonization processes. BRA does not eliminate the possibility that chemical changes associated with the M-1 Pond discharge may have contributed to the decline at KC-3, however, it is suggested that these chemical changes (lowering of pH and increased concentrations of some metals) were short-lived. Further, BRA notes that changes associated with the M-1 discharge were not prohibiting fish located downstream of KC-3 in April and June 1986, from recolonizing the site.

BRA suggest that the overlapping occurrence of two perturbations, the drought in 1985 and the overflow of the M-1 Pond, prevents correlation of a particular event with the impact observed at KC-3. BRA predicts however, that California Roach populations will recover to earlier measured levels following a summer when Knoxville Creek remains flowing at site KC-3. The April 1987 measurements at the site became critical with respect to this prediction. The California Department of Fish and Game therefore recommends that during April 1987, Homestake (BRA) monitor downstream of the KC-3 site at the same general location that was used in 1985, should evidence of recovery and recolonization at KC-3 not be discovered in April 1987.

No other recommendations are made to alter the Aquatic Monitoring Program implemented in 1986. Homestake, at the request of the Planning Division, has proposed to alter the reporting schedule such that reporting of April data is not delayed until sampling of benthics in August is completed. It is proposed that April 1987 sampling results be presented in July to match the annual schedule of reporting on other segments of the monitoring program. Results of the August 1987 benthic sampling would be reported in July 1988.

VEGETATION MONITORING

The 1986 Vegetation Monitoring Program included monitoring of previously reclaimed areas (reclamation success), sensitive plants, and the management of contiguous lands unaffected by mining.

To date, a total of 79 sensitive plant populations have been directly impacted by construction and operation of the McLaughlin Mine Project. This number represents a reduction of nearly 38 percent from the 126 sensitive plant populations predicted to be directly impacted by the project in the McLaughlin Mine Project EIR. The majority of these undisturbed populations were mitigated by redesign or rerouting of facilities and the placement of protective fencing around those populations in close proximity to mine operations. Several new populations were located in the project operations vicinity during the 1986 monitoring surveys. None of these populations were presently threatened by any of the ongoing operations at the mine. On the contrary, some of these populations appear to have resulted from perturbations associated with the facility construction. These species often respond favorably to reduced competition and reoccupy newly bared serpentine soils. No populations in the mine vicinity exhibited signs of toxicity from air or water born pollutants caused by mining operations. No significant indirect impacts were observed to be continuing from the previous year. No other indirect impacts were observed on populations in close proximity to the project operations.

Efforts to re-establish the Thelypodium brachycarpum is areas outside the waste rock dump area continued in 1986. Data collected to date regarding transplant efforts indicates that this species can be successfully re-established elsewhere. Several sites in the project area have been identified as favorable to transplant of the Thelypodium brachycarpum, and have been fenced as suggested by the California Native Plant Society.

Revegetation (reclamation) efforts in 1986 were centered on completing the seeding of approximately 165 acres of lands disturbed by construction activities. None of these disturbed areas seeded in 1985-1986 were located in Napa County. The revegetation program in Napa County focused on evaluating success of prior seeding efforts, and planting of woody shrubs to establish visual screening.

In general, revegetation efforts have been successful in establishing plant cover adequately to stablize disturbed sites and control erosion. Most of the areas revegetated to date are adjacent to undisturbed areas, allowing native plant species to successfully invade reclaim sites.

The seed mixes, soil amendments and mulch used in the 1985-1986 program are recommended for the 1986-1987 revegetation effort. No remedial seeding or fertilizing was recommended.

A program to develop a plan for the management of more than 7,000 acres of nonmined lands owned by Homestake has been initiated. The plan is expected to address various mitigation measures and permit conditions regarding fish and wildlife management, including habitat management of Davis Reservoir. Homestake is using plan preparation as a means to further research and educational programs as required in the Project Use Permit.

The U.S. Bureau of Land Management has reviewed the 1985-1986 Revegetation Monitoring Program and has advised the Conservation, Development and Planning Department that it finds the program to be most adequate.

WILDLIFE MONITORING

The objective of the Wildlife Monitoring Program is to detect changes in the abundance and health of wildlife populations. The focus of the program is on identification of changes that can be attributed to the McLaughlin Project, potentially avoidable and sufficiently important to require remedial action. Potential impacts addressed by the Monitoring Program include: exposure to hazardous wastes, disturbance of Golden Eagle nests, and roadkills.

Wildlife observation sighting surveys conducted during the 1985-1986 period were limited primarily to Davis Creek Reservoir, located in Yolo County. The tailings impoundment located in Lake County is considered to be non-hazardous by the State Department of Health Services. Therefore, Homestake has not conducted systematic surveys to document wildlife use of the tailings impoundment. Rather, intermittent observations by Homestake personnel of wildlife using the tailings impoundment, the waste rock dump sediment control ponds, and the mine pit area, are documented using wildlife observation cards filed with Homestake environmental personnel.

The results of the 1986 Wildlife Monitoring Program show a similar species diversity in comparison to the previous years findings. Of particular interest was the attraction of approximately 20 new species of water birds to the Davis Creek Reservoir. The introduction of this uncontaminated water body into the arid project area is expected to have a significant impact on wildlife populations, particularly through the introduction of new species to the region.

Eagle nest searchers have been conducted as required, with no nests discovered. However, a pair of eagles have been sited frequently in the project area, with an immature eagle spotted by Homestake environmental personnel on one occasion.

Limited data on roadkills are presented in Homestake's Annual Report. These data were collected only in a semi-systematic manner rather than through a monthly survey for roadkills.

An alternate method for assessing roadkills, relying upon routine reporting of kills sited by Homestake personnel rather than monthly survey techniques has been proposed by Homestake. In addition, Homestake has proposed to conduct wildlife surveys in the tailings impoundment area for the 1986-1987 period.

The California Department of Fish and Game (CDFG) has reviewed the 1986 Wildlife Monitoring Report and concurs with Homestake's proposal to conduct systematic surveys to document wildlife use of Davis Creek Reservoir and the tails impoundment located in Lake County. The CDFG recommends however that the proposed monitoring program be extended for two full years, and that certain monitoring protocols be conducted at a limited frequency thereafter. Finally, the CDFG recommends that procedures be incorporated into the Wildlife Monitoring Program to establish local background levels for disease, heavy metals and toxic burden.

GEOTECHNICAL MONITORING

The Geotechnical Monitoring Program entails monitoring the integrity of embankments and natural or induced slope movements for each of four separate water storage or waste impoundment facilities. The Monitoring Program with respect to facilities located in Napa County became effective in 1985 and was established and is conducted in accordance with the requirements of the California Division of Safety of Dams. The Division has indicated their satisfaction that all dams are functioning safely.

CULTURAL RESOURCES MONITORING

Cultural resources field work was completed in 1985 as detailed in the 1984-1985 Annual Report. A final comprehensive project cultural resources report has been prepared under the direction of Dr. David Frederickson and Mr. Tom Origer of Sonoma State University.

NOISE MONITORING

Noise monitoring is limited to two sites in Lake County. No noise complaints have been received to date.

SOCIOECONOMIC MONITORING

Socioeconomic monitoring during the pre-operational phase and follow-up during the first year of operation has been completed and was reported in the 1984-1985 Annual Report. That report completed the project socioeconomic monitoring requirements.

Traffic on Knoxville-Berryessa Road has been monitored in accordance with Napa County Agreement #2055. The traffic data indicates levels well below the threshold level of 125 average daily trips for a period of four (4) consecutive weeks. The threshold level, if reached would initiate origin and destination surveys as detailed in the Napa County Road Agreement.

1986 ANNUAL REPORT

REVIEW OF THE MCLAUGHLIN PROJECT ENVIRONMENTAL MONITORING PROGRAM

1.0 INTRODUCTION

1.1 BACKGROUND

The Conservation, Development and Planning Commission, at their meeting of December 7, 1983, approved the Use Permit and Surface Mining Permit applications of the Homestake Mining Company (#U-198283) subject to Conditions of Approval, including:

> **"Homestake shall on September 1st of each calendar year, provide the CDPD with an annual report on the monitoring program summarizing the monitoring data collected. The report shall include a comparison of all data collected in compliance with required adopted standards and with the projected levels described in the Final EIR/EIS"** (FEIR-548, hereinafter "EIR/EIS") **The Planning Director shall provide an Annual Report to the CDPC on the results of the monitoring program".**

The 1986 Annual Monitoring Report prepared by Homestake Mining Company was received September 2, 1986. Data presented in the report covers the period from July 1, 1985 to June 30, 1986.

The following report is submitted in fulfillment of the permit requirement that the Director report annually to the CDPC on rsults of the McLaughlin Gold Mine Project Monitoring Program. The report begins with an overview of the general monitoring objectives for the McLaughlin Project. The overview is followed by a summary of findings and recommendations regarding the 1986 Operational Monitoring Program. This summary presents findings according to environmental discipline, and is consistent with the format presented in the report prepared by Homestake Mining Company. Recommendations discussed in the report are those presented by Homestake for consideration and approval by applicable permit agencies, including the CDPC.

1.2 OVERVIEW: GENERAL MONITORING OBJECTIVES

The Environmental Monitoring Program for the McLaughlin Gold Mine Project has four major objectives: (1) to detect changes, (2) to assess the importance of changes, (3) to determine the cause of changes, and (4) to trigger action to correct problems. If appropriately applied, the monitoring program will measure compliance with standards recognized in regulatory permits, as well as monitor trends indicative of present or future environmental damage or benefit.

Monitoring for the year 1986 has been conducted in accordance with the provisions for "Operational Monitoring" as specified in the McLaughlin Project Environmental Monitoring Manual. The environmental monitoring sites are shown in Figure 1.

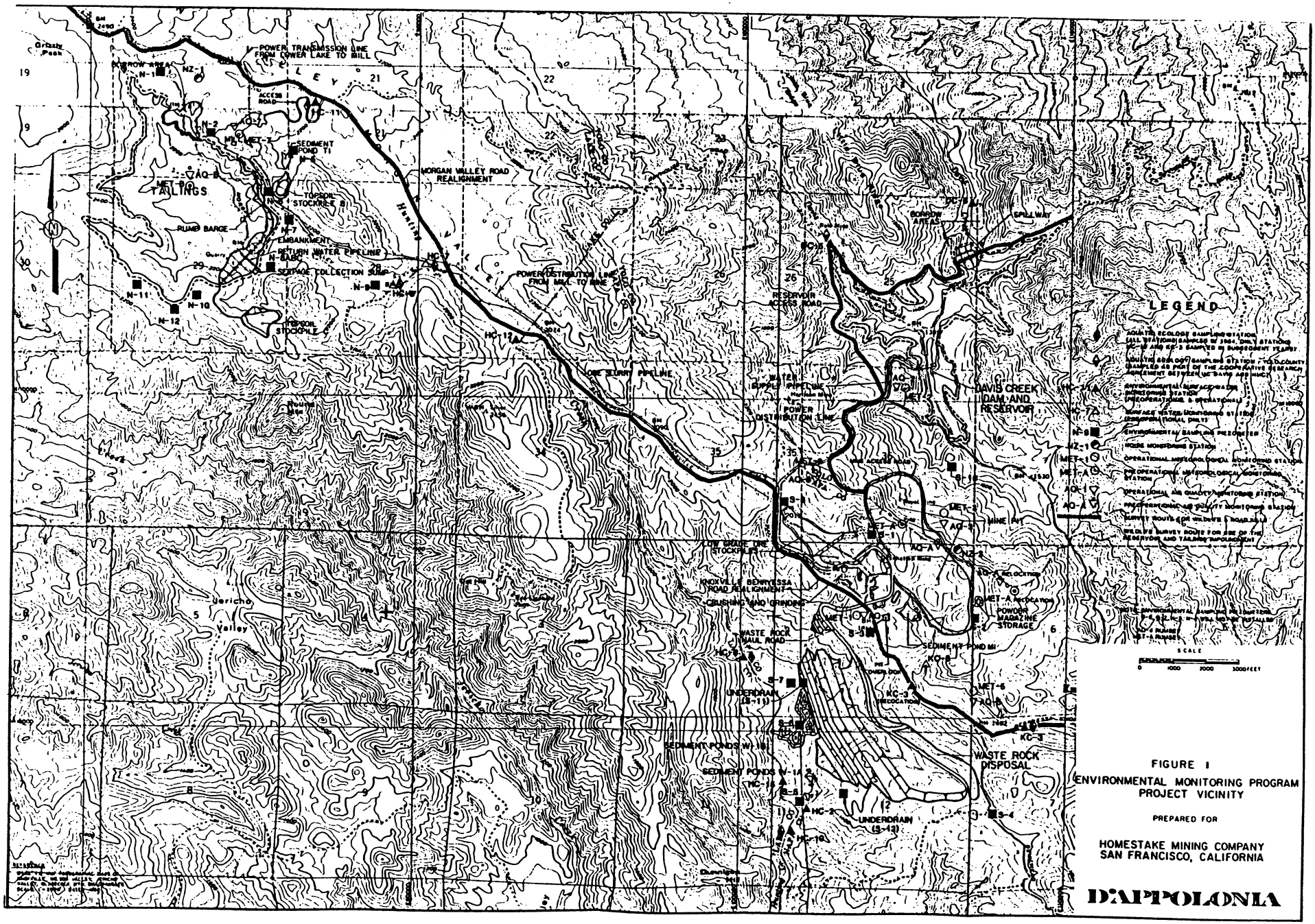


FIGURE 1
ENVIRONMENTAL MONITORING PROGRAM
PROJECT VICINITY

PREPARED FOR

HOMESTAKE MINING COMPANY
SAN FRANCISCO, CALIFORNIA

D'APPOLONIA

2.0 SUMMARY OF FINDINGS AND RECOMMENDATIONS 1986 MONITORING PROGRAM

2.1 WATER QUALITY

The Water Quality Monitoring Program (WQMP) operated by Homestake Mining Company at the McLaughlin Mine is comprised of surface and groundwater monitoring of the hydrologic system surrounding the mine, the milling facilities, and the water supply reservoir. The program is designed to measure ambient (also termed "baseline" or "background") conditions and to monitor Project activities that may affect the hydrologic system of the Project Area.

The WQMP currently involves the measurement of 41 water quality variables at 13 surface water and 23 groundwater locations, with additional measurements at sediment control ponds and within process (tailings) streams. The surface water monitoring involves sampling at sites on Hunting Creek, Davis Creek, Knoxville Creek, Cache Creek and Putah Creek; while groundwater monitoring is conducted at wells and subsurface drains located principally in the Hunting Creek watershed.

A summary and analysis of data collected by the WQMP over the preceding twelve month period (July 1985 through June 1986) was prepared by Homestake and presented in the 1986 Annual Report. The analysis focused on statistical descriptions of water quality data and evaluations of the relationships between these recent data and data collected in the past. These analyses have included (1) comparisons of the quality of surface and groundwaters as described by the WQMP data with pre-project data and water quality criteria, (2) comparison of the data collected over the past twelve months with the earlier data and maximum likely concentration estimated from the early phases of the WQMP, (3) assessments of the utility of frequent monitoring of certain water quality parameters which exist at very low concentrations, and (4) continued examination of temporal (time-series) variations.

The frequency of water quality sampling continued monthly in accordance with the Operational Monitoring Program through April 1986, at which time quarterly sampling of groundwater was initiated. Surface sampling has remained at a monthly frequency.

Due to the size of the data base and the time of reporting, Homestake indicated that the analyses of water quality data has been selective, in that "representative" sampling locations and water quality parameters have been analyzed to date. Analytical emphasis was placed on water quality data collected downstream or downgradient of the McLaughlin Project activities and on water quality variables for which there are numeric reference levels established.

2.1.1 FINDINGS

2.1.1.1 Routine Surface and Groundwater Monitoring

Analysis of the most recent twelve months of water quality data provides the basis for the following findings, as reported by Homestake:

- No changes in surface or groundwater quality in terms of those elements or compounds which are fundamental to compliance with regulatory requirements have been identified. Analytical emphasis has been on cyanide, arsenic, boron, cadmium, chromium (total), copper, lead, mercury, nickel, selenium, and zinc.

- Changes in water quality continue to occur from time-period to time-period. Many of these changes appear at upstream and downstream locations such that most also appear to reflect the normal variations in ambient water quality. There have, as yet, been no project activities identified as causing the observed changes.

- Some of the water-quality parameters exist at concentration levels consistently below the accepted analytical detection and reporting limits. Examples are silver, antimony, beryllium, molybdenum, lead, cadmium, and cyanide. In these cases, other than that of cyanide, continued measurements appear unnecessary.

- Thirty-one apparent exceedences of "Maximum Likely Concentrations" (MLC's) were observed throughout the July 1985 - June 1986 period. There are strong indications that most of these "exceedences" are caused by the change in laboratory analytical procedures that took place early in 1985. This, coupled with the limited size of the data base available for the original establishment of MLC's, demonstrates that the MLC's should be recalculated. This recalculation may be combined with further analysis of statistical distributions of the measurements.

- The early projections of water quality for the area, principally those made based on surface-water quality data collected during the 1960's up to the early 1980's, appear to have been generally borne out by the WQMP data. Recognizing that these earlier projections were based on limited sampling, there are few substantive differences between the projections in the Environmental Impact Statement for the McLaughlin Project and average, maximum, minimum, and median concentrations derived from the WQMP data base.

2.1.1.2 NPDES

NPDES data is collected from the discharge of sediment control dams and from receiving waters, as required by the Central Valley Regional Water Quality Control Board Order No. 85-031 and NPDES No. CA 0081477. Currently, two NPDES discharge points are permitted and require routine monitoring: T-1 Sediment Control Pond located below the revegetated topsoil stockpile adjacent to the Mill in Lake County, and Pond No. 7 of the Waste Rock Sediment Control System in Napa County.

Normal storm water discharges occurred from both T-1 and No. 7 Pond during the 1985-1986 sampling period. Summary reports of the discharges submitted to the Water Quality Control Board indicate that compliance was maintained with criteria applicable to receiving waters with the exception of one downstream turbidity reading and one pH value in excess of allowable incremental increase. Discharges complied with all parameters with the exception of exceedances for total suspended solids on several occasions and

several slightly elevated values for mercury at Pond No. 7 during the February 1986 storm. The mercury readings at Pond No. 7 were primarily as a result of a flushing of total suspended solids, some of which were naturally occuring cinnabar (mercury sulfide). While exceedances were reported at the point of discharge, data indicates that compliance was maintained with receiving water standards, indicating that the sediment control ponds have successfully reduced sediment loads.

Homestake is currently installing a new surface decant system on Pond No. 6 in the waste rock area, in an effort to discharge water with lower suspended solids concentrations to Pond No. 7. This system is of the same design as utilized at Pond No. 7 during the 1984-1985 reporting period.

M-1 Pond located downstream from the Mine and Grinding Area in Napa County also discharged during February and March 1986, when extremely heavy precipitation was recorded. Discharge from M-1 Pond was in violation of the Regional Board Order No. 85-032, which prohibits its discharge to surface waters.

As required, Homestake properly notified the Regional Board (and Napa County) of the discharge, and initiated a daily monitoring program to identify any potential impacts to beneficial users of Knoxville Creek and downstream waters. The Regional Board found no impacts to Knoxville Creek or downstream users resulting from the M-1 Pond discharge. Homestake has implemented corrective measures to provide additional storage of storm runoff volumes at M-1 Pond to prevent discharge from occurring in the future.

This violation of the Regional Board's Order was reported to the Napa County Conservation, Development and Planning Commission in accordance with Condition No. 17 of Homestake's Use Permit on June 18, 1986. The Commission reviewed the Director's report and took no action, as none was required.

2.1.1.3. Other Monitoring

In addition to the routine monthly monitoring of surface and groundwater, the McLaughlin Project Environmental Monitoring Manual includes sampling for the following:

- two domestic wells in Morgan Valley.
- sampling of cooling and evaporation ponds in March and June of each year.
- semi-annual sediment sampling at four locations.
- monthly monitoring for cyanide at observation wells in the tailings dam.
- monthly composite samples of tailings and of the tailings seepage return sump.
- tailings CAM-WET analyses for non-hazardous determination.

Data collected to date in regard to these monitoring efforts indicate that no presence of cyanide has been detected in the tailings embankment and that the tailings dam is functioning as designed.

Tailings continue to test as non-hazardous. Correspondence to this effect from the Division of Health and Services is included in the Appendix A.

Sediment data collected show no clear trends, however, a wide degree of variability within samples collected at the same time at the same site has been noted. As additional operational data becomes available and further trends analysis is conducted, the usefulness of sediment data to monitoring project related impacts should become clear.

The cooling pond and evaporation pond generally reflect values of less than detectable for metals and volatile organics.

Data for domestic wells show no unusual variations and meet drinking water standards, with the exception of elevated manganese and iron at one well.

2.1.2. RECOMMENDATIONS

Based on the findings presented in the 1985-1986 WQMP, Homestake has proposed to modify monitoring protocols. Recommendations have been made for (1) a reduced parameter list, (2) a reduction in surface water quality monitoring frequency to quarterly, and (3) elimination of a surface water monitoring station located on Hunting Creek.

2.1.2.1. Modification to Parameters for Operational Monitoring

Table 2-1 provides a listing of the operational monitoring parameters which Homestake proposes to sample over the forthcoming twelve month period (July 1987 through June 1988). The modified parameter list reflects the following proposed deletions: beryllium, cadmium, selenium, vanadium, chemical oxygen demand (COD) and turbidity. The recommendation to delete these parameters from further monitoring was made using the following criteria:

1. presence in the ore or overburden
2. presence in the mill tailings
3. significance of the parameter in determining and assessing potential project impacts.

Beryllium, cadmium and selenium are recommended for removal due to (1) the lack of significant presence in the ore, overburden or tailings, and (2) lack of presence in properational or operational monitoring data.

With respect to vanadium, removal is recommended due to the lack of presence in significant quantities, or significant presence in the area naturally. Further, no drinking water standard, or fish and wildlife criteria have been established to date.

Chemical oxygen demand (COD) is recommended for removal in that it is generally applied to measure strength of treatment plant effluent. No such waste stream is present at the McLaughlin Mine. Further, specific parameters are routinely analyzed to determine and assess impacts. As such, COD analysis provides no useful data in reviewing potential project

TABLE 2-1

McLAUGHLIN MINE
PROPOSED OPERATIONAL MONITORING PARAMETERS
AUGUST, 1986

PARAMETER	SAMPLE TYPE: GROUNDWATER	SAMPLE TYPE: SURFACE WATER
Field Measurements		
pH	o	o
Temperature	o	o
Specific Conductance	o	o
Dissolved Oxygen	-	o
Flow Estimate	-	o
Groundwater Level	o	-
Oil and Grease Visual	o	o
Lab Measurements		
TDS	o	o
TSS	o	o
Total Acidity	1	1
Total Alkalinity	o	o
Hardness	o	o
Chloride	o	o
Ammonia	o	o
Nitrate	o	o
Nitrite	2	2
Sulfate	o	o
MBAS	o	-
Asbestos	-	3
Total Cyanide	2	2
Free Cyanide	2	2
TKN	2	2
Thiocyanate	2	2
Arsenic	o	o
Barium	o	o
Boron	o	o
Calcium	o	o
Chromium	o	o
Copper	o	o
Iron	o	o
Lead	o	o
Magnesium	o	o
Manganese	o	-
Mercury	o	o

PARAMETER	SAMPLE TYPE: GROUNDWATER	SURFACE WATER
Lab Measurements (cont'd)		
Nickel	o	o
Potassium	o	o
Sodium	o	o
Thallium	-	4
Zinc	o	o

o = Analyzed
- = Not Analyzed

Footnotes:

1. If pH is acidic
2. N series wells, HC-9, HC-10, HC-11
3. Quarterly at CC-1, CC-2, DC-4, PC-1, PC-2, HC-10
4. HC-10 only

impacts. Failure to assist Homestake in determining or assessing potential project impacts is also the reason for the recommendation to remove turbidity. Turbidity has been found to varied widely in project area streams reflecting the varied geology of the area. Specific analysis for total suspended solids has been found to provide more pertinent data for assessing impacts.

2.1.2.2. Monitoring Frequency

The recommendation is that the quarterly monitoring schedule initiated in April 1986 for groundwater sampling be expanded to include all surface water monitoring stations. Surface water quality monitoring has been conducted at a monthly frequency since July 1983, and bi-weekly during the start-up of operations in February, March and April of 1985. It is Homestake's contention that, given any potential impact of the McLaughlin Project would be expected to develop slowly over long periods of time, quarterly surface water quality monitoring is reasonable at this time.

Station HC-10 located on Hunting Creek downstream from all project facilities would continue to composite samples daily for twice weekly analysis. In addition, NPDES discharges and receiving streams would continue to be monitored under the Water Quality Control Board NPDES Permit.

2.1.2.3. Surface Water Quality Operational Monitoring Stations

Homestake is recommending that a mid-stream surface water quality monitoring station on Hunting Creek be eliminated. Stations on Hunting Creek currently monitored are listed below from upstream to downstream:

HC-11	Main branch of Hunting Creek, upstream of project facilities.
HC-09	Downstream of tailings impoundment.
HC-12	Downstream of HC-09 and HC-11.
HC-05	Upstream of the waste rock facility.
HC-10	Downstream of HC-05 and all project facilities.

Homestake recommends elimination of Station HC-12 based on the finding that it is a redundant sampling station and therefore provides no useful data.

2.1.2.4. NPDES Monitoring Parameters and Frequency

Based on findings presented in the 1985-1986 Annual Report, Homestake has proposed to modify the NPDES monitoring protocols. It is proposed that the list of parameters shown in Table 2-2 be adapted for NPDES discharge and receiving stream monitoring. The modify parameter list reflects the proposed deletion of the following: Barium, Beryllium, Calcium, Iron, Magnesium, Manganese, Selenium, Vanadium, Sodium, Sulfate, Nitrate, Ammonia, Chloride, Total Alkalinity, Total Dissolved Solids and Turbidity.

To date, data submitted by Homestake to the Regional Board indicates that of the 28 laboratory analyses currently required for discharge and receiving waters, total suspended solids is the only parameter typically seen above the discharge limit. Turbidity is recommended for removal from the list based on an analysis of upstream and downstream turbidity values reported in prior years.

TABLE 2-2

NPDES: McLAUGHLIN MINE

DISCHARGE AND RECEIVING STREAM MONITORING

PROPOSED PARAMETERS FOR ANALYSIS

Constituent	Units
Flow	gpm
Temperature	^{o}C
Specific Conductance	umhos/cm
Dissolved Oxygen	mg/L
pH	pH units
Total Suspended Solids	mg/L
Settleable Solids	mg/L
Arsenic	mg/L
Boron	mg/L
Cadmium	mg/L
Chromium	mg/L
Copper	mg/L
Mercury	mg/L
Nickel	mg/L
Lead	mg/L
Zinc	mg/L

Homestake has also recommended that a daily monitoring frequency of discharge and receiving waters is no longer necessary given the fact that the sediment control structures are now in place and have a demonstrated performance record. Homestake has proposed that monitoring frequency be reduced to the first two days of discharge and weekly thereafter for the period of continued discharge.

Homestake notes that the reduced monitoring frequency will provide daily monitoring of discharge over the period when discharge flows are expected to be relatively high. It is suggested that the compositing effect and flow attenuation provided by the sediment control ponds will provide for a more stable flow and a slow rate of change following the two day period of initial discharge.

2.1.3 TECHNICAL REVIEW

The Regional Water Quality Control Board has reviewed the 1986 Annual Water Quality Monitoring Report and the proposed recommendations contained therein. Actions taken by the Board to date include:

- Approval for Homestake to recalculate the mean concentration and associated statistical descriptions on the basis of an expanded data base (see Appendix A).

- Removal of Pond T-1 as a point source discharge under the NPDES Permit (see Appendix A).

- Approval of revisions to Monitoring and Reporting Program No. 85-032, including reduction in parameters list, sampling stations and frequency; tentative approval of revisions to Program No. 85-031 (see Appendix A).

The Solano Irrigation District (SID) has also reviewed the proposed changes to the Water Quality Monitoring Program and has found them acceptable (see Appendix A).

2.2 AIR QUALITY AND METEROLOGY

The Air Quality Monitoring Program (AQMP) documents air quality effects of project activities. Included in the program are meterology, ambient air quality, and source emission monitoring, and quality assurance programs. These programs are responsive to requirements established by the local air districts: the Bay Area Air Quality Management District (BAAQMD), Lake County Air Quality Management District, and Yolo-Solano Air Pollution Control District.

The objective of the AQMP is to collect Total Suspended Particulate (TSP) and PM-10 particulates, meterological data to characterize climatological, meterological, and ambient air quality conditions prior to and during project development and operation. Based upon these data, the nature and extent of impacts to the existing air resources from the McLaughlin Project are determined.

The Air Quality Monitoring Network was designed in consultation with the local air pollution control agencies. The monitoring network is composed of seven stations, three of which are located in Napa County. Homestake personnel are responsible for day to day operations of the AQMP, while contractors provide technical support both in the laboratory and in the field.

2.2.1 FINDINGS

During the period from July 1, 1985 to June 30, 1986, over 6,193,000 tons of material were hauled to the waste rock dump in Napa County. An additional 465,000 tons of ore were placed onto the low grade stockpiles, while 1,982,000 tons of ore were placed in the crusher and milled. At no time during this period were state or federal ambient air standards exceeded.

Values obtained from mercury and arsenic determinations indicated that concentrations are very low. No increase in these concentrations were observed from the year 1985 to the year 1986. Asbestos filter analysis over this same period indicates very low asbestos counts.

Source testing in the process area (Lake County) indicates that operations have remained within projected levels and have not exceeded permit limits established by the Lake County Air Pollution Control District.

2.2.2 RECOMMENDATIONS

Based upon a review of air quality siting criteria and current data to determine applicability, Homestake has proposed that the following changes to the AQMP be implemented:

- That Stations AQ-3 and AQ-4, both located in Yolo County be dropped from the sampling network. It is suggested that a comparison of data collected demonstrates substantial redundancy in the air quality sampling network.

- That only PM-10 data be collected during periods of extended precipitation.

- That all air quality sampling be placed on a six day schedule.

2.2.3 TECHNICAL REVIEW

Focus of air quality monitoring in Napa County is on documenting TSP and PM-10 levels, as required by the Permit to Operate issued by the BAAQMD. Based on information gathered in 1986, BAAQMD determined that the McLaughlin Project has been in compliance with current PM-10 and TSP standards.

In response to Homestake's proposed modifications to the air quality monitoring program as it relates to Napa County, the BAAQMD has requested addition data to support the proposal to eliminate TSP sampling during periods of extended precipitation. The District has also informed Homestake that it has approved the request that air sampling be placed on a six day schedule during the Summer 1987, in accordance with Condition 9.C of the Permit to Operate (see Appendix A).

2.3 AQUATIC ECOLOGY

The primary objective of the Aquatic Ecology Monitoring Program is to provide information on the biological integrity of local area streams to augment water quality monitoring. Specifically, the Aquatic Monitoring Program is designed to provide data on the community structure and diversity of fish and benthic macroinvertebrate populations. Collection of these data permit detection of changes in populations which may provide evidence of developing problems in water or sediment conditions that may not be apparent from chemical analysis. As part of the Aquatic Monitoring Program, concentrations of potential trace element contaminants in fish species are monitored to ascertain the degree of bioaccumulation of such chemicals.

The Aquatic Ecology Monitoring Program has evolved from a comprehensive program designed to characterize aquatic baseline conditions, to a focused program designed to optimize detection of any changes over background levels which might result from operation of the McLaughlin Project. Beginning in 1984, baseline data was collected at a series of matched sampling sites at upstream and downstream stations on the Hunting Creek and Knoxville Creek drainages. Over the following two years, monitoring methods were refined based upon previous years data, with an emphasis on assessing seasonal/annual variability within and between monitoring sites. The current monitoring program reflects these refinements, with the frequency of sampling having been reduced from quarterly to annual sampling (primarily in April) and sampling concentrating on four sites considered to be the most useful for monitoring operation activities HC-5, HC-7A, HC-10, KC-3 (see Figure 2).

Over the three year period, from 1984 through 1986, aquatic monitoring has been conducted by Bodega Research Associates (BRA), under contract to Homestake. At the request of Napa County, the BRA study team has periodically been accompanied by representatives from the California Department of Fish and Game.

The Aquatic Ecology Monitoring Program Annual Report: July 1, 1985 - June 30, 1986 was filed on November 24, 1986. The report provides information covering a period when the McLaughlin Project commenced operation (March 1985). As such, while adding to the data base, the 1986 Annual Report is the first to report on any changes noted in the aquatic ecological environment that may be attributable to Project operations. These findings are summarized below.

2.3.1. FINDINGS

2.3.1.1 Benthic Macroinvertebrates

The 1986 monitoring program for benthic macroinvertebrates included sampling four monitoring sites in April 1986 and one site in August 1986. Results for 1986 confirm earlier findings regarding annual variability and seasonal differences in species composition and abundance. However, 1986 data further indicate that benthic macroinvertebrate species richness (mean number of taxa per sample) declined at each site from previous years, while density of individuals increased at two of the sites and was found to be within the previous two-year range at the other sites. This phenomena was especially noticeable at the monitoring site on Knoxville Creek (KC-3), where the decline in mean number of taxa was significantly lower in 1986 than in either 1984 or 1985. In fact, the decline observed at KC-3 had the highest statistical significance of all the annual changes observed by BRA.

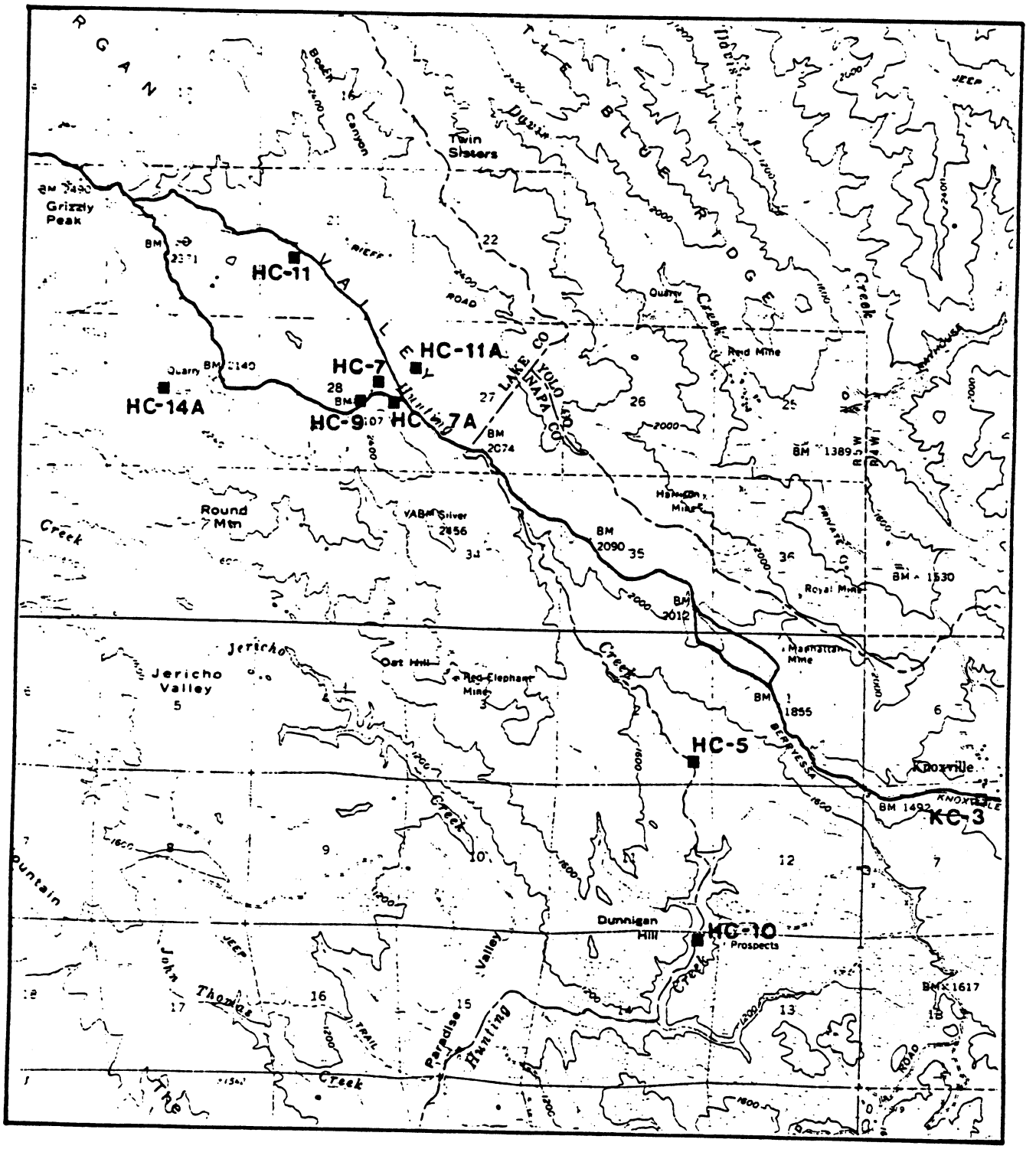


Figure 2. Locations of aquatic ecology monitoring sites in Lake and Napa Counties. Scale approximately 1 inch equals 1 mile. From USGS 15 minute series Morgan Valley Quadrangle.

One cause (identified by BRA) for faunal changes observed in 1986, relates to the precipitation pattern that has occurred prior to the annual April sampling date. Rainfall during the wet season (October - April) in the vicinity of the McLaughlin Project was 2.5 inches above average rainfall in 1983-84, 7.2 inches below average in 1984-85 and 10.6 inches above average in 1985-86. It is suggested that the below average rainfall in 1984-85 produced drought-related effects which caused a decline in the number of individuals/sample. This effect would be most noticeable at monitoring sites having a low flow rate under normal circumstances, such as at KC-3. Once flows resumed at these low discharge sites, BRA suggests that recolonization by benthic fauna most probably occurred through aerial means, rather than through upstream migration, downstream drift or hyporheic movement (vertically up through the sediments).

Apart from natural hydrologic events,, BRA evaluated whether the decline in the benthic community at KC-3 in 1986 was related to an unplanned discharge from the M-1 Sediment Pond into Knoxville Creek, that occurred during February and March 1986. The discharge lowered the pH (increasing acidity) and increased the concentrations of several metals including, arsenic, chromium, copper, mercury and zinc. BRA was unable to ascertain from the data collected following the discharge, which of two events - below average rainfall in 1985/environmental disturbance - produced the changes that occurred at site KC-3 in April 1986. It is suggested that the overlapping occurrence of these two perturbations prevents correlation of a particular event with the observed impact at KC-3. BRA determined, however, that annual benthic monitoring as currently required at KC-3, will document final recovery and will monitor future impacts.

2.3.1.2 Fish Populations

In 1986, a total of 5 different fish species were collected over the entire study area. Consistent with prior years data, this low diversity of fish species typifies California Coast Range streams of the size range found in the project area. California roach, a minnow with a wide tolerance for physical conditions remains the only abundant and wide-spread species in Hunting and Knoxville Creeks, where high temperatures and low flow rates are the usual late summer conditions. As in 1985, the highest diversity of species was at site HC-10 on Hunting Creek, located farthest downstream from all project activities.

In general, California roach populations were found to be healthy, registering similar values for size and conditions as in 1985. Roach densities declined in 1986 at all sites compared with 1985 densities however, but they were not appreciably different from previous years except at KC-3. At the Knoxville Creek station, the annual variation reached an extreme in 1986, with only one roach observed; down from 90 per 100-feet station in 1984 and 36 in 1985.

BRA suggests that the changes in the local fish population are a response to natural hydrologic events: low 1985 winter rainfall led to dry summer conditions, especially at KC-3, and high 1986 winter rainfall affected recolonization processes. With respect to Knoxville Creek, BRA discounts the discharge from the M-1 Sediment Pond resulting in localized chemical

changes in the stream, as a cause for the lack of fish at KC-3. Although BRA does not eliminate the possibility that the M-1 Pond discharge could have contributed to the decline, they suggest that the chemical changes were short-lived and therefore, were not prohibiting recolonization by fish cite one mile further downstream from KC-3 in April 1986. In late June 1986, BRA found fish absent from KC-3 stations, but found that fish cited downstream from KC-3 in April had moved upstream to within 200 feet of KC-3. BRA is therefore predicting that California roach populations will recover to earlier measured levels following summers when Knoxville Creek remains flowing at the KC-3 site.

As in prior years, BRA found that the size distribution of California roach in 1986 varied considerably amoung sample sites, reflecting in part, their short longerity (3-5 years); however, other contributing factors may include spawning dates, recruitment rates and growth rates.

2.3.1.3 Trace Element Monitoring

Concentration of seven elements analyzed in pooled samples of California roach in April 1986 add to the base of data describing sample and annual variability in these elements at the four primary monitoring sites. Comparing all four sites across years, BRA found no consistent changes in trace element concentrations.

As in prior years, concentrations of Chromium (Cr) and Nickel (Ni) were found to be highly correlated, although Cr concentrations were somewhat lower in 1986. The highest concentration of Cr and Ni of any sample analyzed during the 3-year period was measured in 1986 at site HC-5 on Hunting Creek. The other HC-5 sample had much lower concentrations of Cr and Ni, suggesting that the high measurements do not reflect widespread levels throughout the local fish population. Citing similar instances in 1984 and 1985 where only one set of measurements was high, BRA suggests that the erratic nature of these measurements may be due, in part, to the inclusion of small mineral particles in the tissue sampled from an individual fish, rather than population tissue concentrations.

Chromium and Nickel concentrations in fish samples have been found to be highly correlated, and are attributed to the geochemical association of these two elements in the project area. Measurements at KC-3 in 1986 however, indicate that Cr and Ni concentrations did not fit well with this pattern of correlation. In 1986, Cr concentrations were low, but Ni concentrations were somewhat high. Mercury concentrations were also found to be slightly higher than previous years. None of these measurements at KC-3, however, were outside the range of concentrations observed by BRA throughtout the study period.

Because of the M-1 Sediment Pond discharge, BRA reviewed the KC-3 trace element measurements to look for any evidence that metal concentrations were elevated sufficiently to account for the lack of fish at site KC-3. The study team believes that the concentrations in the fish samples collected downstream of KC-3 do not indicate that metal contamination was responsible for the population change. As noted previously, BRA believes the hydrologic conditions of heavy winter flows following severe drying in late summery 1985 caused the decline.

2.3.2 RECOMMENDATIONS

Homestake is proposing that the focused monitoring program implemented in 1986, continues without major alteration in 1987. Citing the detection and interpretation of changes in Knoxville Creek associated with the M-1 Pond discharge, BRA believes the reduced monitoring program has functioned efficiently and productively.

For 1987, Homestake has proposed to alter the reporting schedule such that April sampling results is presented in July, to match the annual schedule for reporting on other segments of the monitoring program. This recommendation is made in response to a request by the Planning Division. Results of the August 1987 benthic sampling would be reported in July 1988.

2.3.3 TECHNICAL REVIEW

The California Department of Fish and Game has been directly involved in the Aquatic Monitoring Program, providing on-site field inspection and technical review of the annual report. The CDFG has reviewed the 1986 Annual Aquatic Monitoring Report and found the report to be generally very good (see Appendix A). California Department of Fish and Game concurs with Homestake that the focused monitoring program implemented in 1986 should continue unaltered. However, CDFG suggests that monitoring on Knoxville Creek downstream of KC-3 at the site BRA visited in April 1986 should continue in 1987. The basis for this recommendation follows from BRA's belief that given a return to normal flow conditions at KC-3, recovery and recolonization of the site will occur. Until such time as measurements taken during the April sampling period substantiate that recovery at KC-3 has occurred, CDFG believes that supplemental monitoring (as conducted by BRA in 1986) will be needed.

2.4 VEGETATION

The 1986 Vegetation Monitoring Program included monitoring of previously reclaimed areas (reclamation success), sensitive plants and the management of contiguous lands unaffected by mining.

Pursuant to Use Permit requirements, performance standards to ascertain reclamation success on serpentine and non-serpentine soils were integrated into the 1986 Monitoring Program. In addition, reclamation research and test planting programs initiated in 1985 have continued. Results of the 1986 Vegetation Monitoring Program are discussed below, together with recommendations for the 1987 monitoring effort.

2.4.1 FINDINGS

2.4.1.1 Sensitive Plants

The Sensitive Plant Monitoring Program has been designed to evaluate the direct and indirect effects of project construction and operation on sensitive plant populations in close proximity to project operations (including roads). To accomplish this goal, Biosystems Analysis Inc. (BSAI) in consultation with the Napa Chapter of the California Native Plant Society (CNPS) began, in the Spring of 1985, surveys of selected sensitive plant populations and the establishment of reference monitoring plots. During the late Winter and Spring of 1986, BSAI continued the monitoring of these selected sensitive plant populations.

A total of 59 sensitive plant occurrence areas were visited by BSAI. All populations surveyed are in close proximity to the main project features including: tailings pond, mill site, access roads, slurry pipelines, mine site, waste rock area, and Davis Creek Reservoir. Several new populations were located in the project area during the 1986 monitoring surveys. These surveys indicated that no serious disturbances to sensitive plant populations were encountered in 1986. Both fenced and unfenced populations showed no evidence of wind or water born pollution or an inordinant increase in insect damage. On the contrary, indications are that the number of individual plants increased significantly over 1985 at select locations. BSAI suggested that the increase in number was most likely due to a combination of an above average winter rainfall and cooler winter temperatures. It is further suggested that the new populations identified, appear to have resulted from perturbations associated with facility construction. It was noted that the plant species identified often respond favorably to reduced competition and reoccupy newly bared serpentine soils.

No significant indirect impacts were observed to be continuing from previous years. No other indirect impacts on the sensitive plant populations in close proximity to project facilities were observed.

In 1985, BSAI identified several sensitive plant populations which it considered candidates for monitoring effects of grazing. Surveys of unfenced populations indicate that these plant populations did not exhibit an inordinant amount of cropping due to select grazing pressure. The populations within the confines of fenced areas showed similar individual plant totals and proportions to those in 1985.

Efforts to re-establish the Thelypodium brachycarpum in areas outside the waste rock dump continued in 1986. The CNPS has continued with its program of seed collection and plantings at sites identified during monitoring studies as good potential transplant locations. A successful transplant of 15 T. brachycarpum plants in Pope Canyon was destroyed in a landslide during heavy rains in February 1986. These plants had survived to flower, suggesting that this species can be successfully re-established elsewhere.

Homestake continues to provide protection of the existing stand of T. brachycarpum located in the waste rock area, and has indicated that the existing site may not be removed for at least another three years, and maybe not at all during the life of the project. Based on this new time line, the CNPS has decided on a more deliberate time schedule favoring small, annual plantings and monitoring.

2.4.1.2 Reclamation Success

Revegetation efforts in 1986 were centered on completing the seeding of areas disturbed by construction activities, planting of some 6,000 liner trees and shrubs to establish visual screening, and monitoring of initial reclaim areas and test plots.

The 1985-1986 revegetation program was implemented on 165 acres of disturbed land throughout the project area and was found to be successful in controlling erosion. Focus of this effort was on slopes and embankments on project dams and access roads. Revegetation of disturbed areas in Napa County had previously been completed during 1984-1985. The focus of revegetation efforts in Napa County therefore was on evaluating the success of prior actions and the need for corrective actions. In addition, the majority of woody plants installed in January 1986 were in Napa County, as indicated below:

County	Area	No. of Plants
Napa	Sewage Treatment Pond Area	1,528
Napa	County Road roadcuts	1,157
Napa	Mine Storage Facility	620
Napa	Waste Rock Dump	2,251
Lake	Morgan Valley Roadsides	475
Lake	Picnic Area	342

In general, revegetation efforts have been successful in establishing plant cover adequate to stablize disturbed sites and control erosion. Most of the areas revegetated to date are adjacent to undisturbed areas, where native species have started to invade.

2.4.1.3 Management of Contiguous Lands

A program to develop a plan for the management of more than 7,000 acres of non-mined lands owned by Homestake has been initiated, as required in the Project Use Permit. The plan is expected to address mitigation measures and permit conditions regarding fish and wildlife management, including habitat management adjacent to project waterbodies. In addition, the preparation of the plan has provided an opportunity to furher the research and educational programs, as provided in the project Master Reclamation Plan.

A group of private consultants and graduate students under the direction of their major professors has been assembled to prepare the plan. Included are participants from both U.C. Berkeley and U.C. Davis. A draft of the Plan was complete in the Fall of 1986, and was submitted to review agencies for comments on March 16, 1987.

2.4.2 RECOMMENDATIONS

The consultant retained by Homestake to conduct the Reclamation Monitoring Program has recommended that based on field observations of the 1985-1986 revegetation effort, no change be made in the seed mixes, soil amendments and type of mulch to be used for the 1986-1987 program. In addition, no remedial seeding or fertilizing is recommended.

BSAI has recommended that two sites in the project area identified by the CNPS as prime candidates for T. brachycarpum transplant be fenced. Further, that fencing around the existing T. brachycarpum population be repaired.

2.4.3 TECHNICAL REVIEW

The U.S. Bureau of Land Management has reviewed the recommendations regarding the 1986-1987 Vegetation Monitoring Program and has advised the Planning Division that it finds them acceptable.

2.5 WILDLIFE

The objective of the Wildlife Monitoring Program is to detect changes in the abundance or health of wildlife populations. Specifically, the program design provides for identification of changes that are attributable to the McLaughlin Project, potentially avoidable, and sufficiently important to require corrective measures.

As identified in the EIR/EIS, potentially avoidable impacts that justify monitoring and corrective measures, if necessary, include:

1. Exposure of wildlife to hazardous wastes.
2. Disturbance to Golden Eagle nests.
3. Road kills

2.5.1 FINDINGS

2.5.1.1 Exposure of Wildlife to Hazardous Wastes

Exposure to hazardous wastes in potentially the most immediate danger posed to wildlife from the McLaughlin Project. The wildlife monitoring program has therefore been designed to document wildlife exposure to project waterbodies identified as potentially hazardous. Given the chemical composition of the tailings and waste rock deposits, of particular concern would be use by wildlife, particularly water fowl, of the tailings impoundment, sediment control basins and water collected in the mine pit. Data collected to date indicate that none of these waterbodies can be considered hazardous.

Wildlife observation sighting surveys conducted over the 1985-1986 period, were limited primarily to Davis Creek Reservoir located in Yolo County. The tailings impoundment located in Lake County is considered by the State Department of Health Services to be non-hazardous, therefore Homestake did not conduct systematic pedestrian surveys to document wildlife use. Rather, observations by Homestake personnel were intermittantly documented within and adjacent to the tailings impoundment, the waste rock sediment control ponds, and mine pit area.

As reported by Homestake, data collected in 1985-1986 showed a very similar species diversity in comparison to the previous year's reporting period. It was noted that not all of the species observed during the 1982 wildlife baseline surveys were observed in 1985-1986. It was suggested that this was due to the less rigorous study of wildlife during the operations phase, the purpose of which is monitoring abundance and health of the more common resident species versus documentation of all species present.

Species diversity documented in 1984-1985 was reported as almost entirely reproducible. Of particular interest was the attraction of approximately 20 new species of water birds to the Davis Creek Reservoir. The Reservoir represents the introduction of an uncontaminated water body into the project area.

As reported by Homestake, the distribution of recorded sightings in 1985-1986 among project area waterbodies varied considerably. This was more a function of monitoring protocol, since the focus of the pedestrian surveys was documenting use of Davis Creek Reservoir.

2.5.1.2 Disturbance of Golden Eagle Nests

An aerial helicopter search for eagle nests was conducted on April 29, 1986. Results of the 1986 program confirm earlier findings regarding no active golden eagle nests, nor positive signs of eagle nesting, having been located in the project area. However, after a year of single-bird golden eagle sightings at the Davis Creek Reservoir, a pair of eagles were seen on several occasions during Spring 1986. An inmature eagle was also observed by an environmental technician from Homestake, which may or may not be from this pair. It was noted that the eagles are routinely seen by company personnel foregoing around the mill.

2.5.1.3 Roadkills

Increased vehicular traffic due to development of the McLaughlin Project was identified in the EIR/EIS as a potential cause for increased levels of mortality and injury to wildlife. No pre-project data on roadkills in the project area exist, therefore, the monitoring program is designed simply to provide for a determination of the rate of roadkills by species.

Limited data on roadkills are presented in the Annual Report. These data were collected only in a semi-systematic manner rather than through a monthly survey of roadkills.

2.5.2 **RECOMMENDATIONS**

Homestake has proposed that the Wildlife Monitoring Program continue in its present form, with the addition of systematic monitoring for wildlife in the tailings impoundment area. Monitoring in the tailings impoundment area would consist of pedestrian shoreline surveys combined with perimeter automobile sightings at dawn. This pedestrian survey would be conducted during the 1986-1987 season by Darell Slotton of U.C. Davis, in conjunction with his ongoing doctoral thesis work at Davis Creek Reservoir.

As proposed by Mr. Slotton, priorities for wildlife monitoring at the tailings impoundment would include: tracking mammals within the fenceline surrounding the area, determining those which utilize the pond itself, and assessing water fowl usage of both pond and shoreline. Toward this end, a recommendation for increased frequency of surveys during Fall and Winter months is recommended.

Consultant to Homestake has recommended dropping the requirement for monthly survey for roadkills. This recommendation is based upon experience in the project area which indicates that monthly data collection is meaningless. Roadkills in the project area occur almost exclusively on Morgan Valley Road. Meaningful data can more readily be collected on a routine basis by Homestake employees traveling Morgan Valley Road on a daily basis. This procedure is currently specified in the Environmental Monitoring Manual.

2.5.3 TECHNICAL REVIEW

The California Department of Fish and Game (CDFG) has reviewed the 1986 Annual Wildlife Monitoring Report and the proposed recommendations contained therein. The CDFG concurs with proposed modifications to the wildlife program calling for systematic monthly surveys not only in the Davis Creek area, but also in the tailings impoundment area. CDFG notes that these surveys will help provide information needed for general species abundance and diversity. Homestake has proposed that such surveys be conducted for the period 1986-1987. However, CDFG recommends that systematic wildlife surveys be completed in depth for a second full year. Further, CDFG recommends that the proposed intensive survey to identify all local breeding birds during the nesting season, be extended for an initial two year period, then every fifth year thereafter. Bi-annual surveys are recommended for doves, deer, and raptorial birds during Spring and Winter.

The CDFG has also recommended that procedures be added to the Wildlife Monitoring Program that would establish local background levels for disease, heavy metals and toxic burden. CDFG recommends determination of background levels through analysis of tissue of roadkill specimens, and annual sampling of water fowl and water bird tissues. Intensive sampling is recommended for a least two years, with reduced sampling thereafter.

2.6 GEOTECHNICAL

The Geotechnical Monitoring Program entails monitoring the integrity of embankments and natural or induced slope movements for each of four separate water storage or waste impoundment facilities as listed below:

- Tailings Impoundment (Lake County)
- Davis Creek Dam and Reservoir (Yolo County)
- M-1 Dam and Reservoir (Napa County)
- Waste Rock Disposal Sediment Control Facility (Napa County)

Monitoring data has been collected by Homestake for each of the structures from the time each structure began operating. Most of the dams and impoundments have undergone complete reservoir filling and lowering cycles since the start of operations. The structures have operated satisfactorily based on the data collected to date and the visual inspection reports.

Monitoring data for 1986 has been reviewed and analyzed by the firm of Steffen, Robertson & Kirsten (SRK), a Geotechnical engineering firm under contract to Homestake Mining Company. Subsequent to data analysis, SRK completed a field inspection of each structure and an evaluation of structure performance relative to design criteria and permit requirements. Based upon its findings, SRK indicated that the structures are performing as designed. Recommendations by SRK for change regarding facilities located in Napa County included the installation of a permanent weir at M-1 Dam and reduction of monitoring frequency of certain parameters from the original start-up schedules.

The report prepared by SRK was transmitted to the Division of Safety of Dams in compliance with reporting requirements for Geotechnical Monitoring. The Division has indicated their satisfaction that all dams are functioning safely.

2.7 CULTURAL RESOURCES

Cultural resources field work was completed in 1985 as detailed in the 1984-1985 Annual Report. A final comprehensive project cultural resources report has been prepared under the direction of Dr. David Frederickson and Mr. Tom Origer of Sonoma State University.

2.8 NOISE

Noise monitoring is limited to two sites in Lake County. No noise complaints have been received to date.

2.9 SOCIOECONOMIC

Socioeconomic monitoring during the pre-operational phase and follow-up during the first year of operation has been completed and was reported in the 1984-1985 Annual Report. That report completed the project socioeconomic monitoring requirements.

Traffic on Knoxville-Berryessa Road has been monitored in accordance with Napa County Agreement #2055. The traffic data indicates levels well below the threshold level of 125 average daily trips for a period of four (4) consecutive weeks. The threshold level, if reached would initiate origin and destination surveys as detailed in the Napa County Road Agreement.

APPENDIX A

REVIEW COMMENTS FROM PERMITTING AGENCIES

ATE OF CALIFORNIA
GEORGE DEUKMEJIAN, Governor

ALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD—
ENTRAL VALLEY REGION
-43 ROUTIER ROAD
\CRAMENTO, CA 95827-3098

RECEIVED
MAR 25 1987
Napa County Conservation,
Development & Planning Department

24 March 1987

Mr. Raymond E. Krauss
Environmental Manager
Homestake Mining Company
McLaughlin Gold Project
Post Office Box 1010
Lower Lake, CA 95457

MC LAUGHLIN MINE ENVIRONMENTAL MONITORING ANNUAL REPORT, JULY 1985 - 30 JUNE 1986, LAKE, NAPA, AND YOLO COUNTIES

We have reviewed the October 1986 McLaughlin Mine Environmental Monitoring Annual Report. The comprehensive report is in compliance with Provision 13 of Waste Discharge Requirements Order No. 85-032, which requires the development and annual update of the water quality statistical data.

The report adequately defined the quality of ground and surface waters in the project's area of influence during the 1985-86 water year. The 1985-86 water quality data was compared with prior data. Both standard deviation for samples with characteristics of log normal distribution properties and Student T-Tests in a normal type distribution were used to evaluate changes in water quality over previous background conditions. The report concludes "no changes in water quality attributable to McLaughlin Project activities have been identified". However, some water quality has changed in terms of some variables and at some locations. The report states the changes may be related to regional and local decreases in the precipitation in the recent past. Seasonal and annual fluctuations will continue to be evaluated as additional data is accumulated.

We find the report and its conclusion acceptable for this stage of the project.

In several areas of the report, Homestake notes the high frequency with which certain constituents are routinely measured at less than the detection limits and that the purposes of analyzing for these constituents have been satisfied. We agree. There are also certain constituents and sampling locations which no

longer provide additional information. The sampling frequency should be reconsidered. Therefore, we have reviewed the monitoring program and made changes accordingly. The intent of the changes is to give more focus to the data collection. The rationale for significant changes is given on the attached sheet.

Please call Mr. Ed Crawford at (916) 361-5652 if you have any questions.

Jack DeConteffon

JIM ECKMAN
Senior Engineer

EZC:gs

Attachments

cc: Mr. Van Manning, c/o Tim Julius, Bureau of Land Management, Ukiah
Mrs. Betsy Jennings, Office of the Chief Counsel, State Water Resources Control Board, Sacramento
Mr. John Graham, Lake County Planning Department, Lakeport
Mr. Tim Cool, Napa County Planning Department, Napa
Mr. Ben Hulse, Yolo County Planning Department, Woodland
Mr. Eugene Knapp, Solano County Public Works Department, Fairfield
Mr. Brice Bledsoe, Solano Irrigation District, Vacaville

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

REVISED MONITORING AND REPORTING PROGRAM NO. 85-032
FOR
MC LAUGHLIN MINE
HOMESTAKE MINING COMPANY AND
US BUREAU OF LAND MANAGEMENT
YOLO, LAKE AND NAPA COUNTIES

Monitoring and Reporting programs No. 83-124, dated 23 September 1983, and No. 85-032, dated 25 January 1985, contained pre-operation monitoring. These programs are on file in the Regional Board office.

Mine

Constituents	Units	Type of Sample	Sampling Frequency
Mass Extracted	Dry Tons	Estimate	Monthly
Low Grade Ore Stockpile			
Mass Added	Dry Tons	Estimate	Monthly
Mass Used	Dry Tons	Estimate	Monthly
Waste Rock Disposal			
Mass Added	Dry Tons	Estimate	Monthly
Crushing and Grinding Facility			
Mass of solids placed in Slurry Pipeline	Dry Tons	Estimate	Monthly
Tailings Disposal			
Flow to impoundment	MGD	Metered	Quarterly
pH	pH units	Range	Monthly
Sulfate	mg/l mg/kg	Composite	Quarterly
Arsenic	mg/l mg/kg	Composite	Quarterly
Total Chromium	mg/l mg/kg	Composite	Quarterly
Copper	mg/l mg/kg	Composite	Quarterly
Mercury	mg/l mg/kg	Composite	Quarterly

Constituent	Units	Type of Sample	Sampling Frequency
Nickel	mg/l and mg/kg	Composite	Monthly
Total Cyanide	mg/l and mg/kg	Composite	Monthly

Note: The volume of waste rock, crushed ore and low grade ore stockpiled must equal volume amount taken from the mine.

Evaporation Pond

Constituent	Units	Type of Sample	Sampling Frequency
pH	pH Units	Grab	Bi-Annual*
EC	umhos/cm	Grab	Bi-Annual*
Oil & Grease	mg/l	Grab	Bi-Annual*
Ethylene Glycol	mg/l	Grab	Bi-Annual*
Volatile Organics	ug/l	Grab	Bi-Annual*
Zinc	mg/l	Grab	Bi-Annual*
Minimum Freeboard	feet	--	Bi-Annual

* Samples to be collected in March and June

Cooling Pond

Constituent	Units	Type of Sample	Sampling Frequency
pH	pH Units	Grab	Bi-Annual
EC	umhos/cm	Grab	Bi-Annual
TDS	mg/l	Grab	Bi-Annual
Chloride	mg/l	Grab	Bi-Annual
Pond elevation (at) time of sample)	feet	--	Bi-Annual
Minimum pond freeboard	Feet	--	Bi-Annual
Heavy Metals*	mg/l	Grab	Annual

* The following dissolved metals shall be analyzed: Chromium III, Copper, Molybdenum, Nickel, Lead, Zinc

Tailings Return Sump

Constituent	Units	Type of Sample	Sampling Frequency
Return Flow	gpd	pump hours or metered	Monthly
pH	pH Units	Grab	Quarterly
EC	umhos/cm	Grab	Quarterly
TDS	mg/l	Grab	Quarterly
Heavy Metals*	mg/l	Grab	Quarterly

* The following metals shall be analyzed: Arsenic, Chromium III, Copper, Mercury, Nickel, Cyanide

GROUND WATER MONITORING

Mine

Two wells (S-1 and S-2) are established to measure the ground water quality.

Low Grade Ore Stockpile, Ore Crushing Area

One monitoring well (S-8) is established in this area.

Waste Rock Disposal

Five monitoring wells (S-3, S-4, S-5, S-6 and S-7) are established to measure up and downgradient ground water quality.

Tailings Disposal Facility

Twelve monitoring wells (N Series) are established to measure up and downgradient water quality.

Note: All monitoring well locations shall be established under the direction of the Board's staff. Prior to construction of any additional wells, plans and specifications for ground water monitoring wells shall be submitted to Board staff for review and approval.

CONSTITUENTS (OPERATIONAL)

Field Measurements

pH
Temperature
Specific Conductance
Ground Water Elevations

Laboratory Measurement

Total Alkalinity	Nitrate
Total Hardness	Sulfate
Total Dissolved Solids	Ammonia
MBAS	

Metals (total)

Barium	Total Chromium	Mercury	Iron
Arsenic	Copper	Nickel	Total Cyanide
Boron	Lead	Free Cyanide	
Sodium	Manganese	Zinc	

Note: Cyanide shall only be analyzed in wells near the tailings disposal and mill site.

Units

All units shall be reported in mg/l, except pH (pH Units) and levels (in feet USGS Datum).

Type of Sample

All samples shall be grab samples using proper EPA and Regional Board sampling techniques and preservation. The wells shall be adequately purged prior to sampling. Samples being analyzed for metals should be reported as total metals.

Sampling Frequency

Samples shall be collected and analyzed quarterly. Ground water elevations shall be obtained quarterly.

OBSERVATION WELLS (TAILINGS KEY TRENCH)

OW 1, 2, 3, 4, and 5, shall be monitored quarterly for the following constituents: water elevation, pH, EC and Total Cyanide.

WELL MONITORING REVIEW

When the tailings elevation reaches 2180 feet or prior to Stage II tailings embankment construction, the monitoring well system around the embankment will be reevaluated. New wells will be added to the monitoring program as necessary. Special consideration shall be given to the following two locations:

1. Stage I spillway (Station 14 + 62)

2. A location 600 feet northeast of Well N-10 in a saddle on a ridge between two minor peaks.

Wells N-6, N-10, and N-11 shall be reevaluated to determine if shallower screened intervals would be more appropriate during Stage II filling of the tailings disposal facility.

RECEIVING WATER MONITORING LOCATIONS

All receiving water samples shall be grab samples. Receiving water samples shall be taken from the following locations:

Cache Creek 1 (CC-1)

CC-1 is upstream of the confluence of Cache Creek and Davis Creek on the west bank of Cache Creek in Lake County. The station is situated at approximately 122° 22' 32" west longitude and 38° 56' north latitude. The station is approximately 50 feet northwest of the Davis Creek, Cache Creek junction, along a rocky embankment.

Cache Creek 2 (CC-2)

CC-2 is downstream of the confluence of Cache Creek and Davis Creek on the west bank of Cache Creek in Lake County. The station is situated at approximately 122° 22' 32" west longitude and 38° 56' north latitude. The station is approximately 200 feet southeast of Davis Creek at the edge of a sandy alluvial deposit.

Davis Creek 4 (DC-4)

DC-4 is approximately 100 yards from the confluence of Davis Creek and Cache Creek on Davis Creek. The station is situated at approximately 122° 22' 32" west longitude and 38° 56' north latitude. The sampling location is immediately upstream of a jeep trail crossing Davis Creek near a large tree.

Davis Creek 5 (DC-5)

DC-5 is on Davis Creek near the Reid Mine in the northwest quarter of Section 25, T12N, R5W. The sampling location is on the west bank, near the Rieff-Rayhouse Road, upstream of the road crossing.

Davis Creek 6 (DC-6)

DC-6 is on Davis Creek downstream of the Davis Creek Reservoir Dam near the northeast corner of Section 25, T12N, R5W. The sampling location is downstream of the confluence of a tributary from the west along the side of Hobit Mountain between a 1-1/2 foot diameter leaning, pine tree and three-foot diameter oak tree on the east bank.

Hunting Creek 5 (HC-5)

HC-5 is on an eastern tributary to Hunting Creek in the southeastern quarter of Section 2, T11N, R5W. The sampling location is in the Hunting Creek channel adjacent to a sharp bend in a dirt road which proceeds up a steep hill. The sampling point is approximately six feet west of a two-foot diameter oak tree and adjacent to two steel fence posts driven into the ground.

Hunting Creek (HC-7A)

HC-7A is on Hunting Creek immediately downstream of the road crossing to the Red Elephant Mine in the SW-1/4 of Section 27, T12N, R5W, MDB&M.

Hunting Creek 9 (HC-9)

HC-9 is on a western tributary to Hunting Creek, draining Quarry Valley and parallel to the Old Morgan Valley Road. The station is south of the center of Section 28, T12N, R5W. The sampling location is north of the old Morgan Valley Road, west of a small bridge crossing Hunting Creek and south of a rock outcrop. A steel post is approximately 10 feet south of the sampling location.

Hunting Creek 10 (HC-10)

HC-10 is on the main channel of Hunting Creek immediately below the concrete weir in the northeastern quarter of Section 11, T11N, R5W.

Hunting Creek 11 (HC-11)

HC-11 is downstream of the Rieff Road Bridge on Hunting Creek in Morgan Valley in the western half of Section 21, T12N, R5W. The sampling station is approximately 40 feet downstream of the Rieff Road Bridge in the center of the stream opposite a cluster of Manzanita bushes.

Knoxville Creek 3 (KC-3)

KC-3 is in the northwest quarter of Section 7, T11N, R4W, upstream of the county road crossing and downstream of the Devils Head Road.

Putah Creek 1 (PC-1)

PC-1 is on Putah Creek at the Coast Guard LORAN Station pump house in the northwest quarter of Section 24, T11N, R6W, MDB&M.

Putah Creek 2 (PC-2)

PC-2 is on Putah Creek upstream of the irrigation pump near Round Corral in the southwest quarter of Section 33, T11N, R5W, MDB&M.

RECEIVING WATER MONITORING (Operational)

The following surface water monitoring stations shall be analyzed quarterly: DC-6, HC-5, HC-9, HC-10, HC-11, and KC-3. Free and total cyanide shall only be analyzed at Stations HC-9 and HC-10. Chrysotile asbestos shall only be analyzed at the following stations: CC-1, CC-2, DC-4, HC-10, PC-1, and PC-2.

Constituent	Units
Flow (estimate)	gpm
pH (field)	pH Units
Temperature (field)	°C
EC (field)	umhos/cm
Total Alkalinity	mg/l
TDS	mg/l
Suspended Matter	mg/l
Chloride	mg/l
Nitrate	mg/l
Sulfate	mg/l
Ammonia	mg/l
Arsenic	mg/l
Boron	mg/l
Chromium	mg/l
Copper	mg/l
Iron	mg/l
Lead	mg/l
Mercury	mg/l

Constituent	Units
Nickel	mg/l
Sodium	mg/l
Zinc	mg/l
Free Cyanide	mg/l
Total Cyanide	mg/l
Chrysotile Asbestos	Fiber/l

Note: Metal analysis shall be reported in both dissolved and total metals present (filtered and non-filtered).

Sampling Station HC-10 will provide for daily composites analyzed twice per week for free cyanide.

Sediment Samples

Sediment samples shall be collected at the following locations: DC-5, DC-6, KC-3, and HC-10. The samples shall be analyzed semi-annually for the following constituents and reported in dry weight: arsenic, chromium, copper, lead, mercury, nickel and zinc.

Aquatic Ecology

Aquatic life shall be sampled at the following locations annually: HC-10, HC-7A, HC-11,, KC-3, DC-5 and DC-6. Sampling shall provide for the following: sampling by net, electro-shocking, surber sampler; species identification, inventory and mercury analysis of fish flesh.

REPORTING

In reporting the monitoring data, the Discharger shall arrange the data in tabular form so that the date, the constituents, and the concentrations are readily discernible. The data shall be summarized in such a manner to illustrate clearly the compliance with Waste Discharge Requirements.

Quarterly monitoring reports shall be submitted to the Regional Board within 45 days of analytical determination.

If the Discharger monitors any pollutant at the locations designated herein more frequently than is required by this Order, he shall include the results of such monitoring in the calculation and reporting of the values required in the Discharge Monitoring Reporting Form.

The Discharger shall submit a report to the Board by 30 January of each year containing both tabular and graphical summaries of the monitoring data obtained during the previous year. In addition, the Discharger shall discuss the compliance record and the corrective actions taken or planned which may be needed to bring the discharges into full compliance with the waste discharge requirements.

If any additional monitoring activities are required as a condition of, or performed in conjunction with, any permit for Homestake's McLaughlin Mine, including sediment sampling or "aquatic life" sampling, the results of such additional monitoring shall be submitted to the Board at the same time that the results are submitted to the agencies or entities which require such monitoring.

The Discharger shall implement the above monitoring program on the effective date of this Order.

William H. Crooks

WILLIAM H. CROOKS, Executive Officer

24 March 1987

(Date)

Revised:2/27/87:EZC:gs

RATIONALE FOR CHANGES TO
MONITORING AND REPORTING PROGRAM NO. 85-032

Page 1, Tailings Disposal

The measurement for pH has been changed from weekly to monthly. Selenium has been deleted and all other measurements have been changed from monthly to quarterly. Selenium has not been found above detection limits. All other constituents have not shown any significant short-term variation.

Page 2, Evaporation Pond

No change

Cooling Pond - Change "Pond Volume" to read "Pond Elevation". Dissolved metals, cadmium, cobalt, and vanadium deleted. These metals have not been found above detection limits.

Tailings Return Sump - The dissolved metal, selenium, deleted. This metal has not been found above detection limits.

Page 3, Ground Water Monitoring

Waste Rock Disposal - Change to read: "Five monitoring wells (S-3, S-4, S-5, S-6, and S-7)..."

Constituents - (pre-operations) deleted for clarity.

Page 4, Constituents (Operational)

Laboratory measurements for pH, chloride, and COD deleted. pH is best measured in the field, because it is subject to change with time. Chloride and COD are not considered significant and reliable attributes of the waste streams.

Metals (total) - Beryllium, vanadium, cadmium, and selenium are not found in sufficient concentration to warrant further monitoring on a continuous basis. Calcium and magnesium have not shown any anomalous variability and, therefore, are adequately covered under Total Hardness.

Page 5, Sampling Frequency

Ground water elevation measurements have been changed from monthly to quarterly. Ground water elevations vary significantly and are related to precipitation. The purpose of ground water elevation measurements is to determine long-term trends. This can be determined by quarterly measurements.

Page 11, Receiving Water Monitoring (Operational)

Station HC-12 has been deleted. This station was between HC-10 and HC-11. Monitoring at the station did not show significant results and is considered a redundancy of HC-10.

Page 12, Constituents

Barium, calcium, cadmium, magnesium, and selenium have been deleted. These constituents are not used in the mining operation and have not been found in sufficient concentration in the natural environment to warrant further continuous monitoring.

Continuous monitoring for specific conductance, pH, sodium, and temperature at HC-10 has not shown significant concentrations or variation. Therefore, continuous monitoring for these constituents is not warranted.

Page 13, Aquatic Ecology

In addition to sampling of aquatic life at DC-5 and DC-6, aquatic life sampling has been included at HC-7A, HC-10, and KC-3.

EZC:gs

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD—
CENTRAL VALLEY REGION
443 ROUTIER ROAD
SACRAMENTO, CA 95827-3098

RECEIVED
MAR 25 1987
Napa County Conservation,
Development & Planning Department

23 March 1987

Mr. Phil Barnes
Homestake Mining Company
P. O. Box 1010
Lower Lake, CA 95457

REVISION OF MONITORING AND REPORTING PROGRAM NO. 85-031 (NPDES NO. CA0081477), LAKE, NAPA, AND YOLO COUNTIES

Enclosed are copies of a proposed revision and rationale for Monitoring and Reporting Program No. 85-031 and a public notice concerning the revision. The revision includes deletion of monitoring of Discharge 004 because it is no longer an NPDES discharge point. Other revisions include deletion of monitoring stations and selected constituents and reduction in monitoring frequency.

Please post a copy of the Public Notice and the proposed revised Monitoring and Reporting Program in the post office at Napa, Lower Lake, and Woodland for a period of 30 days, beginning 6 April 1987. By 13 April 1987, you must file a proof of posting with our office (form enclosed).

If you have any questions, please contact Ed Crawford at (916) 361-5652.

Jack E. DeConta/for

JIM ECKMAN
Senior Engineer

EZC:gs

Enclosures

cc: Environmental Protection Agency, San Francisco
Department of Fish and Game, Region III, Yountville
Department of Health Services, Santa Rosa
Department of Health Services, Sacramento
Department of Water Resources, Northern District, Red Bluff
Yolo County Department of Health Services, Woodland
Napa County Department of Health Services, Napa
Lake County Department of Health Services, Lakeport
Yolo County Planning Department, Woodland
Napa County Planning Department, Napa ✓
Lake County Planning Department, Lakeport
Yolo County Flood Control District, Woodland
Solano Irrigation District, Vacaville
Homestake Mining, Lower Lake
Mr. Frances Looney, Rumsey

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION
3443 ROUTIER ROAD
SACRAMENTO, CALIFORNIA 95827-3098

PUBLIC NOTICE
FOR
REVISED MONITORING AND REPORTING PROGRAM
FOR
HOMESTAKE MINING COMPANY
MC LAUGHLIN MINE
LAKE, NAPA, AND YOLO COUNTIES

The discharge of a portion of the wastewater at Homestake Mining Company, McLaughlin Mine, is governed by Order No. 85-031 (NPDES NO. CA0081477). The Monitoring and Reporting Program of the waste discharge requirements specifies the constituents to be monitored and the frequency of monitoring. It is proposed to eliminate monitoring of one point because it no longer discharges directly to surface waters, eliminate monitoring at several receiving water locations, eliminate the analysis of several constituents and reduce the frequency of monitoring.

Persons wishing to comment on the proposed modifications are invited to submit same in writing to the Regional Board no later than 15 May 1987. All comments received by this date will be considered in the final modifications to the Monitoring and Reporting Program for Homestake Mining Company, McLaughlin Mine.

Copies of the existing and proposed Monitoring and Reporting Program can be obtained by contacting Edwin Crawford at (916) 361-5652. Related reports and documents may be inspected and copied at the Regional Board's office at 3443 Routier Road, Sacramento, California, 95827, weekdays between 8:00 a.m. and 5:00 p.m.

Please bring the above information to the attention of anyone you know who would be interested in this matter.

Jack E. Del Conte

JACK E. DEL CONTE, Supervising Engineer

3/23/87:EZC:gs

RATIONALE FOR CHANGES TO
MONITORING AND REPORTING PROGRAM NO. 85-031 (NPDES NO. CA0081477)

Page 1

Discharge 004 is no longer an NPDES discharge point. Discharge 001 has been stabilized and revegetated. Therefore, monitoring has been reduced accordingly.

Effluent Monitoring - The following constituents have been deleted: TDS - This is a redundancy of specific conductance. pH (Laboratory) - pH is best measured in the field because it is subject to change with time. Total alkalinity - Surface water drainage courses in the area have historically had a relatively high alkalinity (over 400 mg/l). This is a consequence of the relatively high carbonate content of the geologic formations in the area. Because of this, monitoring for total alkalinity on a continuous basis is not warranted. Calcium, chloride, nitrate, sulfate, ammonia, barium, beryllium, iron, magnesium, manganese, sodium, and selenium are not used in the mining operation and have not been found in significant concentrations in the natural environment.

Nitrate is an end product of cyanide decomposition. However, nitrate analysis is retained at the N series wells around the tailings disposal facility. Also, any significant increase in cyanide decomposition products would result in an increase in specific conductance. Therefore, further monitoring for these constituents on a continuous basis is not warranted. Frequency of monitoring has been changed from daily to "Daily for the first two days of discharge, and weekly thereafter for periods of continued discharge".

A review of two years of monitoring data has shown there is no significant variability in constituent concentrations after the first day of a discharge period.

Page 2, Receiving Water Monitoring

The NPDES permit is specific for point source discharges. Monitoring, therefore, should be specific for the discharge points. Accordingly, Stations R-1 and R-2 have been deleted as a redundancy of Station R-3. Station R-5 has been deleted because it was a receiving water station below M-1 (004), which is no longer a point source discharge. Stations R-3, R-3A, and R-4 have been redesignated as HC-5R, HC-15R, and HC-10R, respectively.

Page 2 and 3, Receiving Water Monitoring

The following constituents have been deleted: TDS, pH (Laboratory), total alkalinity, calcium, chloride, nitrate, sulfate, ammonia, barium, beryllium, iron, magnesium, manganese, sodium, selenium, and turbidity. Turbidity is

more qualitative than quantitative. There is no correlation between perceived turbidity and the laboratory measurements. Turbidity measurements vary considerably in any given stream transect. Moreover, there is no standard for turbidity limits to protect aquatic life. But, there is such a standard for suspended solids. Therefore, for a firm data base to gauge ongoing operations and trends, suspended solids measurements only are considered to be adequate.

EZC:gs

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

MONITORING AND REPORTING PROGRAM NO. 85-031

NPDES NO. CA0081477

FOR
MC LAUGHLIN MINE
HOMESTAKE MINING COMPANY
AND US BUREAU OF LAND MANAGEMENT
YOLO, LAKE, AND NAPA COUNTIES

TENTATIVE

Previous Monitoring and Reporting Programs No. 83-125, dated 23 September 1983, and No. 85-031, dated 25 January 1985, are on file in the Regional Board office.

Sample stations shall be established such that the samples are representative of the volume and nature of the discharge.

EFFLUENT MONITORING

During each discharge period, the discharge from discharge 001 shall be sampled and analyzed according to the following schedule:

Constituent	Units	Type of Sample	Frequency
Flow	Gallons per day	Estimate	Daily for first two (2) days of discharge and
Suspended Solids	mg/l	Grab	weekly thereafter for period of continued discharge

During each discharge period, the discharge from discharges 002, and 003 shall be sampled and analyzed according to the following schedule:

Constituent	Units	Type of Sample	Frequency
Flow	Gallons per day	Estimate	Daily for first two (2)
Temperature	°C	Grab	days of discharge and
EC	umhos/cm	Grab	weekly thereafter for
pH (field)	pH Units	Grab	period of continued
Settleable Solids	ml/l	Grab	discharge

RECEIVING WATER MONITORING

Receiving water samples shall be collected daily for the first two (2) days of discharge and weekly thereafter for the continued period.

Station	Description
HC-5R	Hunting Creek, 1/2 mile upstream of Waste Rock Disposal area
HC-15R	Hunting Creek, midpoint between discharges 002 and 003 from the Waste Rock Disposal area
HC-10R	Hunting Creek, 1/2 mile downstream of Waste Rock Disposal area

Constituents	Units
Flow	Gallons per day
Temperature	°C
EC	umhos/cm
pH (field)	pH units
Suspended Solids	mg/l
Settleable Solids	ml/l
Boron	mg/l
Arsenic	mg/l
Cadmium	mg/l
Chromium	mg/l
Copper	mg/l
Lead	mg/l
Mercury	mg/l
Nickel	mg/l
Vanadium	mg/l
Zinc	mg/l

Metals shall be analyzed and reported as totals.

REPORTING

In reporting the monitoring data, the Discharger shall arrange the data in tabular form so that the date, the constituents, and the concentrations are readily discernible. The data shall be summarized in such a manner to illustrate clearly the compliance with Waste Discharge Requirements.

Monthly monitoring reports shall be submitted to the Regional Board within 45 days of analytical determination.

If the Discharger monitors any pollutant at the locations designated herein more frequently than is required by this Order, he shall include the results of such monitoring in the calculation and reporting of the values required in the Discharge Monitoring Reporting Form. Such increased frequency shall be indicated on the Discharge Monitoring Reporting Form.

The Discharger shall submit a report to the Board by 30 January of each year. The report shall contain both tabular and graphical summaries of the monitoring data obtained during the previous year. In addition, the Discharger shall discuss the compliance record and the corrective actions taken or planned which may be needed to bring the discharge into full compliance with the waste discharge requirements.

The Discharger shall implement the above monitoring program on the effective date of this Order.

Ordered by _____
WILLIAM H. CROOKS, Executive Officer

_____
(Date)

Revised:2/27/86:EZC:gs

STATE OF CALIFORNIA

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD—
CENTRAL VALLEY REGION
3443 ROUTIER ROAD
SACRAMENTO, CA 95827-3098

RECEIVED
FEB 2 1987
Napa County Conservation,
Development & Planning Department

28 January 1987

Mr. Phil Barnes, Environmental Engineer
Homestake Mining Company
P. O. Box 1010
Lower Lake, CA 95457

HOMESTAKE MINING COMPANY, MC LAUGHLIN MINE, MONITORING AND REPORTING PROGRAMS NO. 85-031 (NPDES CA0081477) AND 85-032, LAKE, NAPA, AND YOLO COUNTIES

We have reviewed the 1985-1986 Annual Monitoring Report and your letter of 22 September 1986 which requested revisions to Monitoring and Reporting Programs No. 85-031 and 85-032.

Your request to modify certain aspects of the monitoring has merit. We also want to modify the programs to achieve a more directed focus of the data. Accordingly, we have tentatively modified both programs. We have retained monitoring for vanadium because the research data available to us indicates it may be toxic to plants in relatively minute concentrations.

Please review the proposed changes to the programs and advise us by 13 February 1987 if you have any comments or objections. My phone number is (916) 361-5652.

Edwin Z. Crawford

EDWIN Z. CRAWFORD
Area Representative

EZC:gs

Enclosure

cc: see attached list

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

REVISED MONITORING AND REPORTING PROGRAM NO. 85-031

NPDES NO. CA0081477

FOR
MC LAUGHLIN MINE
HOMESTAKE MINING COMPANY
AND US BUREAU OF LAND MANAGEMENT
YOLO, LAKE, AND NAPA COUNTIES

TENTATIVE

Previous Monitoring and Reporting Programs No. 83-125, dated 23 September 1983, and No. 85-031, dated 25 January 1985, are on file in the Regional Board office.

Sample stations shall be established such that the samples are representative of the volume and nature of the discharge.

EFFLUENT MONITORING

During each discharge period, the discharge from discharge 001 shall be sampled and analyzed according to the following schedule:

Constituent	Units	Type of Sample	Frequency
Flow	Gallons per day	Estimate	Daily for first two (2) days of discharge and
Suspended Solids	mg/l	Grab	weekly thereafter for period of continued discharge

During each discharge period, the discharge from discharges 002, 003, and 004 shall be sampled and analyzed according to the following schedule:

Constituent	Units	Type of Sample	Frequency
Flow	Gallons per day per day	Estimate	Daily for first two (2) days of discharge and
Temperature	°C	Grab	weekly thereafter for
EC	umhos/cm	Grab	period of continued
pH (field)	pH Units	Grab	discharge
Suspended Solids	mg/l	Grab	" " "
Settleable Solids	ml/l	Grab	" " "
Boron	mg/l	Grab	" " "
Arsenic	mg/l	Grab	" " "
Cadmium	mg/l	Grab	" " "
Chromium	mg/l	Grab	" " "
Copper	mg/l	Grab	" " "

Constituent	Units	Type of Sample	Frequency
Lead	mg/l	Grab	Daily for the first two (2) days of discharge and weekly thereafter for the period of continued discharge
Mercury	mg/l	Grab	
Nickel	mg/l	Grab	
Vanadium	mg/l	Grab	
Zinc	mg/l	Grab	

Metals shall be analyzed and reported as totals.

RECEIVING WATER MONITORING

Receiving water samples shall be collected daily for the first two (2) days of discharge and weekly thereafter for the continued period.

Station	Description
HC-5R	Hunting Creek, 1/2 mile upstream of Waste Rock Disposal area
HC-15R	Hunting Creek, midpoint between discharges 002 and 003 from the Waste Rock Disposal area
HC-10R	Hunting Creek, 1/2 mile downstream of Waste Rock Disposal area
KC-3	Knoxville Creek, 1/4 mile west of Knoxville

Constituents	Units
Flow	Gallons per day
Temperature	°C
EC	umhos/cm
pH (field)	pH units
Suspended Solids	mg/l
Settleable Solids	ml/l

Constituents	Units
Boron	mg/l
Arsenic	mg/l
Cadmium	mg/l
Chromium	mg/l
Copper	mg/l
Lead	mg/l
Mercury	mg/l
Nickel	mg/l
Vanadium	mg/l
Zinc	mg/l

Metals shall be analyzed and reported as totals.

REPORTING

In reporting the monitoring data, the Discharger shall arrange the data in tabular form so that the date, the constituents, and the concentrations are readily discernible. The data shall be summarized in such a manner to illustrate clearly the compliance with Waste Discharge Requirements.

Monthly monitoring reports shall be submitted to the Regional Board within 45 days of analytical determination.

If the Discharger monitors any pollutant at the locations designated herein more frequently than is required by this Order, he shall include the results of such monitoring in the calculation and reporting of the values required in the Discharge Monitoring Reporting Form. Such increased frequency shall be indicated on the Discharge Monitoring Reporting Form.

The Discharger shall submit a report to the Board by 30 January of each year. The report shall contain both tabular and graphical summaries of the monitoring data obtained during the previous year. In addition, the Discharger shall discuss the compliance record and the corrective actions taken or planned which may be needed to bring the discharge into full compliance with the waste discharge requirements.

The Discharger shall implement the above monitoring program on the effective date of this Order.

Ordered by _____
WILLIAM H. CROOKS, Executive Officer

_____
(Date)

Revised:12/19/86:EZC:gs

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

REVISED MONITORING AND REPORTING PROGRAM NO. 85-032
FOR
MC LAUGHLIN MINE
HOMESTAKE MINING COMPANY AND
US BUREAU OF LAND MANAGEMENT
YOLO, LAKE AND NAPA COUNTIES

TENTATIV

Monitoring and Reporting programs No. 83-124, dated 23 September 1983, and No. 85-032, dated 25 January 1985, contained pre-operation monitoring. These programs are on file in the Regional Board office.

Mine

Constituents	Units	Type of Sample	Sampling Frequency
Mass Extracted	Dry Tons	Estimate	Monthly
Low Grade Ore Stockpile			
Mass Added	Dry Tons	Estimate	Monthly
Mass Used	Dry Tons	Estimate	Monthly
Waste Rock Disposal			
Mass Added	Dry Tons	Estimate	Monthly
Crushing and Grinding Facility			
Mass of solids placed in Slurry Pipeline	Dry Tons	Estimate	Monthly
Tailings Disposal			
Flow to impoundment	MGD	Metered	Quarterly
pH	pH units	Range	Monthly
Sulfate	mg/l mg/kg	Composite	Quarterly
Arsenic	mg/l mg/kg	Composite	Quarterly
Total Chromium	mg/l mg/kg	Composite	Quarterly
Copper	mg/l mg/kg	Composite	Quarterly
Mercury	mg/l mg/kg	Composite	Quarterly

Constituent	Units	Type of Sample	Sampling Frequency
Nickel	mg/l and mg/kg	Composite	Monthly
Total Cyanide	mg/l and mg/kg	Composite	Monthly

Note: The volume of waste rock, crushed ore and low grade ore stockpiled must equal volume amount taken from the mine.

Evaporation Pond

Constituent	Units	Type of Sample	Sampling Frequency
pH	pH Units	Grab	Bi-Annual*
EC	umhos/cm	Grab	Bi-Annual*
Oil & Grease	mg/l	Grab	Bi-Annual*
Ethylene Glycol	mg/l	Grab	Bi-Annual*
Volatile Organics	ug/l	Grab	Bi-Annual*
Zinc	mg/l	Grab	Bi-Annual*
Minimum Freeboard	feet	--	Bi-Annual

* Samples to be collected in March and June

Cooling Pond

Constituent	Units	Type of Sample	Sampling Frequency
pH	pH Units	Grab	Bi-Annual
EC	umhos/cm	Grab	Bi-Annual
TDS	mg/l	Grab	Bi-Annual
Chloride	mg/l	Grab	Bi-Annual
Pond volume (at time of sample)	Gallons	--	Bi-Annual
Minimum pond freeboard	Feet	--	Bi-Annual
Heavy Metals*	mg/l	Grab	Annual

* The following dissolved metals shall be analyzed: Chromium III, Copper, Molybdenum, Nickel, Lead, Zinc

Tailings Return Sump

Constituent	Units	Type of Sample	Sampling Frequency
Return Flow	gpd	pump hours or metered	Monthly
pH	pH Units	Grab	Quarterly
EC	umhos/cm	Grab	Quarterly
TDS	mg/l	Grab	Quarterly
Heavy Metals*	mg/l	Grab	Quarterly

* The following metals shall be analyzed: Arsenic, Chromium III, Copper, Mercury, Nickel, Cyanide

GROUND WATER MONITORING

Mine

A minimum of two wells (S-1 and S-2) are established to measure the ground water quality.

Low Grade Ore Stockpile, Ore Crushing Area

One monitoring well (S-8) is established in this area.

Waste Rock Disposal

Three monitoring wells (S-3, S-5, and S-7) are established to measure up and downgradient ground water quality.

Tailings Disposal Facility

Twelve monitoring wells (N Series) are established to measure up and downgradient water quality.

Note: All monitoring well locations shall be established under the direction of the Board's staff. Prior to construction of any additional wells, plans and specifications for ground water monitoring wells shall be submitted to Board staff for review and approval.

CONSTITUENTS (OPERATIONAL)

Field Measurements

pH
Temperature
Specific Conductance
Ground Water Elevations

Laboratory Measurement

Total Alkalinity	Nitrate
Total Hardness	Sulfate
Total Dissolved Solids	Ammonia
MBAS	

Metals (total)

Barium	Total Chromium	Mercury	Iron
Arsenic	Copper	Nickel	Total Cyanide
Boron	Lead	Free Cyanide	
Sodium	Manganese	Zinc	

Note: Cyanide shall only be analyzed in wells near the tailings disposal and mill site.

Units

All units shall be reported in mg/l, except pH (pH Units) and levels (in feet USGS Datum).

Type of Sample

All samples shall be grab samples using proper EPA and Regional Board sampling techniques and preservation. The wells shall be adequately purged prior to sampling. Samples being analyzed for metals should be reported as total metals.

Sampling Frequency

Samples shall be collected and analyzed quarterly. Ground water elevations shall be obtained monthly.

OBSERVATION WELLS (TAILINGS KEY TRENCH)

OW 1, 2, 3, 4, and 5, shall be monitored quarterly for the following constituents: water elevation, pH, EC and Total Cyanide.

WELL MONITORING REVIEW

When the tailings elevation reaches 2180 feet or prior to Stage II tailings embankment construction, the monitoring well system around the embankment will be reevaluated. New wells will be added to the monitoring program as necessary. Special consideration shall be given to the following two locations:

1. Stage I spillway (Station 14 + 62)

2. A location 600 feet northeast of Well N-10 in a saddle on a ridge between two minor peaks.

Wells N-6, N-10, and N-11 shall be reevaluated to determine if shallower screened intervals would be more appropriate during Stage II filling of the tailings disposal facility.

RECEIVING WATER MONITORING LOCATIONS

All receiving water samples shall be grab samples. Receiving water samples shall be taken from the following locations:

Cache Creek 1 (CC-1)

CC-1 is upstream of the confluence of Cache Creek and Davis Creek on the west bank of Cache Creek in Lake County. The station is situated at approximately 122° 22' 32" west longitude and 38° 56' north latitude. The station is approximately 50 feet northwest of the Davis Creek, Cache Creek junction, along a rocky embankment.

Cache Creek 2 (CC-2)

CC-2 is downstream of the confluence of Cache Creek and Davis Creek on the west bank of Cache Creek in Lake County. The station is situated at approximately 122° 22' 32" west longitude and 38° 56' north latitude. The station is approximately 200 feet southeast of Davis Creek at the edge of a sandy alluvial deposit.

Davis Creek 4 (DC-4)

DC-4 is approximately 100 yards from the confluence of Davis Creek and Cache Creek on Davis Creek. The station is situated at approximately 122° 22' 32" west longitude and 38° 56' north latitude. The sampling location is immediately upstream of a jeep trail crossing Davis Creek near a large tree.

Davis Creek 5 (DC-5)

DC-5 is on Davis Creek near the Reid Mine in the northwest quarter of Section 25, T12N, R5W. The sampling location is on the west bank, near the Rieff-Rayhouse Road, downstream of a tributary junction, upstream of a wooden bridge for the Rayhouse Road, opposite an abandoned retort.

Davis Creek 6 (DC-6)

DC-6 is on Davis Creek downstream of the proposed Davis Creek Reservoir Dam near the northeast corner of Section 25, T12N, R5W. The sampling location is downstream of the confluence of a tributary from the west along the side of Hobit Mountain between a 1-1/2 foot diameter leaning, pine tree and three-foot diameter oak tree on the east bank.

Hunting Creek 5 (HC-5)

HC-5 is on an eastern tributary to Hunting Creek to Hunting Creek in the southeastern quarter of Section 2, T11N, R5W. The sampling location is in the Hunting Creek channel adjacent to a sharp bend in a dirt road which proceeds up a steep hill. The sampling point is approximately six feet west of a two-foot diameter oak tree and adjacent to two steel fence posts driven into the ground.

Hunting Creek 9 (HC-9)

HC-9 is on a western tributary to Hunting Creek, draining Quarry Valley and parallel to the Old Morgan Valley Road. The station is south of the center of Section 28, T12N, R5W. The sampling location is north of the old Morgan Valley Road, west of a small bridge crossing Hunting Creek and south of a rock outcrop. A steel post is approximately 10 feet south of the sampling location.

Hunting Creek 10 (HC-10)

HC-10 is on the main channel of Hunting Creek near a BLM campground in the northeastern quarter of Section 14, T11N, R5W. The sampling point is approximately 500 feet downstream of a major dirt road crossing, 75 feet upstream of a small jeep trail crossing and at the south end of the camp parking area. Two blazed trees on the east bank are immediately adjacent to the sampling location.

Hunting Creek 11 (HC-11)

HC-11 is downstream of the Rieff Road Bridge on Hunting Creek in Morgan Valley in the western half of Section 21, T12N, R5W. The sampling station is approximately 40 feet downstream of the Rieff Road Bridge in the center of the stream opposite a cluster of Manzanita bushes.

Knoxville Creek 3 (KC-3)

KC-3 is approximately 150 yards upstream of the Knoxville Community Hall Foundation on Knoxville Creek south of the Knoxville-Berryessa Road in the northeast quarter of Section 7, T11N, R4W. The sampling location is in the stream between two steel posts on both sides of the stream.

Putah Creek 1 (PC-1)

PC-1 is on Putah Creek approximately 100 feet upstream of its confluence with Hunting Creek in the southeast quarter of Section 28, T11N, R5W. The sampling location is in the first pool upstream of Hunting Creek.

Putah Creek 2 (PC-2)

PC-2 is on Putah Creek approximately 150 feet downstream of its confluence with Hunting Creek in the southeast quarter of Section 28, T11N, R5W.

RECEIVING WATER MONITORING (Operational)

The following surface water monitoring stations shall be analyzed quarterly: Analysis shall be provided for each of the following locations: DC-5, DC-6, HC-5, HC-9, HC-10, HC-11, KC-3, and PC-2. Free and total cyanide shall only be analyzed at Stations HC-9 and HC-10. Chrysotile asbestos shall only be analyzed at the following stations: CC-1, CC-2, DC-4, HC-10, PC-1, and PC-2.

Constituent	Units
Flow (estimate)	gpm
pH (field)	pH Units
Temperature (field)	°C
EC (field)	umhos/cm
Total Alkalinity	mg/l
TDS	mg/l
Suspended Matter	mg/l
Chloride	mg/l
Nitrate	mg/l
Sulfate	mg/l
Ammonia	mg/l
Arsenic	mg/l
Boron	mg/l
Chromium	mg/l
Copper	mg/l
Iron	mg/l
Lead	mg/l
Mercury	mg/l

Constituent	Units
Nickel	mg/l
Sodium	mg/l
Zinc	mg/l
Free Cyanide	mg/l
Total Cyanide	mg/l
Chrysotile Asbestos	Fiber/l

Note: Metal analysis shall be reported in both dissolved and total metals present (filtered and non-filtered).

Sampling Station HC-10 will provide for daily composites analyzed twice per week for free cyanide.

Sediment Samples

Sediment samples shall be collected at the following locations: DC-5, DC-6, KC-3, and HC-10. The samples shall be analyzed semi-annually for the following constituents and reported in dry weight: arsenic, chromium, copper, lead, mercury, nickel and zinc.

Aquatic Ecology

Aquatic life shall be sampled at the following locations annually: HC-10, HC-11,, KC-3, DC-5 and DC-6. Sampling shall provide for the following: sampling by net, electro-shocking, surber sampler; species identification, inventory and mercury analysis of fish flesh.

REPORTING

In reporting the monitoring data, the Discharger shall arrange the data in tabular form so that the date, the constituents, and the concentrations are readily discernible. The data shall be summarized in such a manner to illustrate clearly the compliance with Waste Discharge Requirements.

Monthly monitoring reports shall be submitted to the Regional Board within 45 days of analytical determination.

If the Discharger monitors any pollutant at the locations designated herein more frequently than is required by this Order, he shall include the results of such monitoring in the calculation and reporting of the values required in the Discharge Monitoring Reporting Form.

The Discharger shall submit a report to the Board by 30 January of each year containing both tabular and graphical summaries of the monitoring data obtained during the previous year. In addition, the Discharger shall discuss the compliance record and the corrective actions taken or planned which may be needed to bring the discharges into full compliance with the waste discharge requirements.

If any additional monitoring activities are required as a condition of, or performed in conjunction with, any permit for Homestake's McLaughlin Mine, including sediment sampling or "aquatic life" sampling, the results of such additional monitoring shall be submitted to the Board at the same time that the results are submitted to the agencies or entities which require such monitoring.

The Discharger shall implement the above monitoring program on the effective date of this Order.

_____

WILLIAM H. CROOKS, Executive Officer

_____

(Date)

Revised:1/26/87:EZC:gs

INSPECTION REPORT

19 February 1987

DISCHARGER: HOMESTAKE MINING COMPANY (NPDES NO. CA0081477)

LOCATION & COUNTY: Knoxville, Napa and Lake Counties

CONTACT(S): ----

INSPECTION DATE: 4 February 1987

INSPECTED BY: Edwin Z. Crawford and Jim Eckman

ACCOMPANIED BY: Mr. Ray Krauss and Mr. Phil Barnes, Environmental Manager and Environmental Engineer, respectively

OBSERVATIONS AND COMMENTS:

There was no direct discharge of waste from any portion of the mine operation to surface drainage courses.

Pond T-1 (001) has been revegetated and stabilized to the point where it is no longer a point source discharge.

Pond system W-1 (002). This system consists of 7 ponds. There was no discharge from pond #1. There was a discharge, estimated flow 20 gpm, from pond #7. The water was clear with no visible turbidity or sediment. Also, the discharge percolated into the ground before reaching Hunting Creek. Hunting Creek was clear above and below the point of discharge. Also, there were no visible sediment deposits in the creek attributable to the discharge.

Pond M-1 (004). There was no discharge from this unit to surface drainage courses. Water in the unit is recycled back into the process unit.

Edwin Z. Crawford

EDWIN Z. CRAWFORD, Area Representative

EZC:gs

cc: U. S. Bureau of Reclamation, Napa
Napa County Planning Department, Napa
Lake County Planning Department, Lakeport
Yolo County Planning Department, Woodland

(form letter sent)

STATE OF CALIFORNIA
GEORGE DEUKMEJIAN, *Governor*

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD—
CENTRAL VALLEY REGION
3201 S STREET
SACRAMENTO, CALIFORNIA 95816-7090
PHONE: (916) 445-0270

25 November 1986

Mr. Phil Barnes
Homestake Mining
P. O. Box 1010
Lower Lake, CA 95451

HOMESTAKE MINING, MONITORING AND REPORTING PROGRAM NO. 85-032, NAPA, LAKE, AND YOLO COUNTIES

Your discussion of the Maximum Likely Concentrations (MCLs) in Volume 1 of the 1985-1986 Annual Report is well taken. We agree with your premise and documentation that the incidents where the MLCs were exceeded can be attributed to the natural ambient system and the high degree of variability of water quality constituents.

Therefore, you may recalculate the mean concentrations and associated statistical descriptions on the basis of an expanded data base.

Please contact me at (916) 322-1594 if you have any questions.

Edwin Z. Crawford

EDWIN Z. CRAWFORD
Area Engineer

EZC:gs

cc: Environmental Protection Agency, San Francisco
Department of Fish and Game, Region III, Yountville
Napa County Planning Department, Napa
Yolo County Planning Department, Woodland
Lake County Planning Department, Lakeport
Mr. Brice Bledsoe, Solano Irrigation District, Vacaville
Yolo County Flood Control District, Woodland
Mr. Robert Speirs, Brooks
Ms. Gretchen Ceteras, Rumsey

CENTRAL VALLEY REGIONAL WATER QUALITY CONTROL BOARD

INSPECTION REPORT

DISCHARGER: HOMESTAKE MINING COMPANY 3 October 1986

LOCATION & COUNTY: Knoxville, Napa County

CONTACT(S): Messrs. Raymond E. Krauss and Phillip C. Barnes, Environmental Manager and Environmental Engineer

INSPECTION DATE: 16 September 1986

INSPECTED BY: Edwin Z. Crawford

ACCOMPANIED BY: Shalanda White, Student Assistant

OBSERVATIONS AND COMMENTS

We looked at the road realignment, the mill site, the tailings disposal area, and NPDES point T-1.

Cut and fill areas of the road realignment are well-compacted, revegetated and maintained. I found no evidence of significant erosion. In fact, the realigned road is in better condition than the original roadway before Homestake commenced operation.

The mill site is paved with extensive spill prevention and contingency facilities in place. Cyanide is stored in individual containers on impervious material with surrounding berm, and is within a fenced and locked compound. Adequate hypochlorite is also stockpiled on-site for use in the event of cyanide release in any area of the process.

At present time, tailings are being deposited along the upstream face of the dam. Mr. Barnes explained that the intent of disposal method was to provide uniform deposition of tailings in the reservoir and ensure an additional blanket of fines over the face of the dam.

The topsoil storage area, T-1, has been compacted and revegetated. The sedimentation pond at the toe of the fill has well-established vegetation. Water in the pond was clear. There was no evidence of significant sediment in the rock spillway below the pond or the downstream drainage course. Mr. Barnes asked if the monitoring point T-1 could be rescinded as an NPDES station. I said we would review and advise him accordingly.

We reviewed Monitoring and Reporting Program No. 85-032. We discussed the 31 exceedences of the "Maximum Likely Concentration" (MLCs) reported in the 1 July 1985 - 30 June 1986 annual report. Mr. Barnes explained that some of the exceedences may have resulted from a change in analytical procedure. Another cause is that the data points for the operation phase exceed the data points for background.

REVIEWED BY:

Therefore, by the very nature of statistical analysis, there will be "spikes" or exceedences of the MLCs as a result of statistical variation, rather than actual exceedences due to mine operation. Mr. Barnes said that he would recompute the MLCs based on the expanded data base. I agree that this is appropriate methodology.

Mr. Barnes and I discussed reduction of sample locations and certain constituents. He will summarize the company's request for revision in a separate letter to our office.

Mr. Krauss said the company would continue to fund the project to study the Davis Creek Reservoir.

INSPECTION SUMMARY

I completed an extensive review and critique of the current Monitoring and Reporting Programs and found them in need of revision.

Edwin Z. Crawford

EDWIN Z. CRAWFORD, Area Representative

EZC:kwc

(form letter sent)

cc: Homestake Mining Company
✓Napa County Planning Department, Napa, CA
Solano Irrigation District, Vacaville, CA

STATE OF CALIFORNIA—HEALTH AND WELFARE AGENCY GEORGE DEUKMEJIAN, Governor

DEPARTMENT OF HEALTH SERVICES
TOXIC SUBSTANCES CONTROL DIVISION
NORTHERN CALIFORNIA SECTION
[illegible]0 POWER INN ROAD
[illegible]CRAMENTO, CA 95826
(916) 739-3145

April 17, 1986

Mr. Dennis Goldstein
Homestake Mining Company
650 California Street, 9th Floor
San Francisco, California 94108

Dear Mr. Goldstein:

MODIFICATION TO WASTE ANALYSIS REQUIREMENTS

On February 11, 1986, members of my staff met with representatives of Homestake Mining Company to review the monitoring requirements for Homestake's waste tailings discharge. Homestake has been on a monthly sampling program to verify a pilot plant study that indicated Homestake's tailings may be non-hazardous.

In the months since Homestake put the auto-claves into production, the waste analysis of the tailings has shown that the tailings produced thus far are non-hazardous. Therefore, in consideration of the waste analysis data, the Department has agreed to revise Homestake's monitoring schedule to quarterly monitoring periods. Monitoring reports shall henceforth be prepared in the months of January, April, July and October of each year. Additional parameters to be included in all future reports are pH, free cyanide, and total cyanide.

If you have any questions about this determination, please telephone Mr. Charles Snyder, with our Permitting Unit in Sacramento at (916) 739-2832.

Sincerely,

James T. Allen, Ph.D.
Chief, Northern
California Section

CVS:am

cc: Mr. Greg Vaughn, RWQCB, Sacramento
Mr. James Cool, Napa Planning Department, Napa

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

ALAMEDA COUNTY
Edward R. Campbell
Shirley J. Campbell
Fred F. Cooper
Frank H. Ogawa
(Vice Chairperson)

CONTRA COSTA COUNTY
Paul L. Cooper
Sunne Wright McPeak

MARIN COUNTY
Al Aramburu
(Secretary)

NAPA COUNTY
Harold I. Moskowite

SAN FRANCISCO COUNTY
Harry G. Britt
Carol Ruth Silver
(Chairperson)

SAN MATEO COUNTY
Gus J. Nicolopulos
K. Jacqueline Speier

SANTA CLARA COUNTY
Rod Diridon
Ralph P. Doetsch, Sr.
Roberta H. Hughan
Susanne Wilson

SOLANO COUNTY
Osby Davis

SONOMA COUNTY
Helen B. Rudee

March 10, 1987

Homestake Mining Company
P. O. Box 1010
Lower Lake, CA 95457

Attention: John P. Lawton
Environmental Engineer

Re: TSP Sampling Schedule

Dear Mr. Lawton,

The District has received and evaluated Homestake's February 4, 1987 letter requesting permission to change the particulate sampling from every third day to every sixth day.

District staff has reviewed both the monitoring data supplied to us on a regular basis and the "percent data recovery" summary sheet attached to the February 4, 1987 letter. The data indicates that a particulate problem does not exist at the Homestake mine. Efforts made by the company to keep fugitive dust at a minimum have worked remarkably well. As a result, District, staff supports a change in sampling schedule from every third to every sixth day. Staff requests this schedule be the same as the national sampling schedule so that particulate data from Homestake monitors can be easily compared with data from samples taken at other locations in the District.

In summary, condition 9.c of the permit shall be modified to allow sampling every six days. This change can take place as soon as practicable for you.

If you have any questions, please call me at (415) 771-6000, ext. 255.

Very truly yours,

Ellen G. Linder

Ellen G. Linder
Senior Air Quality Engineer
Permit Services Division

EGL:jb

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

October 28, 1986

Homestake Mining Company
P O Box 1010
Lower Lake, CA 95457

RECEIVED
OCT 30 1986

Attention: Ray Krauss
Environmental Manager

Dear Mr. Krauss:

We have received and evaluated Homestake's annual Monitoring Report. In general, we feel the report is satisfactory. We do, however, have the following specific comments:

PM-10/TSP

According to the report, "considerable time, effort, and expense was generated trying to sample TSP in inclimate weather. We would propose only PM-10 be collected during periods of extended precipitation."

This statement is confusing because two of the air quality monitoring stations in Napa County (AQ-5, AQ-6) have collocated PM-10 and TSP Why is it difficult to collect TSP in inclimate weather and not PM It would seem that if PM-10 could be collected then TSP could also Please explain why this can not be done.

SCHEDULING

According to the report, "It is recommended that all air sampling be placed on a six day schedule."

As condition 9.C of the Permit to Operate states "after two years of full operation under this permit, Homestake may revise the frequency of this sampling to every 6 days ..." The permit to Operate for the McLaughlin mine was issued in June 1985. Therefore, in June 1987, Homestake may request to revise the sampling frequency of the air quality monitoring stations in Napa County.

I hope these comments are helpful to you. If you have any questions, please call me at (415) 771-6000, extension 255.

RECEIVED
NOV 6 1986
Napa County Conservation,
Development & Planning Department

Very truly yours,

Ellen G. Linder
Senior Air Quality Engineer

EGL:mc

STATE OF CALIFORNIA—THE RESOURCES AGENCY
GEORGE DEUKMEJIAN, Governor

DEPARTMENT OF FISH AND GAME
POST OFFICE BOX 47
YOUNTVILLE, CALIFORNIA 94599
(707) 944-2011

February 18, 1987

Jim Cool
Napa County Planning Department
1195 Third Street
Napa, CA 94559

Dear Mr. Cool:

This is a response to your request for a review of the Aquatic Ecology Monitoring Program Annual Report of November 1, 1986 for the Hunting and Knoxville Creek drainages.

The report is generally very good. However, it would be helpful to supplement the use of photographic evidence for substrate composition with another method, such as the use of the McNeil Sampler 1 demonstrated previously. Depending upon the location in a stream, larger particles may tend to aggregate at the surface, and the smaller particles will be found down deeper. Thus, there will be a bias in the interpretation of photographs, and the substrate may appear to be of higher quality than it is. Use of a sampler which removes the deeper layers of substrate, such as the McNeil (previously demonstrated to the consultants), should be helpful in making comparisons.

Electrofishing stations must be selected such that reaches of stream (i.e., pools, riffles, and other habitat types) representative of the stream as a whole are sampled. I would like to assist the sampling team this April as time permits.

Reference is made on page 43 of the report to the collection of fish downstream of KC-3, mainly to collect fish for the analysis of damage from the M-1 discharge. I believe that the site of this collection should be retained if samples of an adequate size cannot be obtained from KC-3 due to low water conditions or other factors, and that sampling results from this alternate station should be compared to those obtained in 1986.

Sincerely,

Frank Gray

Frank Gray
Fishery Biologist
Region 3

FG/dcf

RECEIVED
FEB 20 1987
Napa County Conservation,
Development & Planning Department

STATE OF CALIFORNIA—THE RESOURCES AGENCY

GEORGE DEUKMEJIAN, *Governor*

DEPARTMENT OF FISH AND GAME
POST OFFICE BOX 47
YOUNTVILLE, CALIFORNIA 94599
(707) 944-2011

March 24, 1987

RECEIVED
MAR 25 1987
Napa County Conservation,
Development & Planning Department

Jim Cool
Napa County Planning Department
1195 Third Street
Napa, CA 94559

Dear Jim:

We have reviewed the wildlife monitoring section of the McLaughlin Mine Annual Monitoring Report for 1986 and have the follwing comments.

The wildlife observation reporting routes along Morgan Valley Road, Davis Creek Reservoir and tailing impoundment roads, Rayhouse Road, provided good, but inconsistent data. The recent contract for systematic monthly surveys will help provide the information needed for general species abundance and diversity for the current monitoring year and should be completed in depth for a second full year.

The following modifications in the survey work were recommended by Darell Slotton in his August 1986 report on "Wildlife Noted at Davis Creek Reservoir," from Ecological Research Associates:

Modify the "dawn pedestrian survey" into a dawn boat perimeter survey, and return for track surveys at key points around perimeter. When we previously asked for a perimeter survey we did not specify technique and assumed the steep areas would be done by the "best practical" methods. The "dawn pedestrian" survey of the tailing impoundment perimeter is only appropriate during the part of the year when the water is low. When high, a boat is recommended.

Furthermore, we do not agree with the "semi-quantitative" method proposed using "abundant," "common" or "rare" bird classifications except as it relates to the general region. The systematic surveys should count every bird possible during stops of specific time periods at specific locations. Over time this data will indicate relative seasonal and annual abundance and provide a usable index.

We concur with the addition of habitat classification for specific uses regarding feeding areas, nesting areas, etc. We also concur with the recommendation to identify all local breeding birds by intensive survey during the spring (June-July) nesting season. This should extendinitially for

at lest two full years, then every fifth year (for all bird species.) Bi-annual surveys are recommended for doves, deer, and raptorial birds during spring and winter (mid Oct-mid Nov.)

The road kill monthly survey is meaningless and should either be dropped or increased to include all documentable kills. We recommend the latter option to document all road kills at the earliest date using local employees. The various road kill species also offer opportunity for blood and tissue analysis which would be helpful for extablishing local background levels for disease, heavy metals and toxic burden. Intensive sampling should occur for at least two years with lab analysis repeated every fifth year.

While we have agreed that water quality generally indicates potential transfer of pollutants, we recommend determination of background levels of accumulation in tissue through analysis of aquatic organisms including some annual sampling of water fowl and water bird tissues. This should be part of a long term analysis program to help satisfy the "health" questions. Of particular concern is the Davis Creek Reservoir area and mercury contamination. Our priorities for the monitoring of wildlife at the tailings would be for assessing bioaccumulation by noting both the species which utilize the area and analysis of tissue samples of these species. A one year, monthly tissue collection should be initiated for a representative in box sample collection. After the first year, sampling should be bi-annually.

Sampling of fish and aquatic organisms from Davis Creek Reservoir is recommended on a periodic long-term basis after a thorough two year sampling program at monthly intervals. If high levels are found in aquatic organic tissues, then sampling should include some waterfowl and waterbird tissues.

If you have any questions, please phone me at (707) 942-4449.

Sincerely,

Allan Buckmann

Allan Buckmann
Unit Wildlife Biologist
Region 3

ANNUAL REPORT
REVIEW OF THE

1985 ENVIRONMENTAL MONITORING PROGRAM

McLAUGHLIN PROJECT

MAY 1986

NAPA COUNTY
CONSERVATION · DEVELOPMENT
AND PLANNING DEPARTMENT

EXECUTIVE SUMMARY

REVIEW OF THE MCLAUGHLIN PROJECT
1985 ENVIRONMENT MONITORING PROGRAM

The environmental monitoring program for the McLaughlin Gold Project has evolved for a limited program in support of the EIR/EIS into a much larger on-going, comprehensive monitoring effort. The overall objective of the monitoring program is to measure compliance with environmental performance standards recognized in regulatory permits. Equally important, the monitoring program is designed to monitor trends indicative of present or future environmental impacts attributable to the Project.

Over the 1985 monitoring period, the environmental monitoring program conducted by Homestake Mining Company (hereafter "Homestake") shifted from "pre-opertions monitoring" to "operations monitoring". Operations data presented in the 1985 Annual Monitoring Report prepared by Homestake, covers a five month period: February 1, 1985 to June 30, 1985. While comparisons of collected data with adopted standards are made in the Annual Report, in view of the relatively short period of record for operations monitoring, trends analysis is understandably limited. Emphasis of the statistical analysis has therefore been to assess if the more recent data collected for operations reflect natural changes in the regional and local environment, or changes related to project activities.

WATER QUALITY MONITORING

The 1985 Water Quality Monitoring Program (WQMP) includes surface - and groundwater monitoring of over 40 water quality variables. The operations monitoring network includes 13 surface water sampling sites and 22 groundwater monitoring wells located principally in the Hunting Creek drainage area.

Analysis of WQMP data collected over the 1985 reporting period provide the basis for the following findings, as reported by Homestake:

- No changes in water quality attributable to McLaughlin Project activites have been identified.

- Due, principally to an apparent decrease in local precipitation and the accompanying decrease in overland runoff, an increase in some water quality variables were observed. The frequency of occurrence of high concentrations is similar to that which may be expected from a statisitical viewpoint alone.

- The considerably-high frequency with which measurements of certain variables are measured as "less than" the detection limit, suggests changes in the analytical protocol may be warranted.

Specific findings with respect to monitoring activities for facilities located in Napa County indicate that no significant trends have been observed at groundwater and surface water monitoring locations.

The Regional Water Quality Control Board has reviewed the 1985 Annual Monitoring Report prepared by Homestake and has found the report and its conclusions "acceptable for this stage of the project".

AIR QUALITY/METEROLOGY MONITORING

The 1985 Operational Air Quality Monitoring Program in Napa County has focused on documenting Total Suspended Particulate (TSP) concentrations (i.e., dust), as required by the "Permit to Operate" issued by the Bay Area Air Quality Management District. Data collected over the reporting period indicate that TSP levels have remained with the national primary and secondary standard. Meterological data collected during periods when TSP levels have been high, reveal low humidities, with increased wind speeds and low variation in wind direction.

AQUATIC ECOLOGY MONITORING

The 1985 Aquatic Ecology Monitoring Program was comprehensive in nature, designed to characterize "baseline" conditions. Monitoring of seven sites located up - and down gradient of major project facilities was conducted over a four quarter period. Commencing in April 1986, a focused Monitoring Program will be implementd by Homestake. While the scope of the Operations Monitoring Program is reduced from 7 to 4 monitoring sites, the monitoring program is an expansion over the program originally proposed by Homestake.

In general, the aquatic ecology system characterizing streams in the Project Area reflect adaptation to stresses stemming from local hydrologic and geologic conditions. Data collected over the reporting period substantiate earlier findings which reported the diversity of fish species to be very low, with those present having adapted to low flows and high temperatures characteristics of late summer conditions found in California Coast Range streams. The benthic macroinvertebrate fauna also are typical of that found in upland streams. Included among the more than 90 different species collected, are members of pollution tolerant organisms. These species are especially important when assessing impacts, since they trend to respond more clearly to localized changes in water and sediment conditions.

Metal concentrations in the California Roach, a minnow with a wide temperature tolerance (the most abundant and wide spread species occuring

on site) were found to be low, with the exception of chromium and nickel. High concentrations of these two metal is attributed to natural conditions: chromium and nickel are characteristic of the serpentine soils which are prevelant in the area.

Apart from providing additional data on species diversity and density, the 1985 Monitroing Program was designed to compare the annual variability and seasonal differences in the aquatic community. The results of the 1985 monitoring effort demonstrate that significant difference do exist between sampling periods on a seasonal, as well as an annual basis. Both patterns are typical of streams in the California Coast Range, and are directly related to the year-to-year variability, severity and sequencing of storm events. The pattern of annual variability and seasonal change evidenced in the 1985 Monitoring Program, suggest that in terms of monitoring potential impacts related to the McLaughlin Project, the time of year when a potential impacting acitivity occurs is critical.

The California Department of Fish and Game has been directly involved in the aquatic monitoring program, providing on-site field inspection and technical review of the annual report. The CDFG has reviewed the 1985 Annual Aquatic Monitoring Report and found the report to be "generally very good".

VEGETATION MONITORING

The 1985 Vegetation Monitoring Program included monitoring of previously reclaimed areas (reclamation success): sensitive plants; and the management of contiguous lands unaffected by mining.

To date, a total of 77 sensitive plant populations have been directly impacted by construction and operation of the McLaughlin Gold Project. This number represents a reduction of nearly 39% from the 126 sensitive plant populations predicted to be directly impacted by the project in the Project EIR/EIS. A total of 51 sensitive plant populations undisturbed by Project opertion were surveyed in 1985. These surveys indicated that no serious disturbances to sensitive plant populations were encountered. No populations in the mine vicinity were found to exhibit signs of toxicity from air or water borne pollutants caused by mining operations. Impacts from increased siltation on four sensitive plant populations below several check dams and topsoil stockpiles, two of which are located in Napa County, was observed.

Efforts to re-establish the Thelypodium brachycarpum in areas outside the waste rock dump disposal area continued in 1985. Successful propagation of the plant has been achieved both from seed and rosettes. Significant new information on the distribution of the species was acquired during the 1985 monitoring period. Surveys in Colusa County located two new natural occuring populations of Thelypodium brachycarpum, supporting a total of approximately 1500 individual plants. It was recommended that these sites be evaluated for possible similarities to the site at the McLaughlin Project. Present scientific evidence does not support the hypothesis that plants from the population located on-site differed from the disjunct populations located in northern California.

Reclamation monitoring of lands revegetated in 1984 (750 acres of disturbed lands) indicated that successful erosion control at the Project site had been achieved. The success of erosion control efforts in the 1984-1985 period is attributed in large part to the use of straw mulch as a means of protecting revegetated areas from rain and wind erosion.

Germination success of the seed mixture used during the 1984-1985 period was observed to be highly variable between species. The revegetation program implemented in the Fall of 1985 was therefore adjusted to include more drought tolerant grasses, likely to provide additional cover and erosion control. A separate seed mix was developed for use on serpentine soils.

Homestake has adopted performance standards to be applied to the Revegetation Program. Recommended performance standards specify 70 to 80 percent cover (including mulch) on the first inspection, in late Fall or early Winter. At the second inspection, in late Spring/early Summer differences in percent cover are expected due to the type of material on which the plants are growing. Recommended performance standards at this stage specify at least 25 and 40 percent cover on serpentine and non-serpentine soils, respectively. Cover should be at least 70 percent on topsoil stockpiles.

Research on revegetation using woody plants continued throughout 1985. Test plantings of shrubs and woody species on both serpentine and non-serpentine test plots was conducted. Monitoring of these test plots was completed in October 1985, leading to a major revegetation effort using woody species over the 1985-1986 Winter rainy season.

Two methods proposed by Homestake to achieve the shrub density required in the Project Use Permit include: initial over planting taking into account historic success rate on pilot test plots; or, initial planting at the desired density with maintenance achieved through plant replacement or natural invasion.

A program to develop a plan for the management of more than 7,000 acres of nonmined lands owned by Homestake was initiated in 1985. The plan is expected to address various mitigation measures and permit conditions regarding fish and wildfife management, including habitat management of Davis Reservoir. Homestake is using plan preparation as a means to further research and educational programs as required in the Project Use Permit.

The U.S. Bureau of Land Management has reviewed the proposed changes in the Revegetation Monitoring Program and has advised the Conservation, Development and Planning Department that it finds them acceptable. Further BLM has reviewed the Annual Monitoring Report and has found the report "to be most adequate".

WILDLIFE MONITORING

The objective of the Wildlife Monitoring Program is to detect changes in the abundance or health of wildlife populations. As identified in the EIR/EIS, potentially avoidable impacts that justify monitoring and corrective measure, if necessary, include: exposure of wildlife to hazardous wastes; disturbance to Golden Eagle nests; and road kills.

The result of the 1985 Wildlife Monitoring Program indicate wildlife sightings ranged from 52% to 66% of those species actually sighted during baseline field studies conducted in 1982. A wide diverisity of species were observed, including twenty-one (21) new species not previously observed in the project study area. A majority of these new species (72%) were only sighted at Davis Creek Reservoir, attesting to the impact this new source of water in the project area is having on species diversification.

No decreasing trends in species health were observed during the reporting period, as evidenced by the low rate of use of potentially toxic water bodies; only 13 of 76 (17%) of recorded sightings at water bodies were recorded at potentially hazardous waste sites.

Prior surveys of the entire study area have attempted to identify both active or former Golden Eagle nest sites, as well as potential nesting areas. An eagle nest survey was conducted in July 1985, to ensure against new nests located within 1 km of project facilities since the previous surveys. Results of the 1985 program confirm earlier findings: no active Golden Eagle nests nor positive signs of eagle nesting have been located in the project area. Golden Eagle occurrence in the project area is attributable to occasional foreaging flights into habitat containing animals considered prey.

Monthly systematic automobile surveys of regularly used roadways in the project area began in the Spring 1985. Data collected indicate recorded sightings along project area roadways of 13% (15 out of 113) of the species actually sighted during 1982. A total of 3 new species were observed along survey routes, including: wild turkey, wild pig and ring-tailed cat. The majority of recorded sightings along project area roads occurred along Morgan Valley/Berryessa-Knoxville Road, particular in the immediate area of the project (between the mill area and the mine area). No pre-project data on roadkills in the project area exist. Traffic data indicates that average daily traffic on Berryessa-Knoxville Road has experienced a 42% increase over pre-project levels. It can therefore be assumed that roadkills have also increased along with the increase in traffic.

GEOTECHNICAL MONITORING

The Geotechnical Monitoring Program entails monitoring the integrity of embankments and natural or induced slope movements for each of four separate water storage or waste impoundment facilties. The Monitoring Program with respect to facilities located in Napa County became effective in 1985 and was established and is conducted in accordance with the requirements of the California Division of Safety of Dams. The Division has indicated their satisfaction that all dams are functioning safely.

CULTURAL RESOURCES MONITORING

With one exception, all cultural resource sites were mitigated during 1983 and 1984. Mitigation was accomplished through extraction of relevant data, excavation of the site if warranted, and cataloging data for eventual analysis. The final remaining site, located in Yolo County was excavated during summer 1985. Currently, materials recovered over the past three years of investigation are being processed and analyzed for inclusion in a Final Report on the McLaughlin Project Archaeological Surveys, anticipated for release in mid-1986.

NOISE MONITORING

The Noise Monitoring Program established for the McLaughlin Project did not require monitoring through the pre-operations phase. Operational monitoring, as requested by Lake County, was delayed pending completion of certain facilites at the McLaughlin Mill. The Noise Monitoring Program is expected to be re-evaluated as these facilties became fully operational. No noise complaints have been received to date.

SOCIOECONOMICS MONITORING

The Socioeconomic Monitoring Program has included: monitoring of traffic in Napa County along Knoxville-Berryessa Road; and, monitoring of local social and economic indicators in Lake County.

Traffic on the Knoxville-Berryessa Road has been monitored in accordance with Napa County Agreement #2055. The agreement establishes an upper limit for traffic on Knoxville-Berryessa Road of 125 average daily trips (ADT), averaged over a four week period. Data collected to date, indicate that at no time was the 125 ADT threshold exceeded. Daily trips over any consecutive four week period have averaged slight more than 71 ADT. Highest traffic volumes were recorded on weekends (96 ADT) in comparison to the rest of the week (58 ADT). The higher weekend figure is not unexpected, since the Bureau of Land Management maintains a recreation area adjacent to the south end of the McLaughlin Project Area.

The introduction of the McLaughlin Project into a rual economy like that of Lake County and the surrounding counties, not unexpectedly, has had a significant effect on the overall level of economic activity. Surprisingly, the subsequent decline in project related jobs, as the construction period ended, has not dramatically affected primary economic indicators. It is apparent that the job training program implemented by Homestake helped to achieve roughly a 50 percent local hiring quota, thus insuring that a substantial portion of the economic benefits from the project were retained with the local area.

REPORT ON REVIEW OF THE 1985 ENVIRONMENTAL MONITORING PROGRAM FOR THE MCLAUGHLIN PROJECT

		Page
	EXECUTIVE SUMMARY	i
1.0	INTRODUCTION	1
1.1	Background	1
1.2	Overview: General Monitoring Objectives	1
2.0	SUMMARY OF FINDINGS AND RECOMMENDATIONS: 1985 MONITORING PROGRAM	3
2.1	Water Quality	3
2.2	Air Quality and Meterology	5
2.3	Aquatic Ecology	5
2.4	Vegetation	9
2.5	Wildlife	14
2.6	Geotechnical	17
2.7	Cultural Resources	18
2.8	Noise	18
2.9	Socioeconomics	19
	Appendix A	

REVIEW OF THE MCLAUGHLIN PROJECT ENVIRONMENTAL MONITORING PROGRAM

1.0 INTRODUCTION

1.1 BACKGROUND

The Conservation, Development and Planning Commission, at their meeting of December 7, 1983, approved the Use Permit and Surface Mining Permit applications of the Homestake Mining Company (#U-198283) subject to Conditions of Approval, including:

> **"Homestake shall on September 1st of each calendar year, provide the CDPD with an annual report on the monitoring program summarizing the monitoring data collected. The report shall include a comparison of all data collected in compliance with required adopted standards and with the projected levels described in the Final EIR/EIS"** (FEIR-548, hereinafter "EIR/EIS") **The Planning Director shall provide an Annual Report to the CDPC on the results of the monitoring program".**

The 1985 Annual Monitoring Report prepared by Homestake Mining Company was received October 1, 1985 by the CDPD. (Upon formal request from Homestake to the CDPD a one month extension for submission of the Annual Report was granted). The 1985 Monitoring Report is the first annual report to address "Operational Monitoring". Data presented in the report covers the period from July 1, 1984 to June 30, 1985. The time period from February 1, 1985 to June 30, 1985 constitutes the earliest stages of the "Operational Monitoring Program". The 1985 Annual Report, therefore examines relationships between data collected and reported for the "Pre-Operational Monitoring Program" and the more recent data for the "Operational Monitoring Program".

The following report is submitted in fulfillment of the permit requirement that the Director report annually to the CDPC on results of the McLaughlin Gold Mine Project Monitoring Program. The report begins with an overview of the general monitoring objectives for the McLaughlin Project. The overview is followed by a summary of findings and recommendations regarding the 1985 Operational Monitoring Program. This summary presents findings according to environmental discipline, and is consistent with the format presented in the report prepared by Homestake Mining Company. Recommendations discussed in the report are those presented by Homestake for consideration and approval by applicable permit agencies, including the CDPC.

1.2 OVERVIEW: GENERAL MONITORING OBJECTIVES

The Environmental Monitoring Program for the McLaughlin Gold Mine Project has four major objectives: (1) to detect changes, (2) to assess the

importance of changes, (3) to determine the cause of changes, and (4) to trigger action to correct problems. If appropriately applied, the monitoring program will measure compliance with standards recognized in regulatory permits, as well as monitor trends indicative of present or future environmental damage or benefit.

Monitoring for the year 1985 has been conducted in accordance with the provisions for "Operational Monitoring" as specified in the McLaughlin Project Environmental Monitoring Manual. The environmental monitoring sites are shown in Figure 1.

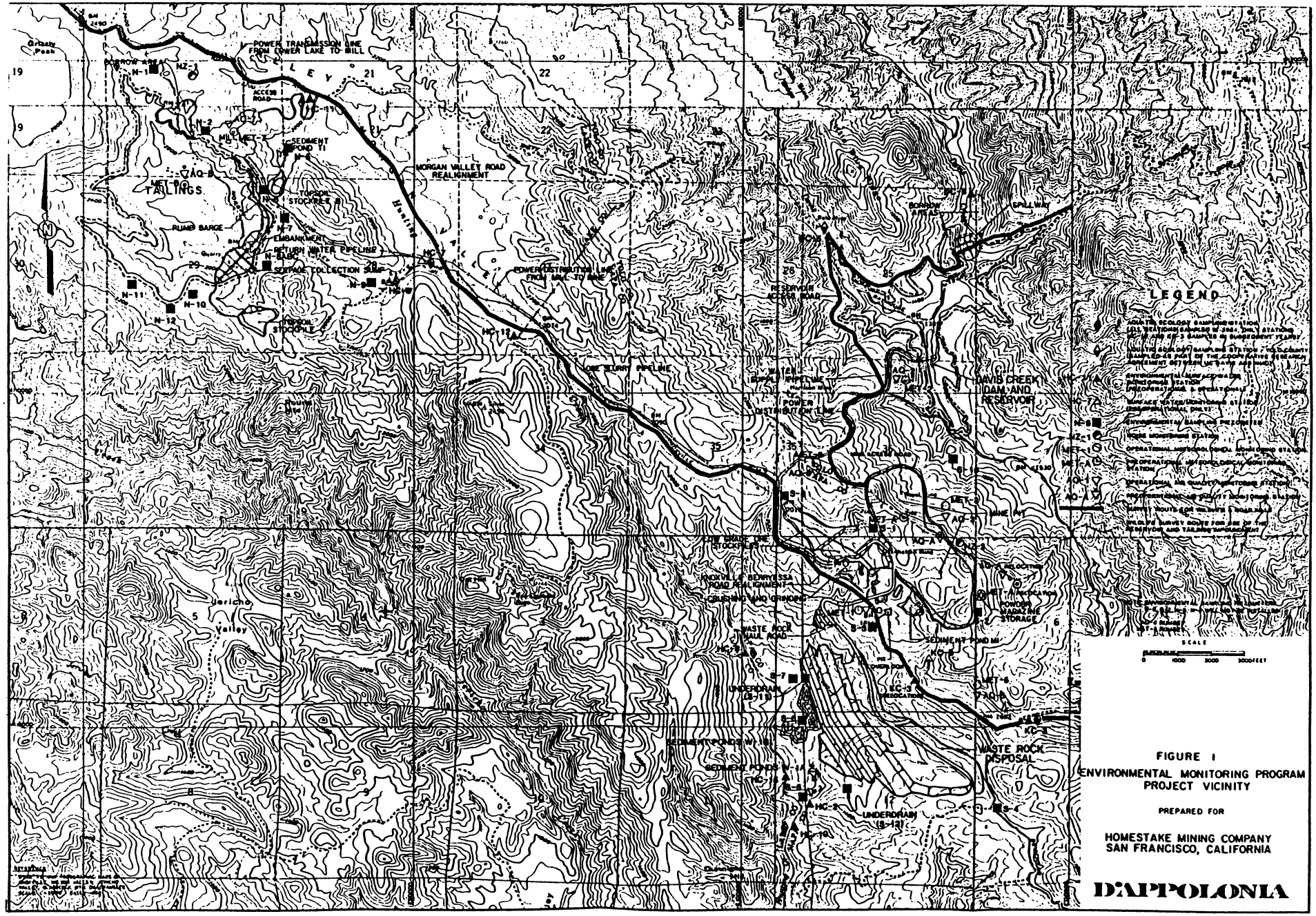


FIGURE 1
ENVIRONMENTAL MONITORING PROGRAM
PROJECT VICINITY

PREPARED FOR

HOMESTAKE MINING COMPANY
SAN FRANCISCO, CALIFORNIA

D'APPOLONIA

2.0 SUMMARY OF FINDINGS AND RECOMMENDATIONS: 1985 MONITORING PROGRAM

2.1 WATER QUALITY

The Water Quality Monitoring Program (WQMP) at the McLaughlin Gold Project includes surface - and groundwater monitoring of over 40 water quality variables, designed to measure ambient (baseline) conditions and to monitor Project activities that may affect the hydrologic system of the Project Area. The monitoring includes 13 surface water sampling sites in Hunting Creek, Davis Creek, Knoxville Creek, Cache Creek and Putah Creek; and 22 groundwater monitoring wells located principally in the Hunting Creek drainage area. The first three streams drain the Project area. Cache and Putah Creek are the two major downstream creeks.

In general, water quality of local area streams is of poor quality as a result of the serpentine geochemistry of the area. In addition, historic mining of the area has lead to degradation of water quality, with noticable concentrations of arsenic, boron, cadmium, manganese, magnesium, mercury and sulfate, detected in early investigations supporting the EIR/EIS. Groundwater flow patterns are complex and ill-defined because of the very low hydraulic conductivity that characterizes much of the area, and because of complex geologic structure (faulting) and complex mineralization. Groundwater quality is highly variable, highly mineralized, representative of water moving slowly through highly complex mineralized rock. Establishment of ambient water quality conditions, therefore, continue to be a major goal of the statistical analyses at this stage in the monitoring program.

Analytical emphasis has been on time-related changes, with attention also given to the complexities of spatial variations in water quality. The frequency of sampling continued monthly through January 1985, in accordance with the Preoperational Monitoring Program. More recently, sampling was bi-weekly for the period of February through April 1985 in accordance with the Operational Monitoring Program. Thereafter, sampling reverted back to a monthly schedule.

The WQMP data evaluated in the 1985 Annual Report, span the time period beginning in 1981 and extending through 1985. This time period spans the pre-construction, construction, start-up and operation phases of the McLaughlin Project. These data were divided into three time segments for purposes of assessing relationships between data collected and reported earlier and the more recent data. These time segments include: inception of water quality sampling through July 31, 1984; August 1, 1984 through January 31, 1985; and February 1, 1985 through early July 1985. Combination of the first two periods constitutes "Pre-operational Monitoring data" whereas the final time period corresponds to the earliest stages of collection of "Operational Monitoring data". The primary purpose for comparing data collected over these time periods was to assess if more recent water quality data reflected changes in conditions, either natural conditions or hydrologic conditions related to Project activities.

Analysis of these WQMP data provide the basis for the following findings, as reported by Homestake:

- No changes in water quality attributable to McLaughlin Project activities have been identified.

- Due, principally, to the apparent decrease in precipitation and accompanying decrease in overland runoff in the recent past, some increase in some water quality variables were observed. These increase make it increasingly difficult to identify future ambient conditions at this stage of data collection.

- Despite the variability of water quality, only in a very few instances have the measured concentrations exceeded the initially-established maximum likely concentrations (mlc's). The frequency of occurrence of these higher concentrations is similar to that which may be expected, from a statistical viewpoint alone.

- While it appears that revised means and mlc's for the water quality variables might be recalculated based on the period-of-record data base, continuing evolution of time-series variations in most of the variables makes recalculations premature. Future measurements should continue to help define the temporal variations.

- The considerably-high frequency with which measurements of certain variables at certain, if not all, locations are measured as "less than" the detection limit, suggests changes in the analytical scheme.

Specific findings with respect to monitoring activities for facilities located in Napa County, including the waste rock disposal facility, indicate that no significant trends have been observed at groundwater and surface water monitoring loctions. The data indicates continuing evolution of natural time series-variations which are expected to become more fully defined as monitoring in the initial operations period (1985-1986) is completed.

In accordance with recommendations of the Central Valley Regional Water Quality Control Board, Homestake added four additional monitoring sites to the Operational Monitoring Program. One surface water quality monitoring site, HC-15, was established on Hunting Creek in association with the redesign of the Waste Rock Sediment Control System. This station is monitored only during periods of discharge.

Two additional groundwater monitoring wells were established upgradient and downgradient of the mine pit, and one well was added downgradient of the waste rock disposal area. In addition to these monitoring wells, Homestake re-established two wells for monitoring the tailings impoundment, as required by the Water Quality Control Board.

The Regional Water Quality Control Board has reviewed the 1985 Annual Monitoring Report, and has found the report and its conclusions "acceptable for this stage of the project" (see Appendix A).

2.2 AIR QUALITY AND METEOROLOGY

The objective of the Air Quality Monitoring Program is to collect data from High Volume Air Samplers to determine that Total Suspended Particulate (TSP) concentrations in air comply with permits issued by local air pollution control districts. Additional analysis is conducted to determine metals and airborne asbestos concentrations.

The Air Quality Monitoring Network was designed in consultation with the local air pollution control agencies. The monitoring network is composed of seven stations, three of which are located in Napa County.

The operational Air Quality Monitoring Program is being conducted by Homestake environmental personnel. Field technicians collect filters from air quality sampling equipment. Loaded filters are sent to Environmental Research and Technology (ERT) for analysis and archival.

Focus of air quality monitoring in Napa County is on documenting TSP levels, as required by the Permit to Operate, issued by the Bay Area Air Quality Management District (BAAQMD). Based on information gathered in 1985, BAAQMD determined that the McLaughlin Project has been in compliance with the current PM-10 standard of 50 micrograms/cubic meter and the TSP standard of 150 micrograms/cubic meter.

Meterological data collected during periods when TSP levels have been high, reveal low humidities with increased solar radiation, increased wind speeds, and lower variation in wind direction.

2.3 AQUATIC ECOLOGY

Located in the headwaters of the Cache Creek and Putah Creek drainages, streams in the McLaughlin Project area are intermittent, with zero flow during summer months. The baseline surveys conducted in support of the EIR/EIS found that the local aquatic communities did not represent significant fishery or ecological resources. Aquatic ecological monitoring however, has been implemented with the objective: to provide data on the biological integrity of local area streams that will augment the water quality monitoring program. Specifically, the Aquatic Monitoring Program is designed to enhance the environmental information gathered by direct physical and chemical monitoring of water and sediments in streams potentially affected by activities associated with the McLaughlin Gold Project. Through biological monitoring of fish populations and benthic macroinvertebrates, detection of population changes may provide evidence of developing problems in water or sediment conditions which may not be apparent from chemical analysis. Additionally, monitoring the concentrations of potential trace element contaminants in fish species will permit evaluation of bioaccumulation of these chemicals.

As provided in the Use Permit issued for the McLaughlin Project a comprehensive aquatic monitoring program, extending over a four quarter period, was implemented commencing in April 1984. This initial program, designed to provide a baseline description of aspects of the local area aquatic ecology , was completed in 1985. Monitoring was conducted during April 1984, and again during February, April and August, 1985. The 1984-1985 Aquatic Monitoring Program was conducted by Bodega Research Associates (BRA) under contract to Homestake Mining Company. At times, the research team included a representative from the California Department of Fish and Game, as required by the Use Permit issued for the project.

During April 1984, BRA established a series of "matched" sampling sites (in pairs whenever possible), including upstream and downstream stations on the Hunting Creek and Knoxville Creek drainages. This design provided an "experimental" site and a "control" site relative to potential sources of contamination or other development distrubances. These initial baseline data were presented and discussed in the 1984 Annual Monitoring Report. Based upon the 1984 findings, BRA with approval from the Napa County Planning Commission, modified the 1985 Aquatic Monitoring Program to provide for a better understanding of the seasonal and stastical variability within and between monitoring sites on the project area streams.

Commencing in April 1986 a reduced and focused Aquatic Monitoring Program will be implemented by Homestake Mining Company. This monitoring effort includes a reduction in sampling frequency (from quarterly to annual), with adjustments in the number of sites to be monitored (7 to 4), and changes in monitoring protocol reflecting modifications in monitoring site location and number of stations sampled per site.

A substantial aquatic baseline description, depicting the community structure and diversity, as well as seasonal variability in the Hunting Creek and Knoxville Creek drainages has now been compiled. In addition, background trace element concentrations of seven (7) heavy metals in the most wide spread fish (California Roach) have been measured. These baseline data, derived from the 1984-1985 Aquatic Monitoring Program, are summarized below.

2.3.1 FINDINGS

2.3.1.1 Benthic Macroinvertebrates

The benthic macroinvertebrate fauna collected during the 1984 and 1985 baseline monitoring period, is typical of that found in upland streams of the Northern California Coast Range. Included among the more than 90 different species collected, are several species that have been formed to be particularly important for use in biomonitoring programs that have examined the influence of geothermal energy development activites at the Geysers Known Geothermal Resource Area in Lake, Sonoma and Napa Counties. These species have been especially useful due to their sensitivity to pollutants. Since benthic macroinvertebrates are less mobile than fishes, their populations tend to respond more clearly to localized changes in water and sediment conditions.

Apart from providing additional data on species diversity and density, the 1985 Monitoring Program was designed to compare the annual variability and seasonal differences in the benthic community. The results of the 1985 monitoring effort demonstrate that significant difference do exist between sampling periods on a seasonal, as well as an annual basis. Both patterns, annual variability and seasonal difference in the composition and abundance of the local benthic community, have been documented in streams in nearby areas of The California Coast Range, and are typical. These patterns appear to be directly related to the year-to-year variability, severity and sequencing of storm events in the Coastal Region. The presence of a distinct wet/dry cycle in the Project Area provides the underlying basis for biotic interactions in streams of the area.

The 1984 Monitoring Program conducted by BRA indicated that the paired sites selected for study were biologically similar, thereby assuring their use as effective monitoring sites. The pattern of annual variability and seasonal change evidenced in the 1985 Monitoring Program, suggest that in terms of using these sites to assess potential impacts related to the McLaughlin Project, the time of year when a potential impacting activity occurs is critical. In terms of monitoring sites for which intersite comparisons are possible, as for example when a potential impacted site is being compared to a control site, late spring is best for assessing impacts on the benthic community. Where intersite comparisons are not possible, such as on the Knoxville Creek drainage, conditions such as those experienced in late summer are preferrable. This is due to the fact that natural conditions stressing the benthic community are more constant on a year-to-year basis during the dryer part of the year.

2.3.1.2 Fish Populations

The 1984-1985 baseline data indicate that the diversity of fish species in project area streams is low. A total of 7 different fish species were collected over the entire study area, four (4) of which were collected in both 1984 and 1985. This low diversity is typical of California Coast Range streams where low flow rates and high temperatures are usual late summer conditions. California Roach, a minnow with a wide temperature tolerance, were the most abundant and wide-spread species, occuring at all sites sampled in the Hunting and Knoxville Creek drainages. The highest diversity of species was at the station on Hunting Creek farthest downstream from all project activities (HC-10), where the the highest flow rate and deepest pools were observed.

The 1984-1985 baseline data indicate that the numerical abundance of California Roach was highly variable, both on a seasonal and annual basis. Least variation between seasons and between years was found at sites which remained flowing through late summer. Due to this high variability factor, BRA suggested that comparison of single-year abundance estimates may not be a sufficient indication of the health of fish populations in project area streams. Continous annual monitoring will permit detection of trends and establish patterns of annual variability. BRA notes however, that present data suggest that a decline in abundance for two or more consecutive years would indicate that fish populations were under stress.

The size distribution of California Roach varied considerably among sampling sites within the same sampling period and among sampling periods. This is due in part to the short longevity (3 - 5 years) of the roach; however, BRA suggested that other contributing factors may include variability of spawning dates, recruitment dates and growth rates among sites. Data indicate that successful recruitment of California Roach took place in 1984 and 1985, with a peak of small fishes (20 to 40 mm FL) in February and August 1985. BRA suggested that if fishes in this size range are absent in future monitoring, reproduction failure would be indicated. Further, two successive years of little or no recruitment could result in the local extinction of California Roach.

The condition factors calculated for 1985 exhibited an annual trend corresponding to the reproductive cycle, with a peak near the April sampling period. BRA found that condition factors could be used as an indicator of the general status of the roach populations, and recommended regarding any condition factor below 1.20 as indicating the sampled population to be under stress.

2.3.1.3 Trace Element Monitoring

Pooled samples of California Roach analyzed in 1984 and 1985 provide a baseline of metal concentrations of 7 elements in fish at the monitoring sites, and considerable information on seasonal, annual and inter- and intrasite variability in these concentrations.

Comparison of all sites and all metals in April of both years indicate no pattern of change between 1984 and 1985, therefore, BRA considers both data sets as baseline measurements. The baseline data indicate concentrations of arsenic, copper, lead, mercury and zinc are low, and within expected ranges for fresh water fish in Northern California streams. Concentrations of chromium and nickel were found to be high and the most variable of elements measured. This is attributable to local mineral content of the project area: chromium and nickel are characteristic of serpentine soils.

Chromium and nickel concentrations in California Roach samples from the project area were found to be highly correlated, and attributed to the geochemical association of these two elements in the project area. This statistical relationship was found to exist across all seasons.
The close agreement between baseline data sets for 1984 and 1985 is encouraging in terms of sampling and analytical protocols. Further, the pooled sampling technique employed by BRA which gives an estimate of mean concentrations in the local population was found to provide consistent estimates of mean metal concentrations. These findings are of particular importance for interpretation of later impacts in view of the project areas unusual minerology.

2.3.2 RECOMMENDATIONS

Based on the findings presented in the 1984 -1985 baseline Monitoring Program, Homestake has modified its original Aquatic Monitoring Program proposal which was to have been implemented commencing in April 1986. As originally proposed, Homestake intended to sample a single site on an annual basis, once the baseline aquatic ecology had been established. This sole monitoring site was the farthest downstream from all project activities: HC-10 located on Hunting Creek.

A focused Aquatic Monitoring Program will now be implemented by Homestake, that includes sampling 4 sites on an annual basis. Three monitoring sites will be retained on the Hunting Creek drainage, including the only upstream -downstream pair (HC-5 and HC-10), that satisfied the original design of the baseline monitoring program. HC-10 is a key monitoring site because of its location downstream of all development effects and because of the diversity of its aquatic communities. The third site on Hunting Creek (HC-7A) is situated in a manner that permits potential impacts from the Mill/Tailings impoundment to be differentiate from those associated with the Waste Rock Dump Facility. A final site (KC-3) is located on Knoxville Creek downstream of the Mine. Benthic macroinvertebrate sampling stations will remain at the same locations as in 1984 and 1985.

With one exception, Homestake will sample all stations on an annual basis, in April of each year. This season has been shown to have high diversity benthic invertebrate communties, high fish populations, and moderate flow rates. It also provides the benefit of 2 years of comparable baseline monitoring data. One additional benthic sampling will be conducted in August of each year at HC-7A, located below the tailings empoundment. This additional sampling period was recommended by BRA to compensate for the fact that HC-7A has no matched "control" site. The additional data is expected to improve the sensitivity of annual comparisons at this site.

Within fish population stations and bethnic sampling sites, all sampling protocols will continue as instituted by BRA, except that no further adult insect pan-trapping will be conducted. Collection and analysis of California roach for trace element concentrations will also follow the protocol established by BRA except that two pooled samples will be collected and analyzed from each site annually. This duplication is expected to provide a check of any anomalously high concentrations, as well as increase the reliability of estimates of mean concentrations. BRA has recommended that changes in trace element analytical instrumentation or procedures should be permitted only when they maintain or increase the sensitivity of the analyses. In all other cases, the monitoring program should strive for consistency in all procedures to maximize the usefulness of interannual comparisons.

As noted, the California Department of Fish and Game has been directly involved in the aquatic monitoring program, providing on-site field inspection and technical review of the annual report. The CDFG has reviewed the 1985 Annual Aquatic Monitoring Report and found the report to be "generally very good"(see Appendix A). A recommended change in sediment sampling methodology made by the CDFG was demonstrated in the field during the April 1986 sampling period. Review of the proposed procedural change is continuing.

2.4 VEGETATION

The 1985 Vegetation Monitoring Program included monitoring of previously reclaimed areas (reclamation success); sensitive plants; and, the management of contiguous lands unaffected by mining.

Pursuant to Use Permit requirements, reclamation research and test plantings to determine reclamation methods best suited to areas characterized by serpentine and non-serpentine soils, was integrated into the 1985 Monitoring Program. Results of the 1985 Vegetation Monitoring Program are discussed below, together with recommendations for the 1986 monitoring program.

2.4.1 FINDINGS

2.4.1.1 Sensitive Plants

The 1985 sensitive Plant Monitoring Program was designed to evaluate the direct and indirect effects of project construction and operation on sensitive plant populations in close proximity to project operations (including access roads). In addition, efforts to propagate, salvage, and successfully transplant the single known population of Thelypodium brachycarpum growing within the confines of the Project Area continued in 1985.

To date, a total of 77 sensitive plant populations have been directly impacted by construction and operation of the McLaughlin Gold Project. This number represents a reduction of nearly 39% from the 126 sensitive plant populations predicted to be directly impacted by the project in the Project EIR/EIS. The majority of these undisturbed populations were mitigated by redesign or rerouting of facilities, and the placement of protective fencing around those populations in close proximity to mine operations.

Monitoring of sensitive plant populations undisturbed by Project operation was initiated in 1985, by Biosystems Analysis, Inc. (BSAI) in consultation with the Napa Chapter of the California Native Plant Society (CNPS). Sensitive plant surveys were conducted during the Spring and early Summer. Surveys were timed to include the optimum flowering and growth period of the sensitive plant populations selected for monitoring. A total of 51 sensitive plant occurrence areas were visited (note: an occurrence area could include several different sensitive plant populations). During each survey, observations were made on the general appearance of the sensitive species, indications of physical disturbances at the site, and an assessment of vigor. These surveys indicated that no serious disturbances to sensitive plant populations were encountered. No populations in the mine vicinity were found to exhibit signs of toxicity from air or water borne pollutants caused by mining operations. BSAI did observe indirect impacts from increased siltation on four sensitive plant populations below several check dams and topsoil stockpiles; two of which are located in Napa County. No other indirect impacts on the sensitive plant populations in close proximity to the project operations were observed.

Efforts to re-establish the Thelypodium brachycarpum in areas outside the waste rock dump disposal area continued in 1985. Successful propagation of the plant has been achieved both from seed and rosettes. Seedlings were transplanted to a site in Colusa County, while the CNPS planted salvaged rosettes to a site in Pope Canyon in Napa County. Based on the fact that 12 of 15 plants salvaged by the CNPS have survived to flower and produce viable seed, CNPS has recommended the transplanting of rosettes for the establishment of the Thelypodium brachycarpum elsewhere.

Significant new information on the distribution of the species was acquired during the 1985 monitoring period. Surveys conducted by BSAI in Colusa County located two new natural occuring populations of Thelypodium brachycarpum, supporting a total of approximately 1500 individual plants. BSAI recommended that these sites be evaluated for possible similarities to the site at the McLaughlin Project.

A review of the taxonomy of the Knoxville (on-site) population was completed in 1985, by Dr. Al-Shebaz of the Arnold Arboretum at Harvard University at the request of the CNPS. Dr. Al-Shebaz evaluations show no difference between the Knoxville population and those populations located in Northern California and Oregon. Present scientific evidence does not therefore support the hypothesis by the CNPS that plants from the Knoxville site differed from the disjunct populations to the north.

Final salvage and transplant of the Knoxville Thelypodium brachycarpum population was scheduled for Spring 1986. However, Homestake has implemented an interim plan for waste rock disposal which will provide an additional two to three years for salvage activities to continue.

2.4.1.2. Reclamation Success

Revegation efforts in 1985 were centered on completing the seeding of areas disturbed by construction activities. Focus of these efforts included slopes and embankments on project dams and access roads. In Napa County, these included revegetation of the bench slope behind the explosives storage area, the water tank area, the sewage pond and adjacent pad area, the waste rock disposal sediment pond access road and pond embankments, and Knoxville-Berryessa Road.

Reclamation monitoring of lands revegetated in 1984 (750 acres of disturbed lands) was conducted by Ms. Lorraine Van Kekerix, an independent consultant retained by Homestake, formerly with the California Division of Mines and Geology; in conjunction with representatives from the U.S. Bureau of Land Management. Observations of 1983 and 1984 revegetation efforts indicated that successful erosion control at the Project site had been achieved. It was observed that erosion which did occur was a result of problems with slope angles, grading, unstable and/or rock cut slopes or placement of structures to divert water.

The success of erosion control efforts in the 1984-1985 period is attributed in large part to the use of straw mulch as a means of protecting revegetated areas from rain and wind erosion. In addition, the mulch layer helped to promote plant growth by moderating surface temperatures and conserving water.

Germination success of the seed mixture used during the 1984-1985 period was observed to be highly variable between species. The revegetation program implemented in the Fall of 1985 was therefore adjusted. The revised seed mix includes more drought tolerant grasses, likely to provide additional cover and erosion control. A separate seed mix developed for use on serpentine soils, included grasses proven to have potential for establishment in upland soils characteristic of the Project site.

Based upon the consultant's recommendations, and approval by the U.S. Bureau of Land Management, Homestake has adopted performance standards to be applied to the Revegetation Program. Recommended performance standards specify 70 to 80 percent cover (including mulch) on the first inspection in late Fall or early Winter. It is expected that at the second inspection, in late Spring/ Early Summer differences in percent cover will be noted due to the type of material on which the plants are growing. Recommended performance standards at this stage specify at least 25 and 40 percent cover on serpentine and non-serpentine soils, respectively. Cover should be at least 70 percent on topsoil stockpiles.

The consultant proposed two methods to achieve the shrub density required in the project Use Permit: initial over planting taking into account historic success rate on pilot test plots; or, initial planting at the desired density with maintenance achieved through plant replacement or natural invasion.

Research on revegetation using woody plants continued throughout 1985. Circuit Rider Productions, a firm specializing in revegetation with extensive experience in the Geysers area, conducted test plantings of shrubs and woody species on both serpentine and non-serpentine test plots. The pilot planting program is designed to evaluate individual species and their response to different planting tehniques. Monitoring of these test plots was completed in October 1985, leading to a major revegetation effort using woody species over the 1985-1986 Winter rainy season. Native seed from the Project site, collected during 1984, was propagated in a nursery by Circuit Rider, thereby providing approximately 10,000 plants for use during the 1985-1986 revegetation effort.

2.4.1.3 Management of Contiguous Lands

A program to develop a plan for the management of more than 7,000 acres of nonmined lands owned by Homestake was initiated in 1985. The plan is expected to address various mitigation measures and permit conditions regarding fish and wildlife management, including habitat management of Davis Reservoir. Primary management goals to be achieved through the plan include:

1) Enhance and protect wildlife habitat while minimizing erosion and sediment transport, maintaining water quality and improving scenic quality.

2) Compensate for habitat quality loss in disturbed areas.

3) Protect and enhance habitat requirements of rare, endangered and protected species.

4) Preserve archaeological sites.

5) Define land use options for agricultural, recreational, research and other uses of portions of contiguous lands.

6) Assess income-producing potential.

7) Ensure compatibility of land uses with surrounding public lands management objectives.

These goals are reflected in the permit conditions under which the project was approved.

Homestake is using plan preparation as a means to further research and educational programs as required in the project Reclamation Plan. A group of private consultants and graduate students under the direction of University Department heads have been assembled to prepare the management plan. Participants include representatives from both U.C. Berkeley and U.C. Davis. In addition, preparation of the management plan is being conducted in cooperation with the U.S. Bureau of Land Management and the California Department of Fish and Game. The management plan is expected to be completed in 1986, a year and a half ahead of the date required in the Project Use Permit.

2.4.2 RECOMMENDATIONS

As noted, consultants to Homestake Mining Company have made recommendations for additional mitigation of sensitive plants and reclamation of disturbed areas. Resurveying of several sensitive plant populations which were not located during the 1985 monitoring period is proposed for the 1986 monitoring season. In addition, BSAI identified a sensitive plant population in the monitoring area which it suggested should be considered for salvage prior to disturbance from on-going operation activities. BSAI also identified several populations of sensitive plants which it considered candidates for monitoring the effects of future grazing. Establishment of reference control plots was recommended.

The consultant retained by Homestake to conduct the Reclamation Monitoring Program reported that based on field observations of the 1983 and 1984 revegetation effort, changes in seed mix should be made for general use for the 1985 planting season. As noted above, two seed mixes were recommended: one for use on serpentine areas and one for non-serpentine areas. In addition, a wildflower mix was recommended for use on small areas where flowers could enhance aesthetic quality.

No change in the rates and type of mulch and fertilizers to be used for general use in 1985 were recommended. The straw mulch used in 1984 was observed to be "very effective in protecting disturbed surfaces and preventing erosion".

Pursuant to Use Permit requirements, Homestake has adopted performance standards to ascertain reclamation success which were recommended by the reclamation Consultant, as reviewed by the U.S. Bureau of Land Management (BLM). The EIR/EIS mitigation measures proposed use of reference plots for evaluating the revegetation program. Based upon the consultants recommendation, a program providing for visual estimate of percent plant cover and species composition was approved by the BLM. For areas with slopes of no more than 2:1, plot frames will be used. A minimum of five (5) randomly placed plot frames was recommended for each revegetated area to be monitored.

Detailed record keeping as discussed in the Environmental Monitoring Manual is to be retained, including data on species (seed) mix, type and rate of mulch application, and date at which revegetation was accomplished. Semi-annual monitoring of newly planted areas will be conducted. The first inspection will occur in late Fall/early Winter to determine if erosion is occuring, and if necessary what remedial measures should be applied immediately. The second inspection will occur in the late Spring/early Summer to assess survival, percent cover, seed formation and invasion by unplanted species.

Performance standards to determine successful revegetation are as follows:

First Inspection:	70 - 80% cover (including mulch), except on well consolidated rocky areas.

Second Inspection:	40% cover on non-serpentine areas; 25% cover on serpentine areas.
Topsoil stockpiles:	70% cover.

Two approaches were recommended to arrive at the shrub density specified in the Project Master Reclamation Plan: 1500 tublings per acre. Either the areas will be planted at a higher density taking into account percent plant loss derived from shrub test plots established by Circuit Riders, or the plantings will be at the proposed final density with replacement, either by replanting or natural invasion, as necessary.

The U.S. Bureau of Land Management has reviewed these recommended changes in the Revegetation Monitoring Program and has advised the Napa County CDPD that it finds them acceptable. Further BLM has reviewed the Annual Monitoring Report and has found the report "to be most adequate" (See Appendix A).

2.5 WILDLIFE

The objective of the Wildlife Monitoring Program is to detect changes in the abundance or health of wildlife populations. Specifically, the program design provides for identification of changes that are attributable to the McLaughlin Project, potentially avoidable, and sufficiently important to require corrective measures.

As identified in the EIR/EIS, potentially avoidable impacts that justify monitoring and corrective measures, if necessary, include:

1. Exposure of wildlife to hazardous wastes.
2. Disturbance to Golden Eagle nests.
3. Road kills.

The result of the 1985 Wildlife Monitoring Program are summarized in Table 2.5-1. The data indicate recorded wildlife sightings ranged from 52% to 66% of those species actually sighted during baseline field studies conducted in 1982, in support of the EIR/EIS. A wide diverisity of species were observed, including twenty-one (21) new species not previously observed in the project study area. A majority of these new species (72%) were only sighted at Davis Creek Reservoir, attesting to the impact this new source of water in the project area is having on species diversification.

No decreasing trends in species health were observed during the reporting period, as evidenced by the low rate of use of potentially toxic water bodies: only 13 of 76 (17%) of recorded sightings at water bodies were recorded at potentially hazardous waste sites.

Due to the limited 1985 reporting period, data collected is insufficient to permit detection of any change in wildlife abundance. The fact that all of the species observed during the 1982 baseline studies were not observed in 1985 is attributed (by Homestake) to less rigorous study required to achieve the objectives of the on-going monitoring program, as opposed to documenting all species present to establish a baseline situation for the EIR/EIS.

2.5.1 Exposure of Wildlife to Hazardous Wastes

Exposure to hazardous wastes is the most immediate danger posed to wildlife from the McLaughlin Project. Given the chemical composition of the tailings and waste rock deposits, water in the tailings impoundment, sediment basins and the mine pit may prove to be toxic to most wildlife. Impacts, particularly on water fowl, would be dependent on length of stay and extent to which water is drunk. Monitoring to ascertain the extent of hazardous waste exposure has therefore focused on documenting wildlife use of potentially toxic waters in the project area. As such use would constitute a change from pre-project conditions, the Wildlife Monitoring Program has been designed not only to establish the extent of use, but also to provide some idea of spatial variation, allowing for appropriate corrective action(s) to be taken, if deemed necessary.

Monitoring of potentially contaminated waterbodies in the project area was initiated in the Spring 1985, and is continuing on a monthly basis in accordance with Use Permit conditions. The Wildlife Monitoring Program is being conducted by Homestake environmental personnel. A qualified wildlife biologist has been retained by Homestake, who is available for reference, when needed.

Wildlife observation sighting routes include the perimeter roads to the tailings impoundment (Lake County) and Davis Creek Reservoir (Yolo County). Wildlife observations within and adjacent to the waste rock sediment control ponds are documented only intermittently. The monitoring program as implemented by Homestake, provides for surveys of sediment ponds to be conducted only when water quality measurements indicate elevated levels of heavy metals in the sediment ponds. Wildlife surveys are not conducted in the mine pit area, however company personnel are encouraged to report incidental sightings.

Data collected over the 1985 reporting period, reveals a wide diversity of species using project area water bodies, including species previously unobserved in the general project area. Table 2.5-1 presents a comparison between present collected wildlife data and previous field and research studies conducted in support of the EIR/EIS. The data indicate recorded sightings at project area water bodies of 53% (60 out of 113) of those species actually sighted during 1982. A total of 18 new species, 14 of which were birds, were sighted using project area water bodies.

The distribution of recorded sightings among project area water bodies varied considerably. Table 2.5-2 presents a comparison of recorded sightings in 1985 according to waterbody: tailings impoundment, waste rock sediment control ponds, and Davis Creek Reservoir. Of a total of 78 species sighted in 1985, slight less than 77% (60 out of 78) were recorded exclusively at Davis Creek Reservoir. In addition, 15 of the 18 newly recorded species were sighted only at Davis Creek Reservoir. The Reservoir represents an uncontaminated water body introduced into the project area with the development of the McLaughlin Gold Project.

2.5.2 Disturbance of Golden Eagle Nests

The Golden Eagle is a federally-protected species, potential disturbance of which, can be avoided by establishing protective buffer zones around nests. The objective of the monitoring program in this case, is to determine whether Golden Eagles nest near project facilities.

TABLE 2.5-1
WILDLIFE DATA SUMMARY AND COMPARISON

	1981 Field Studies Total Species	1985 Field Studies Total Species	1985 Field Studies Total Species by Area[1]			Observed Species in 1985 as Percentage of 1981 Recordings	Research Studies[2] Total Species
			Waterbodies	Roadside	Other		
Birds	79	56 [15] (8)	55 [14]	10 [3]	10	52%	140
Mammals	18	15 [3] (1)	10 [1]	9 [2]	2	66%	41
Herptiles	16	13 [3] (1)	13 [3]	1	3	63%	33

Notes: [ ] Recorded species not observed during 1981 Field Studies

( ) Recorded species not mentioned in 1982 Research Studies.

1 Area totals are mutually exclusive.

2 Potentially occuring species (D'Appolonia 1982)

TABLE 2.5-2
WILDLIFE DISTRIBUTION BY SIGHTING AREA

	1985 Field Studies Total Species	Designated Sighting Location Areas [1, 2]								
		Waterbodies Total Species			Roadside Total Species			Other Total Species		
		A	B	C	D	E	F	G	H	I
Birds	56	54 (40)	6	4 (1)	1	10 (1)	1	5 (3)	1 (1)	6 (4)
Mammals	15	10 (9)	1	-	7	8 (1)	4	1 (1)	1 (1)	-
Herptiles	13	12 (11)	2 (1)	-	-	1 (1)	-	-	1 (1)	2 (2)

Notes: ( ) Recorded exclusively at the designated sighting location area.

[1] Key to sighting Location Areas:

Waterbodies:
- A Davis Creek Reservoir
- B Waste Rock Sediment Control Ponds
- C Tailings Impoundment

Roadside:
- D Morgan Valley Rd from Lower Lake to Rieff Road
- E Morgan Valley Rd from Rieff Rd to Knoxville
- F Rieff Rd to the Reid Mine

Other:
- G Process Site
- H Mine Site
- I Core Shed & Meadows

[2] Area totals are mutually exclusive

Prior surveys of the entire study area have attempted to identify both active or former nest sites, as well as potential nesting areas. These surveys were conducted in 1982 (pre-project) and again in 1984 (pre-operations). An additional eagle nest survey was conducted in July 1985, by Biosystems Analysis, Inc., to ensure against new nests located within 1 km of project facilities since the previous surveys. An aerial survey was conducted via helicopter and covered both project lands and surrounding areas. Results of the 1985 program confirm earlier findings:

1. While the country surrounding the project site contains suitable breeding habitat for golden eagles, no active golden eagle nests nor positive signs of eagle nesting have been located in the project area.

2. Golden Eagles were observed in the project area.

3. Golden Eagle occurrence in the project area is attributable to occasional foreaging flights into habitat containing animals considered prey of the Golden Eagle. Additional sightings include migrating and transient individual birds.

The 1985 survey indicated that most of the potential breeding habitat (cliffs, rock outcrops, large trees on slopes) in the project area is adequately removed from project features that distrurbance from mine activities would be minimal should nesting occur in the future.

2.5.3 Roadkills

Increased vehicular traffic due to development of the McLaughlin Project was identified in the EIR/EIS as a potential cause for increased levels of mortality and injury to wildlife. No pre-project data on roadkills in the project area exist, therefore, the monitoring program design simply provides for a determination of the rate of roadkills by species. Roadkills are mapped to allow for identification of localized areas where wildlife use is more prevalent, i.e., game crossings, riparian corridors. Should monitoring data indicate excessive roadkills (or use), corrective (control) measures are to be implemented.

Monthly systematic automobile surveys of regularly used roadways in the project area began in the Spring 1985. Survey routes include Morgan Valley Road/Berryessa-Knoxville Road from Lower Lake (Lake County) to Knoxville (Napa County); and, Davis Creek Dam access road/Rayhouse Road (Yolo County) from the mine area easterly across Davis Creek Dam.

Data collected over the 1985 reporting period indicate recorded sightings along project area roadways of 13% (15 out of 113) of the species actually sighted during 1982 (see Table 2.5-1). A total of 3 new species were observed along survey routes, including: wild turkey, wild pig and ring-tailed cat.

The majority of recorded sightings along project area roads occurred along Morgan Valley/Berryessa-Knoxville Road, particular in the immediate area of the project (between the mill area and the mine area)(see Table 2.5-2). Data collected over the 1985 reporting period was report in a "generalized" format, relating sighting locations of a particular species to a particular area rather than specific location. Therefore, indication of excessive species mortaility rates and/or identification of localized areas where roadkills were prevalent could not be determined. However, traffic data indicates that average daily traffic on Berryessa-Knoxville Road has experienced a 42% increase over pre-project levels. It can therefore be assumed that roadkills have also increased along with the increase in traffic.

2.6 GEOTECHNICAL

The Geotechnical Monitoring Program entails monitoring the integrity of embankments and natural or induced slope movements for each of four separate water storage or waste impoundment facilities as listed below:

- Tailings Impoundment (Lake County)
- Davis Creek Dam and Reservoir (Yolo County)
- M-1 Dam and Reservoir (Napa County)
- Waste Rock Disposal Sediment Control Facility (Napa County)

The Geotechnical Monitoring Program with respect to facilities located in Napa County became effective in 1985, with the completion of construction and the installation of required monitoring instrumentation and devices. The monitoring program was established and is conducted in accordance with the requirements of the California Division of Safety of Dams.

Monitoring data for 1985 has been reviewed and analyzed by the firm of Steffen, Robertson & Kirsten (SRK), a Geotechnical engineering firm under contract to Homestake Mining Company. Subsequent to data analysis, SRK completed a field inspection of each structure and an evaluation of structure performance relative to design criteria and permit requirements. Based upon its findings, SRK indicated that the structures are performing as designed. Recommendations by SRK for change included the installation of a seepage weir at M-1 Dam and installation of settlement monuments at Davis Creek Dam. Installation of the monument and the weir were completed in the Fall 1985.

The report prepared by SRK was transmitted to the Division of Safety of Dams in compliance with reporting requirements for Geotechnical Monitoring. The Division has indicated their satisfaction that all dams are functioning safely.

2.7 CULTURAL RESOURCES

The EIR/EIS estimated that construction activities would directly or indirectly impact 38 prehistoric, 15 historic and 9 paleontologic cultural resource sites. With one exception, all cultural resource sites had been mitigated during 1984 and 1983. Mitigation was accomplished through extraction of relevant data, excavation of the site if warranted, and cataloging data for eventual analysis. The final remaining site, located in Yolo County, has been excavated. Field work was completed during summer 1985, under the direction of Dr. David Fredrickson and Mr. Thomas Origer of Sonoma State University's Center for Antropological Studies. The Archeological Data Recovery and Mitigation Program has been conducted in cooperation and with the assistance of members of the local Indian population.

Currently, materials recovered over the past three years of investigation are being processed and analyzed for inclusion in a Final Report on the McLaughlin Project Archaeological Surveys, anticipated for release in mid-1986.

2.8 NOISE

The Noise Monitoring Program established for the McLaughlin Project did not require monitoring through the preoperations phase. However, Homestake (and its contractors) were to take certain steps to reduce potential noise impacts. Accordingly, Homestake has:

1. Purchased the Barker property to eliminate noise impacts on private properties adjacent to the mine pit;

2. Advised campers at Hunting Creek campground of construction and blasting activities by posting appropriate signs;

3. Specified that trucks used on-site meet California Motor Vehicle regulations; and

4. Made use of the best available control technology to reduce noise levels.

Noise monitoring as requested by Lake County has been delayed pending operational completion of certain facilities at the mill, i.e., oxygen plant, autoclaves. The Noise Monitoring Program is expected to be re-evaluated as these facilities became fully operational, on a routine basis. No noise complaints have been received to date.

2.9 SOCIOECONOMICS

2.9.1 Economic Indicators

As part of the 1985 Annual Monitoring Program for the McLaughlin Project, Homestake had Mr. David R. Clore, Senior Associate, Mundi & Associates (San Francisco), prepare a summary report of the Socioeconomic Program. The socioeconomic monitoring program, initiated in 1983, is responsive to concerns raised in the EIR/EIS regarding the size and compositon of the construction/operation workforce and associated increase in population. The emphasis of the impact analysis is on Lake County, however, the findings are germane to Napa County. The follow discussion briefly summarizes the more interesting of survey findings.

1. Comparison of Findings with EIR/EIS (1983) Projections

   a) Construction Period: Comparison between EIR/EIS projections and what surveys and hiring reports have shown, indicates that the employment, in-migration and population assumptions and projections in the EIR/EIS turned out to be "relative" accurate. Table 2.9-1 shows that the variance between projected peak construction employment and actual results was significant. Homestake had estimated a one month peak of 720 employees, the EIR/EIS increased that number to include a range from 700 to 800. Actual peak construction employment occured in August 1984 when approximated 1150 jobs were filled. The larger peak was explained by Homestake as having been caused by the need to compress the construction schedule after the start of construction was delayed beyond the anticipated date of summery 1983.

   b) Operations Period: Although estimates for both total employment and percent local-hire for the operations period approximate actual findings, survey data indicates that operations period population increase was underestimated in the EIR/EIS by 5 to 23 percent. This underestimation stems in large part from the assumption used in the EIR/EIS for average family size for households. Based upon empirical data gathered at other large scale development projects, which have shown that the family households of construction workers have been larger than those of the permanent workforce, the EIR/EIS assumed 3.3 persons and 2.85 persons per household, respectively. The average household size for the non-local permanent employee has been calculated to be over 3.0, resulting in a larger population increase (and increase in school age children) than was projected.

      A survey of special districts (other than school districts) to determine the extent they preceived an increase in demand for services, indicated that no significant impacts have occured. Allocation of employees by residence tends to support this finding: non-local employees have tended to favor unincorporated areas, while locally-hired residents favor the City of Clearlake.

TABLE 2.9 - 1

COMPARISON OF SURVEY FINDINGS AND EIR/EIS PROJECTIONS

	EIR/EIS Projections	Survey Result
CONSTRUCTION PERIOD		
Peak Total Employment	700-800	1,150
Percentage Locally Hired	30% ("worst case") 50% ("best case")	50% (peak period) 41% (low month) 66% (high period)
Peak Increase in Population	311-1,118	approx. 820
Peak Increase in School Age Children	123-400	198 (83/84) 267 (84-85) 215 (peak est.)
OPERATIONS PERIOD		
Total Operating Employment	234	219 *
Percentage Locally Hired	50% ("worst case") 60% ("best case")	54%
Increase in Permanent Population	247-289	303
Permanent Increase in School Age Children	49-58	90-100

* The survey of permanent employees during the week of August 5, 1985, resulted in the return of 219 questionaires. Homestake now estimates a total permanent workforce of about 280 and expects to reach this level by January of 1986 (Krauss, 1985).

2. Supplemental Analysis

a) Origin of Non-Local Hires: While the Lake County labor market obviously benefited from short-term hiring over the construction period, other California counties (including Napa County) provided very few employees who were not local residents as of June 30, 1983. Of 264 non-local employees surveyed, slightly more than 70 percent (187) were from out-of-state. A disproportionate number of construction workers relocated from outlying rural Colorado communities in proximity to each other. The hypothesis is that many of these workers came to Lake County from places where they had been working on similar mineral extraction projects, i.e., oil shale. Thus "project to project migration", common in the construction industry for large scale developments, was also evident on the McLaughlin Project.

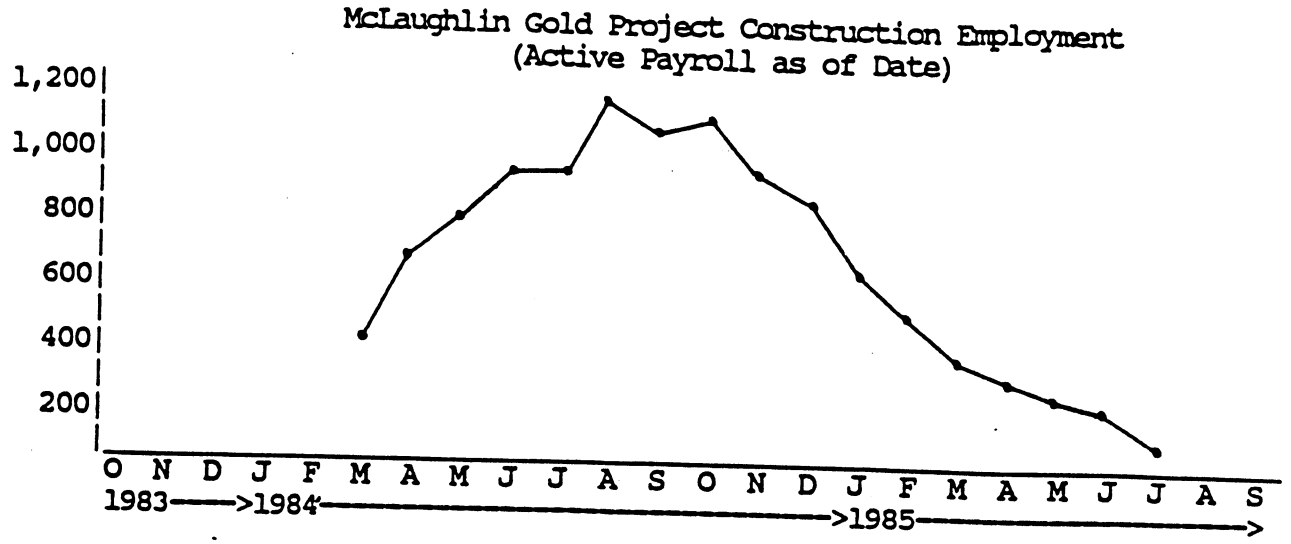
b) Distribution of Workforce by Type of Position: How far afield did Homestake (and its contractors) have to look in order to find construction workers with requisit skills and experience to meet employment needs. For positions requiring college education or advance work experience - managerial, professional and technical positions - one out of five (18 out of 85) employees resided locally prior to June 30, 1983. Fifty-two (52) percent of total employees for all other occupations were locally hired.

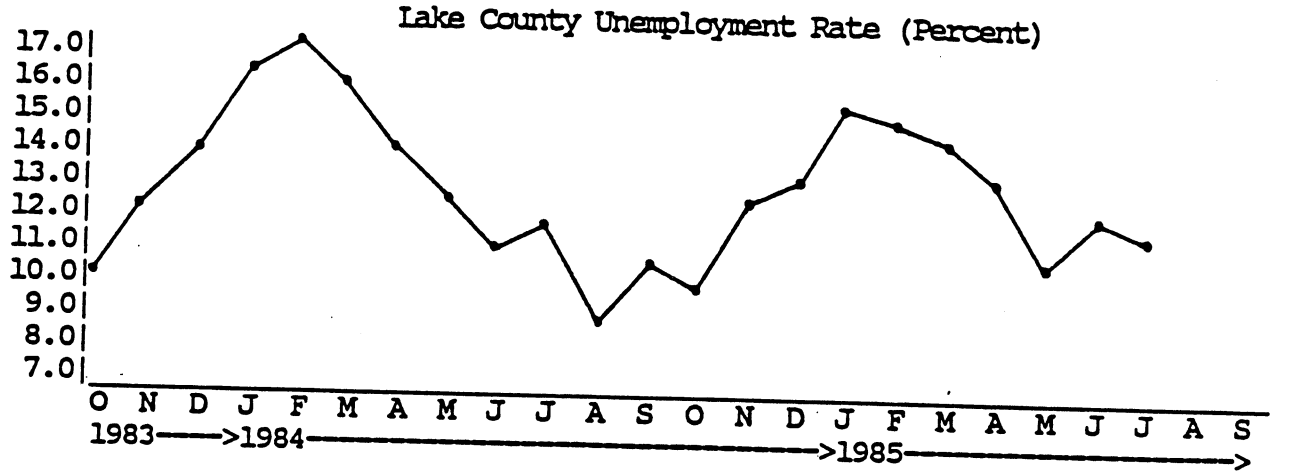
c) Housing Tenure: Approximately 70 percent (71 of 101) of in-migrating (operations) employees rented homes as of August 1985, while locally hired employees split fifty-fifty: owner-occupied/rented.

3. Local Economic Indicators

a) Project Employment Levels: Lake County normally experiences a strong seasonal fluctuation in its unemployment rate and level of employment. The rate of unemployment generally reaches its lowest point each year during the summer and early fall months and this trend was no difference during the 20 month construction phase of the McLaughlin Project (see Figure 2). However, the employment levels generated by the project had a significant effect on the local labor market. Coinciding with the peak of project construction employment, the 8.6 percent unemployment rate of August 1984 was over a full percentage point below the lowest rates of 1983 and 1984.

Surprisingly, despite lay-offs affecting nearly 1,000 construction workers, the unemployment rate in Lake County has not reached significantly high levels. Further, the total number of employed persons for January through July, 1985 has surpassed the 1984 levels. This phenomenon is attributed to two possible explanations: (1) a time lag between the end of construction at the Project site and a slowdown in other Lake County construction activity which was unrelated to the new population generated by the Project may exist; (2) a portion of the McLaughlin Workforce may have moved on to the next large scale construction project, without staying in Lake County long enough to show up as a temporary statistic.





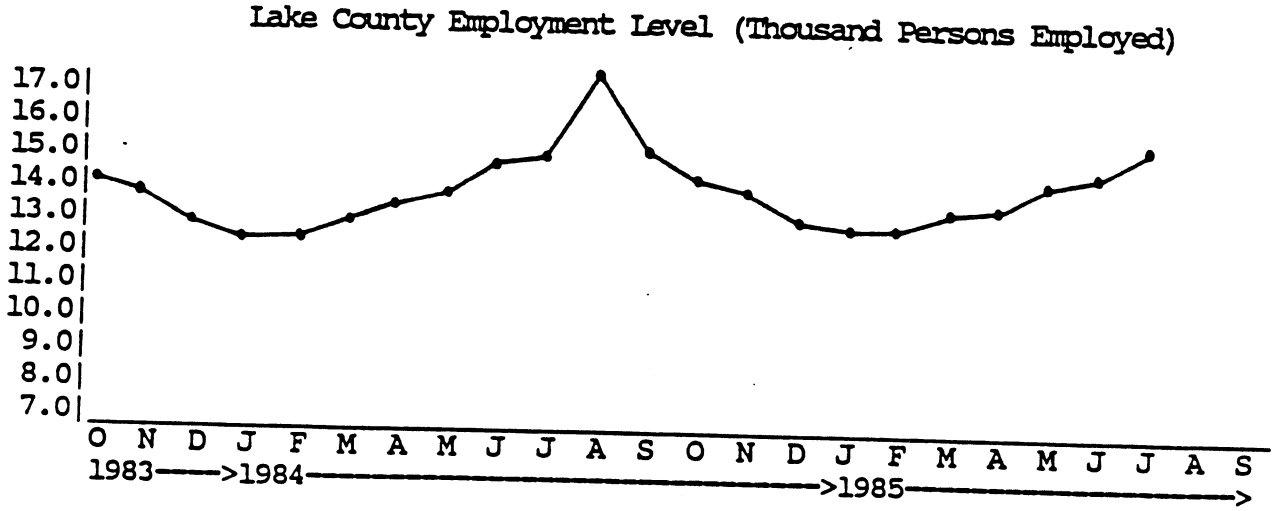


Figure 2: Employment Statistics Comparison
Source: Homestake Mining Company and Employment Development Department, summarized by Mundie & Associates

b) Job Training Program: The job training program, organized by Homestake in cooperation with Yuba College in July 1983, is attributed with attainment of the 50 percent local-hiring goal, as well as insuring that the local communities garnered substantial economic benefits from the McLaughlin Project.

c) Expenditures and Local Economy: Overall level of economic activity in Lake County, (as reflected in public revenues, demand for services, and taxable sales) was significantly affected by the construction of the McLaughlin Project. Not unexpected, the introduction of 1,150 construction jobs and over 200 permanent jobs, has generated hundreds of service jobs as well. Homestake estimates that,to date, total expenditures made directly in Lake County approximate $73 million, out of a total project budget of $270 million. As a proxy for local commercial activity related to McLaughlin Project expenditures, taxable sales data (as collected by the State Board of Equalization) was analyzed. Percentage increases in total taxable sales over the same quarters of preceding years, beginning in the third quarter 1983 and continuing into the first quarter 1985 have been substantial, ranging from 4.4 to 24.7 percentage points higher.

4. Conclusions

The introduction of the McLaughlin Project into a rural economy like that of Lake County and the surrounding counties, not unexpectedly, has had a significant effect on the overall level of economic activity. Surprisingly, the subsequent decline in project related jobs, as the construction period ended, to date, has not dramatically affected primary economic indications. Finally, it is apparent that the job training program help Homestake to achieve roughly a 50 percent local hiring quota, while insuring that a substantial portion of the economic benefits from the project were retained within the local area.

2.9.2 Traffic

Traffic on the Knoxville-Berryessa Road has been monitored in accordance with Section 16 of Napa County Agreement #2055. Installation of an electronic traffic control counter at the southern end of the newly constructed county road was completed in November 1984. Partial data was retrieved in late 1984, but due to equipment malfunction the data is not continuous and thus does not lend itself to analysis. Only partial data for the month of June 1985 is provided due to the same problem.

Napa County Agreement #2055 establishes an upper limit for traffic on Knoxville-Berryessa Road of 125 average daily trips (ADT), averaged over a four (4) week period. Once this threshold is reached, origin and destination surveys would be conducted (at Homestake's expense) to ascertain the number of daily vehicle trips attributable to the McLaughlin Project.

Data collected to date, indicate that at no time was the 125 ADT threshold exceeded over the four and one half month study period. Daily trips over any consecutive four week period have averaged slight more than 71 ADT, with a high of slightly less than 95 ADT achieved only once, in late March/early April. Highest traffic volumes were recorded on weekends (96 ADT) in comparison to the rest of the week (58 ADT). The higher weekend figure is not unexpected, since the Bureau of Land Management maintains a recreation area adjacent to the south end of the McLaughlin Project area. Finally, the traffic data indicate a lessening of traffic on the Knoxville-Berryessa Road over time. From February to mid-April, the four week average daily traffic totals range from 72 to 93 ADT. Thereafter, the four week totals have ranged from 55 to 86 ADT, with the lower totals registered toward the end of the reporting period (June 1985).

APPENDIX A

REVIEW COMMENTS FROM PERMITTING AGENCIES

STATE OF CALIFORNIA — GEORGE DEUKMEJIAN, Governor

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD—
CENTRAL VALLEY REGION
3201 S STREET
SACRAMENTO, CALIFORNIA 95816-7090
PHONE: (916) 445-0270

RECEIVED
FEB 1 1 1986
Environmental Management Department

7 February 1986

Mr. Raymond E. Krauss
Environmental Manager
Homestake Mining Company
McLaughlin Gold Project
Post Office Box 1010
Lower Lake, CA 95457

MC LAUGHLIN MINE ENVIRONMENTAL MONITORING ANNUAL REPORT, 1 JULY 1984 - 30 JUNE 1985, LAKE, NAPA, AND YOLO COUNTIES

We have reviewed the October 1985 McLaughlin Mine Environmental Monitoring Annual Report. The comprehensive report is in compliance with Provision 13 of Waste Discharge Requirements Order No. 85-032, which requires the development and annual update of the water quality statistical data.

The report adequately defined the quality of ground and surface waters in the project's area of influence during the 1984-85 water year. The 1984-85 water quality data was compared with all prior data. Both standard deviation for samples with characteristics of log normal distribution properties and Student T-Tests in a normal type distribution were used to evaluate changes in water quality over previous background conditions. The report concludes "no changes in water quality attributable to McLaughlin Project activities have been identified". However, some water quality has changed in terms of some variables and at some locations. The report theorizes that the changes may be related to regional and local decreases in the precipitation in the recent past. Seasonal and annual fluctuations will continue to be evaluated as additional data is accumulated in subsequent years.

We find the report and its conclusion acceptable for this stage of the project.

In several areas of the report, Homestake notes the high frequency with which certain parameters are routinely measured at less than the detection limits. I agree. There are certain parameters and perhaps sampling locations which no longer provide any additional information and perhaps the sampling frequency could be reconsidered. Of course, we would notify all previously comment agencies prior to proposing actual changes to your monitoring program. I suggest we meet during the week of 18-21 February at your office to discuss this.

Please give me a call at (916) 322-1589 for a convenient time and date you wish to meet.

GREG K. VAUGHN
Staff Engineer

GKV:mlm

cc: Mr. Van Manning, c/o Tim Julius, Bureau of Land Management, Ukiah
Mr. John Graham, Lake County Planning Department, Lakeport
Mr. Jim Cool, Napa County Planning Department, Napa
Mr. Ben Hulse, Yolo County Planning Department, Woodland
Mr. Eugene Knapp, Solano County Public Works Department, Fairfield
Mr. Brice Bledsoe, Solano Irrigation District, Vacaville

STATE OF CALIFORNIA—THE RESOURCES AGENCY

GEORGE DEUKMEJIAN, *Governor*

DEPARTMENT OF FISH AND GAME
POST OFFICE BOX 47
YOUNTVILLE, CALIFORNIA 94599
(707) 944-2011

January 17, 1986

RECEIVED
JAN 23 1986

Jim Cool
Napa County Planning Department
1195 Third Street
Napa, CA 94559

Dear Mr. Cool:

Subject: Homestake Mining Company

This is in response to your request for a review of the Aquatic Ecology Monitoring Program Annual Report of November 1, 1985, prepared by Bodega Research Associates for the Homestake Mining Company.

This report is on aquatic conditions in 1985 in Hunting and Knoxville creeks in north Napa County and is primarily an assessment of any environmental changes resulting from the Homestake gold mine. Survey methods include surber sampling for insects, backpack electrofishing, and analysis of fish tissues for trace elements.

The report is generally very good. However, we believe that the sampling should include use of the McNeil sampler and related equipment. This would provide a quantitative assessment of the percentages of sediments of given sizes. Over a period of time, the lack of sedimentation or the rate of sedimentation could be determined as related to the project.

The sampler is a large steel cylinder which is pushed into the creek bottom. Substrate material is removed and passed through a series of decreasingly smaller mesh sieves. The sample is evaluated on percentage of material in each size class. Particular emphasis is placed upon determining the volume of "fines," those materials less than 0.833mm in diameter.

Enclosed is a copy of the McNeil sampling method as described by McNeil and Ahnell in 1964. If you have any questions regarding our comments or the McNeil method, please contact Frank Gray, Fishery Biologist, of our Yountville office at (707) 944-2011.

Sincerely,

Brian Hunter
Regional Manager
Region 3

Enclosure

cc: Bodega Research Associates

IN REPLY REFER TO:
3800

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
UKIAH DISTRICT OFFICE
P.O. Box 940
Ukiah, California 95482

RECEIVED
APR 16 1986
County Department
Planning Department
APR 15 1986

Mr. James Hickey, Planning Director
Napa County Planning Department
1195 Third Street, Room 210
Napa, CA 94559

Dear Jim:

The McLaughlin Mine-Homestake Mining Company Annual Monitoring Report, July 1, 1984 to June 30, 1985, has been reviewed and we find the report to be most adequate. Homestake is to be complimented on their efforts toward finding the optimal revegetation methods with respect to erosion control and plant establishment.

Please keep us informed on the next coordinated McLaughlin Mine Project inspection. Tim Julius and/or Eric Johnson of this office would be interested in attending the coordinated inspecton.

Sincerely,

Gretchen Smyth

Gretchen Smyth
Clear Lake Resource Area Manager

ANNUAL REPORT
REVIEW OF THE

1984 ENVIRONMENTAL MONITORING PROGRAM

McLAUGHLIN PROJECT

DECEMBER 1984

REVISED : FEBRUARY 1985

NAPA COUNTY
CONSERVATION · DEVELOPMENT
AND PLANNING DEPARTMENT

REPORT ON REVIEW OF THE 1984 ENVIRONMENTAL MONITORING PROGRAM FOR THE MCLAUGHLIN PROJECT

CONTENTS

		PAGE
	EXECUTIVE SUMMARY	iii
1.0	INTRODUCTION	1
1.1	Background	1
1.2	Overview: General Monitoring Objectives	1
2.0	SUMMARY OF FINDINGS: 1984 MONITORING PROGRAM	3
2.1	Surface Water Quality	3
2.2	Groundwater Quality	4
2.3	Air Quality and Meterology	4
2.4	Aquatic Ecology	6
2.5	Vegetation	8
2.6	Wildlife	10
2.7	Geotechnical	11
2.8	Cultural Resources	11
2.9	Noise	11
2.10	Socioeconomics	11

EXECUTIVE SUMMARY

REVIEW OF THE MCLAUGHLIN PROJECT
1984 ENVIRONMENTAL MONITORING PROGRAM

Homestake Mining Company has developed an environmental monitoring program for the McLaughlin Gold Mine Project. The overall objective of the monitoring program is to measure compliance with environmental performance standards recognized in regulatory permits, and to monitor trends indicative of present or future environmental damage or benefit.

Monitoring for the year 1984 has been conducted in accordance with the provisions for "Preoperational Monitoring", the objective of which is to establish baseline environmental conditions, such that impacts from operations activities can adequately be assessed for subsequent years. Baseline data for 1984 is presented in the report prepared by the applicant entitled, Report of Preoperational Monitoring, dated September 1984.

SURFACE WATER QUALITY SUMMARY

Statistical analysis of surface water data for the period 1980 through October 1983 has previously been completed in accordance with provisions of an agreement with the Solano Irrigation District (SID), which was signed to assure non-degradation of water quality of waters draining into Lake Berryessa. Analysis of 1984 surface water quality data, including statistical analysis of stream sediments for metals concentrations, was completed in December 1984 and presented in a report titled, "Water Quality Statistical Evaluation: Report of Background Water Quality Data". Pursuant to Order No. 83-124 of the Central Valley Regional Water Quality Control Board (RWQCB), the report summaries statistical analysis of surface water and ground water data and provides maximum likely concentrations for selected water quality variables to be monitored during the Operation Phase. Based on this report, the RWQCB adopted waste discharge requirements applicable to operation of the McLaughlin Project, on January 25, 1985.

GROUNDWATER QUALITY SUMMARY

The groundwater monitoring network is comprised of 23 groundwater monitoring wells located both upgradient and downgradient of key facilities; 5 are located in Napa County.

Initial data from the tailings area wells (Lake County) tend to support earlier conclusions: low rechange rates; long residence times; and, lack of any hydrological continuity in the rocks underlying and surrounding the tailings area. Data from wells in Napa County was presented in the report entitled "Water Quality Statistical Evaluation: Report on Background Water Quality Data". This report was received December 14, 1984 and was prepared pursuant to Order No 83-124 issued by the RWQCB. As noted above, waste discharge requirements applicable to operation of the McLaughlin Project were adopted by the RWQCB on January 25, 1985. These discharge requirements include groundwater quality requirements for each parameter to be monitored, as specified by State and Federal standards.

AIR QUALITY AND METEROLOGY SUMMARY

The 1984 Preoperation Air Quality Monitoring Program has focused on documenting TSP levels (i.e., dust), as required by project permits. Initial data for the 1984 monitoring period indicates that TSP levels have remained well below the national primary and secondary standard.

AQUATIC ECOLOGY SUMMARY

Aquatic Ecology Monitoring is comprised of two separate monitoring programs. A trial program developed by the Brown and Caldwell Review Team, was used to initiate the Aquatic Monitoring Program for the McLaughlin Project in April 1984. Beginning in April 1986, the monitoring program as proposed by Homestake Mining Company will be used to monitor operation activities. Under both proposals, the Aquatic Monitoring Program is to serve as a supplement to the Chemical Water Quality Monitoring Program.

Benthic Macroinvertebrates. The benthic macroinvertebrate fauna of the sites sampled as part of the baseline monitoring program, is typical of that found in upland streams of the Northern California Coastal Range. Of the 69 different species collected, several found at certain of the seven sites examined, are of particular importance for biomonitoring. The sampling design used "paired" sites, upstream and downstream of key facilities. The data collected suggests that the paired sites are biologically similar, assuring their use as effective monitoring sites.

Fish Populations. The diversity of fish species recorded was low and is typical of California coastal range streams of the size encountered at the McLaughlin Project site. The California roach (a minnow) was the only widespread and abundant species in project area streams. Only at the station located on Hunting Creek farthest down stream from all project activities, with the highest flow rate and deepest pools, were native species other than the California roach collected. The size distribution of California roach varied considerably among sampling sites, due in part to their short longevity (3 - 5 years); however, other contributing factors may include variability of spawning dates, recruitment dates and growth rates among sites.

Trace Element Monitoring. Pooled samples of California roach analyzed in 1984 indicate concentrations of arsenic, copper, lead, mercury and zinc are low, and within expected ranges for fresh water fish in Northern California streams. Concentrations of chromium and nickel were found to be high, and attributable to local mineral content of soils in the project area.

VEGETATION SUMMARY

Findings regarding the 1984 Vegetation Monitoring Program conducted by Homestake Mining Company, are discussed in two sections: sensitive plants; and reclamation success.

Sensitive Plants. Sensitive plant protection efforts have included identification of areas to be avoided during construction, as well as salvage of impacted populations. Final adjustments in the siting of project facilities has reduced the number of impacted sensitive plant populations by half, to 62 populations.

Efforts to salvage sensitive plant populations have focused on attempts to transplant a population of Thelypodium brachycarpum. Protection of this population, located in the Waste Rock Dump area has been extended, allowing the Napa Chapter of the California Native Plant Society (CNPS) and researchers at University of California, Davis, to continue efforts to salvage plants. Attempts to propogate the plant from seed have had mixed success, while transplanting rosettes has proved to be a way to establish the plant elsewhere. Both the CNPS and U.C. Davis researchers are continuing efforts to locate suitable sites in which the Thelypodium brachycarpum can be relocated.

Reclamation success. Revegetation of disturbed areas was conducted during the fall of 1983, and a major program was completed during the fall of 1984. Results of the 1983 hydroseeding and mulching program were evaluated with respect to seed mixture and application rate, with the specifications for the 1984 Program adjusted accordingly. Germination success of the seed mixture during the 1983-84 period resulted in good erosion control. However, it was noted that better success was achieved in those areas where straw mulch was applied. The 1984 Program was adjusted, with both wood fiber and straw mulch applied to all disturbed areas. In addition, the seed mixture and application rate for the 1984 Program was modified. The major component of the seed mixture remains an annual brome grass, characteristic of existing grasslands in the project area.

Work on revegetation utilizing woody plants was conducted during 1983. Seed collection from the McLaughlin Project site was initiated, leading to a pilot test planting of 840 plants during the Fall and Winter of 1984. Monitoring of the pilot planting will occur in January, April, June and October, 1985. Additional seed collection was conducted during 1984, and will provide the basis for the planting of 10,000 plants along public roads planned for the winter of 1985-86.

WILDLIFE SUMMARY

Preoperational wildlife monitoring has been limited to golden eagle nest surveys. The 1984 monitoring program consisted of a rechecking of possible nest sites identified during earlier surveys conducted in regards to the EIR/EIS. Results of the 1984 program confirm earlier findings:

1) Golden Eagles were observed in the project area, particularly in the Morgan Valley area, throughout the construction period.

2) Evidence of historic nesting has been noted, however, no active golden eagle nests have been located in the project area.

3) Golden Eagle occurrence in the project area is attributable to occasional foreaging flights into habitat containing animals considered prey of the golden eagle. Additional sightings include migrating and transient individual birds.

GEOTECHNICAL SUMMARY

Preoperational geotechnical monitoring has been limited to surveys of monitoring equipment installed in the slopes of the Davis Creek Reservoir located in Yolo County. Surveys of project facilities located in Napa County are to be undertaken starting in 1985.

CULTURAL RESOURCES SUMMARY

As described in the EIR/EIS, construction activites would result in direct or indirect impact to 38 prehistoric, 15 historic and 9 paleontologic cultural resources. With one exception, all cultural resource sites which could be impacted by the Project have been mitigated by the extraction of the relevant data or have been fenced to assure no disturbance during construction. An archeological site located in Yolo County was scheduled for mitigation in the fall of 1984. The 1984 Archeological Data Recovery and Mitigation Program implemented by Homestake Mining Company, was found by the California Office of Historic Preservation to be satisfactory in meeting the requirements of CEQA.

NOISE SUMMARY

No preoperational noise monitoring is required.

SOCIOECONOMICS SUMMARY

Socioeconomics monitoring has been conducted in accordance with the requirements of the Lake County permits. Monthly local hire reports have been reviewed and approved by the Lake County Planning Commission. Results of these surveys have demonstrated that the project has achieved the goal of 50% local hires. Local hires residing in Napa (and Yolo) County have ranged from 7 to 47 employees.

Traffic monitoring on the Berryessa-Knoxville Road began in November 1984, pursuant to Napa County Agreement No. 2055; wherein upon demand from the County, Homestake may be required to upgrade Berryessa-Knoxville Road (south of the mine site to Eticura Creek).

REVIEW OF THE MCLAUGHLIN PROJECT ENVIRONMENTAL MONITORING PROGRAM

1.0 INTRODUCTION

1.1 BACKGROUND

The Conservation, Development and Planning Commission, at their meeting of December 7, 1983, approved the Use Permit and Surface Mining Permit applications of the Homestake Mining Company (#U-198283) subject to Conditions of Approval, including:

> **"Homestake shall on September 1st of each calendar year, provide the CDPD with an annual report on the monitoring program summarizing the monitoring data collected. The report shall include a comparison of all data collected in compliance with required adopted standards and with the projected levels described in the Final EIR/EIS"** (FEIR-548, hereinafter "EIR/EIS") **"The first report shall be filed with the CDPD on September 1, 1984. The Planning Director shall provide an annual report to the CDPC on the results of the monitoring program".**

The 1984 annual report prepared by Homestake Mining Company entitled, Report of Preoperational Monitoring, was received September 11, 1984 by the CDPD. The following report is submitted in fulfillment of the permit requirement that the Director report annually to the CDPC on results of the McLaughlin Project Environmental Monitoring Program.

The report begins with an overview of the general monitoring objectives for the McLaughlin Project. The overview is followed by a summary of findings regarding the 1984 Preoperational Monitoring Program. This summary presents findings according to environmental discipline, and is consistent with the format presented in the report prepared by Homestake Mining Company.

1.2 OVERVIEW: GENERAL MONITORING OBJECTIVES

The Environmental Monitoring Program for the McLaughlin Gold Mine Project has four major objectives: (1) to detect changes, (2) to assess the importance of changes, (3) to determine the cause of changes, and (4) to trigger action to correct problems. If appropriately applied, the monitoring program will measure compliance with environmental standards recognized in regulatory permits, as well as monitor trends indicative of present or future environmental damage or benefit.

Monitoring for the year 1984 has been conducted in accordance with the provisions for "Preoperational Monitoring" as specified in the McLaughlin Project Environmental Monitoring Manual. The objective of the Preoperational Monitoring Program is to provide detailed information regarding baseline environmental conditions, such that impacts from operations (including construction) can adequately be assessed for subsequent years.

2.0 SUMMARY OF FINDINGS: 1984 MONITORING PROGRAM

2.1 SURFACE WATER QUALITY

The Surface Water Quality Monitoring Program to be conducted by Homestake Mining Company is to include monitoring of surface water, (i.e., streams sediment control ponds, Davis Creek Reservoir), including the monitoring of underdrain discharge. Stream sediment samples are to be collected in conjunction with in-stream monitoring. The monitoring program is designed to provide more detailed information regarding baseline conditions and environmental effects during the preoperational, as well as construction and operational phases of the project.

The monitoring program includes 23 surface water quality monitoring sites, located in each of the drainages in the project area. The monitoring network has been designed such that all water-related discharges can be measured for compliance with discharge prohibitions, as specified in the water quality and waste discharge requirements imposed by the Central Valley Regional Water Quality Control Board (RWQCB). Recommendations of the Brown and Caldwell review team, as adopted by the Napa County Conservation, Development and Planning Commission, are reflected in the Surface Water Quality Monitoring Program for 1984.

The Surface Water Quality Monitoring Program was initiated in 1980 in support of the EIR/EIS, and has continued on a monthly schedule in accordance with the NPDES permit requirements. Data presented in the 1984 Monitoring Program Annual Report covers a 5 month period: March through July 1984. Monitoring data continues to be provided by Homestake pursuant to Use Permit requirements, with data through September 1984 currently on file.

Statistical analysis of surface water data for the period 1980 through October 1983 has previously been completed in accordance with provisions of an agreement with the Solano Irrigation District (SID), which was signed to assure non-degradation of water quality of waters draining into Lake Berryessa. Analysis of 1984 surface water quality data, including statistical analysis of stream sediments for metals concentrations, was completed in December 1984 and presented in a report titled, "Water Quality Statistical Evaluation: Report of Background Water Quality Data". Pursuant to Order No. 83-124 of the RWQCB, the report summaries statistical analysis of surface water and ground water data and provides maximum likely concentrations for selected water quality variables to be monitored during the Operation Phase.

On January 25, 1985, the RWQCB adopted waste discharge requirements applicable to operation of the McLaughlin Project. In accordance with Order No. 85-031, Homestake is required to submit a report to the RWQCB by 30 January of each year. The report is to summarize monitoring data obtained during the previous year as well as discuss the compliance record and the corrective actions taken or planned which may be needed to bring operations discharge into full compliance with the waste discharge permit.

2.2 GROUNDWATER QUALITY

The Groundwater Monitoring Program is designed to address operational impacts noted in the EIR/EIS. Potential impacts to the groundwater regime include: increased mineralization and toxic seepage and leachate contribution, and contamination of groundwater resulting from accidental spills of toxic materials or other pollutants. The objective of the Preoperational Groundwater Monitoring Program is to provide more detailed information regarding baseline conditions, such that impacts from operations can adequately be assessed.

Homestake Mining Company initiated the Groundwater Monitoring Program under a contract with Steffen Roberton & Kirstein (SRK), a geotechnical, mining and environmental engineering firm of Denver, Colorado. The groundwater monitoring network designed by SRK, as revised per recommendations of the Central Valley Regional Water Quality Control Board (RWQCB) and the Brown and Caldwell review team, is comprised of 24 groundwater monitoring wells. The wells are located both upgradient and downgradient of key facilities, i.e., tailings empoundment, waste rock dump.

Monitoring wells were sampled monthly from April 1984 through January 1985. Initation of sampling was delayed due to equipment malfunction/failure; experienced as part of "startup difficulties". Modifications to sampling equipment were made to rectify the problems encountered, based upon a review by an equipment specialist retained by Homestake Mining Company. Data presented in the 1984 Monitoring Program Annual Report covers a 4 month period: April through July 1984. Monitoring data continues to be provided by Homestake pursuant to Use Permit requirements, with data through September 1984 currently on file.

Initial data from the tailings area wells (Lake County) tend to support conclusions drawn from preliminary and final design studies: low rechange rates; long residence times; and, lack of any hydrological continuity in the rocks underlying and surrounding the tailings area.

Although data from wells in Napa County in the vicinity of the mine and waste rock dump was presented, analysis and evaluation of these data relative to preliminary findings presented in the EIR/EIS, was not presented in the 1984 Monitoring Program Annual Report, pending submission of the report entitled "Water Quality Statistical Evaluation: Report on Background Water Quality Data". This report was received December 14, 1984 and was prepared pursuant to Order No 83-124 issued by the RWQCB. As noted in Section 2.1, waste discharge requirements applicable to operation of the McLaughlin Project were adopted by the RWQCB on January 25, 1985. These discharge requirements include groundwater quality requirements for each parameter to be monitored, as specified by State and Federal standards.

2.3 AIR QUALITY AND METEROLOGY

The objective of the Preoperational Air Quality and Meterology Monitoring Program is to collect Total Suspended Particulate (TSP) and meterological data to characterize climatological and meterological conditions.

Air quality monitoring has been initiated by Homestake Mining Company under a contract with Aero Environment, Inc. of Pasadena, California. From July through October 1983, a special monitoring program was conducted to provide supplemental data on potential air pollutants for which no ambient air quality standards exist, i.e. airborne asbestos, arsenic.

The 1984 Preoperation Monitoring Program has focused on documenting TSP levels (i.e., dust), as required by project permits. The monitoring network was comprised of two sampling stations, only one of which continued to operate through August 1984. Topsoil stripping at the tailings area in Lake County resulted in the shut down of the sampling station at that location on May 1, 1984. Data from the remaining station, located adjacent to the mine site in Napa County, was lost for a 2 month period (December 14, 1983 - February 18, 1984) due to equipment malfunction/failure. Homestake Mining Company has indicated that the lost data was judged not to be critical, as wet conditions were prevalent.

The data for the 1983 - 1984 period indicates that TSP levels have remained well below the national primary standard of 260 micrograms per cubic meter, as well as the national secondary standard of 150 micrograms per cubic meter. Of particular importance is the fact that the low TSP levels have been recorded during a period of construction, when approximately six times the amount of equipment to be used during operations was in use.

Meterological data was not included in the 1984 Monitoring Program Annual Report, even though air quality sampling stations were equipped as electronic weather stations. Homestake was of the opinion that the air pollution control agencies had not required such a statistical evaluation for preoperational conditions, and therefore none had been provided. Upon request by the CDPD, Homestake prepared a meterology statistical evaluation background report dated February 1985,which summarizes preoperation meterological and climatological conditions, in support of baseline data presented in the EIR/EIS.

Homestake Mining Company has designed and received approval of the operations Air Quality Monitoring Program; monitoring stations are now equipped and operating. The monitoring network has been designed in consultation with the air pollution control agencies, and complies with the recommendations of the Brown and Caldwell review team. As designed, the monitoring network is composed of seven stations, three of which are located in Napa County.

2.4 AQUATIC ECOLOGY

Aquatic Ecology Monitoring is comprised of two separate monitoring programs. A trial program developed by the Brown and Caldwell Review Team, was used to initiate the Aquatic Monitoring Program for the McLaughlin Project in April 1984. Beginning in April 1986, the monitoring program as proposed by Homestake Mining Company will be used to monitor operation activities.

Under both proposals, the Aquatic Monitoring Program is to serve as a supplement to the Chemical Water Quality Monitoring Program. The trail program recommended by Brown & Caldwell is comprehensive in nature, and includes increased sampling frequency (quarterly), additional sampling sites as well as control locations, changes in collection procedures for fish and macro-invertebrates and inclusion of California Department of Fish and Game personnel as a member of the sampling team.

The data generated from the 1984 - 1985 monitoring program will be used to establish a detailed baseline of aquatic conditons on-site. In addition, since there is no existing State or Federal protocal regarding an aquatic monitoring program, independent review of the trial program is to be conducted by a qualified public health expert in accordance with the McLaughlin Project Use Permit.

The preliminary aquatic ecology baseline sampling program was initiated by Homestake Mining Company under a contract with Bodega Research Associates (BRA) in April 1984, and will continue through August 1985. During April 1984, BRA established a series of sampling sites on the Knoxville Creek and Hunting Creek drainages. The 1984 monitoring program has developed baseline data on community structure and populations of benthic macroinvertebrates and fishes, and on the concentration of select heavy metals in the most wide spread fish species. These baseline data derived from the April 1984 sampling period are summarized below.

2.4.1 Benthic Macroinvertebrates

The benthic macroinvertebrate fauna of the sites sampled as part of the baseline monitoring program, is typical of that found in upland streams of the Northern California Coastal Range. Of the 69 different species collected in April 1984, several found at certain of the seven sites examined are of particular importance for biomonitoring. Voucher specimens of these and other populations have been prepared by BRA; to be used to verify subsequent years comparisons.

The sampling design recommended by Brown and Caldwell called for "paired" sites upstream and downstream of potential development effects. The data collected by BRA suggests that the paired sites are biologically similar, assuring their use as effective monitoring sites in evaluating whether impact has or has not occurred.

2.4.2 Fish Populations

The diversity of fish species recorded in 1984 at most of the monitoring sites was low: only 6 different species of fishes were captured over the entire study area. This low diversity is typical of California coastal range streams of the size encountered at the McLaughlin Project site. California roach, a minnow with a wide temperature tolerance, is the only widespread and abundant species in Hunting Creek and Knoxville Creek. Only at the station located on Hunting Creek farthest down stream from all project activites (HC-10), with the highest flow rate and deepest pools, were other native species collected.

The size distribution of California roach varied considerably among sampling sites, due in part to their short longevity (3 - 5 years); however, BRA suggested that other contributing factors may include variability of spawning dates, recruitment dates and growth rates among sites. The 1984 baseline data describe the "general" abundance and biomass in fish populations on site. However, as noted by BRA, "comparisons of population size distributions in themselves remain difficult to interpret without (additional) information on growth rates or condition factors which reflect the general health of individuals, as well as the variability within the populations". Collection of additional data over 1985 will allow detailed comparison and interpretation of population size distributions.

California roach populations were found to be "artificially depressed" at up stream monitoring locations on Hunting Creek. BRA concluded that upstream movements of fish have been restricted or eliminated by construction of temporary sediment control structures, "thus restricting what may be an important annual redistribution of populations". BRA recommend that such dams be permanently removed, in that the advantage of possible reduced siltation does not off set the disadvantage of reduced fish populations. At the recommendation of the California Department of Fish and Game, the dams in question are to be retained through 1985; thereafter, Homestake will have them removed as recommended by BRA.

2.4.3 Trace Element Monitoring

Pooled samples of California roach analyzed in 1984 are expected to provide "a general baseline" of natural trace element concentrations in project area fish populations. However, BRA notes that these data are not sufficient to describe the natural variation in trace element concentrations in fish populations at each site. Sampling for trace metals has therefore been increased for the 1985 Program to allow for evaluation of natural variation.

The 1984 baseline data indicate concentrations of arsenic, copper, lead, mercury and zinc are low, and within expected ranges for fresh water fish in Northern California streams. Concentrations of chromium and nickel were found to be high, and attributable to local mineral content of the project area: chromium and nickel are characteristic of serpentine soils. These baseline data are of particular importance for interpretation of later impacts in view of the project areas unusual minerology.

2.5 VEGETATION

The Vegetation Monitoring Program to be conducted by Homestake Mining Company is to include monitoring of three district components: sensitive plants; revegetation of disturbed areas (reclamation success); and management of contiguous land unaffected by mining.

Unlike other disciplines such as air and water quality, there are no recognized standards that can uniformly be applied to a vegetation monitoring program. As such, monitoring requirements differ for the three program components. Each of the components of the program requires separate evaluation.

Findings regarding the 1984 Vegetation Monitoring Program conducted by Homestake Mining Company, are discussed in three sections: sensitive plants; reclamation success; and management of contiguous lands.

2.5.1 Sensitive Plants

Preoperational monitoring of sensitive plants has focused on the protection of sensitive plant populations during construction. Sensitive plants are those defined by the California Native Plant Society (CNPS) as requiring monitoring. Sensitive plant protection efforts have included identification of areas to be avoided during construction, as well as salvage of impacted populations.

As described in the EIR/EIS, under "worst case" facility siting conditions, it was estimated that approximately 121 plant populations (34% of populations of all species encountered in the project area) would be lost or damaged by the McLaughlin Project. Final adjustments in the siting of project facilities has reduced the number of impacted populations by half, to 62 populations.

Consultants retained by Homestake Mining Company to implement the 1984 Sensitive Plant Mitigation Program include Biosystems Analysis Inc. (BSAI), the same consultant who conducted the 1983 sensitive plant survey. BSAI botanists staked and flagged all populations to be avoided during construction and mapped exact boundaries of such on project construction drawings. In most instances, protective fencing was constructed around plant populations to assure that no inadvertant disturbances could occur.

Efforts to salvage sensitive plant populations have focused on attempts to transplant a population of Thelypodium brachycarpum consisting of 75 plants, located in the Waste Rock Dump Area. Protection of the population has been extended, allowing the Napa Chapter of the California Native Plant Society (CNPS) and researchers at University of California, Davis, to continue salvage efforts. The population has been fenced and disturbance will be avoided through Spring of 1985.

The Napa CNPS has reported limited success at re-establishing the Thelypodium brachycarpum at select locations. Attempts to propogate the plant from seed have had mixed success, while transplanting rosettes has proved to be a way to establish the plant elsewhere. Transplant efforts by U.C. Davis also indicate that propogation by seed is difficult. Both the CNPS and U.C. Davis researchers are continuing efforts to locate suitable sites in which the Thelypodium brachycarpum can be relocated.

2.5.2 Reclamation success

Efforts to revegetate areas disturbed by construction activities began in 1982 with the selection of a basic grassland seeding mixture. Assisting Homestake Mining Company in development of a seed mixture appropriate for upland soils which characterized the project site, were researchers from the Range Extension Division of the University of California, Davis, and the California Division of Mines and Geology: Mined Land Reclamation Program.

Revegetation of disturbed areas was conducted during the fall of 1983, and a major program was completed during the fall of 1984. Results of the 1983 hydroseeding and mulching program were evaluated with respect to seed mixture and application rate, with the specifications for the 1984 Program adjusted accordingly. An agronomist working under contract to Homestake Mining Company collaborated with a reclamation specialist/botanist from the State Division of Mines and Geology in the evaluation of 1983 Program findings.

Germination success of the seed mixture during the 1983-84 period resulted in "good" erosion control. However, it was noted that better success was achieved in those areas where straw mulch was applied. The 1984 Program was adjusted, with both wood fiber and straw mulch applied to all disturbed areas. In addition, the seed mixture and application rate for the 1984 Program was changed. Three (3) new seed species (including perennial species), were added to the seed mixture. The major component of the seed mixture remains an annual brome grass, characteristic of existing grasslands in the project area.

Vegetation monitoring through 1984 has been conducted through visual inspection of reclaimed areas by reclamation specialist, including representatives from the California Division of Mines and Geology.

Methodology for quantitative evaluation of reclamation success will be established by Homestake in consultation with the California Divsion of Mines and Geology in the Spring of 1985. In this regard, reference plots will be established in 1985. A Revegetation Plan that establishes performance/achievement standards for reclamation success is to be filed with the CDPD on January 1, 1986.

Work on revegetation utilizing woody plants has been initiated by Homestake Mining Company under a contract with Circuit Rider Productions, a firm specializing in revegetation with extensive experience in the Geyers area. Seed collection from the McLaughlin Project site was initiated during 1983, leading to a pilot test planting of 840 plants during the Fall and Winter of 1984. The pilot planting, located on a Serpentine Chaparral site and a Blue Oak Woodland site (non-serpentine soils), will test different planting techniques. Monitoring of the pilot planting will occur in January, April, June and October, 1985. The goal is to provide information whereby a plant survival vs. economic cost assessment can be completed prior to the fall of 1985.

Additional seed collection was conducted during 1984, and will provide the basis for the planting of 10,000 plants along public roads planned for the winter of 1985-1986.

2.5.3 Management of Contiguous Land

The McLaughlin Project includes substantial buffer lands not intended for direct use. A program for the management of contiguous lands was not required during the preoperational monitoring phase. Commencing the year after mill operations begin, Homestake Mining Company is to prepare an annual report which will include details of the management program and associated monitoring activites.

2.6 WILDLIFE

The objective of the Wildlife Monitoring Program is to detect changes in the abundance or health of wildlife populations. Potentially avoidable impacts identified in the EIR/EIS that are addressed in the Homestake Mining Company Wildlife Monitoring Program include: exposure of wildlife to hazardous waste; disturbance of golden eagle nests; and, road kills.

Preoperational wildlife monitoring has been limited to golden eagle nest surveys. The golden eagle is federally protected by provisions of the Bald Eagle Protection Act.

The 1984 monitoring program consisted of a rechecking of possible nest sites identified during earlier surveys conducted in support of the EIR/EIS. Results of the 1984 program confirm earlier findings:

1) Golden Eagles were observed in the project area, particularly in the Morgan Valley area, throughout the construction period.

2) Evidence of historic nesting has been noted, however, no active golden eagle nests have been located in the project area.

3) Golden Eagle occurrence in the project area is attributable to occasional foreaging flights into habitat containing animals considered prey of the golden eagle. Additional sightings include migrating and transient individual birds.

2.7 GEOTECHNICAL

The Geological and Geotechnical Monitoring Program consists of monitoring natural and artificial slope movements, the integrity of each structures, and deformation and pore pressure in embankments. These elements occur in all of the major project facilities.

Preoperational geotechnical monitoring has been limited to twice annual surveys of two slope inclinometers and two pore pressure gauges installed in the slopes of the Davis Creek Reservoir located in Yolo County. Surveys of project facilities located in Napa County are to be undertaken starting in 1985.

2.8 CULTURAL RESOURCES

The Cultural Resources Monitoring Program is formulated on the basis that construction of the McLaughlin Project would potentially impact directly or indirectly a number of prehistoric, historic or paleontologic resources.

As described in the EIR/EIS, construction activites would result in direct or indirect impact to 38 prehistoric, 15 historic and 9 paleontologic cultural resources. With one exception, all cultural resource sites which could be impacted by the Project have been mitigated by the extraction of the relevant data or have been fenced to assure no disturbance during construction. An archeological site located in Yolo County was scheduled for mitigation in the fall of 1984.

The 1984 Archeological Data Recovery and Mitigation Program implemented by Homestake Mining Company, was found by the California Office of Historic Preservation to be satisfactory in meeting the requirements of CEQA. The Archeological Impact Mitigation Program for the McLaughlin Project was conducted by researchers from Sonoma State University Academic Foundation: Anthropological Studies Center.

2.9 NOISE

No preoperational noise monitoring is required.

2.10 SOCIOECONOMICS

Socioeconomics monitoring has been conducted in accordance with the requirments of the Lake County permits. Monthly local hire reports have been compiled by Davy McKee, the project construction managers, and submitted to the Lake County Planning Commission for their review and approval. Additional quarterly censuses of employees and their place of residence has been undertaken to document the distribution of public service impacts among the various districts.

Results of these surveys have demonstrated that the project has achieved the goal of 50% local hires. Local hires residing in Napa and Yolo Counties have ranged from 7 to 47 employees.

A survey of special districts is in progress. This survey will determine if the project, based on the location information from the employee census, has adversely effected the availability of public services in any of the districts.

Annual school surveys have been conducted to determine the number of newly enrolled students in each district resulting from the McLaughlin Project. School mitigation fees have been paid to the districts based on these survey results.

Traffic monitoring on the Berryessa-Knoxville Road began in November 1984, pursuant to Napa County Agreement No. 2055. This Agreement provides that at any time traffic on the Berryessa-Knoxville Road south of the mine pit area to Eticura Creek which is attributable to the operation of the McLaughlin Project increases significant, Homestake shall improve the roadway upon demand from the County to either a 20 foot or 24 foot width.

BODEGA RESEARCH ASSOCIATES
P.O. Box 1015 • Bodega Bay, CA 94923 • 707-875-3379

HUNTING CREEK AQUATIC ECOLOGY MONITORING PROGRAM
INTERIM REPORT, APRIL 1994
PETER G. CONNORS

As Research Ecologist and Reserve Manager at the University of California Bodega Marine Laboratory, I have studied pollution ecology, ornithology, and habitat restoration ecology since 1971. I have published 32 scientific articles in research journals and books, and numerous government reports and magazine articles. With colleagues from UC Berkeley and UC Davis specializing in stream benthic invertebrates and fish population biology, I have designed and conducted annual monitoring studies of streams in the vicinity of the Homestake Mining Company's McLaughlin Mine since 1984, to detect any changes in the aquatic ecology of these streams that might be caused by the mining operations. We have conducted this program on non-University time, as consultants to HMC.

We have maintained monitoring sites at three separate regions of Hunting Creek, measuring fish populations and size distributions, benthic macroinvertebrate populations, and trace element concentrations in fish. Our results and conclusions have been reported in annual reports, 1984-1993, and included in Homestake's Annual Monitoring Reports. I will summarize the results from that extensive data set, and add the preliminary, but very interesting, fish population measurements from the just completed April 1994 field studies.

Hunting Creek Monitoring Sites:

We established an upstream site at HC-7A, below the tailings reservoir, to test for effects of that activity; a midstream site at HC-5, where those effects would be muted but the wasterock area would not have introduced any effects; and at HC-10, below the wasterock area, to test for all effects.

Fish Populations:

Populations of all species have been extremely variable across the eleven years of data, but the variability can not be attributed to pollution from mining operations. Most of the variability can be traced to effects of the low rainfall period 1987-1992, with some additional effects of predation or competition as populations changed. California roach, the only species present at all three sites, occurred at high densities 1984-1987, but then began a steady and significant decline at all sites, with population densities 1991-1993 averaging only 10-20% of the mid-80's peaks. We considered that this decline could have been caused by pollution from mining operations, by changes in stream habitat during the drought (especially at HC-7A, where willows, cattails and sedges have filled in portions of the stream), or by low summer reproduction and survival caused by the drought-induced low flow conditions in summer. These potential causes were separated to a great extent by the high rainfall winter of 1992-1993. Roach populations had not

responded by April of 1993, but subsequent reproduction and survival to April 1994 has been extremely high. Roach populations at all sites have increased sharply from recent levels. At HC-7A, numbers increased ten-fold from 1993, but remain below peak levels, probably because of the habitat changes. At HC-5, only 1985 and 1987 had higher populations. At HC-10, only 1984 and 1985 had clearly higher densities.

At HC-10, other fish populations have also varied, but interpretation is more complicated because of predator-prey relations and competitive interactions. Sacramento sucker densities had been gradually declining over the course of our monitoring, but they rebounded sharply in 1994, occurring at higher densities than in any previous year. Sacramento squawfish, a large predatory minnow, declined 1984-1989, with none present in any year after 1988. During the same period, green sunfish, a predator not native to California but becoming widespread, has increased in density from absent in 1984 to common 1989-1994. It is possible that squawfish populations have not recovered because of competition with green sunfish, and that sucker populations have increased beyond earlier densities because of the absence of large squawfish predators during the summer 1993 recovery period. At any rate, pollution from mining activities is not a likely cause of these changes. Especially in view of the strong recovery of roach and sucker populations following the first summer of high flow conditions, we are confident in attributing the earlier declines to hydrological conditions.

Benthic Macroinvertebrates:

Macroinvertebrate communities in Hunting Creek are much more diverse than the relatively simple fish community, with mean numbers of species collected during April each year averaging 35 to 45 over the three sites. However, we detected considerable change in the species present at each site over the eleven-year sampling period; only 12% to 16% of total species recorded at a site were present in all years. There were no time trends at any of the sites in species richness, however, and we do not judge the changes in species present to be attributable to mining activities. Variability in total invertebrate density is also quite variable at these sites, with no clear time trends.

Our analysis indicates that the most probable factor explaining annual variability in these communities is annual variability in hydrological conditions arising from annual differences in winter rainfall. At both HC-5 and HC-10, species richness per sample is significantly (negatively) correlated with annual rainfall. At HC-5, where hydraulic stress during high flows is greatest, annual rainfall also is significantly correlated with three other community parameters, including total density. Thus the monitoring program has detected significant changes in macroinvertebrates communities, but these are attributable to natural rainfall and flow conditions, not to mining activities.

Trace Elements:

At each site we have collected California roach annually to be analyzed for concentrations of arsenic, chromium, copper, lead, mercury, nickel, and zinc. The extensive data set resulting from these analyses does not indicate any meaningful trends in concentrations of trace elements that can be identified as arising from Homestake mining operations. Concentrations of all seven elements have been variable between samples and between years, but mean concentrations are remaining relatively stable.

Summary:

The monitoring program has been intensive enough, and sufficiently focussed, to detect significant changes in population densities or community parameters of several species of fish and of benthic macroinvertebrates. However, our analysis indicates that all these changes should be attributed to natural processes (variability in rainfall and streamflow, habitat succession, predation and competition) not associated with Homestake Mining activities in the vicinity of Hunting Creek.

Submitted,

Peter G. Connors 24 April 94

Peter G. Connors, Ph.D.
Research Ecologist

STATE OF CALIFORNIA - Environmental Protection Agency PETE WILSON, Governor

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION
3443 Routier Road, Suite A
Sacramento, CA 95827-3098
PHONE: (916) 255-3000
FAX: (916) 255-3015

7 November 1994

CERTIFIED MAIL
P 945 302 553

Mr. Ray Krauss
Homestake Mining Co., McLaughlin Mine
26775 Morgan Valley Road
Lower Lake, CA 95457

TRANSMITTAL OF ADOPTED/AMENDED WASTE DISCHARGE REQUIREMENTS FOR HOMESTAKE MINING COMPANY OF CALIFORNIA, McLAUGHLIN MINE, LAKE, NAPA, AND YOLO COUNTIES

Enclosed is an official copy of Order No. 94-315 as amended by the California Regional Water Quality Control Board, Central Valley Region, at its last regular meeting.

William J. Marshall

WILLIAM J. MARSHALL, Chief
Waste Discharge to Land Unit

SER:sjs/njs

Enclosures: Adopted Order, Standard Provisions (Discharger only)

cc+Encl: Mrs. Betsy Jennings, State Water Resources Control Board, Sacramento
Ms. Liz, Haven, Division of Clean Water Program, State Water Resources Control Board
Office of Drinking Water, Department of Health Services, Sacramento
Environmental Mgmt. Branch, Department of Health Services, Sacramento
Department of Fish and Game, Region II, Rancho Cordova
Lake County Health Department, Lakeport
Lake County Planning Department, Lakeport
Napa County Health Department, Napa
Napa County Planning Department, Napa
Yolo County Environmental Health Department, Woodland
Yolo County Planning Department, Woodland
Mr. Brice Bledsoe, Solano Irrigation District, Vacaville
Mr. Robert Speirs, Brooks
Mr. James Wilson, Legal and Safety Employer Research, Gridley

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

ORDER NO. 94-315

WASTE DISCHARGE REQUIREMENTS FOR HOMESTAKE MINING COMPANY OF CALIFORNIA McLAUGHLIN MINE LAKE, NAPA, AND YOLO COUNTIES

The California Regional Water Quality Control Board, Central Valley Region, (hereafter Board) finds that:

1. The McLaughlin Mine is an existing open-pit gold mining operation at the juncture of Lake, Napa, and Yolo Counties. The mine is owned and operated by the Homestake Mining Company of California (Homestake), hereafter referred to as Discharger. Waste discharge to land at the McLaughlin Mine is regulated by Waste Discharge Requirements (WDRs) Order No. 93-121. Revision of Order No. 93-121 is necessary due to the Discharger's proposed reconfiguration of the in-pit waste rock disposal at the mine.

2. The Discharger operates a gold mine and mineral extraction facility (mill) to process about 8,000 tons of ore per day. The mine area includes: the mine pit with in-pit waste rock disposal sites, two waste disposal sites outside of the pit with leachate collection and pump back systems, a low grade ore storage area, storage and handling facilities for off-site sources of sulfide and ore. a grinding and crushing facility, recycle water lines to the grinding circuit, the M-1 dam, sediment control ponds, and slurry lines to transfer crushed ore to the mill. The mill area includes the mill with a flotation circuit and related facilities and a tailings disposal facility. The facility also includes inter-connecting roadways, and an electrical transmission corridor and a water supply reservoir. The mine, mill and tailings facilities are shown on Attachments A, B, C and D, which are incorporated herein and made a part of this Order.

3. The McLaughlin Mine discharges mining wastes in T12N, R5W, Sections 20, 21, 25, 27, 28, 29, 30, 34, 35, and 36; T11N, R5W, Sections 1, 2, and 12; T11N, R4W, Section 7; and T12N, R4W, Section 30 MDB&M.

4. These requirements apply to all project units except the surface water discharge from sediment control ponds. The discharge from these ponds is regulated through a separate NPDES permit.

5. The mine pit will ultimately be about one mile long, one-half mile wide and 800 feet deep. The pit's rim elevation is between 1900 and 2000 mean sea level (MSL) and the bottom is about 1420 feet MSL in the north and about 1280 feet MSL in the south. An east-west trending berm near 1700 feet MSL currently separates the northern portion of the pit from the southern portion. These areas within the mine pit are referred to as the north pit and south pit, respectively. Proposed mining may reduce or eliminate this berm.

6. The mining process begins at the mine pit where ore and waste rock are excavated. Ore bearing rock is crushed and ground at the mine site, then pumped through a 4-1/2 mile slurry pipeline to the mill. At the mill, the ore slurry undergoes pretreatment followed by a cyanide leach process to extract the gold. The processed tailing are discharged to a 546-acre tailing impoundment as shown in Attachment B.

7. Waste rock from the mine pit is currently discharged to the Main Waste Rock Disposal Site which covers about 350 acres and the waste rock site in the north pit which covers about 49 acres (Attachments C and D). The East Rock Disposal Site covers about 62 acres and was closed and reclaimed in 1990. The Discharger proposes a reconfiguration of the in-pit waste rock site which would allow a portion of the waste rock to be redirected to the south pit for disposal and reclamation. The Main Waste Rock Disposal Site will be closed and reclaimed as waste rock is diverted to the in-pit waste rock areas.

8. Waste rock placed in the mine pit will consist of both acid forming waste rock and non-acid forming waste rock. These rock types will be randomly discharged from the pit bottom to about 1700 feet MSL. Ground water levels in the pit are expected to stabilize at this elevation following cessation of mining activities, thereby minimizing waste rock oxidation in the lower portion of the waste piles. Above 1700 feet MSL, acid forming waste rock will be placed in thick lifts separated by layers of non-acid forming rock. At final grade, the waste rock areas above 1700 feet MSL will be covered with a layered cap consisting of compacted clay, non-acid forming rock and topsoil. This encapsulation and reclamation strategy is used in the East and Main Waste Rock Disposal Areas to minimize oxidation and acid generation within the waste rock. Final elevation for the waste rock units will be near 1900 feet MSL in the north pit and 1940 feet MSL in the south pit. The proposed configuration of the in-pit disposal areas is shown in Attachment D. Final design plans for the backfill areas will be developed once the remaining volume of gold ore and waste rock is determined.

9. The north and south pit waste rock disposal areas will be graded to drain into the open portion of the south pit. An area on the northeast side of the north pit will drain toward Davis Creek Reservoir following reclamation.

10. The chemical quality of ground and surface waters in the immediate vicinity of the tailings impoundment, waste rock disposal areas and mine pit is generally poor when compared to EPA Primary and Secondary Drinking Water Standards. In addition, little ground water has been found underlying the tailings and waste rock areas due to the low permeability of the bedrock. In the mine pit area, a deeper aquifer occurs primarily in fractured basalt dikes which are limited to the immediate vicinity of the pit. This deep aquifer is of poor quality due to its geothermal nature. Salinity ranges from about 1,000 to 5,000 mg/l TDS. Sulfate averages about 400 mg/l and chloride ranges between 20 and 1,600 mg/l. Boron averages about 100

mg/l near the south pit and about 3 mg/l near the north pit. These boron levels exceed the recommended level of 0.7 mg/l for continuous irrigation use.

11. After mining stops, the ground water level should recover to its pre-mining elevations and create a reservoir 360 to 500 feet deep in the open portion of the south pit. The south pit should form a local ground water sink because of evaporation from the water surface.

12. The Discharger previously determined through a comprehensive hydrogeologic investigation that backfilling waste rock in the pit will not impact surface water in Davis Creek Reservoir, Hunting Creek or Knoxville Creek either through surface water runoff or ground water flow from the pit area. Although backfilling may affect water quality in the pit, this water has naturally poor quality and the discharge will not impact existing or future beneficial uses. Furthermore, ground water in the pit is hydraulically isolated by local geology from aquifers suitable for domestic or agricultural supply. The Discharger has demonstrated that the mine pit meets the requirements for an exemption from the liner and leachate collection system requirements of Chapter 15, as discussed below.

13. Tailings waste from the mill and waste rock from the mine are Group B mining wastes as defined in Section 2571(b)(2)(B) of Chapter 15. The tailings and waste rock contain dissolved and/or soluble components, such as heavy metals and complex cyanides which, if discharged to surface or ground waters, could adversely affect the quality of those waters.

14. Chapter 15, Section 2572(f) and (g) set forth construction requirements for liners and leachate collection and removal systems at mining waste management units. Section 2570 provides that the Regional Board may grant exemptions from the requirements of Section 2572(f) and (g) if a mining waste management unit meets specific criteria. Section 2570 states:

    "c) *Regional boards may exempt a Group A or B* (see Section 2571 of this article) *mining waste management unit from certain provisions of this article if the discharger has developed a comprehensive hydrogeologic investigation which demonstrates that:*

        "1. there are only very minor amounts of ground water underlying the area; or

        2. the discharge is in compliance with the applicable water quality control plan; and

        3. either natural conditions or containment structures will prevent lateral hydraulic interconnection with natural geologic materials containing ground water suitable for agricultural, domestic, or municipal beneficial uses. There is no detectable vertical hydraulic interconnection between the natural geologic materials containing such ground water."

15. The Board previously granted exemptions from the requirements of Section 2572(f) and (g) under Section 2570(c) for the tailings disposal area, the East Waste Rock Disposal Site, Main Waste Rock Disposal Site and mine pit. The conditions required for these exemptions still exist and the exemptions are continued by this Order.

16. Storm water runoff from the process area, mill shop area, and mill cooling pond overflow is discharged to the tailings disposal facility, where it is reused for process water or evaporated. Storm water runoff from the mine pit, crushing and grinding area, mine shop, low grade ore storage, and waste rock pump back facilities is discharged to the M-1 containment pond, where it is reused in the grinding circuit or evaporated. Storm water from the waste rock disposal facilities is either pumped back to the M-1 pond or discharged to Hunting Creek or Knoxville Creek in accordance with the NPDES permit for the mine.

17. Tailings from the mill are in slurry form. The tailings disposal facility (Attachment B) is designed and constructed to accept, recycle, reclaim, and evaporate the liquids and permanently retain the residual solids. The tailings disposal facility is designed to be built in stages and design capacity is adequate to contain the mill production rate for the life of the project.

18. The tailings disposal facility is underlain by sedimentary rocks, primarily mudstone, of the Great Valley Sequence and serpentinitic rocks from related ophiolite rocks. No recently active faults have been observed at the site. However, there are a number of minor faults and shear zones which traverse the site. The permeability of both formations is controlled by fracture flows. Average permeabilities below a depth of 70 feet are approximately 2×10^{-7} cm/sec.

19. The tailings disposal facility contains a compacted earthfill embankment (final height 160 feet), a tailings delivery and distribution system, a water reclamation system, storm water diversion ditches, and a seepage collection system downstream of the embankment. Ground water monitoring wells are provided to detect seepage. Downstream areas are available in which additional seepage barriers can be constructed, if necessary.

20. The tailings dam, the water supply reservoir dam, and M-1 dam are features of the Discharger's activities which are regulated by the California Department of Water Resources, Division of Safety of Dams (DSD). DSD reviews and accepts dam design and construction documents and inspects all projects within its jurisdiction. DSD has certified the dams are designed and constructed in a manner that protects downstream life and property.

21. The tailings disposal facility consists of a small valley underlain by low permeability bedrock. An earthen dam has been constructed across the valley to contain the tailings within the valley.

22. An application was filed with the California Department of Health Services (DHS) to determine the tailings waste classification. On 27 March 1984, DHS classified the waste tailings as nonhazardous waste.

23. A solid waste landfill site has been established within the tailings disposal facility (Attachment B). The landfill is utilized for the disposal of construction materials and other solid waste generated during the operation of the project, including wood, paper products, nonsalvageable building materials, metal containers, and plastic materials. Hazardous materials and sanitary waste will not be disposed of in the solid waste landfill. Waste will periodically be covered with soil and the entire site will be reclaimed as described in the Reclamation Plan

The landfill waste is classified as 'nonhazardous' solid waste under Chapter 15, Section 2523 and, therefore, must be discharged to a Class III landfill. The disposal site meets the provisions of Chapter 15, Section 2533, for waste management unit classification and siting criteria.

24. A sewage treatment plant is furnished for the mill site. The 5,000 gpd plant provides secondary treatment and disinfection. Disposal of the wastewater is to the tailings disposal facility or reclaimed for landscape irrigation and dust control.

    A sewage treatment plant at the mine site treats up to 5,000 gpd of sewage wastewater. The wastewater is treated to secondary standards with disinfection. Effluent is stored in a pond for evaporation or reclaimed for landscape irrigation and dust control.

25. Surface water drainages from the Morgan Valley Road area are to Herndon, Hunting and Soda Creeks. Surface water drainage from the McLaughlin Mine and tailings disposal area are to Hunting Creek and Knoxville Creek. All four creeks are tributary to Lake Berryessa. The water supply reservoir is on Davis Creek, which is tributary to Cache Creek. The beneficial uses of Lake Berryessa and Cache Creek are domestic, municipal, industrial, and agricultural supply; recreation; ground water recharge; fresh water replenishment; aesthetic enjoyment; and preservation and enhancement of fish, wildlife, and other aquatic resources.

26. The beneficial uses of the ground water downstream of the project are municipal, industrial, and agricultural supply.

27. The Board adopted the Water Quality Control Plan for the Sacramento River Basin (5A), Second Edition, which contains water quality objectives for all waters of the Basin. These requirements are consistent with that Plan.

28. Lake, Napa, and Yolo Counties have all approved the development of the project and have all issued the required permits.

29. Pursuant to an agreement with Solano Irrigation District, the Discharger has agreed to comply with specified requirements in order to assure nondegradation of the water quality of any surface or subsurface waters flowing or draining into or through Hunting, Soda, Knoxville, Putah, or Eticuera Creeks into Lake Berryessa.

30. The Napa County Conservation, Development and Planning Department approved a Negative Declaration under CEQA and modified the Permit to Mine and the Reclamation Plan to allow waste rock discharge to the north pit on 17 February 1993 and for the south pit project on 7 September 1994. The Board has reviewed the Negative Declaration and concurs that the project, as approved, will not have a significant impact on water quality.

31. The Board has notified the Discharger and interested agencies and persons of its intent to prescribe waste discharge requirements for this discharge.

32. The Board, in a public meeting, heard and considered all comments pertaining to the discharge.

IT IS HEREBY ORDERED that Order No. 93-121 is rescinded and that Homestake Mining Company of California, its agents, successors and assigns, in order to meet the provisions contained in Division 7 of the California Water Code and regulations adopted thereunder, shall comply with the following:

A. Discharge Prohibitions:

1. The discharge or deposit of wastes at this site from sources other than McLaughlin Mill and associated facilities is prohibited, unless specifically authorized by the Board.

2. Discharge of seepage or liquid waste from the mine, mill, shop, sewage treatment pond, crushing area, low grade ore stockpile area or tailings disposal facilities to surface waters or surface water drainage courses is prohibited.

B. Discharge Specifications:

1. Neither the treatment nor the discharge shall cause a nuisance or condition of pollution as defined by the California Water Code, Section 13050.

2. The discharge shall not cause degradation of useable ground or surface water.

3. Waste materials shall be confined to the designated disposal areas shown on Attachments B, C and D which are consistent with the terms and conditions of these requirements.

4. The boundaries of the area used for tailings waste disposal shall be limited to the area shown on Attachment B.

5. The tailings disposal area shall be protected from any washout or erosion of wastes or covering material, and from inundation resulting in overtopping, which could occur as a result of floods under 1000 year, 72-hour precipitation conditions.

6. Surface drainage from diverted tributary areas shall not contact or percolate through wastes discharged at the waste rock or tailings disposal sites.

7. All drainage from the mill site shall be diverted to the tailings disposal facility or to a containment pond which does not discharge.

8. Annually, prior to the anticipated rainfall period, all runoff diversion channels shall be inspected and repaired, if necessary, to prevent erosion or flooding of the site.

9. Tailings waste materials shall be contained in the area designated for Group B waste disposal which is consistent with the terms and conditions of these requirements. Water

that has contacted waste materials shall be reclaimed and used in the mill circuits. Treated recycle water shall be used in the grinding circuits as makeup water.

10. The minimum freeboard of any wastewater holding pond shall be three feet, except those regulated by the NPDES permit.

11. The minimum freeboard of three feet below the dam's spillway shall be maintained in the tailings waste disposal facilities at all times.

12. The seepage collection and disposal system(s) shall be maintained downgradient from the tailings disposal facility to prevent seepage or tailings waste from entering surface or usable ground waters.

13. There shall be no overflow from the tailings disposal or seepage collection facilities.

14. Tailing seepage return sump volumes contained by liquid control barriers shall be maintained below a volume equal to 75 percent (or a lesser amount if necessary, because of specific site conditions) of the total liquid storage capacity of the barrier.

15. The seepage collection control barriers shall consist of a minimum of two feet of compacted clay, soil cement, or other equivalent material having a permeability of 1×10^{-7} cm/sec or less when in contact with the liquid the facility is designed to contain.

16. The Discharger shall maintain in good working order and operate as efficiently as possible any facility or control system installed to achieve compliance with these waste discharge requirements.

17. The Discharger shall remove and relocate any wastes which are discharged at this site in violation of these requirements.

18. During construction activities at the site which are not a part of the routine mining and milling operations, or during construction on the roadways, the Discharger shall comply with the following discharge specifications:

    a. Erosion control and surface flow containment facilities shall be constructed and maintained to prevent discharge of waste earthen materials to surface waters or storm drainage systems from disturbed areas under construction.

    b. There shall be no removal of vegetation nor disturbance of natural soil conditions, except where measures that will prevent erosion discharge to surface waters or storm drainage systems can be installed and operational prior to 15 October annually or where measures are installed and operational prior to the removal or disturbance.

c. The Discharger shall provide by **15 October** annually an engineered erosion control plan which is satisfactory to the Board.

d. All exposed cuts and fills shall be compacted, reseeded, and adequately watered to initiate and sustain plant growth as soon as practicable, and in no case, later than **15 October** of each year.

e. Disturbed areas of roadways shall be water barred as necessary and drained onto undisturbed vegetation or areas which have erosion control.

19. Any disturbance of land shall not increase the turbidity of the receiving waters by more than 20% over immediate upstream levels.

20. Reclaimed wastewater from the sewage treatment plants shall meet the criteria contained in Title 22, Division 4, CCR (Section 60301, et seq.).

21. The dissolved oxygen content of sewage treatment oxidation ponds shall not be less than 1.0 mg/l for 16 hours in any 24-hour period.

22. Sewage treatment ponds shall be constructed and operated so as to prevent the propagation of mosquitoes and other vectors.

23. All wells within the disposal areas shall be sealed to the satisfaction of the Lake, Napa, or Yolo County Health Departments prior to discharging waste materials within 100 feet of any such wells.

C. Provisions:

1. In the event of a violation or threatened violation of this Order, the Discharger, under the direction of a qualified registered engineer or engineering geologist, shall submit a written report to the Board in a timely manner outlining the magnitude of the problem, the possible effects of the discharge, the direction and rate of flow and corrective measures, if appropriate, to be taken (including proposed time schedule). The report shall be submitted if the following occur:

   a. The project causes a measurable increase over background baseline data determined in accordance with Provision No. 13, of the following constituents at any monitoring well or stream monitoring location as described in the attached monitoring program: arsenic, cyanide, and mercury.

   b. The project causes more than an incremental increase of 10 percent (or, if greater than 10 percent, the minimum percentage increase that may be accurately measured), over background baseline data determined in accordance with Provision No. 13, of the following constituents at any monitoring well or stream

monitoring location, as described in the attached monitoring program: boron, chromium, copper, lead, nickel, selenium, and zinc.

2. The Discharger shall maintain a legible record of the volume and type of all chemicals received at the mill site and the manner and location of disposal. The record shall be maintained for a period of not less than twenty (20) years, with the records to be forwarded to the Board upon request or if disposal operations cease.

3. A letter from the Discharger indicating conformance with existing plans or any proposed changes to the operations plan shall be submitted annually by **15 January**.

4. Tailings disposal facilities used to contain Group B waste shall be designed and constructed to minimize damage to the graded foundation or the structures which control seepage, surface drainage, erosion, and gas due to the maximum credible earthquake. The remaining waste discharge facilities shall be designed and constructed to withstand the maximum probable earthquake.

5. The tailings disposal facility, waste rock disposal areas and mine pit are exempted from the requirements of Section 2572(f) and (g) of Chapter 15 because these waste managment units satisfy the requirements for exemption under Section 2570.

6. The Discharger shall report annually any additions or revisions to their Spill Prevention Control and Countermeasures (SPCC) Plan, dated September 1984.

7. The Discharger shall maintain a copy of this Order at the site to be available at all times to site operating personnel.

8. The Discharger shall file with this Board a report of any material change or proposed change in the character, location, or quantity of this waste discharge. For the purpose of these requirements, this includes any proposed change in the boundaries, contours, nature of the waste, or ownership of the disposal area.

9. The Discharger shall file a written report within 90 days after the total quantity of wastes discharged at this site equals 75 percent of the reported capacity of the site.

10. The Discharger has submitted a technical report (Reclamation Plan) to the Board, dated November 1983, describing the methods and controls to be used to assure protection of the quality of surface and ground waters of the area during final operations and with any proposed subsequent use of the land. This report shall be prepared by or under the supervision of a certified engineering geologist or registered civil engineer, updated annually, and submitted to the Board by the **15th day of January** of each year. The method used to close the site and maintain protection of the quality of surface and ground waters shall comply with waste discharge requirements established by the Board. The final report shall be submitted five years prior to closure of the site.

11. The Discharger shall assure the Board that monies are available in an amount sufficient to ensure the closure and subsequent maintenance of the site in a manner that will not pose an adverse threat to the environment. The Discharger shall also assure that sufficient monies are available to the Board in the case of earthquakes or other unforeseen threat to water quality.

    If the Discharger does not provide adequate financial assurances as described in this provision, and specifically if the Discharger violates the "Agreement for Financial Assurances", including any amendments thereto entered into by the Regional Board and the Discharger, by failing to renew a Letter of Credit as ordered by the Board, or failing to replaced a drawdown as required by the Agreement, such violation shall be grounds for the Board to order a cessation of all operations at the site. In addition, the amount by which the Discharger improperly failed to increase, or replace, or renew the Letter of Credit shall constitute a lien upon the recordation of a notice of lien in the office of the appropriate county recorder(s).

12. The Discharger shall comply with the attached Monitoring and Reporting Program No. 94-315, as ordered by the Executive Officer.

13. The Discharger shall comply with the Standard Provisions and Reporting Requirements, dated September 1993, which are a part of this Order.

14. The Discharger shall annually update the water quality statistical evaluation report of background water quality data. The baseline of each parameter, determined from the information in each updated water quality statistical evaluation report will be used to determine compliance with this Order. The parameter values documented in the report shall be determined at the highest confidence level attainable and with appropriate allowances for analytical error.

15. The Discharger shall notify the Board in the scheduled monitoring reports of any monitored constituent which exceeds the level described in Provision C.13.

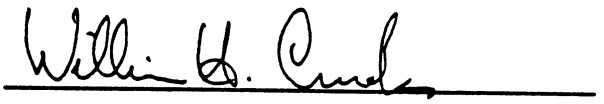
16. The owner of the waste disposal site shall have a continuing responsibility to assure protection of usable waters from the waste discharge, and from gases, leachate or seepage that are caused by infiltration or precipitation or waters draining into the waste disposal areas, and by infiltration of water applied to the waste disposal area during subsequent use of the property for other purposes.

17. In the event of any change in control or ownership of land or waste discharge facilities presently owned or controlled by the Discharger, the Discharger shall notify the succeeding owner or operator of the existence of this Order by letter, a copy of which shall be forwarded to this office.

18. Except as required in the discharge specifications, the Discharger shall follow the recommendation for construction, operation, and maintenance contained in the consultant's reports submitted in the application, dated 15 April 1983 and supplemented 19 May 1983, and July, August, September, and December 1984. Where two submitted reports conflict or are revised the latest report or revision will take precedence.

19. The provisions of this Order are not intended to, and shall not limit or reduce, any obligations or requirements which are additional to, or more stringent than those created pursuant to this Order and which are imposed on the Discharger as a party, including but not limited to, that certain agreement (between Homestake and Solano Irrigation District), dated 30 June 1983, or (b) the requirements and controls imposed by any governmental agency or other authority having jurisdiction with respect to the Project. Nothing in this paragraph shall be construed to release or excuse the Discharger from full and timely compliance with the requirements of this Order or amendments or supplements thereto.

I, WILLIAM H. CROOKS, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, Central Valley Region, on 28 October 1994.



WILLIAM H. CROOKS, Executive Officer

Amended 28 Oct 1994
SER:sjs

Attachments

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

MONITORING AND REPORTING PROGRAM NO. 94-315

FOR
HOMESTAKE MINING COMPANY OF CALIFORNIA
McLAUGHLIN MINE
LAKE, NAPA, AND YOLO COUNTIES

The following shall constitute the Monitoring Program:

Constituents	Units	Type of Sample	Sampling Frequency
Mine			
Mass Extracted	Dry Tons	Estimate	Monthly
Low Grade Ore Stockpile			
Mass Added	Dry Tons	Estimate	Monthly
Mass Used	Dry Tons	Estimate	Monthly
Waste Rock Disposal			
Mass Added	Dry Tons	Estimate	Monthly
Crushing and Grinding Facility			
Mass of solids placed in Slurry Pipeline	Dry Tons	Estimate	Monthly
Tailings Return Sump			
Return Flow	gpd	pump hours or metered	Monthly
pH	pH units	Grab	Quarterly
EC	umhos/cm	Grab	Quarterly
TDS	mg/l	Grab	Quarterly
Heavy Metals*	mg/l	Grab	Quarterly

Constituents	Type of Units	Sampling Sample	Frequency
Tailings Disposal			
Flow to impoundment	mgd	Metered	Quarterly
pH	pH Units	Range	Monthly
Sulfate	mg/l mg/kg	Composite	Quarterly
Arsenic	mg/l mg/kg	Composite	Quarterly
Total Chromium	mg/l mg/kg	Composite	Quarterly
Copper	mg/l mg/kg	Composite	Quarterly
Mercury	mg/l mg/kg	Composite	Quarterly
Nickel	mg/l mg/kg	Composite	Quarterly
Total Cyanide	mg/l mg/kg	Composite	Quarterly

* The following metals shall be analyzed: Arsenic, Chromium III, Copper, Mercury, Nickel, Cyanide

GROUND WATER MONITORING

Mine

Two wells (S-1 and S-2) are established to measure the ground water quality. A third well (S-10) is between the mine and Davis Creek Reservoir.

Low Grade Ore Stockpile, Ore Crushing Area

One monitoring well (S-8) is established in this area.

Waste Rock Disposal

Five monitoring wells (S-3, S-4, S-5, S-6, and S-7) are established to measure up and downgradient ground water quality.

Tailings Disposal Facility

Twelve monitoring wells (N Series) are established to measure up and downgradient ground water quality.

Note: Prior to construction of any additional wells, plans and specifications for ground water monitoring wells shall be submitted to Board staff for review and approval.

CONSTITUENTS (OPERATIONAL)

Field Measurements

pH	Specific Conductance
Temperature	Ground Water Elevations

Laboratory Measurement

Total Alkalinity	Nitrate
Total Hardness	Sulfate
Total Dissolved Solids	

Metals (total)

Arsenic	Copper	Nickel	Total Cyanide
Boron	Lead	Free Cyanide	
Sodium	Manganese	Zinc	
Total Chromium	Mercury	Iron	

Note: Cyanide shall only be analyzed in wells near the tailings disposal and mill site.

Units

All units shall be reported in mg/l, except pH (pH Units) and levels (in feet USGS Datum).

Type of Sample

All samples shall be grab samples using proper EPA and Regional Board sampling techniques and preservation. The wells shall be adequately purged prior to sampling. Samples being analyzed for metals should be reported as total metals.

Sampling Frequency

Samples shall be collected and analyzed quarterly. Ground water elevations shall be obtained quarterly.

OBSERVATION WELLS (TAILINGS KEY TRENCH)

OW 1, 2, 3, 4, and 5 shall be monitored quarterly for the following constituents: water elevation, pH, EC, and Total Cyanide.

WELL MONITORING REVIEW

When the tailings elevation reaches 2180 feet or prior to Stage II tailings embankment construction, the monitoring well system around the embankment will be reevaluated. New wells will be added to the monitoring program as necessary. Special consideration shall be given to the following two locations:

1. Stage I spillway (Station 14 + 62)

2. A location 600 feet northeast of Well N-10 in a saddle on a ridge between two minor peaks.

Wells N-6, N-10, and N-11 shall be reevaluated to determine if shallower screened intervals would be more appropriate during Stage II filling of the tailings disposal facility.

RECEIVING WATER MONITORING LOCATIONS

All receiving water samples shall be grab samples. Receiving water samples shall be taken from the following locations:

Davis Creek 5 (DC-5)

DC-5 is on Davis Creek near the Reid Mine in the northwest quarter of Section 25, T12N, R5W. The sampling location is on the west bank, near the Rieff-Rayhouse Road, upstream of the road crossing.

Davis Creek 6 (DC-6)

DC-6 is on Davis Creek downstream of the Davis Creek Reservoir Dam near the northeast corner of Section 25, T12N, R5W. The sampling location is downstream of the confluence of a tributary from the west along the side of Hobit Mountain between a 1-1/2 foot diameter leaning, pine tree, and three-foot diameter oak tree on the east bank.

Hunting Creek 5 (HC-5)

HC-5 is on an eastern tributary to Hunting Creek in the southeastern quarter of Section 2, T11N, R5W. The sampling location is in the Hunting Creek channel adjacent to a sharp bend in a dirt road which proceeds up a steep hill. The sampling point is approximately six feet west of a two-foot diameter oak tree and adjacent to two steel fence posts driven into the ground.

Hunting Creek 9 (HC-9)

HC-9 is on a western tributary to Hunting Creek, draining Quarry Valley and parallel to the Old Morgan Valley Road. The station is south of the center of Section 28, T12N, R5W. The sampling location is north of the old Morgan Valley Road, west of a small bridge crossing Hunting Creek and south of a rock outcrop. A steel post is approximately 10 feet south of the sampling location.

Hunting Creek 10 (HC-10)

HC-10 is on the main channel of Hunting Creek immediately below the concrete weir in the northeastern quarter of Section 11, T11N, R5W.

Hunting Creek 11 (HC-11)

HC-11 is downstream of the Rieff Road Bridge on Hunting Creek in Morgan Valley in the western half of Section 21, T12N, R5W. The sampling station is approximately 40 feet downstream of the Rieff Road Bridge in the center of the stream opposite a cluster of Manzanita bushes.

Knoxville Creek 3 (KC-3)

KC-3 is in the northwest quarter of Section 7, T11N, R4W, upstream of the county road crossing and downstream of the Devils Head Road.

RECEIVING WATER MONITORING (Operational)

The following surface stations shall be analyzed quarterly: DC-5, DC-6, HC-5, HC-9, HC-10, HC-11, and KC-3. Free and total cyanide shall only be analyzed at Stations HC-9 and HC-10.

Constituents	Units
Flow (estimate)	gpm
pH (field)	pH Units
Temperature (field)	°C
EC (field)	μmhos/cm
Total Alkalinity	mg/l
Suspended Matter	mg/l
Chloride	mg/l
Nitrate	mg/l
Sulfate	mg/l
Ammonia	mg/l
Arsenic	mg/l
Boron	mg/l
Chromium	mg/l
Copper	mg/l
Iron	mg/l
Lead	mg/l
Mercury	mg/l
Nickel	mg/l
Sodium	mg/l
Zinc	mg/l
Free Cyanide	mg/l
Total Cyanide	mg/l

Note: Metal analysis shall be reported in both dissolved and total metals present (filtered and non-filtered).

Sampling Station HC-10 will provide for daily composites analyzed weekly for free cyanide.

Sediment Samples

Sediment samples shall be collected at the following locations: DC-5, DC-6, KC-3, and HC-10. The samples shall be analyzed semi-annually for the following constituents and reported in dry weight: arsenic, chromium, copper, lead, mercury, nickel, and zinc.

Aquatic Ecology

Aquatic life shall be sampled at the following locations annually: HC-10, HC-7A, KC-3, DC-5, and DC-6. Sampling shall provide for the following: sampling by net, electro-shocking, surber sampler; species identification, inventory and mercury analysis of fish flesh.

REPORTING

In reporting the monitoring data, the Discharger shall arrange the data in tabular form so that the date, the constituents, and the concentrations are readily discernible. The data shall be summarized in such a manner as to illustrate clearly the compliance with waste discharge requirements.

Quarterly monitoring reports shall be submitted to the Regional Board within **45 days** of analytical determination.

If the Discharger monitors any pollutant at the locations designated herein more frequently than is required by this Order, he shall include the results of such monitoring in the calculation and reporting of the values required in the Discharge Monitoring Reporting Form.

The Discharger shall submit a report to the Board by **30 October** of each year containing both tabular and graphical summaries of the monitoring data obtained during the previous year. In addition, the Discharger shall discuss the compliance record and the corrective actions taken or planned which may be needed to bring the discharges into full compliance with the waste discharge requirements.

If any additional monitoring activities are required as a condition of, or performed in conjunction with, any permit for Homestake's McLaughlin Mine, including sediment sampling or "aquatic life" sampling, the results of such additional monitoring shall be submitted to the Board at the same time that the results are submitted to the agencies or entities which require such monitoring.

The Discharger shall implement the above monitoring program on the effective data of this Order.

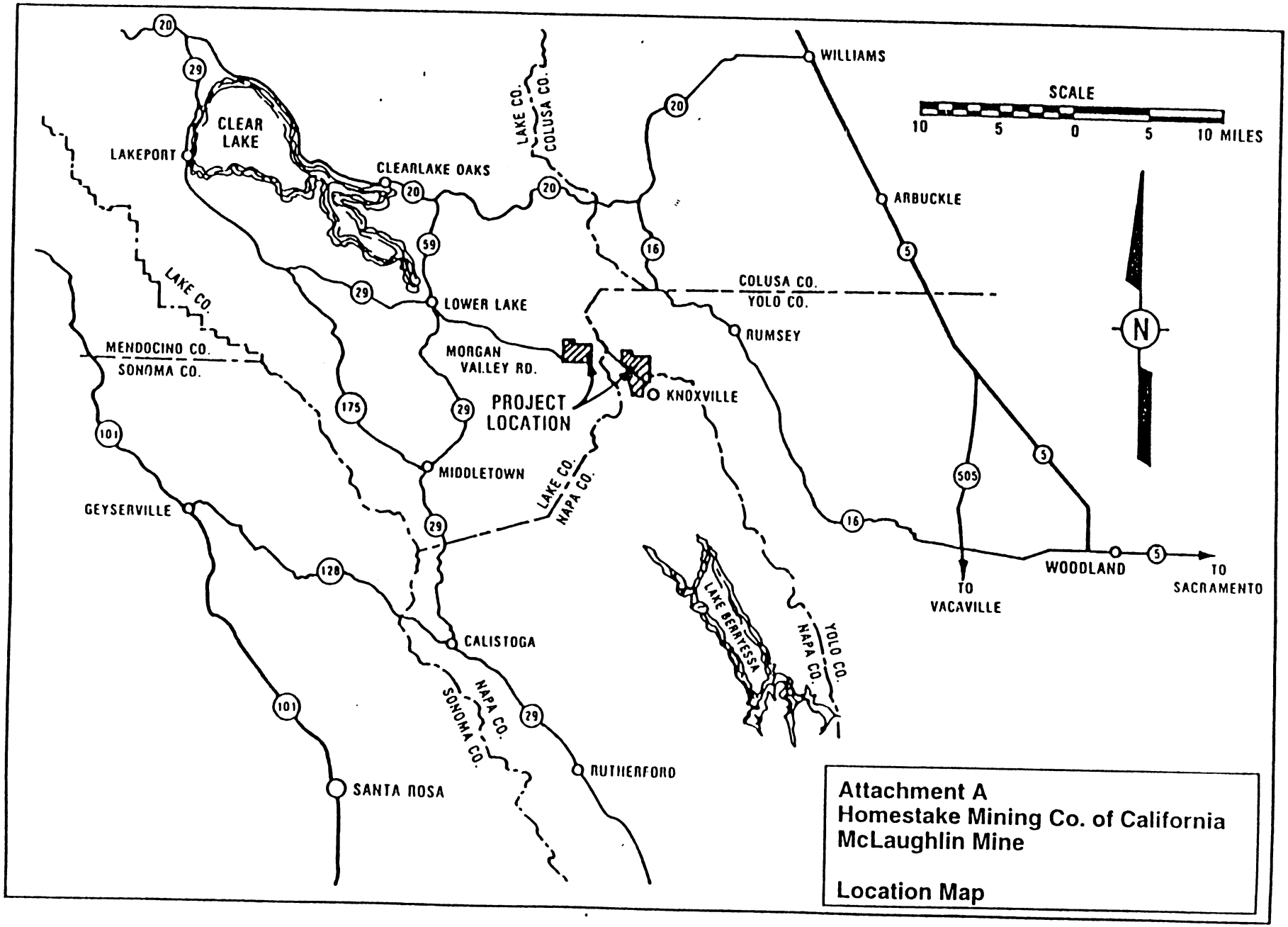
Ordered by William H. Crooks

WILLIAM H. CROOKS, Executive Officer

28 October 1994

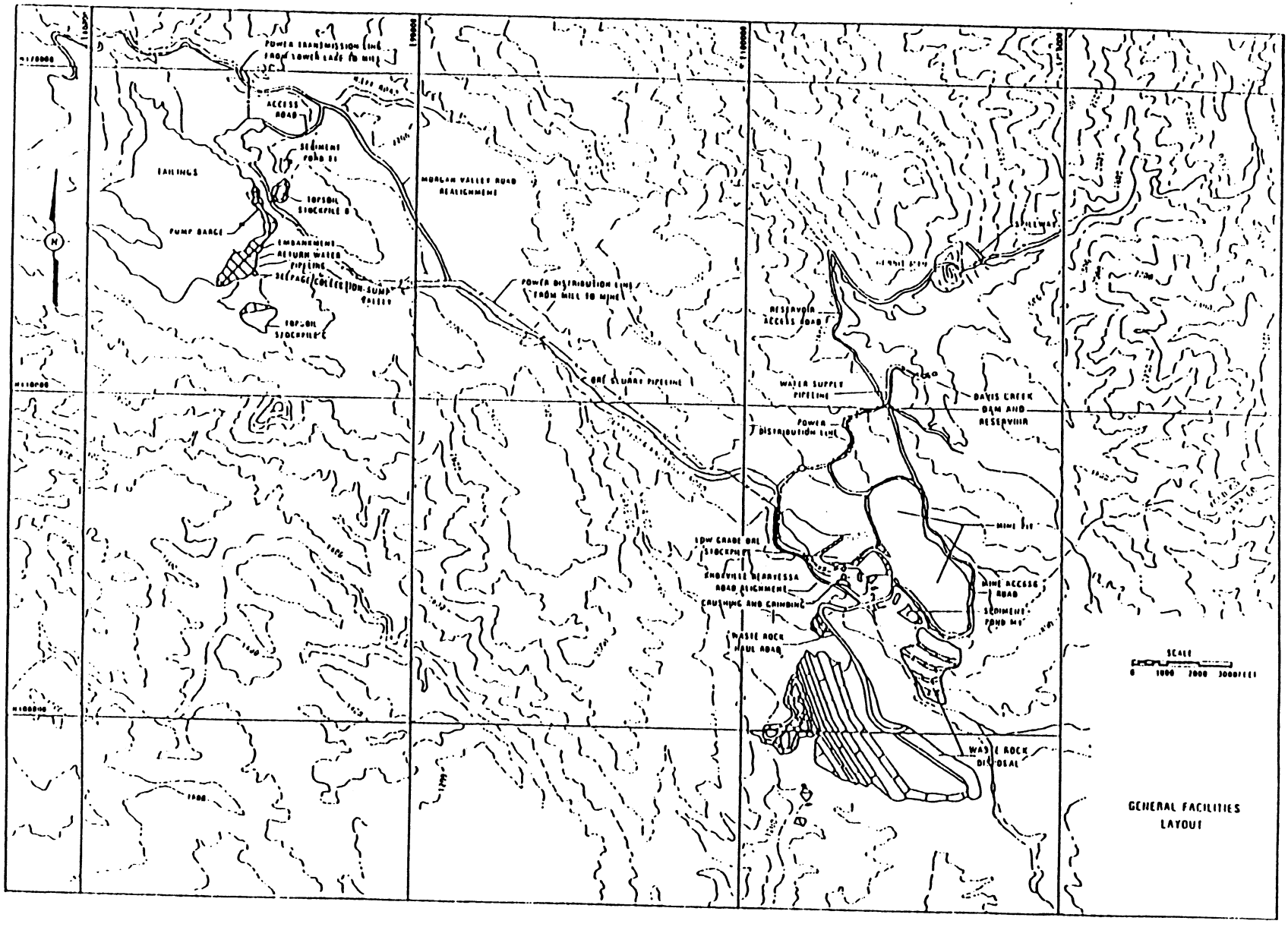
(Date)

Amended 28 Oct 1994
SER:sjs



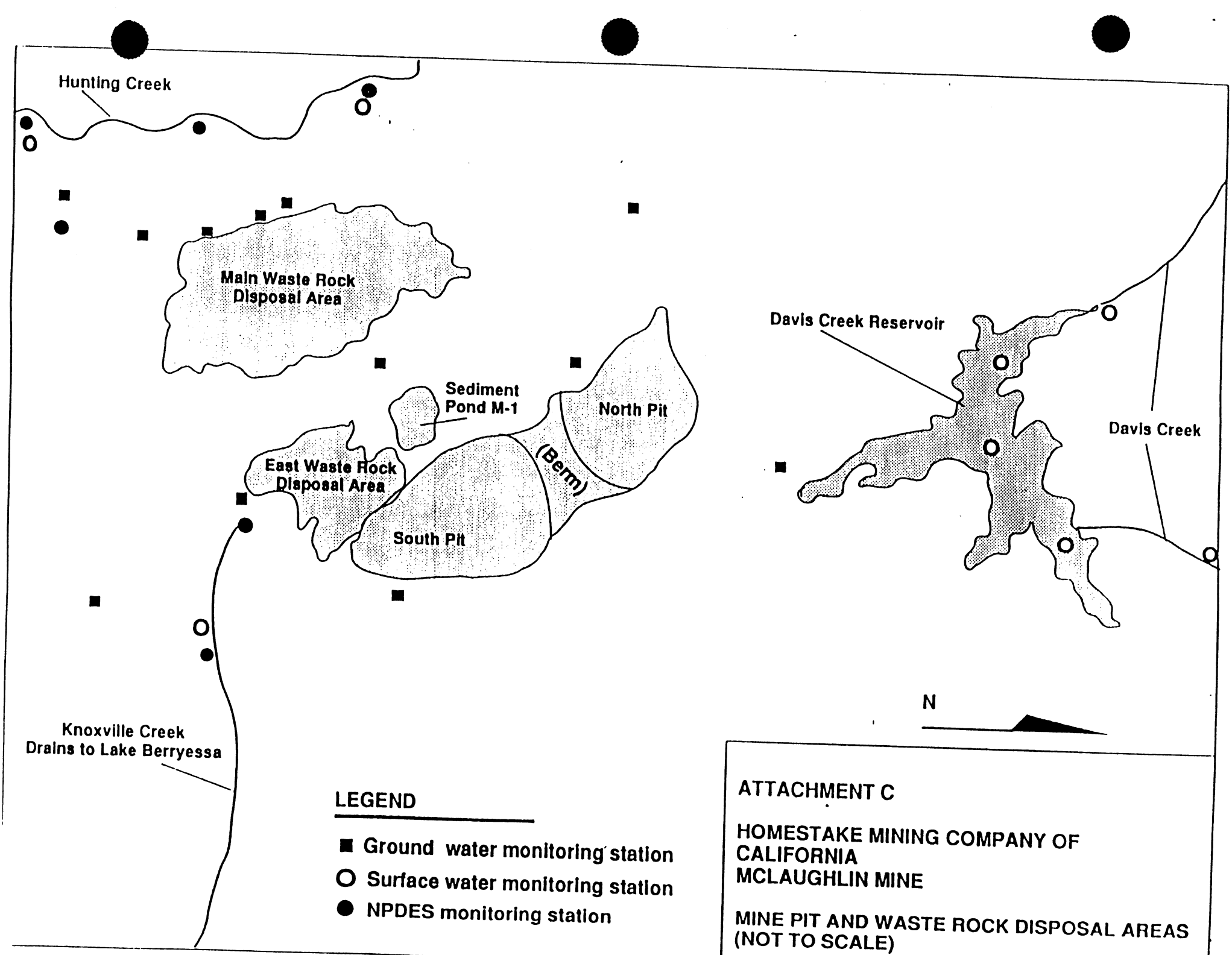
Attachment A
Homestake Mining Co. of California
McLaughlin Mine

Location Map



Attachment B
Homestake Mining Co. of California
McLaughlin Mine

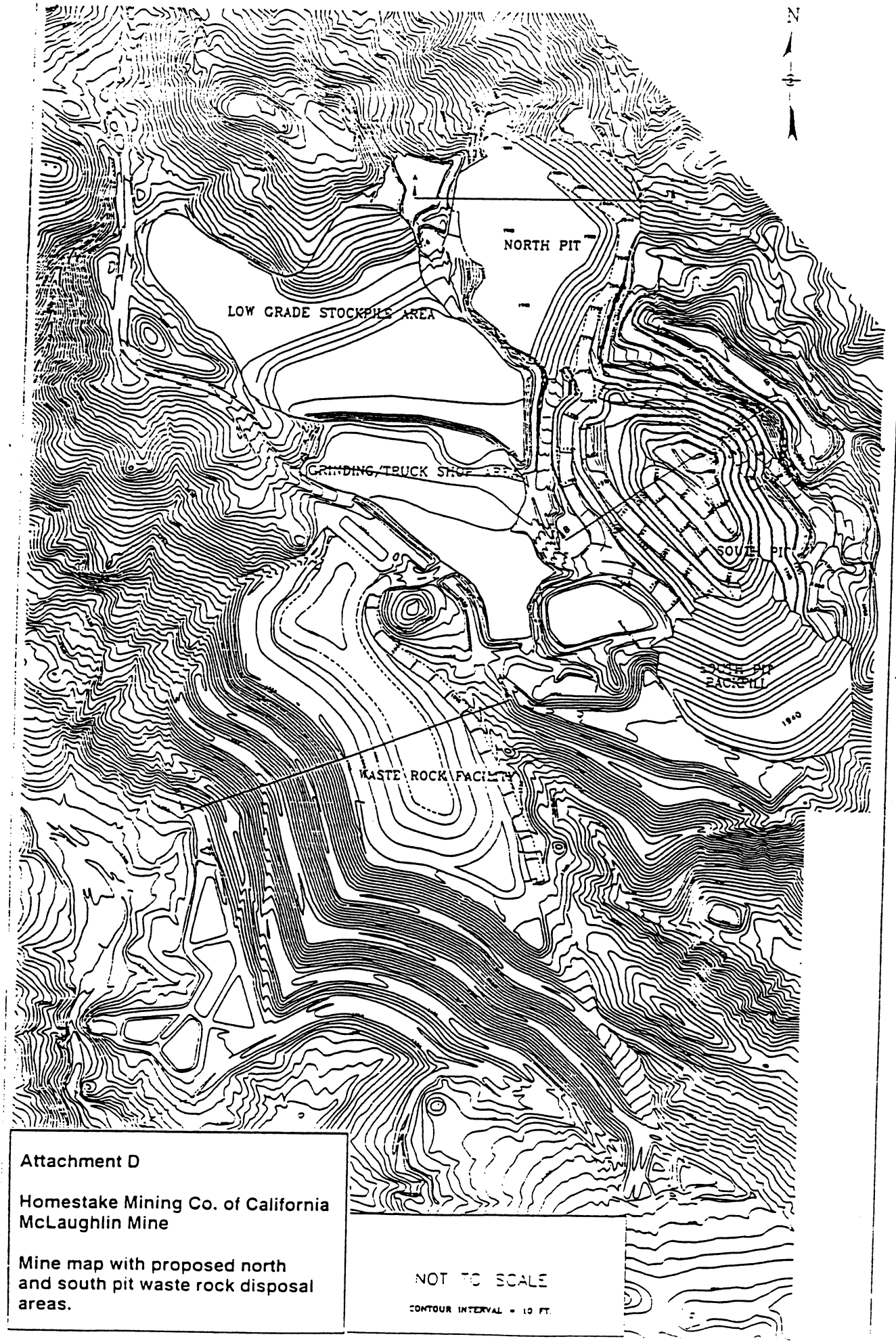
Site Map



ATTACHMENT C

HOMESTAKE MINING COMPANY OF CALIFORNIA
MCLAUGHLIN MINE

MINE PIT AND WASTE ROCK DISPOSAL AREAS
(NOT TO SCALE)



Attachment D

Homestake Mining Co. of California
McLaughlin Mine

Mine map with proposed north and south pit waste rock disposal areas.

INFORMATION SHEET

HOMESTAKE MINING COMPANY OF CALIFORNIA
MC LAUGHLIN MINE
LAKE, NAPA, AND YOLO COUNTIES

This is an existing gold and silver mining operation at the juncture of Lake, Napa, and Yolo Counties. Waste discharge requirements were first set forth in Order No. 83-124, adopted by the Board on 23 September 1983 and amended 6 January 1984 by the State Water Resources Control Board. Order No. 83-124 was again amended on 25 January 1985 by the Regional Board in Order No. 85-032.

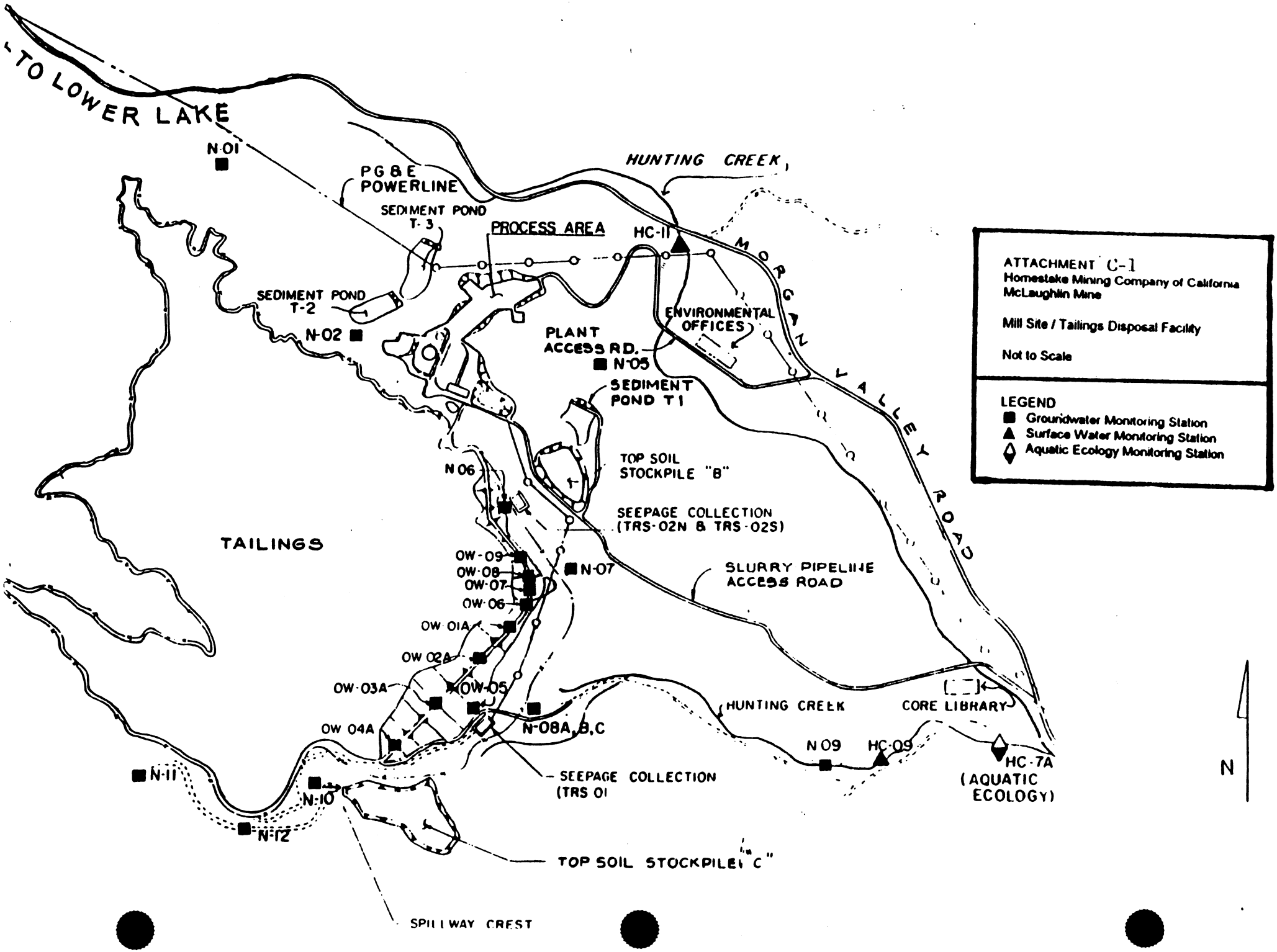
Order No. 86-098, adopted on 25 April 1986, permitted processing of tailings and concentrates from the Empire Mine in Nevada County. Processing of tailings and concentrates from the Idaho-Maryland Mine, also in Nevada County, was permitted by letter dated 19 July 1988. Order No. 89-107 consolidated the previous Orders and amendments. Order No. 93-121, adopted on 5 August 1993, permitted waste rock disposal in the north pit.

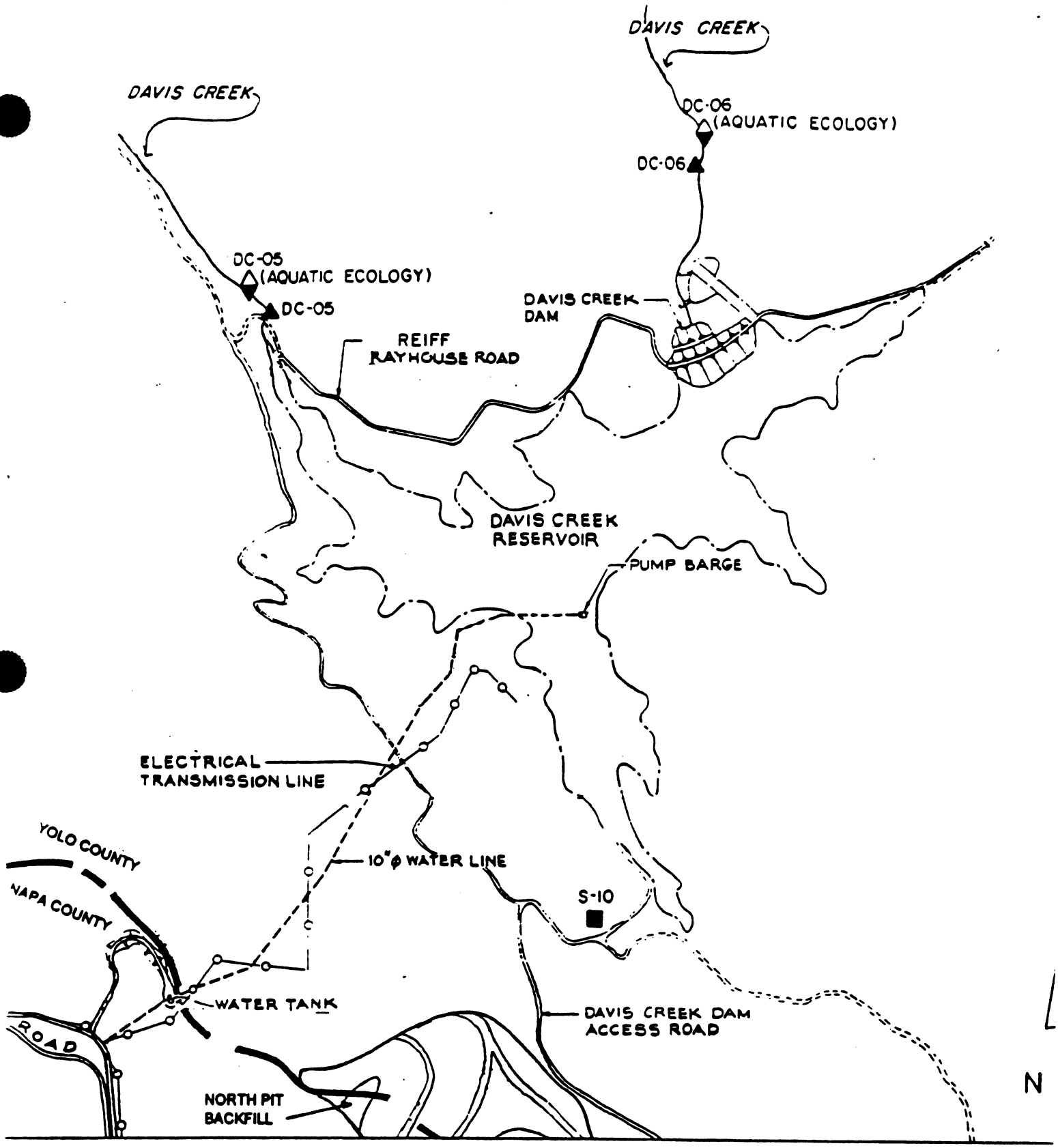
The mining process begins at an open pit which will ultimately be about one mile long, one-half mile wide and 800 feet deep. Approximately 80% of the pit is in Napa County. The remaining 20% is in Yolo County. Ore is crushed, ground, and pumped in a four and one-half mile slurry pipeline to an extraction facility in Lake County. Waste rock from the pit is disposed of at two sites: The Main Waste Rock Disposal Site and the north pit. The Main site covers an area of about 350 acres and the north pit an area of about 49 acres. The East Waste Rock Disposal Site covers about 62 acres and was closed and reclaimed in 1990. The ore slurry undergoes a cyanide leach process to extract minerals, and the processed tailings are discharged to a 546-acre disposal facility. Below a depth of about 70 feet, this facility has an average permeability of approximately 2×10^{-7} cm/sec.

This Order allows Homestake to reconfigure the north pit waste rock site through the redirection of waste rock to other areas of the pit for disposal and reclamation. The pit is exempted from the requirements of Chapter 15 for engineered liners and leachate control systems because of Homestake's demonstration that the pit area is hydraulically isolated from surrounding aquifers. Surface water runoff from the in-pit waste rock areas will be controlled and monitoring implemented to detect any water quality impacts.

A Financial Assurances and Trust Agreement was submitted by the company on 6 December 1984. This Agreement was adopted by the Board in Resolution No. 84-003, on 20 January 1984 and is still in full force and effect.

SER:sjs/Rev:3 November 1994


TO LOWER LAKE
N-01
PG&E POWERLINE
SEDIMENT POND T-3
PROCESS AREA
HC-11
HUNTING CREEK
MORGAN VALLEY ROAD
SEDIMENT POND T-2
N-02
ENVIRONMENTAL OFFICES
PLANT ACCESS RD.
N-05
SEDIMENT POND T1
TOP SOIL STOCKPILE "B"
N 06
SEEPAGE COLLECTION (TRS-02N & TRS-02S)
TAILINGS
OW-09
OW-08
OW-07
OW-06
N-07
SLURRY PIPELINE ACCESS ROAD
OW-01A
OW 02A
OW-03A
OW-05
HUNTING CREEK
CORE LIBRARY
OW 04A
N-08A,B,C
N 09
HC-09
HC-7A (AQUATIC ECOLOGY)
N-11
N-10
SEEPAGE COLLECTION (TRS 01
N-12
TOP SOIL STOCKPILE "C"
SPILLWAY CREST
ATTACHMENT C-1
Homestake Mining Company of California
McLaughlin Mine
Mill Site / Tailings Disposal Facility
Not to Scale
LEGEND
Groundwater Monitoring Station
Surface Water Monitoring Station
Aquatic Ecology Monitoring Station
N

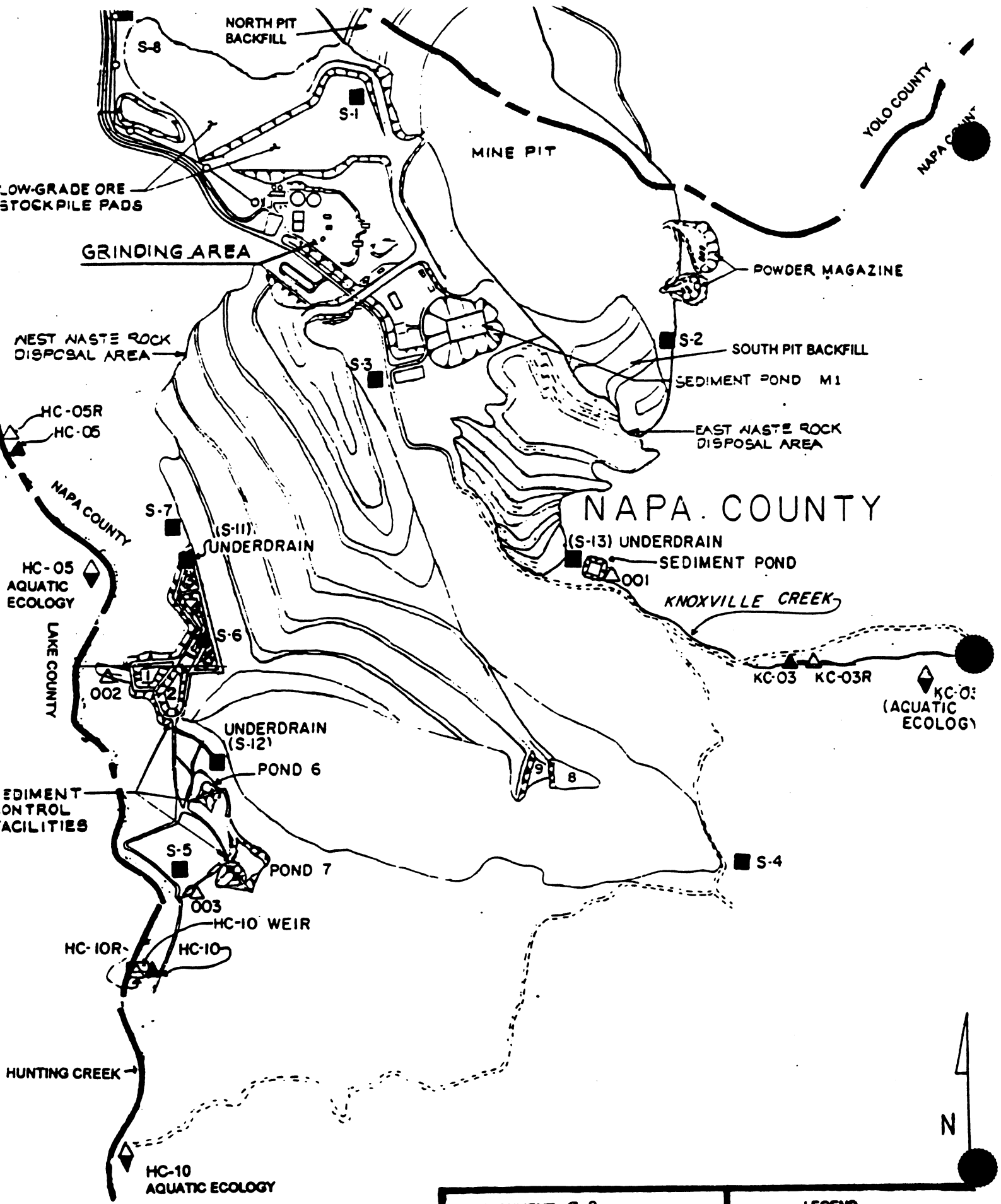


ATTACHMENT C-2
Homestake Mining Company of California
McLaughlin Mine

Davis Creek Reservoir

Not to Scale

LEGEND
- Groundwater Monitoring Station
- Surface Water Monitoring Station
- Aquatic Ecology Monitoring Station



ATTACHMENT C-3
Homestake Mining Company of California
McLaughlin Mine

Mine Pit / Waste Rock Disposal Facilities

LEGEND
- Groundwater Monitoring Station
- NPDES Monitoring Station
- Surface Water Monitoring Station
- Aquatic Ecology Monitoring Station

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

ORDER NO. 94-159

NPDES NO. CA 0081477

WASTE DISCHARGE REQUIREMENTS FOR HOMESTAKE MINING COMPANY OF CALIFORNIA MC LAUGHLIN MINE LAKE, NAPA, AND YOLO COUNTIES

The California Regional Water Quality Control Board, Central Valley Region, (hereafter Board) finds that:

1. Homestake Mining Company of California (Homestake) submitted a Report of Waste Discharge, dated 29 March 1993, to continue to discharge waste under the National Pollutant Discharge Elimination System (NPDES).

2. Homestake Mining Company of California is hereafter referred to as the Discharger.

3. The Board, on 14 November 1988, adopted Order No. 88-181 which prescribed requirements for a discharge of runoff water which has been in contact with mining activities.

4. Homestake Mining Company operates a mineral extraction facility (mill) to process about 8,000 tons of ore per day. Other units of the operation include: a mine pit, waste rock disposal sites, crushing and grinding facilities, low grade ore storage areas, slurry lines and water return lines, a tailings disposal facility, water supply reservoir, interconnecting roadways, and electrical transmission corridors.

5. The Discharger discharges runoff water which has contacted mining activities (excluding reclaimed areas) to sedimentation ponds, thence into Hunting Creek and Knoxville Creek, which are tributary to Lake Berryessa, waters of the United States, in Sections 1 and 11, T11N, R5W, MDB&M.

6. The mining process begins at an open pit which will ultimately be about one mile long, and half mile wide, and average approximately 800 feet deep. Mineral bearing ore is crushed, ground, and piped in a 4.5 mile slurry line to the mill. Waste rock is placed in terraces at the Main Waste Rock disposal facility west of the pit. Following completion of mining in the north pit, the north pit will be backfilled with the remaining waste rock from the south pit. Waste rock will be randomly placed below 1700 feet MSL elevation (up to the saddle sections) with development of terraces above that point. The Main Waste Rock site covers an area of about 350 acres. The East Waste Rock site, covers an area of about 62 acres. The north pit backfill covers an area of approximately 49 acres.

7. The waste rock has been classified as a Group B mining waste pursuant to Section 2571(b) of California Code of Regulations, Title 23, Division 3, Chapter 15 (Chapter 15). The comprehensive hydrogeologic investigations conducted prior to construction of the waste rock units demonstrated that only minor amounts of ground water underlie the waste rock disposal areas, and that there are no detectable vertical or lateral hydraulic interconnection with ground water or surface water systems with beneficial uses. These findings are consistent with findings for exemption from requirements for liners and leachate collection and removal systems pursuant to Section 2570(c) of Chapter 15.

8. The discharge to land of all other mining activities, including the mill tailings impoundment, is regulated by separate waste discharge requirements.

9. The Report of Waste Discharge describes the discharge to surface drainage courses:

Unit	Discharge Point Serial Number	Description
East Waste Rock Disposal Facility	001	Discharge from the collection pond at the East Waste Rock Disposal Facility.
Pond No. 1	002	Sediment control system for the Main Waste Rock Disposal Facility and waste rock subdrainage. This system has nine (9) ponds with points of discharge from Pond No. 1 and Pond No. 7.
Pond No. 7	003	

10. Normal storm water discharges in the second quarter of 1993 occurred from Pond 7 of the main Waste Rock Sediment Control System (discharge point 003 and receiving waters HC-05R and HC-10R). No discharge occurred from Pond 1 (discharge point 002 and receiving waters HC-05R and HC-10R) or from the East Waste Rock Facility Pond (discharge point 001 and receiving stream station KC-03R). The following table shows parameters and water quality from discharge points and monitoring stations in the second quarter of 1993:

Station	Description
HC-05R	Hunting Creek, 1/2 mile upstream of Waste Rock Disposal area
HC-10R	Hunting Creek, 1/2 mile downstream of Waste Rock Disposal area
KC-03R	Knoxville Creek, approximately one mile downstream of East Waste Rock Disposal Area

Parameter/Constituent	Units	Discharge Point 003	Station HC-05R	Station HC-10R
Flow	gpm	105	496	888
Temperature	°C	18.9	19.5	17.0
EC	µmhos/cm	2200	650	850
pH (field)	pH Units	8.3	8.6	8.2
Suspended Solids	mg/l	8.2	3.3	6.3
Settleable Solids	mg/l	N/D[2]	N/D[2]	N/D[2]
Boron	mg/l	0.360	0.200	0.300
Arsenic	mg/l	0.005[1]	0.005[1]	0.005[1]
Cadmium	mg/l	0.005[1]	0.005[1]	0.005[1]
Chromium	mg/l	0.02[1]	0.02[1]	0.02[1]
Copper	mg/l	0.01[1]	0.01[1]	0.01[1]

(continued on next page)

Parameter/Constituent	Units	Discharge Point 003	Station HC-05R	Station HC-10R
Lead	mg/l	0.02[1]	0.02[1]	0.02[1]
Mercury	mg/l	0.0002[1]	0.0002[1]	0.0002[1]
Nickel	mg/l	0.860	0.02[1]	0.02[1]
Zinc	mg/l	0.030	0.030	0.030

[1]Detection levels, actual levels less than detection.
[2]N/D equals non detect

11. The U.S. Environmental Protection Agency (EPA) and the Regional Board have classified this discharge as a minor discharge.

12. The Board adopted a Water Quality Control Plan, Second Edition, for the Sacramento River Basin (5A) (hereafter Basin Plan) which contains water quality objectives for all waters of the Basin. These requirements implement the Basin Plan.

13. The beneficial uses of Hunting and Knoxville Creeks, and Lake Berryessa downstream of the discharge are municipal; agricultural supply; recreation; aesthetic enjoyment; hydroelectric power generation; and preservation and enhancement of fish, wildlife and other aquatic resources.

14. The beneficial uses of the ground water downgradient of the Project are domestic, municipal, irrigation, and stock watering.

15. The permitted discharge is consistent with the antidegradation provisions of 40 CFR 131.12 and State Water Resources Control Board Resolution 68-16. The impact on water quality will be insignificant.

16. The chemical quality of ground and surface waters in the vicinity of the mining operation, tailings disposal area, and waste rock disposal areas is poor compared to EPA Primary and Secondary Drinking Water Standards and State Department of Water Resources Irrigation Water Quality Criteria. Boron levels frequently exceed recommended levels for continuous irrigation use.

17. Effluent limitations, and toxic and pretreatment effluent standards established pursuant to Sections 301, 302, 304, and 307 of the Clean Water Act (CWA) and amendments thereto are applicable to the discharge.

18. The action to adopt an NPDES permit is exempt from the provisions of Chapter 3 of the California Environmental Quality Act (CEQA) (Public Resources Code Section 21100, et seq.), in accordance with Section 13389 of the California Water Code.

19. The Board has notified the Discharger and interested agencies and persons of its intent to prescribe waste discharge requirements for this discharge and has provided them with an opportunity for a public hearing and an opportunity to submit their written views and recommendations.

20. The Board, in a public meeting, heard and considered all comments pertaining to the discharge.

21. This Order shall serve as an NPDES permit pursuant to Section 402 of the Clean Water Act, and amendments thereto, and shall take effect ten days from the date of hearing, provided EPA has no objections.

22. Subsequent to the preparation of the final EIR/EIS, the Discharger and the Solano Irrigation District (SID) entered into an Agreement (the SID Agreement) which provides for a comprehensive monitoring program and a series of response mechanisms designed to preclude any potential adverse environmental impacts on water quality which might otherwise occur in connection with the project. Pursuant to the SID Agreement, the Discharger has agreed to comply with specified requirements in order to assure nondegradation of the water quality of any surface or subsurface waters flowing or draining into or through Hunting, Soda, Knoxville, Putah or Eticuera Creeks into Lake Berryessa.

23. Storm water runoff from the mineral extraction facility (mill) area flows to and is contained in the Tailings Impoundment, a zero discharge facility regulated by Waste Discharge Requirement Order No. 93-121, where it is utilized as recycle water in the process or evaporated. Storm water runoff from the mine pit, crushing and grinding facilities, and low grade ore storage areas flow to the M-1 containment pond which in the event of overtopping would flow internally to the mine pit. From the M-1 Pond the storm water runoff is utilized in the crushing, grinding and milling process and ultimately flows to the Tailings Impoundment where it is recycled or evaporated. As these storm waters are not discharged from the site, the NPDES permit currently in place is sufficient to meet storm water requirements pursuant to Section 402(p) of the Clean Water Act.

IT IS HEREBY ORDERED that Order No. 88-181 is rescinded and that Homestake Mining Company of California, its agents, successors, and assigns, in order to meet the provisions contained in Division 7 of the California Water Code and regulations adopted thereunder and the provisions of the Clean Water Act and regulations and guidelines adopted thereunder, shall comply with the following:

A. Discharge Prohibitions:

1. The discharge of industrial wastes, and runoff from ore stockpiles and process chemical storage/receiving areas, which is deleterious to fish, wildlife, or other beneficial uses is prohibited.

2. The by-pass or overflow of wastes to surface waters is prohibited, except as allowed by the attached Standard Provisions and Reporting Requirements A.13.

3. Discharges of material other than storm water, which are not otherwise regulated by this order, to a storm sewer system or waters of the nation are prohibited.

B. Effluent Limitations (001, 002, and 003):

1. The discharge of an effluent in excess of the following limits is prohibited:

Constituents	Units	30-Day Average	Daily Maximum
Suspended Solids	mg/l	20	30
Settleable Solids	ml/l	0.1	0.5
Oil and Grease	mg/l	5	10
Boron	mg/l	0.7	1.5
Arsenic	mg/l	0.05	0.10
Cadmium	mg/l	0.01	0.02
Chromium	mg/l	0.05	0.10
Copper	mg/l	0.15	0.30
Lead	mg/l	0.05	0.10
Mercury	mg/l	0.001	0.002
Zinc	mg/l	0.75	1.5

Metals shall be analyzed and reported as totals.

2. The discharge shall not have a pH less than 6.5 nor greater than 9.0.

3. The Discharger shall use the best practicable cost-effective control technique currently available to limit mineralization to no more than a reasonable increment.

4. Discharges to surface waters (excluding fresh water diversions from natural or reclaimed areas) shall be limited to discharges from the sediment trap ponds.

5. Survival of aquatic organism in 96-hour bioassays of undiluted waste shall be no less than:

Minimum for any one bioassay ---------- 70%
Median for any three or more consecutive bioassays ---------- 90%

C. Receiving Water Limitations:

Receiving Water Limitations are based upon water quality objectives contained in the Basin Plan. As such, they are a required part of this permit.

The discharge shall not cause the following in the receiving water:

1. Concentrations of dissolved oxygen to fall below 5 mg/l.

2. Oils, greases, waxes, or other materials to form a visible film or coating on the water surface or on the stream bottom.

3. Oils, greases, waxes, floating material (liquids, solids, foams, and scums) or suspended material to create a nuisance or adversely affect beneficial uses.

4. Aesthetically undesirable discoloration.

5. Fungi, slimes, or other objectionable growths.

6. Turbidity to increase more than 20 percent over background levels.

7. The normal ambient pH to fall below 6.5, exceed 9.0, or change by more than 0.5 units.

8. Deposition of material that causes nuisance or adversely affects beneficial uses.

9. The normal ambient temperature to be altered/increased more than 5°F.

10. Taste or odor-producing substances to impart undesirable tastes or odors to fish flesh or other edible products of aquatic origin or to cause nuisance or adversely affect beneficial uses.

11. Radionuclides to be present in concentrations that exceed maximum contaminant levels specified in the California Code of Regulations, Title 22; that harm human, plant, animal or aquatic life; or that result in the accumulation of radionuclides in the food web to an extent that presents a hazard to human, plant, animal, or aquatic life.

12. Aquatic communities and populations, including vertebrate, invertebrate, and plant species, to be degraded.

13. Toxic pollutants to be present in the water column, sediments, or biota in concentrations that adversely affect beneficial uses; that produce detrimental response in human, plant, animal, or aquatic life; or that bioaccumulate in aquatic resources at levels which are harmful to human health.

14. Violation of any applicable water quality standard for receiving waters adopted by the Board or the State Water Resources Control Board pursuant to the CWA and regulations adopted thereunder.

15. A statistically significant incremental increase of more than 10% (or, if greater than 10%, the minimum percentage increase that may be accurately measured) over upstream levels of the receiving waters of the following constituents: arsenic, lead, cadmium, chromium, copper, and mercury.

D. Provisions:

1. The Discharger shall submit by **31 July 1994** a Storm Water Pollution Prevention Plan (SWPPP) in accordance with Attachment C. The SWPPP should contain appropriate best management practices to reduce pollutants in the discharges covered by this Order.

2. The Discharger shall comply with the lawful requirements of municipalities, counties, drainage districts, and other local agencies regarding discharges of storm water to storm drain systems or other water courses under their jurisdiction, including applicable requirements in municipal storm water management programs developed to comply with NPDES general permits issued by the Regional Water Boards to local agencies.

3. The settling ponds shall be designed to contain the flow from the 10-year frequency storms in a 24-hour period.

4. This Order expires on 20 May 1999 and the Discharger must file a Report of Waste Discharge in accordance with Title 23, California Code of Regulations, not later than 180 days in advance of such date as application for issuance of new waste discharge requirements.

5. The provisions of this Order are not intended to, and shall not limit or reduce any obligations or requirements or requirements which are additional to, or more stringent than, those created pursuant to this Order and which are imposed on the Discharger pursuant to (a) the terms of any agreement to which the Discharger and the Solano Irrigation District, or (b) the requirements and controls imposed by any governmental agency or other authority having jurisdiction with respect to the Project. Nothing in this paragraph shall be construed to release or excuse the Discharger from full and timely compliance with the requirements of this Order or amendments or supplements thereto.

6. The Discharger shall submit to the Board on or before each compliance report due date, the specified document or, if appropriate, a written report detailing compliance or noncompliance with the specific schedule date and task. If noncompliance is being reported, the reasons for such noncompliance shall be stated, plus an estimate of the date when the Discharger will be in compliance. The Discharger shall notify the Board by letter when it returns to compliance with the time schedule.

7. The Discharger shall comply with all the items of the "Standard Provisions and Reporting Requirements for Waste Discharge Requirements (NPDES)", dated 1 March 1991, which are part of this Order. This attachment and its individual paragraphs are referred to as "Standard Provision(s)."

8. The Discharger shall comply with the attached Monitoring and Reporting Program No. 94-159, which is part of this Order, and any revisions thereto, as ordered by the Executive Officer.

9. When requested by EPA, the Discharger shall complete and submit Discharge Monitoring Reports. The submittal date shall be no later than the submittal date specified in the Monitoring and Reporting Program for Discharger Self Monitoring Reports.

10. Prior to making any change in the discharge point, place of use, or purpose of use of the wastewater, the Discharger shall obtain approval of or clearance from the State Water Resources Control Board (Division of Water Rights).

11. In the event of any change in control or ownership of land or waste discharge facilities presently owned or controlled by the Discharger, the Discharger shall notify the succeeding owner or operator of the existence of this Order by letter, a copy of which shall be immediately forwarded to this office.

    To assume operation under this Order, the succeeding owner or operator must apply in writing to the Executive Officer requesting transfer of the Order. The request must contain the requesting entity's full legal name, the State of incorporation if a corporation, the name, address, and telephone number of the persons responsible for contact with the Board, and a statement. The statement shall comply with the signatory paragraph of Standard Provision D.6 and state that the new owner or operator assumes full responsibility for compliance with this Order. Failure to submit the request shall be considered a discharge without requirements, a violation of the California Water Code.

12. This permit may be reopened to set effluent limits for sulfate and nickel.

I, WILLIAM H. CROOKS, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, Central Valley Region, on 20 May 1994.

William H. Crooks

WILLIAM H. CROOKS, Executive Officer

Amended 20 May 1994

MWJ:sjs

Attachments

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

MONITORING AND REPORTING PROGRAM NO. 94-159

NPDES NO. CA081477

FOR
HOMESTAKE MINING COMPANY OF CALIFORNIA
MC LAUGHLIN MINE
LAKE, NAPA, AND YOLO COUNTIES

Specific sample station locations shall be established under direction of the Board's staff, and a description of the stations shall be attached to this Order.

EFFLUENT MONITORING

Effluent samples shall be collected downstream from the last connection through which wastes can be admitted into the outfall. Effluent samples should be representative of the volume and nature of the discharge. Samples collected from the outlet structure of ponds will be considered adequately composited. Time of collection of a grab sample shall be recorded. The following shall constitute the effluent monitoring program:

During each discharge period, the discharge from Discharges 001, 002, and 003 shall be sampled and analyzed according to the following schedule:

Constituents	Units	Type of Sample	Sampling Frequency
Flow	Gallons per minute	Estimate	Daily for first two days of discharge and weekly thereafter for period of continued discharge.
Temperature	°C	Grab	" "
EC	µmhos/cm	Grab	" "
pH (field)	pH Units	Grab	" "
Suspended Solids	mg/l	Grab	" "
Settleable Solids	mg/l	Grab	" "
Oil & Grease	mg/l	Grab	" "
Boron	mg/l	Grab	" "
Arsenic	mg/l	Grab	" "
Cadmium	mg/l	Grab	" "
Chromium	mg/l	Grab	" "
Copper	mg/l	Grab	" "
Lead	mg/l	Grab	" "
Mercury	mg/l	Grab	" "
Zinc	mg/l	Grab	" "

Metals shall be analyzed and reported as totals.

If the discharge is intermittent rather than continuous, then on the first day of each such intermittent discharge, the Discharger shall monitor and record data for all of the constituents listed above, after which the frequencies of analysis given in the schedule shall apply for the duration of each such

intermittent discharge. In no event shall the Discharger be required to monitor and record data more often than twice the frequencies listed in the schedule.

RECEIVING WATER MONITORING

Receiving water samples shall be collected daily for the first two (2) days of discharge and weekly thereafter for each period of continuous discharge.

Station	Description
HC-05R	Hunting Creek, 1/2 mile upstream of Waste Rock Disposal area
HC-10R	Hunting Creek, 1/2 mile downstream of Waste Rock Disposal area
KC-03R	Knoxville Creek, approximately one mile downstream of East Waste Rock Disposal Area

Constituents	Units
Flow (field)	Gallons per minute
Temperature	°C
EC	µmhos/cm
pH (field)	pH Units
Suspended Solids	mg/l
Settleable Solids	mg/l
Oil & Grease	mg/l
Boron	mg/l
Arsenic	mg/l
Cadmium	mg/l
Chromium	mg/l
Copper	mg/l
Lead	mg/l
Mercury	mg/l
Zinc	mg/l

Metals shall be analyzed and reported as totals.

In conducting the receiving water sampling, a log shall be kept of the receiving water conditions throughout the reach bounded by Stations HC-05R, HC-10R, and KC-03R. Attention shall be given to the presence or absence of:

a. Floating or suspended matter
b. Discoloration
c. Bottom deposits
d. Aquatic life
e. Visible films, sheens or coatings
f. Fungi, slimes, or objectionable growths
g. Potential nuisance conditions

Notes on receiving water conditions shall be summarized in the monitoring report.

REPORTING

Quarterly monitoring reports shall be submitted to the Regional Board by the **45th day** following each calendar quarter. Annual monitoring reports shall be submitted to the Regional Board by **1 October** of each calendar year for monitoring data taken in the previous year.

In reporting the monitoring data, the Discharger shall arrange the data in tabular form so that the date, the constituents, and the concentrations are readily discernible. The data shall be summarized in such a manner to illustrate clearly whether the discharge complies with waste discharge requirements. The highest daily maximum for the month, monthly and weekly averages, and medians should be determined and recorded.

If the Discharger monitors any pollutant at the locations designated herein more frequently than is required by this Order, the results of such monitoring shall be included in the calculation and reporting of the values required in the discharge monitoring report form. Such increased frequency shall be indicated on the discharge monitoring report form.

The Discharger may also be requested to submit an annual report to the Board with both tabular and graphical summaries of the monitoring data obtained during the previous year. Any such request shall be made in writing. The report shall discuss the compliance record. If violations have occurred, the report shall also discuss the corrective actions taken and planned to bring the discharge into full compliance with the waste discharge requirements.

All reports submitted in response to this Order shall comply with the signatory requirements of Standard Provision D.6.

The Discharger shall implement the above monitoring program on the first day of the month following effective date of this Order.

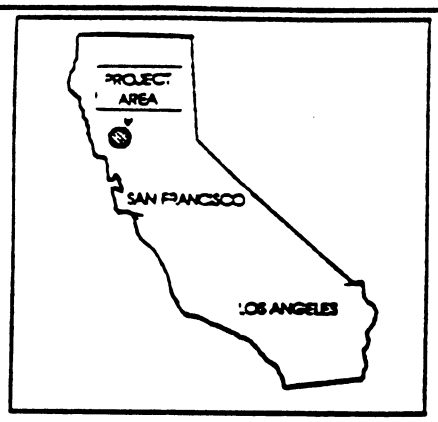
Ordered by: _____
WILLIAM H. CROOKS, Executive Officer

20 May 1994
(Date)

20 May 1994

MWJ

ATTACHMENT A



WILLIAMS

CLEAR LAKE

CLEARLAKE OAKS

LAKEPORT

ARBUCKLE

COLUSA CO.

YOLO CO.

MENDOCINO CO.

LOWER LAKE

RUMSEY

PROJECT LOCATION

KNOXVILLE

LAKE CO.

MIDDLETOWN

YOLO CO.

NAPA CO.

GEYSERVILLE

LAKE BERRYESSA

CALISTOGA

NAPA CO.

SONOMA CO.

RUTHERFORD

SANTA ROSA

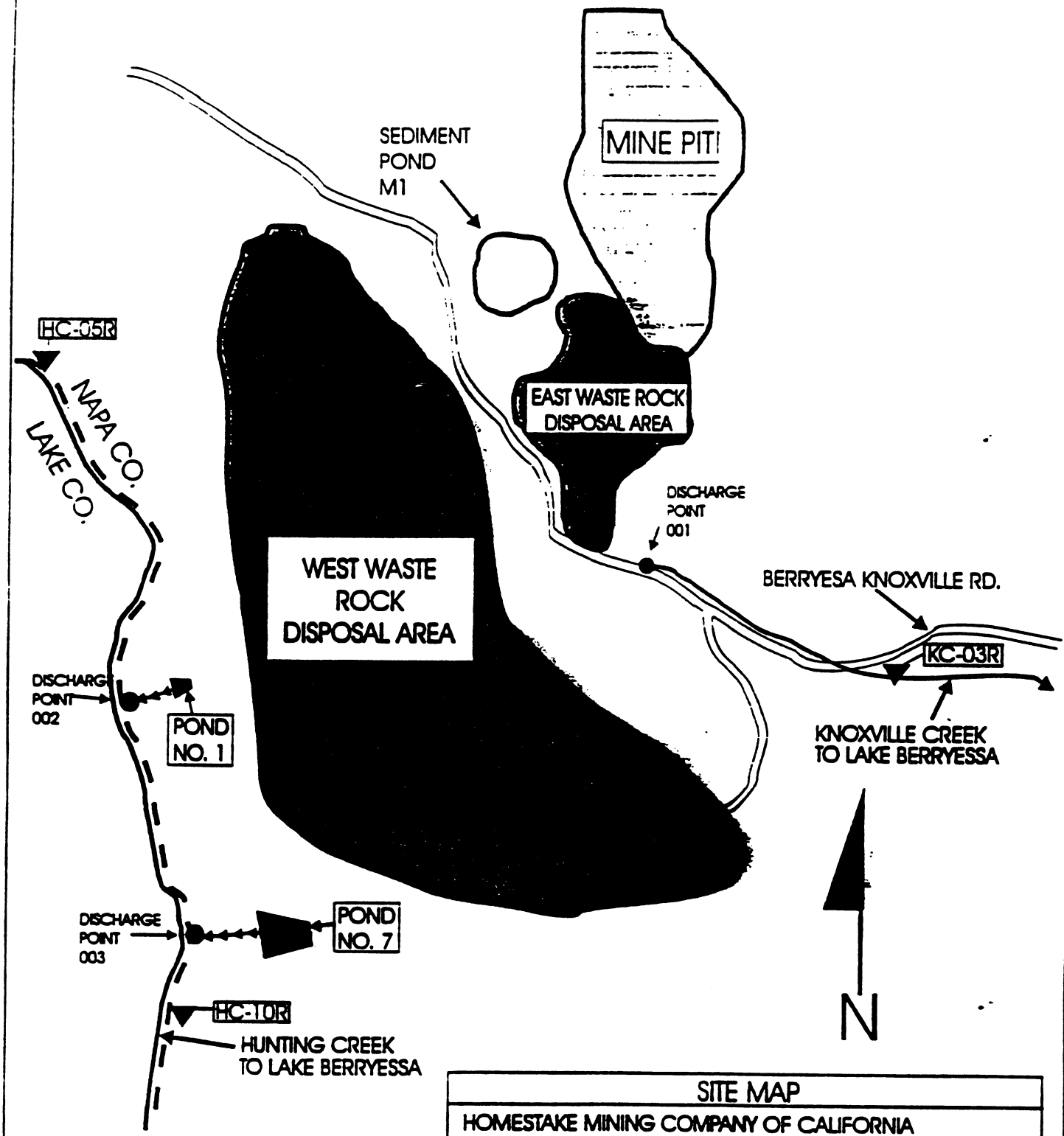
N

LOCATION MAP

HOMESTAKE MINING COMPANY OF CALIFORNIA
McLAUGHLIN MINE

NOT TO SCALE

ATTACHMENT B



SITE MAP

HOMESTAKE MINING COMPANY OF CALIFORNIA
MCLAUGLIN MINE
WASTE ROCK DISPOSAL FACILITIES

- DISCHARGE POINT
- POND NUMBER #
- HC-05R RECEIVING WATER SAMPLING STATIONS

NOT TO SCALE

ATTACHMENT C
Storm Water Pollution Prevention Plan

1. A Storm Water Pollution Prevention Plan (SWPPP) shall be developed and implemented by the Discharger. The SWPPP shall be designed to comply with BAT/BCT and be certified in accordance with the signatory requirements of Standard Provision D.6. The SWPPP shall be retained on-site and made available upon request of a representative of the Regional Water Quality Control Board and/or local storm water management agency (local agency) which receives the storm water discharge.

2. The Regional Water Quality Control Board and/or local agency may notify the Discharger when the SWPPP does not meet one or more of the minimum requirements of this section. Within 30 days of notice, the Discharger shall submit a time schedule that meets the minimum requirements to this section to the Regional Board and/or local agency that requested the changes. After making the required changes, the Discharger shall provide written certification that the changes have been made.

3. The Discharger shall amend the SWPPP whenever there is a change in construction, operation, or maintenance which may effect the discharge of significant quantities of pollutants to surface water, ground water, or the local agency's storm drain system. The SWPPP should also be amended if it is in violation of conditions of the permit, or has not achieved the general objectives of controlling pollutants in the discharges.

4. The SWPPP shall provide a description of potential sources which may be expected to add significant quantities of pollutants to storm water discharges, or which may result in non-storm water discharges from the facilities. The SWPPP shall include, at a minimum, the following items:

   a. A map extending approximately one-quarter mile beyond the property boundaries of the facility showing: the facility, general topography, surface water bodies (including known springs and wells), and the discharge point(s) where the facility's storm water discharges to a municipal storm drain system or other water body. The requirements of this paragraph may be included in the site may required under the following paragraph if appropriate.

   b. A site map showing:

      i. The storm water conveyance and discharge structures.;

      ii. An outline of the storm water drainage areas for each storm water discharge point;

      iii. Paved areas and buildings;

      iv. Areas of pollutant contact, actual or potential;

      v. Location of existing storm water structural control measures (i.e., berms, coverings, etc.);

      vi. Surface water locations;

      vii. Areas of existing and potential soil erosion; and

      viii. Vehicle service areas.

   c. A narrative description of the following:

      i. Significant materials that have been treated, stored, disposed, spilled, or leaked in significant quantities is storm water discharge after 19 November 1988;

ii. Materials, equipment, and vehicle management practices employed to minimize contact of significant materials with storm water discharge;

iii. Material loading, unloading, and access areas;

iv. Existing structural and non-structural control measures (if any) to reduce pollutants in storm water discharge;

v. Industrial storm water discharge treatment facilities (if any);

vi. Methods of on-site storage and disposal of significant materials;

vii. Outdoor storage, manufacturing, and processing activities including activities that generate significant quantities of particulate;

viii. Practices to minimize contact of construction materials, equipment, and vehicles with storm water at the construction site:

ix. Preconstruction control practices (if any) to reduce sediment and other pollutants in storm water discharges; and

x. Methods of on-site storage and disposal of construction materials.

d. A list of pollutants that are likely to be present in storm water discharges in significant quantities, and an estimate of the annual quantities of these pollutants in storm water discharges.

e. An estimate of the size of the facility (in acres or square feet), and the percent of the facility that has impervious areas.

f. A list of the significant spills or leaks of toxic or hazardous pollutants that have occurred after 19 November 1988. This shall include:

i. Toxic chemicals (listed in 40 CFR Part 372) that have been discharged to storm water as reported on USEPA Form R.

ii. Oil or hazardous substances in excess or reportable quantities (see 40 CFR Par 110, 117, or 302).

g. A summary of existing sampling data (if any) describing pollutants in storm water discharges.

5. The SWPPP shall describe the storm water management controls for the facility. The appropriate controls shall reflect identified potential sources of pollutants at the facility. The description of the storm water management controls shall include:

a. Storm Water Pollution Prevention Personnel. Identify specific individuals (and job titles) who are responsible for developing, implementing, and revising the SWPPP.

b. Preventive Maintenance. Preventive maintenance involves inspection and maintenance of storm water conveyance system devices (oil/water separators, catch basins, etc.) and inspection and testing of plant equipment and systems that could fail and result in discharges of pollutants to storm water.

INFORMATION SHEET

HOMESTAKE MINING COMPANY OF CALIFORNIA
MC LAUGHLIN MINE
LAKE, NAPA, AND YOLO COUNTIES

This is an existing operation. The original NPDES Permit Order No. 83-125, was adopted by the Board on 23 September 1983, and revised by Order No. 85-031, adopted 25 January 1985. The permit was revised again by Order No. 88-181, adopted 14 November 1988.

The mine is an open pit. Waste rock is terraced on slopes overlooking Hunting and Knoxville Creeks. Waste rock is also placed in the north pit with terrace development above the 1700 feet MSL elevation. Low grade ore is stockpiled within the drainage area of the mine pit and fed into the circuit as needed. The remainder of the ore is fed into a grinding circuit and pumped as a slurry to the mill site about 4.5 miles distant. Tailings from the mill are deposited in an impervious reservoir. Excess water from the reservoir is recycled back to the mill and grinding circuit.

Runoff water that has contacted mining activities is discharged to Hunting Creek from nine ponds below the Main Waste Rock Disposal Facility. Of the nine ponds, the discharge to surface waters is from Pond No. 1 (002) and Pond No. 7 (003).

Effluent limitations for suspended solids, arsenic, cadmium, copper, lead, mercury, and zinc are derived from the Title 40, Code of Federal Regulations (CFR), Part 440, "Ore Mining and Dressing Point Source Category". This NPDES renewal includes additional effluent limitations that were not included in the previous NPDES permit. The additional limitations include boron, oil and grease. The boron limitation is derived from Agricultural Water Goals. The oil and grease limitation was added to be consistent with the general storm water permit adopted by the State Water Resources Control Board. The effluent limitation toxicity testing for the survival of aquatic organism in 96-hour bioassays of undiluted waste along with several other specifications for receiving water limitations have also been added to be consistent with the Basin Plan.

The permit requires the Discharger to develop a Storm Water Pollution Prevention Plan (SWPPP). The SWPPP will detail the measures the Discharger proposes to: minimize the discharge of pollutants in storm water runoff, provide best management practices to reduce the pollutant loadings, institute source control, prevent and clean up spills, control erosion and sediment, require construction practices that will control/reduce erosion and sediment discharge; and, provide training of personnel to manage the program. The required contents of the SWPPP under this permit are nearly identical to those required by the General Permits for storm water associated with industrial and construction activities adopted by the State Water Resources Control Board.

20 May 1994

MWJ

c. Good Housekeeping. Good housekeeping requires the maintenance of clean, orderly, facility areas that discharge storm water. Material handling areas shall be inspected and cleaned to reduce the potential for pollutants to enter the storm water conveyance system.

d. Spill Prevention and Response. Identification of areas where significant materials can spill into or otherwise enter the storm water conveyance system and their accompanying drainage points. Specific material handling procedures, storage requirements, and procedures should be identified, as appropriate. Internal reporting procedures for spills of significant materials shall be established.

e. Storm Water Management Practices. Storm water management practices other than those which control the source of pollutants. They include measures such as installing oil an grit separators, diverting storm water into retention basins, etc. Based on assessment of the potential of various sources to contribute to storm water discharges in significant quantities, additional storm water management practices to remove pollutants from storm water discharges shall be implemented.

f. Erosion and Sediment Control. The SWPPP shall identify measures to reduce sediment in storm water discharges. For construction sites, this shall include the following.

i. A description of the soil stabilization practices. These practices shall be designed to preserve existing vegetation where feasible and to revegetate open areas as soon as feasible after grading or construction. In developing these practices, the discharger shall consider: temporary seeding, permanent seeding, mulching, sod stabilization, vegetative buffer strips, protection of trees, or other soil stabilization practices. At a minimum, the operator must implement these practices on all disturbed areas during the rainy season;

ii. A description or illustration of control practices which, to the extent feasible, will prevent a net increase of sediment load in storm water discharge. In developing control practices, the discharger shall consider a full range of erosion and sediment controls such as detention basins, straw bale dikes, silt fences, earth dikes, brush barriers, velocity dissipation devices, drainage swales, check dams, subsurface drains, pipe slope drains, level spreaders, storm drain inlet protection, rock outlet protection, sediment traps, temporary sediment basins, or other controls. At a minimum, sandbag dikes, silt fences, straw bale dikes, or equivalent controls practices are required for all significant sideslope and downslope boundaries of the construction area. The Discharger must consider site-specific and seasonal conditions when designing the control practices; and

iii. Procedures for maintenance, inspection, and repair to ensure that all grade surfaces, walls, dams and structures, vegetation, erosion and sediment control measures, and other protective devices are maintained in good and effective condition and are promptly repaired or restored.

g. Post-Construction Storm Water Management. The SWPPP shall describe the control practices to reduce pollutants in storm water discharges after all construction phases have been completed at a site. These must be consistent with all local post-construction storm water management requirements, policies, and guidelines, and with other sections of the SWPPP.

h. Employee Training. Employee training programs shall inform all personnel responsible for implementing the SWPPP. Training should address spill response, good housekeeping, material management practices, inspections, and maintenance and repair measures listed in 5.f.iii., above. Periodic dates for training should be identified.

i. Inspections. All inspections, visual observations and sampling as required in the Monitoring and Reporting Program, shall be done by trained personnel. A tracking or follow-up procedure shall be used to ensure appropriate response has been taken in response to these activities.

6. Non-storm water discharges to the storm water conveyance system shall be eliminated. If they are not eliminated prior to implementation of the SWPPP, the Discharger shall notify the appropriate Regional Water Quality Control Board prior to implementation of the SWPPP that non storm water discharges cannot be eliminated. The notification shall include a proposed time schedule for elimination of non-storm water discharges. In no case shall the elimination of non-storm water discharges exceed three years from the date of the permit.

STATE OF CALIFORNIA — ENVIRONMENTAL PROTECTION AGENCY PETE WILSON, Governor

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD —
CENTRAL VALLEY REGION
3443 ROUTIER ROAD, SUITE A
SACRAMENTO, CA 95827-3098
PHONE: (916) 255-3000
FAX: (916) 255-3015

CERTIFIED MAIL
P 240- 867 546

Mr. Ray Krauss
Homestake Mining Co., McLaughlin Mine
26775 Morgan Valley Road
Lower Lake, CA 95457

13 May 1996

NOTICE OF ADOPTION
REVISED MONITORING AND REPORTING PROGRAM
HOMESTAKE MINING COMPANY OF CALIFORNIA,
McLAUGHLIN MINE
LAKE, NAPA, AND YOLO COUNTIES

Enclosed is a copy of revised Monitoring and Reporting Program No. 94-315 for the above named discharger adopted by the California Regional Water Quality Control Board, Central Valley Region, on 3 May 1996.

WILLIAM J. MARSHALL, Chief
Waste Discharge to Land Unit

PWM

Enclosure - Standard Provisions (Discharger Only)

cc: Ms. Betsy Jennings, State Water Resources Control Board, Sacramento
Ms. Liz Haven, State Water Resources Control Board, Sacramento
Office of Drinking Water, Department of Health Services, Sacramento
Department of Health Services, Environmental Management Branch, Sacramento
Department of Fish and Game, Region II, Rancho Cordova
Lake County Health Department, Lakeport
Mr. Steve Zalusky, Lake County Planning Department, Lakeport
Napa County Health Department, Napa
Ms. Terry Garbarino, Napa County Planning Department, Napa
Yolo County Planning Department, Woodland
Yolo County Environmental Health Department, Woodland
Solano County Department of Environmental Management, Fairfield
Solano County Planning Department, Fairfield
Ms. Suzanne Butterfield, Solano Irrigation District, Vacaville
Mr. Robert Speirs, Brooks
Mr. James Wilson, Legal and Safety Employer Research, Gridley

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

REVISED MONITORING AND REPORTING PROGRAM NO. 94-315

FOR
HOMESTAKE MINING COMPANY OF CALIFORNIA
McLAUGHLIN MINE
LAKE, NAPA, AND YOLO COUNTIES

Compliance with this Monitoring and Reporting Program (MRP), and with the companion Standard Provisions and Reporting Requirements, is ordered by Waste Discharge Requirements (WDRs) Order No. 94-315. Failure to comply with this Program, or with the Standard Provisions and Reporting Requirements, constitutes non-compliance with the WDRs and with the California Water Code, which can result in the imposition of civil monetary liability.

This MRP is based on a revision of MRP No. 94-315. Homestake Mining Company requested changes in the MRP because mining operations in the open pit are ending and the main waste rock disposal area is closing. The revisions reduce some monitoring activities from quarterly to semi-annually and eliminate some reporting requirements related to production from the pit. The monitoring program for surface water prescribed by the facility's NPDES permit is not affected by the changes here.

A. REPORTING

The Discharger shall report monitoring data and information as required in this MRP and as required in the Standard Provisions and Reporting Requirements. Reports which do not comply with the required format will be **REJECTED** and the Discharger shall be deemed to be in non-compliance with the WDRs. In reporting the monitoring data required by this program, the Discharger shall arrange the data in tabular form so that the date, the constituents, the concentrations, and the units are readily discernible. The data shall be summarized in such a manner so as to illustrate clearly the compliance with waste discharge requirements or the lack thereof. A short discussion of the monitoring results, including notations of any water quality violations, shall precede the tabular summaries.

Field and laboratory tests shall be reported in the quarterly monitoring reports. Quarterly monitoring reports shall be submitted to the Regional Board within **45 days** of analytical determination.

If the Discharger monitors any pollutant at the locations designated herein more frequently than is required by this MRP, the Discharger shall include the results of such monitoring in the calculation and reporting of the values required in the Discharge Monitoring Reporting Form.

The Discharger shall submit a report to the Board by **30 October** of each year containing both tabular and graphical summaries of the monitoring data obtained during the previous year. In addition, the Discharger shall discuss the compliance record and the corrective actions taken or planned which may be needed to bring the discharges into full compliance with the waste discharge requirements.

If any additional monitoring activities are required as a condition of, or performed in conjunction with, any permit for Homestake's McLaughlin Mine, including "aquatic life" sampling, the results of such additional monitoring shall be submitted to the Board at the same time that the results are submitted to the agencies or entities which require such monitoring.

Method detection limits and practical quantitation limits shall be reported. All peaks shall be reported, including those which cannot be quantified and/or specifically identified.

B. REQUIRED MONITORING REPORTS

1. Water Quality Protection Standard Report

The Discharger shall submit any changes to the water quality protection standard report in the annual monitoring report.

2. Detection Monitoring Reports

The Discharger shall submit reports of the results of detection monitoring in accordance with the schedules specified in this Monitoring and Reporting Program. Statistical or non-statistical analysis shall be performed as soon as the monitoring data are available.

3. Annual Monitoring Summary Report

The Discharger shall submit the Annual Monitoring Summary Report as specified in the Standard Provisions and Reporting Requirements.

C. REQUIRED MONITORING PROGRAMS

1. Operations Monitoring

The operations monitoring program shall consist of the following:

Constituent	Units	Type of Sample	Sampling Frequency
Low Grade Ore Stockpile			
Mass Used	Dry Tons	Estimate	Monthly
Crushing and Grinding Facility			
Mass of solids placed in Slurry Pipeline	Dry Tons	Estimate	Monthly
Tailings Return Sump			
Return Flow	gpd	pump hours or metered	Monthly
pH	number	Grab	Semi-annually

Constituents	Units	Type of Sample	Sampling Frequency
Specific Conductance	µmhos/cm	Grab	Semi-annually
TDS	mg/l	Grab	Semi-annually
Heavy Metals [1]	mg/l	Grab	Semi-annually

[1] The following metals shall be analyzed: Arsenic, Chromium III, Copper, Mercury, Nickel, Cyanide

Tailings Disposal

Flow to Impoundment	mgd	Metered	Quarterly
pH	number	Range	Quarterly
Sulfate	mg/l mg/kg	Composite	Quarterly
Arsenic	mg/l mg/kg	Composite	Quarterly
Total Chromium	mg/l mg/kg	Composite	Quarterly
Copper	mg/l mg/kg	Composite	Quarterly
Mercury	mg/l mg/kg	Composite	Quarterly
Nickel	mg/l mg/kg	Composite	Quarterly
Total Cyanide	mg/l mg/kg	Composite	Quarterly

2. Ground Water Monitoring

The ground water monitoring program shall consist of the following:

Monitoring Points

Mine

Two wells (S-1 and S-2) are established to measure the ground water quality. A third well (S-10) is between the mine and Davis Creek Reservoir.

Low Grade Ore Stockpile, Ore Crushing Area

One monitoring well (S-8) is established in this area.

Waste Rock Disposal

Five monitoring wells (S-3, S-4, S-5, S-6, and S-7) are established to measure up and downgradient ground water quality.

Tailings Disposal Facility

Twelve monitoring wells (N Series) are established to measure up and downgradient ground water quality.

Note: Prior to construction of any additional wells, plans and specifications for ground water monitoring wells shall be submitted to Board staff for review and approval.

Constituents

Field Parameters

pH	Specific Conductance
Temperature	Ground Water Elevations

Monitoring Parameters and Constituents of Concern

Total Alkalinity	Nitrate
Total Hardness	Sulfate
Total Dissolved Solids	

Metals (total)

Arsenic	Copper	Nickel	Total Cyanide
Boron	Lead	Free Cyanide	
Sodium	Manganese	Zinc	
Total Chromium	Mercury	Iron	

Note: Cyanide shall only be analyzed in wells near the tailings disposal and mill site.

Units

All units shall be reported in mg/l, except pH (number), levels (in feet USGS Datum), temperature (°C), and specific conductance (µmhos/cm).

Type of Sample

All samples shall be grab samples using proper EPA and Regional Board sampling techniques and preservation. The wells shall be adequately purged prior to sampling. Samples being analyzed for metals should be reported as total metals.

Sampling Frequency

Samples shall be collected and analyzed semi-annually. Ground water elevations shall be obtained semi-annually.

Observation Wells (Tailings Key Trench)

OW-1A, 2A, 3A, 4A, 5, 6, 7, 8 and 9 shall be monitored semi-annually for the following constituents: water elevation, pH, specific conductance, and Total Cyanide.

3. **Surface Water Monitoring**

Surface water monitoring reports may be submitted with the corresponding semiannual ground water monitoring and shall include evaluation of potential impacts of the facility on surface water quality and compliance with the Water Quality Protection Standard. All receiving water samples shall be grab samples. Receiving water samples shall be taken from the following locations:

Davis Creek 5 (DC-5)

DC-5 is on Davis Creek near the Reid Mine in the northwest quarter of Section 25, T12N, R5W. The sampling location is on the west bank, near the Rieff-Rayhouse Road, upstream of the road crossing.

Davis Creek 6 (DC-6)

DC-6 is on Davis Creek downstream of the Davis Creek Reservoir Dam near the northeast corner of Section 25, T12N, R5W. The sampling location is downstream of the confluence of a tributary from the west along the side of Hobit Mountain between a 1-1/2 foot diameter leaning, pine tree, and three-foot diameter oak tree on the east bank.

Hunting Creek 5 (HC-5)

HC-5 is on an eastern tributary to Hunting Creek in the southeastern quarter of Section 2, T11N, R5W. The sampling location is in the Hunting Creek channel adjacent to a sharp bend in a dirt road which proceeds up a steep hill. The sampling point is approximately six feet west of a two-foot diameter oak tree and adjacent to two steel fence posts driven into the ground.

Hunting Creek 9 (HC-9)

HC-9 is on a western tributary to Hunting Creek, draining Quarry Valley and parallel to the Old Morgan Valley Road. The station is south of the center of Section 28, T12N, R5W. The sampling location is north of the old Morgan Valley Road, west of a small bridge crossing Hunting Creek and south of a rock outcrop. A steel post is approximately 10 feet south of the sampling location.

Hunting Creek 10 (HC-10)

HC-10 is on the main channel of Hunting Creek immediately below the concrete weir in the northeastern quarter of Section 11, T11N, R5W.

Hunting Creek 11 (HC-11)

HC-11 is downstream of the Rieff Road Bridge on Hunting Creek in Morgan Valley in the western half of Section 21, T12N, R5W. The sampling station is approximately

40 feet downstream of the Rieff Road Bridge in the center of the stream opposite a cluster of Manzanita bushes.

Knoxville Creek 3 (KC-3)

KC-3 is in the northwest quarter of Section 7, T11N, R4W, upstream of the county road crossing and downstream of the Devils Head Road.

RECEIVING WATER MONITORING

The following surface stations shall be analyzed semi-annually: DC-5, DC-6, HC-5, HC-9, HC-10, HC-11, and KC-3. Free and total cyanide shall only be analyzed at Stations HC-9 and HC-10.

Constituent	Units
Flow (estimate)	gpm
pH (field)	number
Temperature (field)	°C
Specific Conductance (field)	µmhos/cm
Total Alkalinity	mg/l
Suspended Matter	mg/l
Chloride	mg/l
Nitrate	mg/l
Sulfate	mg/l
Ammonia	mg/l
Arsenic	mg/l
Boron	mg/l
Chromium	mg/l
Copper	mg/l
Iron	mg/l
Lead	mg/l
Mercury	mg/l
Nickel	mg/l
Sodium	mg/l
Zinc	mg/l
Free Cyanide	mg/l
Total Cyanide	mg/l

Note: Metal analysis shall be reported in both dissolved and total metals present (filtered and non-filtered). Sampling Station HC-10 will provide for daily composites analyzed semimonthly for free cyanide.

Aquatic Ecology

Aquatic life shall be sampled at the following locations annually: HC-10, HC-7A, KC-3, DC-5, and DC-6. Sampling shall provide for the following: sampling by net, electro-shocking, surber sampler; species identification, inventory and mercury analysis of fish flesh.

D. WATER QUALITY PROTECTION STANDARD

The Water Quality Protection Standard (Standard) shall consist of the following elements:

1. **Constituents of Concern**

   The list of Constituents of Concern (COC) shall include all constituents listed in this MRP and Waste Discharge Requirements Order No. 94-315 . The Discharger shall monitor all COCs at the frequencies specified in this MRP.

2. **Concentration Limits**

   The Discharger has submitted Concentration Limits for ground water and surface water at the facility. The Discharger shall review the concentration limits for all Constituents of Concern and submit the results with the 1997 Annual Report.

3. **Monitoring Points**

   The monitoring points for ground and surface water include all those specified in this MRP and all newly constructed wells for detection monitoring, as shown in Attachment C.

4. **Points of Compliance**

   The points of compliance for surface water shall be all surface water monitoring points specified in this MRP except for monitoring points used for background monitoring. The points of compliance for ground water shall be N-5, N-8 (A,B,C), N-9, N-11, N-12, and S-10.

5. **Compliance Period**

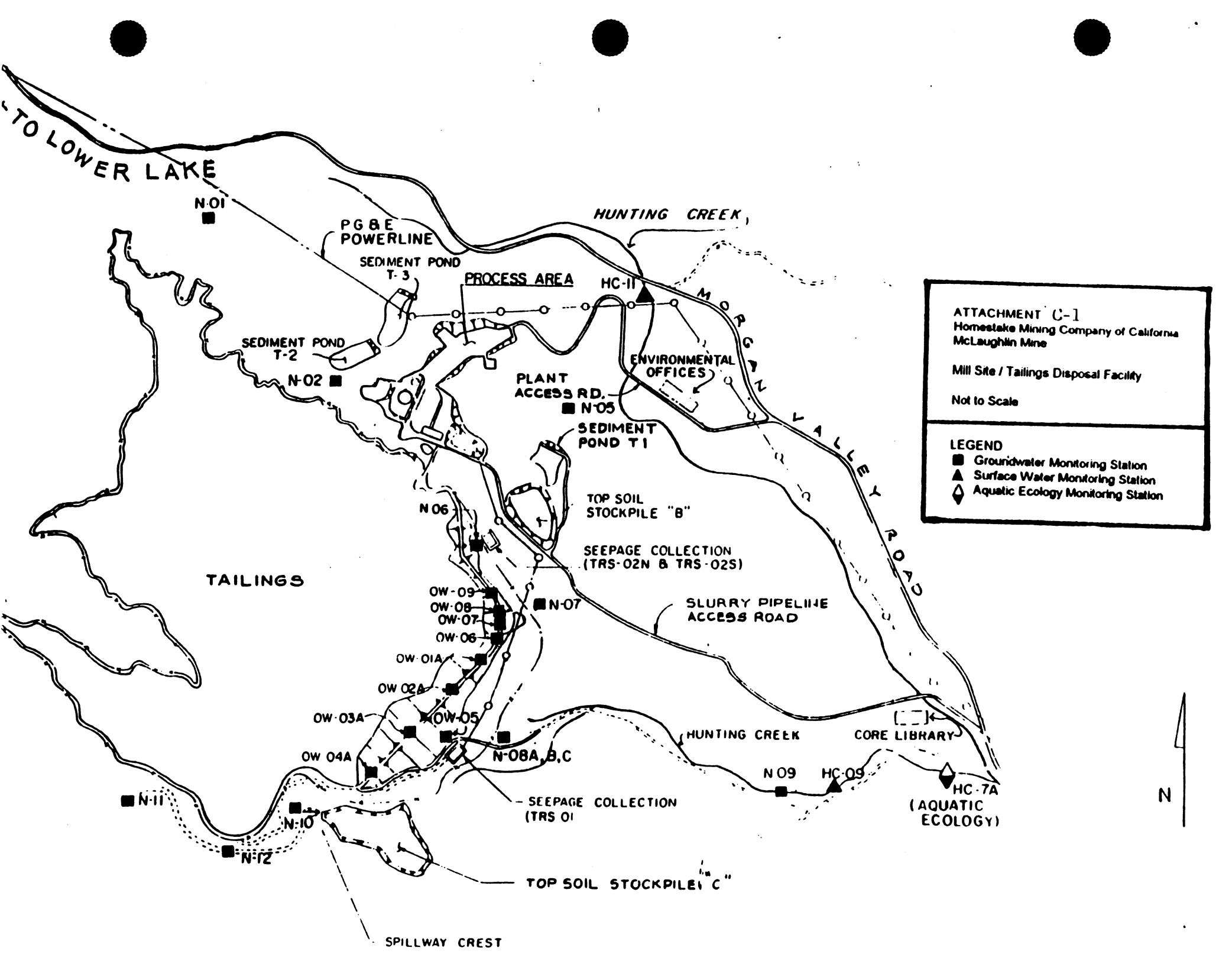
   The Compliance Period is the number of years equal to the active life of the waste management unit plus the closure period. Each time the Water Quality Protection Standard is exceeded (i.e., a release is discovered), the facility begins a Compliance Period on the date the Board directs the Discharger to begin an Evaluation Monitoring Program. If the Discharger's Corrective Action Program (CAP) has not achieved compliance with the Standard by the scheduled end of the Compliance Period. the Compliance Period is automatically extended until the facility has been in continuous compliance for at least three consecutive years.

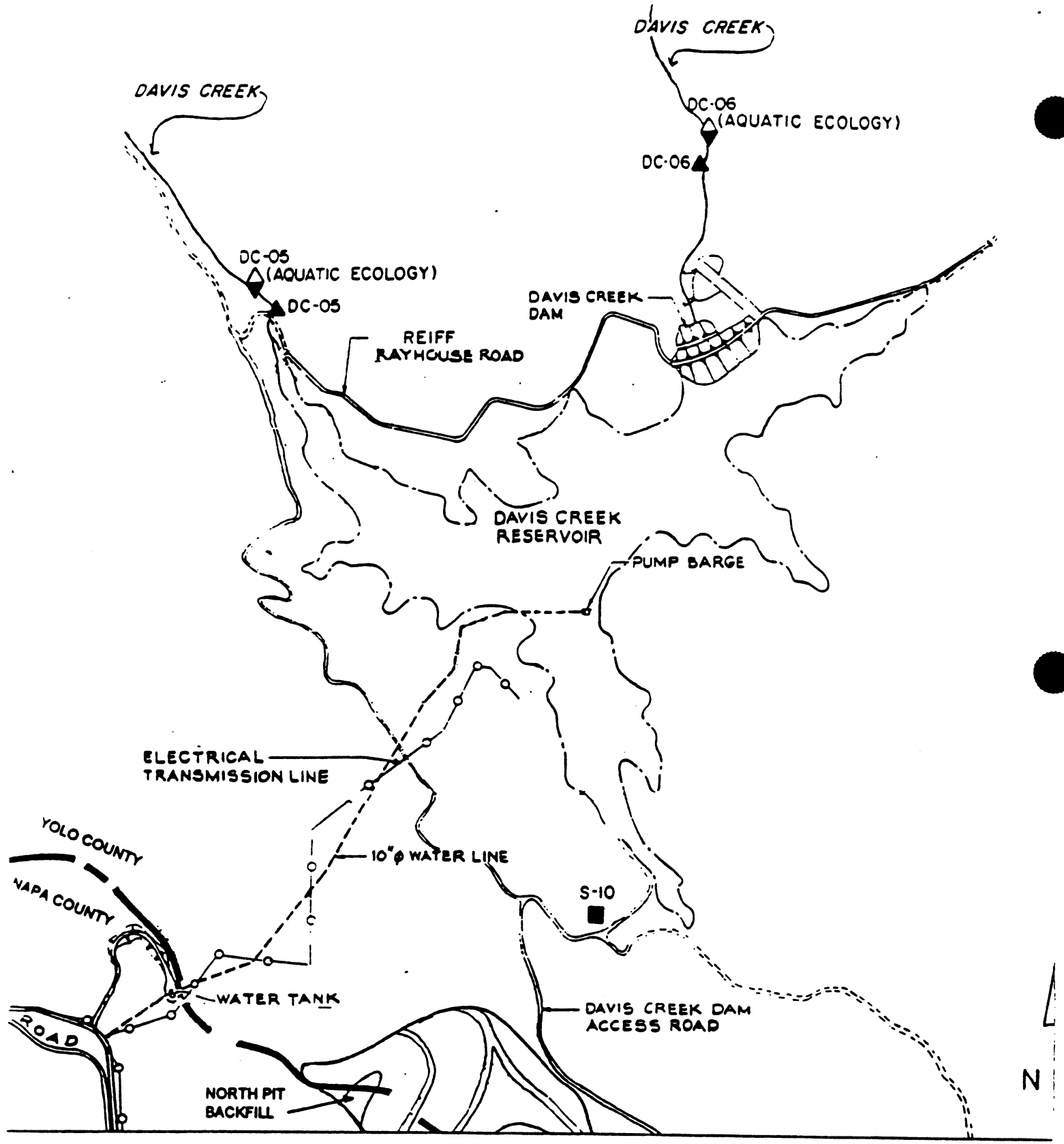
The Discharger shall implement the above monitoring program on the effective data of this Order.

Ordered by: Thomas R Pinkos
for WILLIAM H. CROOKS, Executive Officer

3 May 1996
(Date)

PWM


TO LOWER LAKE
N-01
PG&E POWERLINE
HUNTING CREEK
SEDIMENT POND T-3
PROCESS AREA
HC-11
MORGAN VALLEY ROAD
SEDIMENT POND T-2
N-02
ENVIRONMENTAL OFFICES
PLANT ACCESS RD.
N-05
SEDIMENT POND T1
TOP SOIL STOCKPILE "B"
N-06
SEEPAGE COLLECTION (TRS-02N & TRS-02S)
TAILINGS
OW-09
OW-08
OW-07
OW-06
N-07
SLURRY PIPELINE ACCESS ROAD
OW-01A
OW-02A
OW-03A
OW-05
HUNTING CREEK
CORE LIBRARY
OW-04A
N-08A,B,C
N-09
HC-09
HC-7A (AQUATIC ECOLOGY)
N-11
N-10
SEEPAGE COLLECTION (TRS 01
N-12
TOP SOIL STOCKPILE "C"
SPILLWAY CREST
ATTACHMENT C-1
Homestake Mining Company of California
McLaughlin Mine
Mill Site / Tailings Disposal Facility
Not to Scale
LEGEND
Groundwater Monitoring Station
Surface Water Monitoring Station
Aquatic Ecology Monitoring Station
N

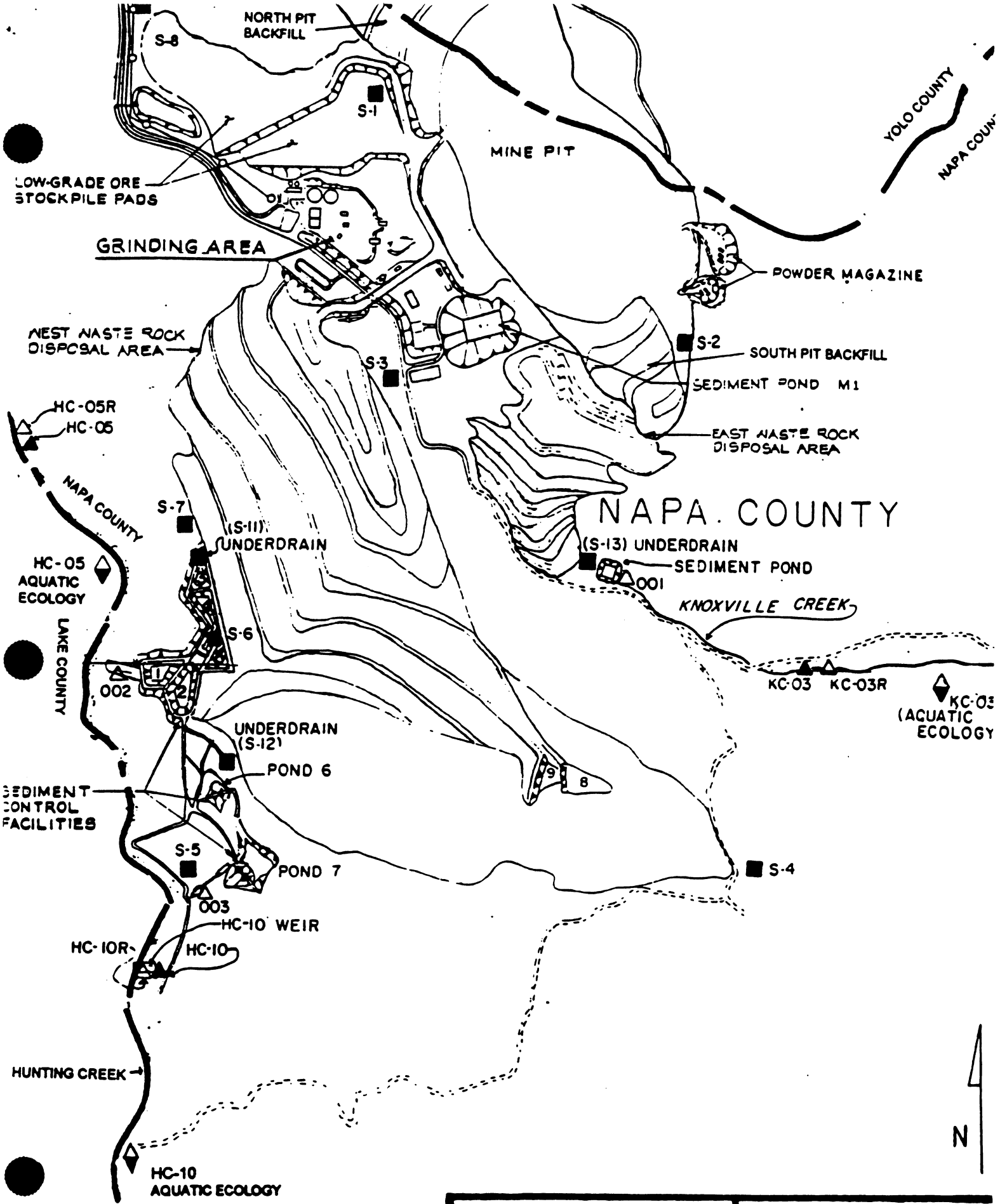


ATTACHMENT C-2
Homestake Mining Company of California
McLaughlin Mine

Davis Creek Reservoir

Not to Scale

LEGEND
- Groundwater Monitoring Station
- Surface Water Monitoring Station
- Aquatic Ecology Monitoring Station



ATTACHMENT C-3
Homestake Mining Company of California
McLaughlin Mine

Mine Pit / Waste Rock Disposal Facilities

LEGEND
- Groundwater Monitoring Station
- NPDES Monitoring Station
- Surface Water Monitoring Station
- Aquatic Ecology Monitoring Station

ADDITIONAL INSPECTION REPORTS

California Regional Water Quality Control Board
Central Valley Region

Peter M. Rooney
Secretary for Environmental Protection

Sacramento Main Office
Internet Address: http://www.swrcb.ca.gov/~rwqcb5
3443 Routier Road, Suite A, Sacramento, California 95827-3003
Phone (916) 255-3000 • FAX (916) 255-3015

Ed J. Schnabel
Chair

RECEIVED
DEC 0 8 1998
Ans'd.....

4 December 1998

Mr. Dean Enderlin
Homestake Mining Company
26775 Morgan Valley Road
Lower Lake, CA 95457

McLAUGHLIN MINE, LAKE COUNTY (Case No. 2724)

Enclosed are copies of recent inspection reports for your facility. If you have any questions, please call me at (916) 255-3131.

S Rosenbaum

STEVE E. ROSENBAUM
Associate Engineering Geologist

SER

Enclosures

cc: Ms. Terry Garbarino, Napa County Conservation, Development and Planning Department, Napa
Mr. Martin Winston, Lake County Department of Public Health, Lakeport
Mr. Ray Krauss, Homestake Mining Company, Santa Rosa

INSPECTION REPORT

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD · CENTRAL VALLEY REGION

WDS NUMBER: 5A172013002
NPDES#: CA0081477

Form Printed -> 11/24/98

DISCHARGER:

HOMESTAKE MINING COMPANY
26775 MORGAN VALLEY RD
LOWER LAKE ,CA 95457

CONTACT: DEAN ENDERLIN
PHONE: 7079956070

FACILITY NAME:

MCLAUGHLIN MINE
26775 MORGAN VALLEY RD
LOWER LAKE ,CA 95457

CONTACT: DEAN ENDERLIN
PHONE: 7079956070

STAFF: SER

ORDERS:

ORDER NUMBER	DATE ADOPTED	TYPE
85-031	850125	NPD
88-181	881028	NPD
94-159	940520	NPD

LAST INSPECTIONS:

DATE	TYPE	VIOLATION?
940225	B1	N
940225	B1	N
960103	A1	N

INSPECTION TYPE:

[ ] 1. "A" TYPE COMPLIANCE (SAMPLING)
[X] 2. "B" TYPE COMPLIANCE (NO SAMPLING)
[ ] 3. NON-COMPLIANCE FOLLOW-UP
[ ] 4. ENFORCEMENT FOLLOW-UP
[ ] 5. COMPLAINT
[ ] 6. PRE-REQUIREMENT
[ ] 7. MISCELLANEOUS

PROGRAM COMPONENT
TASK NUMBER: 1103

NPDES INFORMATION:
INSPECTION AGENCY
[X] STATE
[ ] STATE/EPA JOINT

EPA FORM USED? [ ]Y [X]N
(Majors ONLY)

INSPECTION DATE: 19 98 11 19 (YYMMDD)

INSPECTOR'S INITIALS SER

CONTACT: Dean Enderlin, Ray Krauss

INSPECTION SUMMARY (100 character limit): No discharge to Hunting or Harrisville Creeks observed.

ADDITIONAL COMMENTS: Reclamation of west waste rock unit complete. Some repairs made. Water levels in upper ponds are low. Lower ponds (6 & 7) contain water and support abundant vegetation. Runoff from low grade ore stockpile diverted to North Pit. Runoff from reclaimed North Pit backfill will flow to Davis Creek watershed this year.

WDR REVIEW: OK MONITORING PROGRAM REVIEW: OK

Was there a VIOLATION discovered during this inspection? YES [ ] NO [X] PENDING SAMPLE RESULTS [ ] NOT APPLICABLE [ ]

(If yes, you MUST attach a completed violation input form.)

INSPECTOR SIGNATURE & DATE: S Kenton 11/30/98

Reviewed By:

VTL

DATA ENTRY DATE: CWP 12/1/98

INSPECTION REPORT

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD - CENTRAL VALLEY REGION

WDS NUMBER: 5A172013001

Form Printed -> 11/24/98

DISCHARGER:

HOMESTAKE MINING COMPANY
26775 MORGAN VALLEY RD
LOWER LAKE ,CA 95457

CONTACT: DEAN ENDERLIN
PHONE: 7079956070

FACILITY NAME:

MCLAUGHLIN MINE
PO BOX 1010
LOWER LAKE ,CA 95457

CONTACT: DEAN ENDERLIN
PHONE: 7079956070

STAFF: SER

ORDERS:

ORDER NUMBER	DATE ADOPTED	TYPE
85-032	850125	WDR
89-107	890623	WDR
93-121	930806	WDR
94-315	941028	WDR

LAST INSPECTIONS:

DATE	TYPE	VIOLATION?
921222	B1	N
960103	A1	N
960518	B1	N

INSPECTION TYPE:

[ ] 1. "A" TYPE COMPLIANCE (SAMPLING)
[X] 2. "B" TYPE COMPLIANCE (NO SAMPLING)
[ ] 3. NON-COMPLIANCE FOLLOW-UP
[ ] 4. ENFORCEMENT FOLLOW-UP
[ ] 5. COMPLAINT
[ ] 6. PRE-REQUIREMENT
[ ] 7. MISCELLANEOUS

PROGRAM COMPONENT TASK NUMBER: 1L131

INSPECTION DATE: 19 | 8 | 1 | 1 | 1 | 9 | 1
Y Y M M D D

INSPECTOR'S INITIALS SER

CONTACT: Dean Enderlin, Ray Krauss

INSPECTION SUMMARY (100 character limit): HMC completed 4th and final lift on tailings pond. Oversight by DWR Dam Safety.

ADDITIONAL COMMENTS: North pit backfill covers soil in place for 2 to 3 years. This year HMC will divert clean runoff from North pit's reclaimed area to Davis Creek watershed and not back into pit. HMC working on drainage area calcs for pit water level forecast. HMC will continue to pump waste rock subdrain water to pit during post closure.

WDR REVIEW: ok MONITORING PROGRAM REVIEW: ok

Was there a VIOLATION discovered during this inspection? YES [ ] NO [X] PENDING SAMPLE RESULTS [ ] NOT APPLICABLE [ ]

(If yes, you MUST attach a completed violation input form.)

INSPECTOR SIGNATURE & DATE: S Roerden 11/30/98

Reviewed By:

VTC

DATA ENTRY DATE: CWP 12/1/98

XC:RK

STATE OF CALIFORNIA — ENVIRONMENTAL PROTECTION AGENCY

PETE WILSON, *Governor*

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD—
CENTRAL VALLEY REGION
3443 ROUTIER ROAD, SUITE A
SACRAMENTO, CA 95827-3098
PHONE: (916) 255-3000
FAX: (916) 255-3015

30 November 1994

Ms. Dolora M. Koontz
Homestake Mining Co., McLaughlin Mine
26775 Morgan Valley Road
Lower Lake, CA 95457

McLAUGHLIN MINE, LAKE, NAPA AND YOLO COUNTIES (Case No. 2724)

We have reviewed the 1993-1994 Annual Monitoring Report for the McLaughlin Mine. The report fulfills the monitoring and reporting program requirements contained in the facility's waste discharge requirements and NPDES permit. The report adequately describes water quality monitoring results for the facility and demonstrates compliance with the WDRs and NPDES permit conditions during the reporting period.

As discussed during the adoption of your NPDES permit, we will conduct site inspections and collect water samples during this winter. We will contact you later to schedule these inspections.

We also received your Storm Water Pollution Prevention Program as required by the NPDES permit. We will contact you if any additional information is needed.

If you have any questions, please call Steve Rosenbaum at (916) 255-3131.

William J. Marshall

WILLIAM J. MARSHALL, Chief
Waste Discharge to Land Unit

SER

cc: Mr. Steve Zalusky, Lake County Planning Division, Lakeport
Ms. Therese Garbarino, Napa County Conservation, Development and Planning Department, Napa
Mr. Tom To, Yolo County Environmental Health Department, Woodland
Ms. Suzanne Butterfield, Solano Irrigation District, Vacaville

STATE OF CALIFORNIA

PETE WILSON, *Governor*

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD—
CENTRAL VALLEY REGION
3 ROUTIER ROAD, SUITE A
CRAMENTO, CA 95827-3098
PHONE: (916) 361-5600
FAX: (916) 361-5686

14 August 1991

Ms. Dolora Koontz
Environmental Engineer
Homestake Mining Company, McLaughlin Mine
26775 Morgan Valley Road
Lower Lake, CA 95457

REGIONAL BOARD SAMPLING RESULTS , 3 APRIL 1991 INSPECTION, HOMESTAKE McLAUGHLIN MINE

Enclosed are my sampling results for the subject inspection. I appologize for not sending you our results earlier, even though you did send me a letter dated 24 May!

The results from my sampling efforts are clearly divergent from yours, especially for HC-5. My understanding is that your results are consistent with previous results. This suggests that my results indicate a QA problem, which is understandable for the field EC and pH results obtained with our old @Myron-L meters. The old @Myron-L meters are difficult to adequately calibrate.

Lab spike results for TDS and sulfate appear acceptable, but the results for sample HC-5 showing greater sulfate than TDS are clearly problematical. I did not have obvious inspection sampling QA problems with my other sites last year, possibly due to the unique surface water chemistry at Homestake, as compared with my other sites.

I would like to plan a more thorough sampling and analysis audit with you next winter. This would likely be of more help to me than to you.

If you have any questions, please contact me at (916) 361-5736.

Scott Walker

SCOTT WALKER, C.E.G.
Associate Engineering Geologist

SDW

Enclosure

OFFICE NO: 5S

INSPECTOR: EZC

FACILITIES INSPECTION REPORT

SWRCB 001 (REV. 1-91)

PCA System Task No. 1101

5A172013002
WDS NUMBER

HOMESTAKE MINING COMPANY
NAME OF AGENCY OR PARTY RESPONSIBLE FOR DISCHARGE

CA0081477
NPDES NUMBER

MCLAUGHLIN MINE
NAME OF FACILITY

91 (YY) 03 (MM) A1 (TYPE)
SCHEDULED INSPECTION DATA

PHIL BARNES
ONSITE FACILITY CONTACT PERSON

91.04.03 (YYMM DD)
ACTUAL INSPECTION DATE

916 1446 - 1070
FACILITY PHONE NO.

TITLE

S — Inspection agency (State = S, State / EPA Joint = J)

N — Is this a type "A1" or "B1" Compliance Inspection of an NPDES facility as required by the section 106 grant workplan? (Y/N) If so, send a copy of this report to EPA

INSPECTION TYPE (Check One)

A1 X — "A" type compliance -- Comprehensive inspection in which samples are taken. (EPA Type S)

B1 ___ — "B" type compliance -- A routine nonsampling inspection. (EPA type C)

2 ___ — Noncompliance follow-up -- Inspection made to verify correction of a previously identified violation.

3 ___ — Enforcement follow-up -- Inspection made to verify that conditions of an enforcement action are being met.

4 ___ — Complaint -- Inspection made in response to a complaint.

5 ___ — Pre-requirement -- Inspection made to gather info. relative to preparing, modifying, or rescinding requirements.

6 ___ — Miscellaneous -- Any inspection type not mentioned above.

_____ (Type) — If this is an EPA inspection not mentioned above, please note type. (e.g.--biomonitoring, performance audit, diagnostic, etc.)

N — Were VIOLATIONS noted during this inspection? (Yes/No/Pending Sample Results)

___ — Was this a Quality Assurance-Based Inspection? (Y/N)

___ — Were bioassay samples taken? (N = No) If YES, then S = Static or F = Flowthrough.

INSPECTION SUMMARY (REQUIRED) (100 character limit)

FACILITY HAS RECENTLY DISCHARGED FROM SEDIMENT CONTROL PONDS IN ACCORDANCE WITH WDRS.

INSPECTOR'S DATA:

INITIALS SOW SIGNATURE [signature] DATE 4/4/91

For Internal Use: Reviewed by: (1) RJM (2) _____ (3) [signature]
Reg. WDS Coordinator

WDS Data Entry Date: APR 10 1991

VIOLATION (IF APPLICABLE)

VIOLATION TYPE? (A-G) _____

DATE OF VIOLATION (YYMMDD): _____ - _____ - _____ DATE OF VIOLATION DETERMINATION (YYMMDD): _____ - _____ - _____

DESCRIPTION (200 Character Limit): _____

EPA SUGGESTED INSPECTION CHECKLIST

(S = Satisfactory, M = Marginal, U = Unsatisfactory, N = Not Evaluated)

_____ Permit	_____ Flow Measurement	_____ Pretreatment	_____ Operations & Maintenance
_____ Records/Reports	_____ Laboratories	_____ Compliance Schedules	_____ Sludge Disposal
_____ Facility Site Review	_____ Eff./Receiving Waters	_____ Self-Monitoring	_____ Other

_____ (1-5) Overall Facility Operation Evaluation (5 = Very reliable, 3 = Satisfactory, 1 = Unreliable)

ADDITIONAL COMMENTS, SPECIAL INSTRUCTIONS, ITEMS FOR FOLLOWUP ON FUTURE INSPECTIONS, NOTES, ETC. (Attach additional pages, if necessary)

HISTORICAL INFORMATION:

MOST RECENT ORDERS:

ORDER NO.	DATE ADOPTED	TYPE
}-181	881028	NPD
}-031	850125	NPD

MOST RECENT INSPECTIONS:

DATE	INSP. TYPE	VIOLATIONS?
901017	B1	N
900418	A1	N
890110	A1	N
880914	B1	N
870310	A1	N

MOST RECENT VIOLATIONS:

VIOL. TYPE	DATE

SDW

SIERRA FOOTHILL LABORATORY

REPORT

823 S. HWY. 49
P.O. BOX 1268 • JACKSON, CA 95642
(209) 223-2800

04/27/91

State of California,CRWQCB-CVR
3443 Routier Rd
Sacramento, CA 95827

attn: Scott Walker

Sample Identification: HC5 / Homestake McLaughlin
Collected By: SDW
Date & Time Taken: 04/03/91 1130
On Site Data: Grab Water SFL P 2Liter

Lab Sample Number: 329871 **Received:** 04/04/91

PARAMETER	RESULTS	UNITS	TIME	DATE	METHOD	BY
Sulfate	248	mg/L	1500	04/25/91	EPA375.2 PQL .5mg/L	GM
Solids, Total Dissolved	222	mg/L		04/11/91	EPA160.1 PQL .5mg/L	LW
Solids, Total Suspended	<0.1	mg/L	1000	04/05/91	EPA 160.2 PQL .1mg/L	LW

Quality Assurance for Sample Number 329871

Sample #	Description	Result	Units	Dup/Std Value	Spk Conc.	Percent	Time	Date	By
				Sulfate					
329741	Duplicate	680	mg/L	670		101	1500	04/25/91	GM
329844	Duplicate	190	mg/L	185		103	1500	04/25/91	GM
329871	Duplicate	248	mg/L	248		100	1500	04/25/91	GM
				Solids, Total Dissolved					
329841	Duplicate	851	mg/L	839		101		04/11/91	LW
329843	Duplicate	806	mg/L	789		102		04/11/91	LW
				Solids, Total Suspended					
329751	Duplicate	24650	mg/L	23250		106	1000	04/05/91	LW
329872	Duplicate	0.4	mg/L	0.4		100	1000	04/05/91	LW

Tony Nurse, Owner/Analyst

SIERRA FOOTHILL LABORATORY IS CERTIFIED BY THE STATE OF CALIFORNIA DEPT. HEALTH SERVICES
FOR DRINKING WATER, WASTEWATER, HAZARDOUS WASTE TESTING, HAZARDOUS WASTE BIOASSAY

SIERRA FOOTHILL LABORATORY

REPORT

823 S. HWY. 49
P.O. BOX 1268 • JACKSON, CA 95642
(209) 223-2800

04/27/91

State of California,CRWQCB-CVR
3443 Routier Rd
Sacramento, CA 95827

Sample Identification: HC10 / Homestake - McLaughlin
Collected By: SDW
Date & Time Taken: 04/03/91 1200
On Site Data: Grab Water SFL P 2Liter

Lab Sample Number: 329872 **Received:** 04/04/91

PARAMETER	RESULTS	UNITS	TIME	DATE	METHOD	BY
Sulfate	266	mg/L	1500	04/25/91	EPA375.2 PQL .5mg/L	GM
Solids, Total Dissolved	515	mg/L		04/11/91	EPA160.1 PQL .5mg/L	LW
Solids, Total Suspended	0.4	mg/L	1000	04/05/91	EPA 160.2 PQL .1mg/L	LW

Quality Assurance for Sample Number 329872

Sample #	Description	Result	Units	Dup/Std Value	Spk Conc.	Percent	Time	Date	By
				Sulfate					
329741	Duplicate	680	mg/L	670		101	1500	04/25/91	GM
329844	Duplicate	190	mg/L	185		103	1500	04/25/91	GM
329871	Duplicate	248	mg/L	248		100	1500	04/25/91	GM
				Solids, Total Dissolved					
329841	Duplicate	851	mg/L	839		101		04/11/91	LW
329843	Duplicate	806	mg/L	789		102		04/11/91	LW
				Solids, Total Suspended					
329751	Duplicate	24650	mg/L	23250		106	1000	04/05/91	LW
329872	Duplicate	0.4	mg/L	0.4		100	1000	04/05/91	LW

Tony Nurse, Owner/Analyst

SIERRA FOOTHILL LABORATORY IS CERTIFIED BY THE STATE OF CALIFORNIA DEPT. HEALTH SERVICES
FOR DRINKING WATER, WASTEWATER, HAZARDOUS WASTE TESTING, HAZARDOUS WASTE BIOASSAY

LAB # 32987

SIERRA FOOTHILL LABORATORY
PO BOX 1268/ 823 S HWY 49
JACKSON CA 95642
(209) 223-2800

DATE REC'D _____ TIME REC'D _____ REC'D BY AGP

CUSTOMER NAME: CVRWQCB
ADDRESS: 3443 ROUTIER RD.
CITY, STATE, ZIP: SACRAMENTO, CA 95827-3098
ATTENTION: SCOTT WALKER

BILL TO: SAME
ADDRESS: _____
CITY, ST, ZIP: _____
ATTENTION: MAY HOE
P.O.# _____ REQUISITION# _____

TASK 131-03
CONTRACT # 9-035-150-0

ID#	SOURCE DESCRIPTION	ANALYSIS	SAMPLING & CONTAINER INFORMATION: G/C	W,W/W,S	P/G	DATE/HR COLLECTED		BY
HC5	HOMESTAKE - MCLAUGHLIN	TDS, TOTAL SUSPENDED SOLIDS, SULFATE	G	W	P	4/3/91	1130	SDW
HC10	"	"	G	W	P	4/3/91	1200	SDW

RELINQUISHED BY: _____ DATE/TIME 4/3/91 1800
RECEIVED BY: _____ DATE/TIME 4/4/91 1830
RELINQUISHED BY: Elliott Nurse DATE/TIME 4/4/91 1945
RECEIVED BY: Sandra Nurse DATE/TIME 4-4-91 1945

DATA ENTERED AGP

HOMESTAKE

4/3/91

HC-5

EC-620 pH = 9.6

430 8.7 (Calc)

HC-10

EC-900 pH = 9.0

720 8.5

436W EC-4K

pH-2.9

SPL

HOMESTAKE MINING COMPANY

McLaughlin Mine

May 24, 1991

Scott Walker
Central Valley Regional
Water Quality Control Board
3443 Routier Rd., Ste. A
Sacramento, CA 95827-3098

Dear Mr. Walker,

Enclosed are the results for the split samples collected on 4/3/91 at sample location sites HC-05 and HC-10. The field measurements recorded from HMC instrumentation at the time of sampling were as follows:

		SPECIFIC CONDUCTANCE	
SITE	TEMP °C	umhos/cm	pH
HC-05	14.5	430	8.7
HC-10	15.0	720	8.5

If you should have any questions, please feel free to call.

Sincerely,

Dolora Koontz gm

Dolora Koontz
ENVIRONMENTAL ENGINEER

DK:gm

Enclosures

cc: Phil Barnes
Ray Krauss

91 MAY 28 PM 2:52

Homestake Mining Co., McLaughlin Mine
26775 Morgan Valley Road
Lower Lake, CA 95457

Telephone (707) 995-6070
FAX (707) 995-6078

NET Pacific, Inc.

HOMESTAKE MINING COMPANY WATER QUALITY MONITORING DATA SHEET

Lab No.	Station	Date	Time	Type
6854-81620	HC-10	91:04:03	12:20	SURFACEWATER

Parameter		Units	Detection Limits
pH-Lab		Units	---
Acidity		mg/L	1
Alkalinity		mg/L	1
Hardness		mg/L	1
TDS	660	mg/L	10
TSS	ND	mg/L	1
Settleable solids		mL/Lhr	1
Turbidity		NTU	1
MBAS		mg/L	0.1
Chloride		mg/L	1
Total Cyanide		mg/L	0.05
Free Cyanide		mg/L	0.05
Thiocyanate		mg/L	1
Nitrate		mg/L	0.02
Ammonia		mg/L	0.05
Sulfate	200	mg/L	1
Bicarbonate		mg/L	1
Carbonate		mg/L	1

ND=Not Detected

Approved by:

Jules Skamarack
Laboratory Manager

NET Pacific, Inc.

HOMESTAKE MINING COMPANY WATER QUALITY MONITORING DATA SHEET

Lab No.	Station	Date	Time	Type
6854-81621	HC-05	91:04:03	11:55	SURFACEWATER

Parameter		Units	Detection Limits
pH-Lab		Units	---
Acidity		mg/L	1
Alkalinity		mg/L	1
Hardness		mg/L	1
TDS	430	mg/L	10
TSS	ND	mg/L	1
Settleable solids		mL/Lhr	1
Turbidity		NTU	1
MBAS		mg/L	0.1
Chloride		mg/L	1
Total Cyanide		mg/L	0.05
Free Cyanide		mg/L	0.05
Thiocyanate		mg/L	1
Nitrate		mg/L	0.02
Ammonia		mg/L	0.05
Sulfate	51	mg/L	1
Bicarbonate		mg/L	1
Carbonate		mg/L	1

ND=Not Detected

Approved by:

Jules Skamarack
Laboratory Manager

STATE OF CALIFORNIA
GEORGE DEUKMEJIAN, Governor

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD—
CENTRAL VALLEY REGION
3443 ROUTIER ROAD, SUITE A
SACRAMENTO, CA 95827-3098

21 May 1990

Ms. Therese Armlin, Planner II
Napa County Conservation-Development
and Planning Department
1195 Third Street, Room 210
Napa, CA 94559-3092

HOMESTAKE MINING COMPANY OF CALIFORNIA, NAPA, LAKE, AND YOLO COUNTIES

We reviewed the Homestake McLaughlin Mine 1988-89 Annual Monitoring Report.

There were no evident changes in surface water quality except Hunting Creek (Station HC-10). The increase in calcium and sulfate at Station HC-10 were predicted in the initial environmental document. The data indicate no significant trends in overall surface or ground water quality. The exceedances of Maximum Likely Concentrations in surface water and ground water also did not show any significant trends.

Overall, the monitoring for this period has shown the discharge to be in compliance with Order Nos. 88-181 and 89-107.

Please contact me at (916) 361-5652 if you have any questions.

Edwin Z. Crawford

EDWIN Z. CRAWFORD
Area Representative

EZC:gs

cc: Homestake Mining Company, Lower Lake ✓

STATE OF CALIFORNIA
GEORGE DEUKMEJIAN, Gover

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD—
CENTRAL VALLEY REGION
3443 ROUTIER ROAD, SUITE A
SACRAMENTO, CA 95827-3098

RECEIVED
MAY 16 1990
Ans'd.....

11 May 1990

Homestake Mining Company
of California
26775 Morgan Valley Road
Lower Lake, CA 95457

REPORT OF RECENT INSPECTION - HOMESTAKE MINING COMPANY OF CALIFORNIA, LAKE, NAPA, AND YOLO COUNTIES

Enclosed for your information is a copy of a report covering a recent inspection of your facilities.

Please contact me at (916) 361-5652 if you have any questions.

EDWIN Z. CRAWFORD
Area Representative

EZC:gs

Enclosure

cc: U. S. Environmental Protection Agency, Region 9, San Francisco
U. S. Bureau of Land Management, Ukiah
Napa County Planning Department, Napa
Lake County Planning Department, Napa
Yolo County Planning Department, Woodland
Solano Irrigation District, Vacaville
Western Yolo Grange, Brooks

CENTRAL VALLEY REGIONAL WATER QUALITY CONTROL BOARD

INSPECTION REPORT

8 May 1990

RECEIVED
MAY 16 1990
Ans'd.....

DISCHARGER: HOMESTAKE MINING COMPANY OF CALIFORNIA

LOCATION & COUNTY: Lake, Napa, and Yolo Counties

CONTACT(S): Phil Barnes, Senior Environmental Engineer

INSPECTION DATE: 18 April 1990

INSPECTED BY: Edwin Z. Crawford

ACCOMPANIED BY: Delora Koontz, Biologist

OBSERVATIONS AND COMMENTS:

This facility is regulated by Waste Discharge Requirements (WDRs) Order Nos. 89-107 and 88-181 (NPDES No. CA0081477).

There was no discharge from the mine, mill, shop, sewage treatment pond, crushing area, low grade stockpile area, or tailings disposal facility to surface drainage courses. There also was no discharge from the East Waste Rock Disposal Area (Outfall 001) to Knoxville Creek or from the Main Waste Rock Disposal Area (Outfalls 002 and 003) to Hunting Creek.

Water from the tailings disposal facility is recycled in the mill circuit. Estimated freeboard below the tailings dam spillway was 10 feet. Seepage water from the waste rock disposal area is being recycled in the grinding circuit.

I collected samples from Knoxville Creek and Hunting Creek. The results of measurements are:

Knoxville Creek at Knoxville Road

Time: 0830 pst
Temperature: 64°F
Specific conductance (field): 2,000 micromhos/cm
pH (field): 8.5
Estimated flow: 0.1 cfs
Remarks: Water clear

Hunting Creek above waste rock disposal area Sta. HC-5

Time: 0945 pst
Temperature: 64°F
Specific conductance (field): 720 micromhos/cm
pH (field): 8.7
Estimated flow: 0.2 cfs
Remarks: Water clear

Hunting Creek downstream of all operations, Sta. HC-10

Time: 1000 pst
Temperature: 64°F
Specific conductance (field): 970 micromhos/cm
pH (field): 8.5
Flow: 126 gpm (0.28 cfs)
Remarks: Water clear, algal growth, fish in pool on upstream side of stream gage control structure

All solid waste located in the tailings disposal area consists of metal, plastic, and wood. There was no evidence of hazardous or sanitary waste at the site.

INSPECTION SUMMARY:

Based on the above, Homestake Mining Company of California is in compliance with the Board's requirements.

Edwin Z. Crawford

EDWIN Z. CRAWFORD, Area Representative

cc: Environmental Protection Agency, Region 9, San Francisco
Solano Irrigation District, Vacaville
Western Yolo Grange, Brooks

TA OF CALIFORNIA
:ALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD—
:ENTRAL VALLEY REGION
14: 1OUTIER ROAD
)CHAMENTO, CA 95827-3098

GEORGE DEUKMEJIAN, *Governor*

6 July 1989

Mr. Phil Barnes
Homestake Mining Company of California
P. O. Box 1010
Lower Lake, CA 95457

REPORT OF RECENT INSPECTION - HOMESTAKE MINING COMPANY OF CALIFORNIA, LAKE, NAPA AND YOLO COUNTIES - FILE NO. 2724

Enclosed for your information is a copy of a report covering a recent inspection of your waste disposal facilities.

Edwin Z. Crawford
Area Representative

EZC/mm

Enclosures

cc: U. S. Bureau of Land Management, Ukiah
Napa County Planning Department, Napa
Lake County Planning Department, Lakeport
Yolo County Planning Department, Woodland

APPROVED
author 66
senior WLC

CENTRAL VALLEY REGIONAL WATER QUALITY CONTROL BOARD

INSPECTION REPORT

3 July 1989

DISCHARGER: Homestake Mining Company of California

LOCATION & COUNTY: Lake,Napa, and Yolo Counties

CONTACT(S): - - -

INSPECTION DATE: 10 May1989

INSPECTED BY: Edwin Z. Crawford

ACCOMPANIED BY: Delora Koontz

OBSERVATIONS AND COMMENTS:

This facility is regulated by Order No. 85-032. There was no evident discharge from mining or milling operations to surface drainage courses.

I collected a water sample from Well No. N-8B. The results of measurements and analyses are:

Time:	1300 pst
Temperature:	60°F (Homestake 15°C)
Specific conductance:	3,400 micromhos (Homestake 2,530 micromhos)
pH:	10.1 (Homestake 10.1)
Sulfate:	less than 1 mg/l
Nitrate (NO_3)	less than 0.05 mg/l
Cyanide:	less than 0.05 mg/l

INSPECTION SUMMARY:

Based on the above, Homestake Mining Company of California is in compliance with waste discharge requirements.

Edwin Z. Crawford

EDWIN Z. CRAWFORD, Area Representative

EZC/mm

SIERRA FOOTHILL LABORATORY

REPORT

823 S. HWY. 49
P.O. BOX 1268 • JACKSON, CA 95642
(209) 223-2800

Report Date 5/31/89
Laboratory # 23402
Date Received 5/11/89
Date Completed 5/29/89
SAMPLE TYPE ☒ Water ☐ Wastewater ☐ Soil ☐ Wine
RESULTS ON SAMPLE ☒ as received ☐ as collected

TO: STATE OF CALIFORNIA
CRWQCB-CVR
ATTN: EDWIN CRAWFORD
3443 ROUTIER RD
SACRAMENTO CA 95827-3098

ANALYSIS	RESULTS	
23402-1,-2,-3 HOMESTAKE WELL NO. N-8, collected 5/10/89 1300 ECrawford		
$NO_3 + NO_2$	<0.05	mg/L
Cyanide, total	<0.05	mg/L
Sulfate	<1	mg/L

QC SUMMARY:

Analysis	Method used	Det limit	Preserv used	Date of analysis	Max hold time	Met?	Dupl %RSD	Spike %R	Value fnd in known	Accept rge in known
NO_3+NO_2	353.3	.05mg/L	4°/H_2SO_4	890529	28d	Y	0		4.45mg/L	4.4-5.4
CN	335.2	.05mg/L	4°/NaOH	890518	14d	Y		100	.09mg/L	.08-.12
SO_4	375.4	1mg/L	4°/HNO_3	890516	28d	Y	0		198mg/L	171-209

89 JUN -5 PM 3:55

TONY NURSE, OWNER/ANALYST

SIERRA FOOTHILL LABORATORY IS CERTIFIED BY THE STATE OF CALIFORNIA DEPT. HEALTH SERVICES FOR COMPLETE BACTERIOLOGICAL AND CHEMICAL ANALYSES

23402

SIERRA FOOTHILL LABORATORY
PO BOX 1268/ 823 S HWY 49
JACKSON CA 95642
(209) 223-2800

E REC'D 5-11-89 TIME REC'D 1611 REC'D BY [illegible]

T MER NAME: Cent. Valley Reg. W.Q.C.B. BILL TO: Same
ADDRESS: 3443 Routier Road ADDRESS:
Y STATE, ZIP: Sacramento, CA 95827 CITY, ST, ZIP:
ATTENTION: Edwin Crawford ATTENTION:
P.O.# REQUISITION#

#	SOURCE DESCRIPTION	ANALYSIS	SAMPLING & CONTAINER INFORMATION: G/C	W,W/W,S	P/G	DATE/HR COLLECTED	BY
1	Homestake Well No N-8	NO_3	G		P/1,5Q	5-10-89 1300	E. Crawford
	"	CN	G		G/NaOH	5-10-89 1300	"
	"	SO_4	G		P/HNO3	5-10-89 1300	"

RELINQUISHED BY: Edwin Crawford DATE/ 5-11-89 TIME 1430
RECEIVED BY: Gloria Stineman DATE/ 5-11-89 TIME 1515
RELINQUISHED BY Gloria Stineman DATE/ 5-11-89 TIME 1615
RECEIVED BY: Sandra Lucas DATE/ 5-11-89 TIME 1615

DATA ENTERED

STATE OF CALIFORNIA
GEORGE DEUKMEJIAN, *Governor*

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD—
CENTRAL VALLEY REGION
3443 ROUTIER ROAD
SACRAMENTO, CA 95827-3098

8 March 1989

Mr. Phil Barnes
Senior Environmental Manager
Homestake Mining Company
P. O. Box 1010
Lower Lake, CA 95457

HOMESTAKE MC LAUGHLIN MINE, ENVIRONMENTAL MONITORING MANUAL, LAKE, NAPA, AND YOLO COUNTIES

We reviewed the subject manual and find that it is quite complete in its coverage of sampling procedures, sample preservation, field instrumentation, quality assurance, and data evaluation.

Please contact me at (916) 361-5652 if you have any questions.

Edwin Z. Crawford

EDWIN Z. CRAWFORD
Area Representative

EZC:gs

cc Rek ,D.

STATE OF CALIFORNIA

GEORGE DEUKMEJIAN, *Governor*

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD—
CENTRAL VALLEY REGION
3443 ROUTIER ROAD
SACRAMENTO, CA 95827-3098

27 February 1989

Mr. Phil Barnes
Homestake Mining Company
P.O. Box 1010
Lower Lake, CA 95451

REPORT OF RECENT INSPECTION

Enclosed for your review and reference is a copy of a report covering a recent inspection of your facilities.

Edwin Z. Crawford

EDWIN Z. CRAWFORD
Area Representative

EZC:ej

Enclosures

cc: Environmental Protection Agency, San Francisco
Lake County Planning Department, Lakeport
Napa County Planning Department, Napa
Yolo County Planning Department, Woodland

CENTRAL VALLEY REGIONAL WATER QUALITY CONTROL BOARD

INSPECTION REPORT

DISCHARGER: HOMESTAKE MINING COMPANY 27 February 1989

LOCATION & COUNTY: Napa, Lake, and Yolo Counties

CONTACT(S): Phil Barnes, Environmental Engineer

INSPECTION DATE: 10 January 1989

INSPECTED BY: Edwin Z. Crawford

ACCOMPANIED BY: Delora Koontz, Biologist

OBSERVATIONS AND COMMENTS:

This facility is regulated by Order Nos. 85-032 and 88-181.

All drainage water from the Main and East (Barker) waste rock disposal sites has been contained with no runoff to surface drainage courses. There also was no evidence of significant erosion at either site. All runoff from the East (Barker) site has been returned to the grinding circuit. All runoff from the Main site has been contained in Ponds No. 1 through No. 5 inclusive. There has been a discharge from Ponds No. 6 and No. 7 to Hunting Creek as allowed by Order No. 88-181. These two ponds have received runoff from the waste rock area in the past, but this year the inflow was only runoff from natural terrain.

I collected water samples from the tailings pond and Hunting Creek above (HC-11) and below (HC-10) the operation. The results of analyses are shown on the attached laboratory report, and indicate relatively low cyanide in the tailings pond water.

The only significant increase in analyzed constituents between HC-11 and HC-10 was sulfate which increased from 74 mg/l to 150 mg/l. Analyses showed a reduction in calcium and chloride between the two stations. As there was no discharge from the ponds, the increase in sulfate is attributed to natural conditions.

All drainage from the mining operation and low grade ore stockpile is contained in the mine pit and pumped into the grinding circuit. All drainage from the mill area is directed to the tailings reservoir.

INSPECTION SUMMARY:

Based on the above, Homestake Mining Company is in compliance with Order No. 85-032 and Permit No. CA0081477, Order No. 88-181.

Edwin Z. Crawford

EDWIN Z. CRAWFORD, Area Representative

EZC:ej

United States Environmental Protection Agency
Washington, D. C. 20460

EPA NPDES Compliance Inspection Report

Form Approved
OMB No. 2040-0003
Approval Expires 7-31-85

Section A: National Data System Coding

Transaction Code	NPDES	yr/mo/day	Inspection Type	Inspector	Fac Type
1 N 2 5	3 CA0081477 11	12 89/01/10 17	18 S	19 S	20 2

Remarks

21

Reserved	Facility Evaluation Rating	BI	QA	Reserved
67 69	70 5	71 N	72 N	73 74 75 80

Section B: Facility Data

Name and Location of Facility Inspected	Entry Time / Exit Time/Date	Permit Effective Date / Permit Expiration Date
Homestake Mining Company P.O. Box 1010 Lower Lake, CA 95451	Entry Time ☒ AM ☐ PM 1030 Exit Time/Date 1330 1-10-89	Permit Effective Date 10-28-88 Permit Expiration Date 10-1-93

Name(s) of On-Site Representative(s)	Title(s)	Phone No(s)
Delora Koontz	Biologist	(916) 446-0389

Name, Address of Responsible Official	Title / Phone No.	Contacted
Phil Barnes	Environmental Engineer (916) 446-0389	☒ Yes ☐ No

Section C: Areas Evaluated During Inspection

(S = Satisfactory, M = Marginal, U = Unsatisfactory, N = Not Evaluated)

S	Permit	S	Flow Measurement	N	Pretreatment	S	Operations & Maintenanc
S	Records/Reports	S	Laboratory	N	Compliance Schedules	S	Sludge Disposal
S	Facility Site Review	S	Effluent/Receiving Waters	S	Self-Monitoring Program		Other:

Section D: Summary of Findings/Comments *(Attach additional sheets if necessary)*

All facilities operating within permit conditions.
See attached memo.

Name(s) and Signature(s) of Inspector(s)	Agency/Office/Telephone	Date
Edwin Z. Crawford	Cent. Valley Reg. Water Quality Control Board (916) 361-5652	2-16-88
Edwin J. Crawford		
Signature of Reviewer: Wendy L. Cohen	Agency/Office: CRWQCB	Date: 2/21/89

Regulatory Office Use Only

Action Taken	Date	Compliance Status
		☐ Noncompliance ☐ Compliance

FOOTHILL LABORATORY

23 S. HWY. 49
P.O. BOX 1288 • JACKSON, CA 95642
(209) 223-2800

REPORT

Report Date 2/3/89
Laboratory # 22332-22340
Date Received 1/11/89
Date Completed 1/31/89
SAMPLE TYPE ☒ Water ☐ Wastewater ☒ Soil ☐ Wine
RESULTS ON SAMPLE ☒ as received ☐ as collected

TO: STATE OF CALIFORNIA
CRWQCB-CVR
ATTN: EDWIN CRAWFORD
3443 ROUTIER RD
SACRAMENTO CA 95827-3098

ANALYSIS	RESULTS	
22332 HOMESTAKE MINING TAILINGS EZC-89-1 1/10/89 1100		
Cyanide, Total	0.95	mg/L
22333 HOMESTAKE HC-11 EZC 89-2 1/10/89 (Ca sample #22339)		
Arsenic	0.8	ug/L
Antimony	<0.2	mg/L
Mercury	0.75	ug/L
Nickel	<0.05	mg/L
Chromium, total	4.0	ug/L
Calcium	35	mg/L
22334 HOMESTAKE HC-11 EZC-89-2 1/10/89		
Chloride	18	mg/L
Sulfate	74	mg/L
22335 HOMESTAKE HC-10 EZC-89-3 1/10/89 (Ca sample #22340)		
Arsenic	1.6	ug/L
Antimony	<0.2	mg/L
Mercury	<0.5	ug/L
Nickel	<0.05	mg/L
Chromium, total	8.0	ug/L
Calcium	18	mg/L
22336 HOMESTAKE HC-10 EZC-89-3 1/10/89		
Chloride	1.0	mg/L
Sulfate	150	mg/L

RECEIVED
FEB 11 11:22

TONY NURSE, OWNER/ANALYST

SIERRA FOOTHILL LABORATORY IS CERTIFIED BY THE STATE OF CALIFORNIA DEPT. HEALTH SERVICES FOR COMPLETE BACTERIOLOGICAL AND CHEMICAL ANALYSES

cc CK

STATE OF CALIFORNIA
GEORGE DEUKMEJIAN, Governor

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD—
CENTRAL VALLEY REGION
3443 ROUTIER ROAD
SACRAMENTO, CA 95827-3098

23 November 1988

Mr. Phil Barnes
Homestake Mining Company
P. O. Box 1010
Lower Lake, CA 95457

HOMESTAKE MINING COMPANY ANNUAL 1987-88 MONITORING REPORT, LAKE, NAPA, AND YOLO COUNTIES

We have reviewed the annual monitoring report for the period of 1 July 1987 through 30 June 1988. The report is comprehensive and complies with Provision No. 13 of Order No. 85-032.

The report defines and discusses the quality of effluent, ground water, and surface water for the 1987-1988 water year.

The report indicates several upward trends or increases in specific parameters as follows:

1. Calcium, nickel, and sulfate in discharge 003.

2. Chloride, nickel, sulfate, specific conductivity (EC), and total dissolved solids (TDS) in Knoxville Creek.

3. Calcium, magnesium, sulfate, EC, and TDS in the "S" series wells.

No significant changes were noted in the "N" series wells, Cache Creek, Davis Creek, Hunting Creek, or Putah Creek.

We concur with the conclusions set forth on page 1-5 of the report. We also believe that the monitoring program is functioning as designed. Homestake has initiated an appropriate response to the indicated upward trends of mineral constituents by proposing to return a portion of the Main Waste Rock Disposal Area underdrain water to the grinding circuit, thereby reducing the concentration of constituents reaching the ponds and the creek.

We will continue to monitor nickel for any further upward trends. This element is prevalent in the serpentine rock of the region and, as stated in the report, remains in solution up to a pH of about 9.0. There is no evidence at this time that nickel is a threat to beneficial uses.

Please contact me at (916) 361-5652 if you have any questions.

Edwin Z. Crawford

EDWIN Z. CRAWFORD
Area Representative

EZC:gs

cc: U. S. Bureau of Land Management, Ukiah
Solano County Planning Department, Fairfield
Lake County Planning Department, Lakeport
Napa County Planning Department, Napa
Yolo County Planning Department, Woodland
Solano Irrigation District, Vacaville
City of Fairfield, Fairfield

•STATE OF CALIFORNIA
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD—
CENTRAL VALLEY REGION
3443 ROUTIER ROAD
SACRAMENTO, CA 95827-3098

GEORGE DEUKMEJIAN, Governor

RECEIVED
OCT 03 1988

29 September 1988

Mr. Ray Krauss
Homestake Mining Co.
McLaughlin Mine
P. O. Box 1010
Lower Lake, CA 95451

REPORT OF RECENT INSPECTION - HOMESTAKE MINING CO., LAKE, NAPA, AND YOLO COUNTIES
CASE #2724

Enclosed for your information is a copy of a report covering a recent inspection of your waste disposal facilities.

Wendy L. Cohen for
EDWIN Z. CRAWFORD
Area Representative

EZC:gs

Enclosure

cc: Environmental Protection Agency, Region 9, San Francisco
Lake County Planning Department, Lakeport
Napa County Planning Department, Napa
Solano County Planning Department, Fairfield
Solano Irrigation District, Vacaville

CENTRAL VALLEY REGIONAL WATER QUALITY CONTROL BOARD

INSPECTION REPORT

29 September 1988

DISCHARGER: HOMESTAKE MINING COMPANY, MC LAUGHLIN MINE (CA0081477)

LOCATION & COUNTY: Napa, Lake, and Yolo Counties

CONTACT(S): -----

INSPECTION DATE: 14 September 1988

INSPECTED BY: Edwin Z. Crawford

ACCOMPANIED BY: Mr. Phil Barnes, Senior Environmental Engineer

OBSERVATIONS AND COMMENTS:

This facility is regulated by Order No. 85-031.

The pond below the East Waste Rock Disposal Area is nearing completion. This facility is designed to function as a surge pond. Drainage water above elevation 1,700 feet will be diverted to the Main Waste Rock Disposal Area. Underdrain water will be collected and pumped back into the grinding circuit. At this time, there was no direct discharge to surface drainage courses from either disposal area. Knoxville Creek had an estiamted flow of 2 gpm at Knoxville and was dry downstream of that point.

The Main Waste Rock Disposal Area ponds were recently drained and repairs made as necessary. The valve at the lower end of the spillway below Pond No. 7 has been repaired. Hunting Creek was dry at the HC-10 weir and dry above discharge point 003. Mr. Barnes explained that the company plans to intercept some of the underdrain water from this unit also and return it to the grinding circuit.

Mr. Barnes and I discussed the annual report which is scheduled to be published in October. The findings in the report will be discussed in detail after the reort is distributed.

INSPECTION SUMMARY:

Based on the above, Homestake Mining Company is in compliance with permit conditions.

Wendy L. Eden for

EDWIN Z. CRAWFORD, Area Representative

EZC:gs

cc: as per cover letter

EPA NPDES Compliance Inspection Report

United States Environmental Protection Agency
Washington, D. C. 20460

Form Approved
OMB No. 2040-0003
Approval Expires 7-31-85

Section A: National Data System Coding

Transaction Code	NPDES	yr/mo/day	Inspection Type	Inspector	Fac Type
1 W 2 5	3 C A 0 0 0 8 1 4 7 7 11	12 8 8 0 9 1 4 17	18 C	19 S	20 2

Remarks

21 66

Reserved	Facility Evaluation Rating	BI	QA	Reserved	
67 69	70 5	71 W	72 M	73 74	75 80

Section B: Facility Data

Name and Location of Facility Inspected	Entry Time	Permit Effective Date
Homestake Mining Co., McLaughlin Mine P.O. Box 1010 Lower Lake, CA 95451	10 ☒ AM ☐ PM Exit Time/Date 1300 9-14-88	Permit Expiration Date

Name(s) of On-Site Representative(s)	Title(s)	Phone No(s)
Phil Barnes.	Senior Environmental Engineer	(916) 446-0389

Name, Address of Responsible Official	Title	Contacted
Roy Krauss P.O. Box 1010 Lower Lake, CA 95451	Environmental Manager Phone No. (916) 446-0389	☐ Yes ☒ No

Section C: Areas Evaluated During Inspection

(S = Satisfactory, M = Marginal, U = Unsatisfactory, N = Not Evaluated)

S	Permit	N	Flow Measurement	MA	Pretreatment	S	Operations & Maintenance
S	Records/Reports	N	Laboratory	N	Compliance Schedules	N	Sludge Disposal
S	Facility Site Review	S	Effluent/Receiving Waters	S	Self-Monitoring Program		Other:

Section D: Summary of Findings/Comments *(Attach additional sheets if necessary)*

See attached memo

Name(s) and Signature(s) of Inspector(s)	Agency/Office/Telephone	Date
Edwin Z. Crawford Edwin Z. Crawford	Central Valley Regional Water Quality Control Board (916) 361-5652	22 Sept. 1988
Signature of Reviewer Wendy L. Glen	Agency/Office CVRWQCB	Date 26 Sept. 1988

Regulatory Office Use Only

Action Taken	Date	Compliance Status
		☐ Noncompliance ☐ Compliance

STATE OF CALIFORNIA
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD—
CENTRAL VALLEY REGION
3443 ROUTIER ROAD
SACRAMENTO, CA 95827-3098

GEORGE DEUKMEJIAN, Governor

23 May 1988

Mr. Ray Krauss
Homestake Mining Co.
P. O. Box 1010
Lower Lake, CA 95457

REPORT OF RECENT INSPECTION

Enclosed for your information is a copy of a report covering a recent inspection of your facilities.

Edwin Z. Crawford

EDWIN Z. CRAWFORD
Area Representative

EZC:gs

Enclosure

cc: U. S. Bureau of Land Management, Ukiah
Environmental Protection Agency, San Francisco
Lake County Planning Department, Lakeport
Napa County Planning Department, Napa
Yolo County Planning Department, Woodland
Mr. Rick Wood, City of Fairield
Solano Irrigation District, Vacaville

CENTRAL VALLEY REGIONAL WATER QUALITY CONTROL BOARD

INSPECTION REPORT

DISCHARGER: HOMESTAKE MINING COMPANY 19 May 1988

LOCATION & COUNTY: Napa and Lake County

CONTACT(S): Messrs. Ray Krauss and Phil Barnes

INSPECTION DATE: 30 March 1988

INSPECTED BY: Edwin Z. Crawford and Pat Hannon

ACCOMPANIED BY: Delora Koontz

OBSERVATIONS AND COMMENTS

There was no flow in the surface drainage course below the new East Waste Rock disposal area. The area is stable, with no visible evidence of slippage or wind or water incurred erosion. There are three sediment catchment basins in the drainage below the disposal area. There was no evidence of significant sediment in any of the basins or the water course below the lowest basin.

We made measurements of Knoxville Creek 1 (below KC-3) at the upstream side of the Knoxville-Berryessa Road. The results are:

Time: 0945 pst
Temperature: 56°F
Specific conductance (field): 1938 micromhos
Estimated flow: 8.2
Remarks: Water clear, sediment deposits in streambed are from natural erosion. Roadway is stabilized and maintained. No evidence of sediment attributable to mining activities.

There was no direct discharge from the sewage stabilization pond at the mine site to surface drainage courses. There was only an estimated one foot to two feet of water in the M-1 pond. Any excess water in this pond is diverted into the mine pit and, as available, subsequently pumped into the ore circuit.

The soil and vegetation above pond T-1 remain stable and the pond has become a habitat for waterfowl.

The main waste rock disposal area is stable with no evidence of slippage or erosion. The revegetation is now so lush it is a major food source for local deer.

We made measurements of Pond No. 7, the drainage from Pond No. 7 and Hunting Creek at Stations HC-7A, 10, 11, 12, and 500 feet upstream of the confluence with the drainage from Pond No. 7 (see attached map). We also traversed the stream between HC-11, the station above all operations, and HC-10, the station below all

operations in an effort to determine the source of the increase in specific conductance between HC-7A and HC-10. There are numerous side streams entering Hunting Creek from both banks in this reach, but there is no evidence of mine waste entering any of the drainages.

The results of measurements and analyses are:

1. Hunting Creek (HC-11), near Reif Road, uppermost monitoring station, above all mining operations:

   Time: 1200 pst
   Temperature: 58°F
   Specific conductance (field): 456 microhomos
   Specific conductance (field)(Homestake): 430 micromhos
   pH (field): 8.3
   Calcium: 24 mg/l
   Sulphate: 190 mg/l
   Flow: 0.14 cfs
   Remarks: Water clear

2. Hunting Creek (HC-7A), at road crossing to Red Elephant Mine, upstream side of road:

   Time: 1254 pst
   Temperature: 60°F
   Specific conductance (field): 627 micromhos
   Specific conductance (field)(Homestake): 640 micromhos
   pH (field): 8.1
   pH (field)(Homestake): 8.4
   Remarks: Water clear, algal growth, fish (appear to be Roach).

3. Hunting Creek (HC-12), approximately 0.5 miles downstream of HC-7A:

   Time: 1300 pst
   Temperature: 61°F
   Specific conductance (field): 627 micromhos
   Specific conductance (field)(Homestake): 640 micromhos
   pH (field): 8.5
   pH (field)(Homestake): 8.6
   Remarks: Water clear

4. Hunting Creek about 500 feet upstream of confluence with discharge from Pond No. 7:

   Time: 1345
   Temperature: 62°F
   Specific Conductance (field): 817 micromhos
   Specific conductance (field)(Homestake): 830 micromhos
   pH (field): 8.7
   pH (field)(Homestake): 8.7
   Remarks: Water clear

5. Pond No. 7 at spillway:

Time: 1400 pst
Temperature: 62°F
Specific conductance (field): 1520 micromhos
Specific conductance (field)(Homestake): 1600 micromhos
pH (field): 8.6
pH (field)(Homestake): 8.6
Remarks: Water clear. No discharge over spillway

6. Discharge from Pond No. 7, approximately 3 yards below end of spillway:

Time: 1340 pst
Temperature: 60°F
Specific conductance (field): 1046 micromhos
Specific conductance (field)(Homestake): 1430 micromhos
pH (field): 8.6
Estimated flow: 20 gpm (0.04 cfs)
Remarks: Water clear, iron stain on rocks

7. Hunting Creek (HC-10), lower most monitoring point, below all mining operations:

Time: 1325 pst
Temperature: 62°F
Specific conductance (field): 874 micromhos
Specific conductance (field)(Homestake): 900 micromhos
pH (field): 8.6
pH (field)(Homestake): 8.7
Calcium: 41 mg/l
Sulphate: 86 mg/l
Flow: 378 gpm (0.84 cfs)
Remarks: Water clear, light iron stain visible on rocks

The major source of increase in specific conductance between Station HC-11 and HC-10 is attributable to side stream discharge not related to Homestake's operations.

INSPECTION SUMMARY:

Based on the above, Homestake Mining Company is in compliance with permit conditions.

Edwin Z. Crawford

EDWIN Z. CRAWFORD, Area Representative

EZC:gs

cc: per cover letter

INSTRUCTIONS

Section A: National Data System Coding *(i.e., PCS)*

Column 1: Transaction Code: Use N, C, or D for New, Change, or Delete. All inspections will be *new* unless there is an error in the data entered.

Columns 3-11: NPDES Permit No. Enter the facility's NPDES permit number. *(Use the Remarks columns to record the State permit number, if necessary.)*

Columns 12-17: Inspection Date. Insert the date entry was made into the facility. Use the year/month/day format (e.g., 82/06/30 = June 30, 1982).

Column 18: Inspection Type. Use one of the codes listed below to describe the type of inspection:

A — Performance Audit
B — Biomonitoring
C — Compliance Evaluation
D — Diagnostic
E — Corps of Engrs Inspection
L — Enforcement Case Support
P — Pretreatment
R — Reconnaissance Inspection
S — Compliance Sampling
X — Toxic Sampling

Column 19: Inspector Code. Use one of the codes listed below to describe the *lead agency* in the inspection.

C — Contractor or Other Inspectors *(Specify in Remarks columns)*
E — Corps of Engineers
J — Joint EPA/State Inspectors—EPA lead
N — NEIC Inspectors
R — EPA Regional Inspector
S — State Inspector
T — Joint State/EPA Inspectors—State lead

Column 20: Facility Type. Use one of the codes below to describe the facility.

1 — Municipal. Publicly Owned Treatment Works (POTWs) with 1972 Standard Industrial Code (SIC) 4952.
2 — Industrial. Other than municipal, agricultural, and Federal facilities.
3 — Agricultural. Facilities classified with 1972 SIC 0111 to 0971.
4 — Federal. Facilities identified as Federal by the EPA Regional Office.

Columns 21-66: Remarks. These columns are reserved for remarks at the discretion of the Region.

Column 70: Facility Evaluation Rating. Use information gathered during the inspection (regardless of inspection type) to evaluate the quality of the facility self-monitoring program. Grade the program using a scale of 1 to 5 with a score of 5 being used for very reliable self-monitoring programs, 3 being satisfactory, and 1 being used for very unreliable programs.

Column 71: Biomonitoring Information. Enter D for static testing. Enter F for flow through testing. Enter N for no biomonitoring.

Column 72: Quality Assurance Data Inspection. Enter Q if the inspection was conducted as followup on quality assurance sample results. Enter N otherwise.

Columns 73-80: These columns are reserved for regionally defined information.

Section B: Facility Data

This section is self-explanatory.

Section C: Areas Evaluated During Inspection

Indicate findings (S, M, U, or N) in the appropriate box. Use Section D and additional sheets as necessary. Support the findings, as necessary, in a brief narrative report. Use the headings given on the report form (e.g., Permit, Records/Reports) when discussing the areas evaluated during the inspection. The heading marked "Other" may include activities such as SPCC, BMP's, and multimedia concerns.

Section D: Summary of Findings/Comments

Briefly summarize the inspection findings. This summary should abstract the pertinent inspection findings, not replace the narrative report. Reference a list of attachments, such as completed checklists taken from the NPDES Compliance Inspection Manuals and pretreatment guidance documents, including effluent data when sampling has been done. Use extra sheets as necessary.

STATE OF CALIFORNIA
GEORGE DEUKMEJIAN, *Governor*

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD—
CENTRAL VALLEY REGION
3443 ROUTIER ROAD
SACRAMENTO, CA 95827-3098

RECEIVED
DEC 07 1987

3 December 1987

Mr. Ray Krauss
Homestake Mining Co.
P. O. Box 1010
Lower Lake, CA 95457

REPORT OF RECENT INSPECTION

Enclosed for your information is a copy of a report covering a recent inspection of your waste disposal facilities.

Edwin Z. Crawford

EDWIN Z. CRAWFORD
Area Representative

EZC:gs

Enclosure

cc: Napa County Planning Department, Napa
Lake County Planning Department, Lakeport
Yolo County Planning Department, Woodland
Solano Irrigation District, Vacaville

CENTRAL VALLEY REGIONAL WATER QUALITY CONTROL BOARD

INSPECTION REPORT

3 December 1987

DISCHARGER: HOMESTAKE MINING CO. (ORDER NO. 85-032)

LOCATION & COUNTY: Napa, Lake, and Yolo Counties

CONTACT(S): -----

INSPECTION DATE: 16 November 1987

INSPECTED BY: Edwin Z. Crawford

ACCOMPANIED BY: Mr. Ray Krauss, Environmental Manager

OBSERVATIONS AND COMMENTS:

There was no fugitive dust from the mine pit or waste rock disposal areas. There was no evident significant erosion of roadways, except for an area between Morgan Valley Road and Hunting Creek. The area, which had been revegetated, was rutted by vehicle traffic not associated with the mining operation. Mr. Krauss explained that the company has been unable to prevent the soil disturbance; therefore, the area will be fenced in the near future to preclude access.

The cooling water pond on the south side of the mill has been taken out-of-service because of excessive calcium sulfate accumulation. A new cooling water pond has been installed on the west side of the mill adjacent to the tailings disposal reservoir. In the future, excess calcium sulfate will be discharged to the reservoir.

I looked at the solid waste disposal area situated at the north end of the tailings reservoir. Slit trenches are dug, filled, and covered on a regular basis. During inclement weather, refuse is temporarily stockpiled on the surface. Waste which consisted of construction debris and used grinding mill iron balls was contained in the designated area.

The pump back facility below the tailings dam was operational, with standby power. Recent, incipient erosion of the left abutment groin of the tailings dam has been repaired. There was no surface runoff from the mill area or tailings disposal to surface drainage courses.

Sewage effluent from the mill is discharged to the tailings reservoir. Sewage effluent from the mine area is discharged to an evaporation pond adjacent to and on the west side of Morgan Valley Road. There was no direct discharge from the facility to surface drainage courses.

INSPECTION SUMMARY:

Based on the above Homestake Mining Company is in compliance with the Board's requirements.

Edwin Z. Crawford

EDWIN Z. CRAWFORD, Area Representative

EZC:gs

STATE OF CALIFORNIA
GEORGE DEUKMEJIAN, *Governor*

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD—
CENTRAL VALLEY REGION
3443 ROUTIER ROAD
SACRAMENTO, CA 95827-3098

RECEIVED
DEC 07 1987

2 December 1987

Mr. Ray Krauss
Homestake Mining Co.
P. O. Box 1010
Lower Lake, CA 95457

REPORT OF RECENT INSPECTION

Enclosed for your information is a copy of a report covering a recent inspection of your waste disposal facilities.

Edwin Z. Crawford

EDWIN Z. CRAWFORD
Area Representative

EZC:gs

Enclosure

CENTRAL VALLEY REGIONAL WATER QUALITY CONTROL BOARD

INSPECTION REPORT

2 December 1987

DISCHARGER:	HOMESTAKE MINING CO. (NPDES NO. CA0081477)
LOCATION & COUNTY:	Napa, Lake, and Yolo Counties
CONTACT(S):	-----
INSPECTION DATE:	16 November 1987
INSPECTED BY:	Edwin Z. Crawford
ACCOMPANIED BY:	Mr. Ray Krauss, Environmental Manager

OBSERVATIONS AND COMMENTS:

There was no evidence of significant erosion from roadways, waste rock disposal area, top soil storage areas, or retention dams. The incipient erosion of the left bank groin of the downstream face of the tailings dam has been repaired. The only significant erosion in the area was a roadway not under Homestake's jurisdiction or control.

All surface streams in the area were essentially dry. Recent rain in the area has not been enough to produce runoff.

INSPECTION SUMMARY:

Based on the above, Homestake Mining Co., is in compliance with permit conditions.

Edwin Z. Crawford

EDWIN Z. CRAWFORD, Area Representative

EZC:gs

(form letter sent)

STATE OF CALIFORNIA
GEORGE DEUKMEJIAN, *Governor*

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD—
CENTRAL VALLEY REGION
3443 ROUTIER ROAD
SACRAMENTO, CA 95827-3098

13 May 1987

Mr. Phil Barnes
Homestake Mining
P. O. Box 1010
Lower Lake, CA 95457

REPORT OF RECENT INSPECTION

Enclosed for your information is a copy of a report covering a recent inspection of your waste disposal facilities.

EDWIN Z. CRAWFORD
Area Representative

EZC:gs

Enclosure

cc: Environmental Protection Agency, San Francisco
Department of Health Services, Santa Rosa
Lake County Planning Department, Napa
Napa County Planning Department, Napa
Yolo County Planning Department, Woodland

CENTRAL VALLEY REGIONAL WATER QUALITY CONTROL BOARD

INSPECTION REPORT

DISCHARGER: HOMESTAKE MINING, MC LAUGHLIN MINE 27 April 1987

LOCATION & COUNTY: Lake, Napa, and Yolo Counties

CONTACT(S): Mr. Phil Barnes, Environmental Engineer

INSPECTION DATE: 10 March 1987

INSPECTED BY: Edwin Z. Crawford

ACCOMPANIED BY: Mr. Pete Scwarzer, Assistant Environmental Engineer

OBSERVATIONS AND COMMENTS:

The discharge from Pond T-1 (001) was clear with no visible turbidity or colloidal matter. The discharge from Pond W-1 (002 and 003) was from pond #7. The discharge was clear with no visible turbidity or colloidal matter.

I collected samples from receiving water stations R-1, R-4, and R-5. The results of measurements and analyses are:

R-1 Hunting Creek)HC-5) at Reiff Road (upstream of all operations):

Time: 1445 pst
Temperature: 50°F
Specific Conductance (field): 590 micromhos
pH (field): 7.8
Nitrate as N: <0.01 mg/l
Dissolved Oxygen: 12.0 mg/l
Estimated flow: 1.2 cfs
Remarks: Water clear

R-5 Hunting Creek (HC-10) downstream of all operations:

Time: 1245 pst
Temperature: 50°F
Specific Conductance (field): 920 micromhos
pH (field): 8.4
Dissolved Oxygen: 11.8 mg/l
Nitrate as N: <0.01 mg/l
Flow: 2 cfs
Remarks: Water clear. Settlable solids: 0 mg/l.
Visual turbidity: <25 JTU

R-4 Knoxville Creek (KC-3) at Knoxville-Berryessa Road crossing.

Time: 1030 pst
Temperature: 50°F
Specific Conductance (field): 2,600 micromhos
pH (field): 8.6
Estimated flow: 0.6 cfs
Remarks: Water clear

REVIEWED BY:

I also collected a water sample from Well N-8A, which is situated below the tailings disposal area. The well was purged for about 16 hours prior to sample collection, achieving a drawdown from 7.8 feet to 32.6 feet. The results of measurements and analysis are:

Time: 1130 pst
Temperature: 60°F
Specific Conductance (field): 6,500 micromhos
pH (field): 10.0
Nitrate as N: <0.01 mg/l

INSPECTION SUMMARY:

Based on the above, Homestake Mining is in compliance with waste discharge requirements and permit conditions.

Edwin Z. Crawford

EDWIN Z. CRAWFORD, Area Representative

EZC:gs

cc: Environmental Protection Agency, San Francisco
Department of Health Services, Santa Rosa
Napa County Planning Department, Napa
Lake County Planning Department, Lakeport
Yolo County Planning Department, Woodland

(form letter sent)

EPA

United States Environmental Protection Agency
Washington, D. C 20460

NPDES Compliance Inspection Report

Form Approved
OMB No. 2040-0003
Approval Expires 7-31-85

Section A: National Data System Coding

Transaction Code	NPDES	yr/mo/day	Inspection Type	Inspector	Fac Type
1 W 2 5	3 CA0098147 11	12 870319 17	18 S	19 S	20 2

Remarks

21 66

Reserved	Facility Evaluation Rating	BI	QA	Reserved
67 69	70 5	71 F	72 M	73 74 75 80

Section B: Facility Data

Name and Location of Facility Inspected	Entry Time	Permit Effective Date
Homestake Mining, intersection of Napa, Lake & Yolo Counties.	1045 ☒ AM ☐ PM	1-25-85
	Exit Time/Date: 1445	Permit Expiration Date: 8-1-88

Name(s) of On-Site Representative(s)	Title(s)	Phone No(s)
Phil Barnes	Environmental Engineer	(916) 446-1070
Pete Scwarzer	Ast. Environmental Engineer	(916) 446-1070

Name, Address of Responsible Official	Title	Contacted
Ray Krauss	Environmental Manager	☐ Yes ☒ No
	Phone No. (916) 446-1070	

Section C: Areas Evaluated During Inspection

(S = Satisfactory, M = Marginal, U = Unsatisfactory, N = Not Evaluated)

S	Permit	S	Flow Measurement	N	Pretreatment	S	Operations & Maintenance
S	Records/Reports	N	Laboratory	N	Compliance Schedules	S	Sludge Disposal
S	Facility Site Review	S	Effluent/Receiving Waters	S	Self-Monitoring Program		Other:

Section D: Summary of Findings/Comments *(Attach additional sheets if necessary)*

See attached memorandum

Name(s) and Signature(s) of Inspector(s)	Agency/Office/Telephone	Date
Edwin J. Crawford	Central Valley Regional Water Quality Control Board	4-6-87
Edwin J. Crawford		
Signature of Reviewer	**Agency/Office**	**Date**
James L. Eckman	Central Valley Regional Water Quality Control Board	4-7-87

Regulatory Office Use Only

Action Taken	Date	Compliance Status
		☐ Noncompliance ☐ Compliance

EPA Form 3560-3 (Rev. 3-85) Previous editions are obsolete.

STATE OF CALIFORNIA
GEORGE DEUKMEJIAN, *Governor*

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD—
CENTRAL VALLEY REGION
3443 ROUTIER ROAD
SACRAMENTO, CA 95827-3098

RECEIVED
2 2 1987

19 February 1987

Mr. Ray Krauss
Homestake Mining Co.
P. O. Box 1010
Lower Lake, CA 95457

REPORT OF RECENT INSPECTION

Enclosed for your information is a copy of a report covering a recent inspection of your waste disposal facilities.

EDWIN Z. CRAWFORD
Area Representative

EZC:gs

Enclosure

cc: U. S. Bureau of Reclamation, Napa
Napa County Planning Department, Napa
Lake County Planning Department, Lakeport
Yolo County Planning Department, Woodland

CENTRAL VALLEY REGIONAL WATER QUALITY CONTROL BOARD

INSPECTION REPORT

19 February 1987

DISCHARGER: HOMESTAKE MINING COMPANY (NPDES NO. CA0081477)

LOCATION & COUNTY: Knoxville, Napa and Lake Counties

CONTACT(S): ----

INSPECTION DATE: 4 February 1987

INSPECTED BY: Edwin Z. Crawford and Jim Eckman

ACCOMPANIED BY: Mr. Ray Krauss and Mr. Phil Barnes, Environmental Manager and Environmental Engineer, respectively

OBSERVATIONS AND COMMENTS:

There was no direct discharge of waste from any portion of the mine operation to surface drainage courses.

Pond T-1 (001) has been revegetated and stabilized to the point where it is no longer a point source discharge.

Pond system W-1 (002). This system consists of 7 ponds. There was no discharge from pond #1. There was a discharge, estimated flow 20 gpm, from pond #7. The water was clear with no visible turbidity or sediment. Also, the discharge percolated into the ground before reaching Hunting Creek. Hunting Creek was clear above and below the point of discharge. Also, there were no visible sediment deposits in the creek attributable to the discharge.

Pond M-1 (004). There was no discharge from this unit to surface drainage courses. Water in the unit is recycled back into the process unit.

Edwin Z. Crawford

EDWIN Z. CRAWFORD, Area Representative

EZC:gs

cc: U. S. Bureau of Reclamation, Napa
Napa County Planning Department, Napa
Lake County Planning Department, Lakeport
Yolo County Planning Department, Woodland

(form letter sent)

CENTRAL VALLEY REGIONAL WATER QUALITY CONTROL BOARD

INSPECTION REPORT

19 February 1987

DISCHARGER: HOMESTAKE MINING COMPANY (ORDER NO. 85-032)

LOCATION & COUNTY: Knoxville, Napa and Lake Counties

CONTACT(S): ----

INSPECTION DATE: 4 February 1987

INSPECTED BY: Edwin Z. Crawford and Jim Eckman

ACCOMPANIED BY: Mr. Ray Krauss and Mr. Phil Barnes, Environmental Manager and Environmental Engineer, respectively.

OBSERVATIONS AND COMMENTS:

There was no evident discharge of liquid waste from the mine, mill, shop evaporation pond, cooling water pond, sewage treatment pond, crushing area, low grade ore stockpile area, or tailings disposal facility to surface waters or surface water drainage courses. There was no evidence of liquid or solid waste discharged to the Davis Creek watershed.

I collected water samples from Davis Creek and Knoxville Creek for selenium analysis. The results of measurements follow. The results of analysis will be sent when returned from the laboratory.

Davis Creek, an estimated 500 feet below the Rayhouse Road, Section 25, T12N, R5W, MDB&M.

Time: 1415 pst — Specific Conductance (field): 1,000 micromhos
Estimated flow: 1 cfs — Remarks: Water clear, iron deposits on streambed.

Knoxville Creek at Knoxville-Berryessa Road, Section 7, T11N, R4W, MDB&M.

Time: 0915 pst — Specific Conductance (field): 2,4000 micromhos
Estimated flow: 1 cfs — Remarks: Water clear

INSPECTION SUMMARY:

Based on the above, Homestake Mining Company is in compliance with waste discharge requirements.

Edwin Z. Crawford

EDWIN Z. CRAWFORD, Area Representative

EZC:gs

cc: U.S. Bureau of Reclamation, Napa
Napa County Planning Department, Napa
Lake County Planning Department, Lakeport
Yolo County Planning Department, Woodland

(form letter sent)

File RWQCB PK

STATE OF CALIFORNIA
GEORGE DEUKMEJIAN, Governor

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD—
CENTRAL VALLEY REGION
3201 S STREET
SACRAMENTO, CALIFORNIA 95816-7090
PHONE: (916) 445-0270

3 October 1986

Homestake Mining Company
P.O. Box 1010
Lower Lake, CA 95457

REPORT OF RECENT INSPECTION

Enclosed for your information is a copy of a report covering a recent inspection of your waste disposal facilities.

Edwin Z. Crawford

EDWIN Z. CRAWFORD
Area Representative

EAC:kwc

Enclosure

cc: Napa County Planning Department, Napa CA
Solano Irrigation District, Vacaville, CA

CENTRAL VALLEY REGIONAL WATER QUALITY CONTROL BOARD

INSPECTION REPORT

DISCHARGER:	HOMESTAKE MINING COMPANY	3 October 1986
LOCATION & COUNTY:	Knoxville, Napa County	
CONTACT(S):	Messrs. Raymond E. Krauss and Phillip C. Barnes, Environmental Manager and Environmental Engineer	
INSPECTION DATE:	16 September 1986	
INSPECTED BY:	Edwin Z. Crawford	
ACCOMPANIED BY:	Shalanda White, Student Assistant	

OBSERVATIONS AND COMMENTS

We looked at the road realignment, the mill site, the tailings disposal area, and NPDES point T-1.

Cut and fill areas of the road realignment are well-compacted, revegetated and maintained. I found no evidence of significant erosion. In fact, the realigned road is in better condition than the original roadway before Homestake commenced operation.

The mill site is paved with extensive spill prevention and contingency facilities in place. Cyanide is stored in individual containers on impervious material with surrounding berm, and is within a fenced and locked compound. Adequate hypochlorite is also stockpiled on-site for use in the event of cyanide release in any area of the process.

At present time, tailings are being deposited along the upstream face of the dam. Mr. Barnes explained that the intent of disposal method was to provide uniform deposition of tailings in the reservoir and ensure an additional blanket of fines over the face of the dam.

The topsoil storage area, T-1, has been compacted and revegetated. The sedimentation pond at the toe of the fill has well-established vegetation. Water in the pond was clear. There was no evidence of significant sediment in the rock spillway below the pond or the downstream drainage course. Mr. Barnes asked if the monitoring point T-1 could be rescinded as an NPDES station. I said we would review and advise him accordingly.

We reviewed Monitoring and Reporting Program No. 85-032. We discussed the 31 exceedences of the "Maximum Likely Concentration" (MLCs) reported in the 1 July 1985 - 30 June 1986 annual report. Mr. Barnes explained that some of the exceedences may have resulted from a change in analytical procedure. Another cause is that the data points for the operation phase exceed the data points for background.

Therefore, by the very nature of statistical analysis, there will be "spikes" or exceedences of the MLCs as a result of statistical variation, rather than actual exceedences due to mine operation. Mr. Barnes said that he would recompute the MLCs based on the expanded data base. I agree that this is appropriate methodology.

Mr. Barnes and I discussed reduction of sample locations and certain constituents. He will summarize the company's request for revision in a separate letter to our office.

Mr. Krauss said the company would continue to fund the project to study the Davis Creek Reservoir.

INSPECTION SUMMARY

I completed an extensive review and critique of the current Monitoring and Reporting Programs and found them in need of revision.

Edwin J. Crawford

EDWIN Z. CRAWFORD, Area Representative

EZC:kwc

(form letter sent)

cc: √Homestake Mining Company
Napa County Planning Department, Napa, CA
Solano Irrigation District, Vacaville, CA

NAPA COUNTY

CONSERVATION — DEVELOPMENT
AND PLANNING DEPARTMENT

JAMES H. HICKEY
Director

1196 THIRD STREET, ROOM 210 • NAPA, CALIFORNIA 94559-3092
AREA CODE 707/253-4416

MEMORANDUM

TO: Conservation, Development and Planning Commission

FROM: James H. Hickey, Director

SUBJECT: McLaughlin Gold Mine Project:
Discharge of Water from M-1 Sediment Pond

DATE: June 18, 1986

File: Use Permit #U-198283
Condition of Approval #17

Owner: Homestake Mining Company

Condition No. 17 of Homestake Mining Company's Use Permit for the McLaughlin Gold Project requires that the Director report to the Commission of any violation of adopted standards applicable to the Project. As reported on May 7, 1986, at the regular meeting of the Commission, a discharge of storm waters from sediment Pond M-1 occured in February and March 1986 in violation of the Waste Discharge Permit issued by the Central Valley Regional Water Quality Control Board. The attached report is sent to you in accordance with Condition No. 17. A review of the findings and conclusions presented by Homestake to the Regional Board indicates that the violation of the Waste Discharge Permit was not considered significant.

Storm waters discharged into Knoxville Creek from Pond M-1 were monitored daily at critical downstream points. Although elevated concentrations of metals in excess of adopted standards were noted at the point of discharge, these levels were found to be below said standards at a point 4,000 feet downstream. The discharge was found to have been buffered by the natural alkalinity of rock and soils present in the project area streams. Results indicate that no harm was done to Knoxville Creek.

Following the spill, the operating criteria for Pond M-1 has been revised by Homestake to provide for maximum storage capacity during the rainy season. Further, Homestake has stated that by December 1986 an additional 340 acre feet of emergency storage capacity over that provided by Pond M-1 (215 ac. ft.) will be available through mine pit development.

Finding:

Violation of Homestake's Waste Discharge Permit issued by the Central Valley Regional Water Quality Control Board was not significant; and, measures to prevent a similar occurance are being implemented by Homestake.

RECOMMENDATION

No action required. Information Only.

JHH:ml:2b

STATE OF CALIFORNIA
GEORGE DEUKMEJIAN, *Governor*

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD—
CENTRAL VALLEY REGION
201 S STREET
SACRAMENTO, CALIFORNIA 95816-7090
PHONE: (916) 445-0270

11 February 1986

Mr. Ray Krauss
Homestake Mining Co.
P. O. Box 1010
Lower Lake, CA 95457

REPORT OF RECENT INSPECTION

Enclosed for your information is a copy of a report covering a recent inspection of your waste disposal facilities.

Greg Vaughn

GREG K. VAUGHN
Area Engineer

GKV:gs

Enclosure

INSPECTION REPORT

11 February 1986

DISCHARGER: HOMESTAKE MINING COMPANY, MC LAUGHLIN MINE

LOCATION & COUNTY: One mile north of Knoxville, Lake, Napa & Yolo Counties

CONTACT(S): Phil Barnes, Peter Schwarzer, Environmental Engrs.

INSPECTION DATE: 10 September 1985

INSPECTED BY: Greg K. Vaughn

ACCOMPANIED BY: Phil Barnes, Homestake Environmental Engineer

OBSERVATIONS AND COMMENTS:

The mine has been operating since March 1985. All facilities are completed and approved. Inspection was made of the mill, tailings disposal facilities, the mine, water supply reservoir, waste rock facilities, and all associated sediment control structures and receiving waters.

Erosion control measures for the past winter were very effective. Areas with signs of minor failure and the areas around the waste rock sediment ponds will be further stabilized by Homestake personnel prior to the onset of witner.

All creeks within the project have shown no visible impacts from the Homestake activities. The creeks were either at very low flow or dry at the time of inspection.

A review of the monitoring well data shows good consistent results and no obvious impacts to any ground water body. A full review of the ground and surface water data will be made upon receipt of the Homestake annual monitoring report.

Spot samples were collected and split with Homestake. Sample values were compared with permit conditions for compliance determination. Samples were collected from monitoring well N-6, surface locations Hunting Creek 5 and Hunting Creek 10, and at Discharge Point 003. Discharge 003, a sediment pond within the waste rock drainage, was discharging at the time of inspection. The discharge made up most of the downstream receiving waters of Hunting Creek. HC-5 is upstream of Discharge 003 and HC-10 downstream.

The following are results of the collected samples: (see attached page)

INSPECTION SUMMARY:

The Discharger is in compliance with Board Order Nos. 85-031 and 85-032.

Greg K Vaughn

GREG K. VAUGHN, Area Engineer

GKV:gs

(form letter sent)

HOMESTAKE MINE

Sampling Results (Inspection Date 10 September 1985)

Receiving Water:

	Upstream HC-5 (mg/l)	Downstream HC 10	% Change	% Allowable
Arsenic	<0.005	<0.004	0	0
Cadmium	<0.005	<0.001	0	10
Chromium	<0.020	<0.02	0	10
Copper	<0.010	<0.02	0	10
Lead	<0.02	<0.01	0	0
Mercury	<0.0002	<0.001	0	10
Nickel	<0.020	<0.05	0	10
Selenium	--	<0.005	-	--
Barium	<0.050	0.02	NA	--
Boron	0.14	--	--	10
Iron	0.030	<0.03	0	--
Vanadium	<0.020	--	--	--

Note: Upstream lab analysis performed by California Analytical
Downstream lab analysis performed by Anlab

Well N-6 (mg/l)

Arsenic	< 0.005
Cadmium	< 0.005
Chromium	< 0.020
Copper	< 0.010
Lead	< 0.02
Mercury	< 0.0002
Nickel	< 0.020
Selenium	< 0.005
Zinc	< 0.020
Barium	< 0.050
Iron	0.038
Free Cyanide	< 0.01
Total Cyanide	< 0.01

HOMESTAKE MINE

Sampling Results

Discharge 003

Constituent (mg/l)	Daily Maximum	Sample 9-10-85
Suspended Matter	30	6
Arsenic	0.10	<0.004
Cadmium	0.02	<0.001
Chromium	0.10	<0.02
Copper	0.30	<0.02
Lead	0.10	<0.01
Mercury	0.002	<0.001
Nickel	----	<0.05
Barium	----	0.01
Iron	----	<0.03
Selenium	----	<0.005
Zinc	1.5	<0.01

STATE OF CALIFORNIA
GEORGE DEUKMEJIAN, *Governor*

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD—
CENTRAL VALLEY REGION
201 S STREET
SACRAMENTO, CALIFORNIA 95816-7090
PHONE: (916) 445-0270

20 February 1985

Mr. Raymond Krauss
Homestake Mining Company
Post Office Box 1010
Lower Lake, CA 95457

COMPLIANCE INSPECTION

Enclosed is a copy of the compliance inspection report recently made of your facilities.

If you have any questions on the findings, please contact me at (916) 322-1589.

GREG K. VAUGHN
Area Engineer

GKV:gs

Enclosure

cc: U.S. Bureau of Land Management, Ukiah
Department of Fish and Game, Region II, Rancho Cordova
Napa County Planning Department, Napa
Yolo County Planning Department, Woodland
Lake County Planning Department, Lakeport
Solano Irrigation District

CENTRAL VALLEY REGIONAL WATER QUALITY CONTROL BOARD

INSPECTION REPORT

DISCHARGER:	HOMESTAKE MINING COMPANY	20 February 1985
LOCATION & COUNTY:	Lake, Napa, and Yolo Counties	
CONTACT(S):	Raymond Krauss, Environmental Manager	
INSPECTION DATE:	13 February 1985	
INSPECTED BY:	Greg Vaughn, Jack DelConte	
ACCOMPANIED BY:	Raymond Krauss and Phil Barnes, Environmental Engineer	

OBSERVATIONS AND COMMENTS:

Homestake is within six weeks of completing construction of the mining and milling sites. The tailings disposal facilities are complete. The waste rock facilities and sediment control structures are completed and operational. There had been no rain for the previous five days and no discharges to surface waters were occurring during the time of inspection.

Erosion control measures are in place. Minor amounts of sloughing are occurring where reseeding was done on steep slopes. These areas will be repaired prior to next winter.

The tributary creeks, Knoxville and Hunting Creeks, show no impacts as a result of construction activities. The creeks were at low flow conditions and clear.

An NPDES Compliance Inspection Report has been completed and is enclosed with this report.

INSPECTION SUMMARY:

There was no discharge at the time of this inspection. The Discharger is in compliance with Board Order Numbers 85-031 and 85-032.

Greg K. Vaughn

GREG K. VAUGHN, Area Engineer

GKV:gs

cc: as per cover letter

Enclosure

Form Approved
OMB No. 158-R0073

NPDES COMPLIANCE INSPECTION REPORT (Coding Instructions on back of last page)

TRANSACTION CODE	NPDES	YR	MO	DA	TYPE	INSPECTOR	FAC TYPE	TIME
N	CA0081477	85	02	13	C	S	2	12:30 p.m.

REMARKS

ADDITIONAL

SECTION A - Permit Summary

NAME AND ADDRESS OF FACILITY (Include County, State and ZIP code)
Homestake Mining Company
PO Box 1010
Lower Lake, CA 95457

EXPIRATION DATE: 1 August 1988
ISSUANCE DATE: 25 January 1985

RESPONSIBLE OFFICIAL	TITLE	PHONE
Dennis Goldstein	counsel	(415) 981-8150
FACILITY REPRESENTATIVE	TITLE	PHONE
Raymond Krauss	Environmental Manager	(916) 442 4911

SECTION B - Effluent Characteristics (Additional sheets attached ____)

PARAMETER/ OUTFALL		MINIMUM	AVERAGE	MAXIMUM	ADDITIONAL
001-004 Susp Solids	SAMPLE MEASUREMENT				
	PERMIT REQUIREMENT		20	30	
001-004 Sett solids	SAMPLE MEASUREMENT				
	PERMIT REQUIREMENT		1.0	5.0	
001-004 As	SAMPLE MEASUREMENT				
	PERMIT REQUIREMENT		.05	0.10	
001-004 Cd	SAMPLE MEASUREMENT				
	PERMIT REQUIREMENT		.01	0.02	
001-004 Cr	SAMPLE MEASUREMENT				
	PERMIT REQUIREMENT		.05	0.10	

SECTION C - Facility Evaluation (S = Satisfactory, U = Unsatisfactory, N/A = Not applicable)

N/A	EFFLUENT WITHIN PERMIT REQUIREMENTS	S	OPERATION AND MAINTENANCE	S	SAMPLING PROCEDURES
S	RECORDS AND REPORTS	N/A	COMPLIANCE SCHEDULE	S	LABORATORY PRACTICES
S	PERMIT VERIFICATION	N/A	FLOW MEASUREMENTS		OTHER:

SECTION D - Comments

SECTION E - Inspection/Review

SIGNATURES	AGENCY	DATE
INSPECTED BY Greg K Vaughn	RWQCB, CVR	15 Feb 1985
INSPECTED BY		
REVIEWED BY		

ENFORCEMENT DIVISION USE ONLY
COMPLIANCE STATUS
☐ COMPLIANCE
☐ NONCOMPLIANCE

CODING INSTRUCTIONS

Column 1	Transaction Code - Use N, C, or D for New, Change or Delete. All inspections will be new unless there is an error in the data keypunched into WENDB.
Column 2	Card Code - Always 5 for this card.
Columns 3-11	NPDES - The NPDES permit number. (The State permit number may be accommodated in the remarks or additional spaces).
Column 12-17	Inspection Date - Entered in the year/month/day format (e.g. 77/06/30= June 30, 1977).
Column 18	Inspection Type - An inspection will fall into one of two possible categories: 'C' for Compliance Evaluation or 'S' for Compliance Sampling.
Column 19	Inspector Code - An inspection may be performed by the Region, State or NEIC (U.S. EPA National Enforcement Investigations Center). It may also be the result of a joint effort. (Credit in FPRS for a joint inspection is given to the lead agency.) Acceptable codes for WENDB are: R - EPA Regional inspections S - State inspections J - Joint EPA and State inspections - EPA lead T - Joint EPA and State inspections - State lead N - NEIC inspections
Column 20	Facility Type - This code describes the type of facility that was inspected. Acceptable codes are: 1 - Municipal - Publicly-Owned Treatment Works (POTWs) with 1972 Standard Industrial Classification (SIC) 4952. 2 - Industrial - Other than Municipal, Agricultural, and Federal facilities. 3 - Agricultural - Those facilities classified with 1972 SIC 0111-0971. 4 - Federal - Those facilities identified as Federal by EPA Regional office.
Columns 21-70	Remarks - This remarks field provides the inspector with a vehicle to store descriptive information about the inspection. There is no set format within this 50-position field. Individual Regions or States may choose to set aside portions of this field for their own specific needs.

Form Approved
OMB No. 158 - R0073

Sections F thru L: Complete on all inspections, as appropriate. N/A = Not Applicable

PERMIT NO. CA0081477

SECTION F - Facility and Permit Background

ADDRESS OF PERMITTEE IF DIFFERENT FROM FACILITY (Including City, County and ZIP code)
Homestake Mining Company
650 California Street, 9th floor
San Francisco CA 94108

DATE OF LAST PREVIOUS INVESTIGATION BY EPA/STATE

FINDINGS
pre operational inspection

SECTION G - Records and Reports

RECORDS AND REPORTS MAINTAINED AS REQUIRED BY PERMIT. ☒ YES ☐ NO ☐ N/A (Further explanation attached ____)
DETAILS:

(a) ADEQUATE RECORDS MAINTAINED OF:				
(i)	SAMPLING DATE, TIME, EXACT LOCATION	☒ YES	☐ NO	☐ N/A
(ii)	ANALYSES DATES, TIMES	☒ YES	☐ NO	☐ N/A
(iii)	INDIVIDUAL PERFORMING ANALYSIS	☒ YES	☐ NO	☐ N/A
(iv)	ANALYTICAL METHODS/TECHNIQUES USED	☒ YES	☐ NO	☐ N/A
(v)	ANALYTICAL RESULTS *(e.g., consistent with self-monitoring report data)*	☐ YES	☐ NO	☒ N/A
(b) MONITORING RECORDS *(e.g., flow, pH, D.O., etc.)* MAINTAINED FOR A MINIMUM OF THREE YEARS INCLUDING ALL ORIGINAL STRIP CHART RECORDINGS *(e.g. continuous monitoring instrumentation, calibration and maintenance records).*		☐ YES	☐ NO	☒ N/A
(c) LAB EQUIPMENT CALIBRATION AND MAINTENANCE RECORDS KEPT.		☒ YES	☐ NO	☐ N/A
(d) FACILITY OPERATING RECORDS KEPT INCLUDING OPERATING LOGS FOR EACH TREATMENT UNIT.		☐ YES	☐ NO	☒ N/A
(e) QUALITY ASSURANCE RECORDS KEPT.		☒ YES	☐ NO	☐ N/A
(f) RECORDS MAINTAINED OF MAJOR CONTRIBUTING INDUSTRIES *(and their compliance status)* USING PUBLICLY OWNED TREATMENT WORKS.		☐ YES	☐ NO	☒ N/A

SECTION H - Permit Verification

INSPECTION OBSERVATIONS VERIFY THE PERMIT. ☒ YES ☐ NO ☐ N/A (Further explanation attached ____)
DETAILS:

(a) CORRECT NAME AND MAILING ADDRESS OF PERMITTEE.		☒ YES	☐ NO	☐ N/A
(b) FACILITY IS AS DESCRIBED IN PERMIT.		☒ YES	☐ NO	☐ N/A
(c) PRINCIPAL PRODUCT(S) AND PRODUCTION RATES CONFORM WITH THOSE SET FORTH IN PERMIT APPLICATION.		☐ YES	☐ NO	☒ N/A
(d) TREATMENT PROCESSES ARE AS DESCRIBED IN PERMIT APPLICATION.		☒ YES	☐ NO	☐ N/A
(e) NOTIFICATION GIVEN TO EPA/STATE OF NEW, DIFFERENT OR INCREASED DISCHARGES.		☐ YES	☐ NO	☒ N/A
(f) ACCURATE RECORDS OF RAW WATER VOLUME MAINTAINED.		☐ YES	☐ NO	☒ N/A
(g) NUMBER AND LOCATION OF DISCHARGE POINTS ARE AS DESCRIBED IN PERMIT.		☒ YES	☐ NO	☐ N/A
(h) CORRECT NAME AND LOCATION OF RECEIVING WATERS.		☒ YES	☐ NO	☐ N/A
(i) ALL DISCHARGES ARE PERMITTED.		☒ YES	☐ NO	☐ N/A

SECTION I - Operation and Maintenance

TREATMENT FACILITY PROPERLY OPERATED AND MAINTAINED. ☐ YES ☐ NO ☒ N/A (Further explanation attached ____)
DETAILS: pre operational

(a) STANDBY POWER OR OTHER EQUIVALENT PROVISIONS PROVIDED.		☒ YES	☐ NO	☐ N/A
(b) ADEQUATE ALARM SYSTEM FOR POWER OR EQUIPMENT FAILURES AVAILABLE.		☒ YES	☐ NO	☐ N/A
(c) REPORTS ON ALTERNATE SOURCE OF POWER SENT TO EPA/STATE AS REQUIRED BY PERMIT.		☐ YES	☐ NO	☒ N/A
(d) SLUDGES AND SOLIDS ADEQUATELY DISPOSED.		☒ YES	☐ NO	☐ N/A
(e) ALL TREATMENT UNITS IN SERVICE.		☐ YES	☐ NO	☒ N/A
(f) CONSULTING ENGINEER RETAINED OR AVAILABLE FOR CONSULTATION ON OPERATION AND MAINTENANCE PROBLEMS.		☒ YES	☐ NO	☐ N/A
(g) QUALIFIED OPERATING STAFF PROVIDED.		☒ YES	☐ NO	☐ N/A
(h) ESTABLISHED PROCEDURES AVAILABLE FOR TRAINING NEW OPERATORS.		☒ YES	☐ NO	☐ N/A
(i) FILES MAINTAINED ON SPARE PARTS INVENTORY, MAJOR EQUIPMENT SPECIFICATIONS, AND PARTS AND EQUIPMENT SUPPLIERS.		☐ YES	☐ NO	☒ N/A
(j) INSTRUCTIONS FILES KEPT FOR OPERATION AND MAINTENANCE OF EACH ITEM OF MAJOR EQUIPMENT.		☒ YES	☐ NO	☐ N/A
(k) OPERATION AND MAINTENANCE MANUAL MAINTAINED.		☒ YES	☐ NO	☐ N/A
(l) SPCC PLAN AVAILABLE.		☒ YES	☐ NO	☐ N/A
(m) REGULATORY AGENCY NOTIFIED OF BY PASSING. (Dates ____ ____)		☐ YES	☐ NO	☒ N/A
(n) ANY BY-PASSING SINCE LAST INSPECTION.		☐ YES	☒ NO	☐ N/A
(o) ANY HYDRAULIC AND/OR ORGANIC OVERLOADS EXPERIENCED.		☐ YES	☐ NO	☒ N/A

Form Approved
OMB No. 158-R0073

PERMIT NO. CA0081477

SECTION J - Compliance Schedules

PERMITTEE IS MEETING COMPLIANCE SCHEDULE. ☐ YES ☐ NO ☒ N/A *(Further explanation attached _____)*

CHECK APPROPRIATE PHASE(S):

- ☐ (a) THE PERMITTEE HAS OBTAINED THE NECESSARY APPROVALS FROM THE APPROPRIATE AUTHORITIES TO BEGIN CONSTRUCTION.
- ☐ (b) PROPER ARRANGEMENT HAS BEEN MADE FOR FINANCING *(mortgage commitments, grants, etc.)*.
- ☐ (c) CONTRACTS FOR ENGINEERING SERVICES HAVE BEEN EXECUTED.
- ☐ (d) DESIGN PLANS AND SPECIFICATIONS HAVE BEEN COMPLETED.
- ☐ (e) CONSTRUCTION HAS COMMENCED.
- ☐ (f) CONSTRUCTION AND/OR EQUIPMENT ACQUISITION IS ON SCHEDULE.
- ☐ (g) CONSTRUCTION HAS BEEN COMPLETED.
- ☐ (h) START-UP HAS COMMENCED.
- ☐ (i) THE PERMITTEE HAS REQUESTED AN EXTENSION OF TIME.

SECTION K - Self-Monitoring Program

Part 1 – Flow measurement *(Further explanation attached _____)*			
PERMITTEE FLOW MEASUREMENT MEETS THE REQUIREMENTS AND INTENT OF THE PERMIT.	☒ YES	☐ NO	☐ N/A
DETAILS: Just installed			
(a) PRIMARY MEASURING DEVICE PROPERLY INSTALLED.	☐ YES	☐ NO	☐ N/A
TYPE OF DEVICE: ☒ WEIR ☐ PARSHALL FLUME ☐ MAGMETER ☐ VENTURI METER ☐ OTHER *(Specify _____)*			
(b) CALIBRATION FREQUENCY ADEQUATE. *(Date of last calibration _____)*	☐ YES	☐ NO	☒ N/A
(c) PRIMARY FLOW MEASURING DEVICE PROPERLY OPERATED AND MAINTAINED.	☐ YES	☐ NO	☒ N/A
(d) SECONDARY INSTRUMENTS *(totalizers, recorders, etc.)* PROPERLY OPERATED AND MAINTAINED.	☐ YES	☐ NO	☒ N/A
(e) FLOW MEASUREMENT EQUIPMENT ADEQUATE TO HANDLE EXPECTED RANGES OF FLOW RATES.	☒ YES	☐ NO	☐ N/A
Part 2 – Sampling *(Further explanation attached _____)*			
PERMITTEE SAMPLING MEETS THE REQUIREMENTS AND INTENT OF THE PERMIT.	☒ YES	☐ NO	☐ N/A
DETAILS:			
(a) LOCATIONS ADEQUATE FOR REPRESENTATIVE SAMPLES.	☒ YES	☐ NO	☐ N/A
(b) PARAMETERS AND SAMPLING FREQUENCY AGREE WITH PERMIT.	☒ YES	☐ NO	☐ N/A
(c) PERMITTEE IS USING METHOD OF SAMPLE COLLECTION REQUIRED BY PERMIT.	☒ YES	☐ NO	☐ N/A
IF NO, ☒ GRAB ☐ MANUAL COMPOSITE ☐ AUTOMATIC COMPOSITE FREQUENCY _____			
(d) SAMPLE COLLECTION PROCEDURES ARE ADEQUATE.	☒ YES	☐ NO	☐ N/A
(i) SAMPLES REFRIGERATED DURING COMPOSITING	☐ YES	☐ NO	☒ N/A
(ii) PROPER PRESERVATION TECHNIQUES USED	☒ YES	☐ NO	☐ N/A
(iii) FLOW PROPORTIONED SAMPLES OBTAINED WHERE REQUIRED BY PERMIT	☐ YES	☐ NO	☒ N/A
(iv) SAMPLE HOLDING TIMES PRIOR TO ANALYSES IN CONFORMANCE WITH 40 CFR 136.3	☒ YES	☐ NO	☐ N/A
(e) MONITORING AND ANALYSES BEING PERFORMED MORE FREQUENTLY THAN REQUIRED BY PERMIT.	☐ YES	☐ NO	☒ N/A
(f) IF (e) IS YES, RESULTS ARE REPORTED IN PERMITTEE'S SELF-MONITORING REPORT.	☐ YES	☐ NO	☒ N/A
Part 3 – Laboratory *(Further explanation attached _____)*			
PERMITTEE LABORATORY PROCEDURES MEET THE REQUIREMENTS AND INTENT OF THE PERMIT.	☒ YES	☐ NO	☐ N/A
DETAILS: Contract Lab used			
(a) EPA APPROVED ANALYTICAL TESTING PROCEDURES USED. *(40 CFR 136.3)*	☒ YES	☐ NO	☐ N/A
(b) IF ALTERNATE ANALYTICAL PROCEDURES ARE USED, PROPER APPROVAL HAS BEEN OBTAINED.	☐ YES	☐ NO	☒ N/A
(c) PARAMETERS OTHER THAN THOSE REQUIRED BY THE PERMIT ARE ANALYZED.	☐ YES	☐ NO	☒ N/A
(d) SATISFACTORY CALIBRATION AND MAINTENANCE OF INSTRUMENTS AND EQUIPMENT.	☒ YES	☐ NO	☐ N/A
(e) QUALITY CONTROL PROCEDURES USED.	☒ YES	☐ NO	☐ N/A
(f) DUPLICATE SAMPLES ARE ANALYZED. _____ % OF TIME.	☐ YES	☐ NO	☒ N/A
(g) SPIKED SAMPLES ARE USED. _____ % OF TIME.	☐ YES	☐ NO	☒ N/A
(h) COMMERCIAL LABORATORY USED.	☒ YES	☐ NO	☐ N/A
(i) COMMERCIAL LABORATORY STATE CERTIFIED.	☐ YES	☐ NO	☒ N/A

LAB NAME CAL Analytical Laboratory

LAB ADDRESS 2534 Industrial Blvd, West Sacramento CA

Form Approved
OMB No. 158-R0073

PERMIT NO. CA0081477

SECTION L - Effluent/Receiving Water Observations *(Further explanation attached ____)*

OUTFALL NO.	OIL SHEEN	GREASE	TURBIDITY	VISIBLE FOAM	VISIBLE FLOAT SOL	COLOR	OTHER
003	NONE	NONE	NONE	NONE	NONE.	clear	

(Sections M and N: Complete as appropriate for sampling inspections)

SECTION M - Sampling Inspection Procedures and Observations *(Further explanation attached ____)*

No discharge —

- ☐ GRAB SAMPLES OBTAINED
- ☐ COMPOSITE OBTAINED
- ☐ FLOW PROPORTIONED SAMPLE
- ☐ AUTOMATIC SAMPLER USED
- ☐ SAMPLE SPLIT WITH PERMITTEE
- ☐ CHAIN OF CUSTODY EMPLOYED
- ☐ SAMPLE OBTAINED FROM FACILITY SAMPLING DEVICE

COMPOSITING FREQUENCY _____ PRESERVATION _____

SAMPLE REFRIGERATED DURING COMPOSITING: ☐ YES ☐ NO

SAMPLE REPRESENTATIVE OF VOLUME AND NATURE OF DISCHARGE _____

SECTION N - Analytical Results *(Attach report if necessary)*

HOMESTAKE MINING COMPANY

McLaughlin Mine

July 25, 1998

Steve Rosenbaum
Regional Water Quality Control Bd.
Central Valley Region
3443 Routier Rd., Ste. A
Sacramento, CA 95827-3098

Dear Steve,

As a follow-up to my memos to you regarding system upsets at our East Waste Rock Facility pumpback system on May 19 and May 30, 1998, I am forwarding to you the results of water quality analyses at our NPDES discharge point "001" and corresponding results for our receiving station "KC-03R."

In spite of the rather "spiky" nature of the data, discharge effluent criteria were met with the possible exception of a boron value of 1.6 ±1.0 mg/l, reported for the May 19 station "001" sample. The corresponding downstream boron value at KC-03R was 3.76 ±1.0 mg/l, which is a typical value for the naturally poor quality of the surface waters in the vicinity. No downstream effects are apparent. Please also note that stream flow was very low at the time these samples were taken. I suspect the variability of the results is attributable to these low-flow conditions.

I will be on vacation through August 5, but will monitor my voice mail messages. Please call if you have any further questions.

Sincerely,

Dean A. Enderlin
Sr. Environmental Engineer

Homestake Mining Co., McLaughlin Mine
26775 Morgan Valley Road
Lower Lake, CA 95457

Telephone (707) 995-6070
FAX (707) 995-6078

ATION	DATE	NITRATE	SULFATE	T_ARSENIC	T_BORON	T_CADMIUM	T_CALCIUM	T_CHROMIUM	T_COPPER	T_IRON	T_LEAD	T_MAGNESUM	T_MERCURY	T_NICKEL
)1	98,05,19	0.2810	6260.00	0.00499	1.620	0.09999	368.00	0.09999	0.0999	4.9999	0.0049	1140.0000	0.000199	1.5300
C-03R	98,05,19	0.2070	3500.00	0.00499	3.760	0.09999	211.00	0.09999	0.0999	4.9999	0.0049	734.0000	0.000199	2.1900
)1	98,05,20	0.0499	2650.00	0.00499	0.999	0.09999	241.00	0.09999	0.0999	4.9999	0.0049	638.0000	0.000425	0.0816
C-03R	98,05,20	0.0499	486.00	0.00803	3.900	0.09999	67.00	0.09999	0.0999	4.9999	0.0049	196.0000	0.000258	0.0663
)1	98,05,27	0.0499	436.00	0.00499	0.999	0.09999	63.80	0.09999	0.0999	4.9999	0.0049	172.0000	0.000199	0.0246
C-03R	98,05,27	0.0499	263.00	0.00947	3.920	0.09999	44.10	0.09999	0.0999	4.9999	0.0049	143.0000	0.000199	0.0199
)1	98,05,30	0.4200	7520.00	0.00499	3.240	0.09999	348.00	0.09999	0.0999	14.7000	0.0050	1480.0000	0.000199	6.6500
C-03R	98,05,30													
)1	98,06,03	---	---	---	---	---	---	---	---	---	---	---	---	---
C-03R	98,06,03	0.0499	252.00	0.01040	10.600	0.09999	46.40	0.09999	0.0999	4.9999	0.0049	142.0000	0.000199	0.0199
-Year Period Refe														
C-03	Minimum	0.0199	92.00	0.00900	1.300	NA	18.00	0.00999	0.0099	0.0099	0.0199	46.0000	0.000199	0.0199
C-03	Maximum	0.3000	820.00	0.02100	8.400	NA	87.90	0.01999	0.0099	1.2000	0.0199	250.0000	0.000340	0.0500
C-03	Average	0.0820	303.79	0.01595	4.925	NA	45.14	0.01899	0.0099	0.1869	0.0199	144.9100	0.000235	0.0240

MEMO

TO: **Distribution**
FROM: Dean Enderlin, Sr. Environmental Engineer
Homestake Mining Company, McLaughlin Mine
SUBJECT: Slurry Pipeline
DATE: July 19, 1998

At approximately 4:00 p.m. today (Sunday), the McLaughlin mine slurry pipeline experienced a minor leak, similar to one experienced and reported about a year ago. The drop in pressure was recognized immediately by our automated systems, and the situation was promptly stabilized. Although, the secondary containment performed well, some slurry sprayed and drifted beyond the limits of this containment. No slurry reported to any streams or tributaries.

The leak occured about 1.5 miles northwest of the McLaughlin mill building in Napa County. Clean-up efforts have commenced.

I was notified at home at approximately 7:45 p.m. this evening, and will give you further details on Monday after I have had a chance to investigate this matter in further detail. If you have any questions or comments, please call me at (707) 995-6070.

Distribution:
Steve Rosenbaum, Regional Water Quality Control Bd. (916) 255-3015
Brian Hunter, Department of Fish & Game Region 3 (707) 944-5563
Will Selleck, Napa County Cons. Dev., & Planning Dept. (707) 253-4336
Bob Isaac, Solano Irrigation District (707) 448-7347
Pat Purtell, Homestake Mining Company (707) 995-6078

FAX TRANSMISSION

TO: Distribution
FAX: (various)

FROM: Dean Enderlin
Homestake Mining Company
Phone: 707-995-6070 ext. 274 FAX: 707-995-6078

SUBJECT: Slurry Pipeline Follow-up

DATE: Monday, July 20, 1998 9:49 AM

PAGES: 1

This memo is to follow up with additional information on the short-term slurry line leak which occurred on Sunday, July 19, 1998 at approximately 4:00 p.m. The leak occurred at a flanged joint in the pipeline, and as previously stated, was detected by the line's automatic flow monitors. A small amount of slurry was released and held by the secondary containment structures. The leak was similar to, but much smaller than, one that occurred on May 12, 1997.

As the line was depressurized, a small amount of slurry sprayed up to 15 feet beyond the containment system onto surrounding grassland. No slurry entered any waterway, wet or dry. The slurry will be allowed to dry in place and will then be removed to the Tailings Pond.

Please call me at (707) 995-6070 ext. 274 if you need any further information.

Dean A. Enderlin
Senior Environmental Engineer/Geologist
Homestake Mining Company -- McLaughlin Mine
26775 Morgan Valley Road
Lower Lake, CA 95457
Email: *denderlin@homestake.com*

Distribution:
Steve Rosenbaum, Regional Water Quality Control Bd. (916) 255-3015
Brian Hunter (Department of Fish & Game, Region 3 (707) 944-5563
Will Selleck, Napa County Cons. Dev. & Planning Dept. (707) 253-4336
Bob Isaac, Solano Irrigation District (707) 448-7347

TO: **Distribution**
FROM: Dean Enderlin, Sr. Environmental Engineer
Homestake Mining Company
SUBJECT: Knoxville Creek
DATE: 31 May 1998

This notice is to advise you of a second system upset to our leachate water pumpback system, located at the toe of the McLaughlin mine east waste rock facility. The upset resulted in a minor water release, similar to the one noted in my previous advisory. The cause of the release was, as in the previous one, due to the failure of a pipe joint in the leachate pumpback system.

The upset occured at about noon on Saturday, May 30. It was recognized by a supervisor making his rounds, and immediately stopped by turning off the power to our pumpback system. During the period that the pumps were running (about 1/2 hour) some of the pumpback water flowed down our fresh water diversion ditch and through NPDES monitoring station 001 to Knoxville Creek. The volume of water was substantially less than in the previous release.

These are minor discharges, but we will continue to monitor our NPDES points in accordance with our Discharge Permit until such time as we are confident that there are no potential downstream effects. All results will be posted in our semi-annual monitoring report, and I will advise you immediately if we see anything of concern.

Until we have identified and remedied the cause for the chronic failures of the pipe joint, we will divert <u>all</u> fresh water ditch flow to our secondary containment pond, located near the pumpback system. This will assure that no future releases due to the failure of this component occur.

Please feel free to contact me at (707) 995-6070 ext. 274 if you have any questions or comments.

cc: Steve Rosenbaum, RWQCB
Brian Hunter, Dept. of Fish & Game
Will Selleck, Napa County
Bob Isaac, SID
Pat Purtell, Homestake

MEMO

TO: Distribution
FROM: Dean A. Enderlin, Sr. Environmental Engineer
RE: Homestake Mining Company, McLaughlin Mine
Knoxville Creek discharge
DATE: May 19, 1998

This memo is to inform you of a system upset at our East Waste Rock Facility pumpback system this morning, which resulted in the discharge of an unknown quantity of collected underdrain water to Knoxville Creek. The release occurred when a pipeline conveying water from our S-13 underdrain collection and pumpback system parted at a welded joint, discharging water to our fresh water diversion ditch and ultimately through NPDES discharge point 001.

The pipe failure was recognized at 7:15 a.m. this morning. The pumpback system was deactivated immediately, effectively stopping pumpback flow to the ditch. The pipe failure was recognized by our general manager making morning rounds. It appears that water had been flowing from the pipe for several hours. No visual or field-tested chemical effects were apparent at receiving station KC-03R at 8:55 a.m. this morning, confirming that the upset had been quickly spotted. NPDES samples were collected today, and will be collected tomorrow as required by our NPDES permit. Additional samples will be collected as needed to demonstrate no adverse effects on downstream water quality.

Please feel free to call me at (707) 995-6070 ext. 274 or email me at *denderlin@homestake.com* if you have any questions or concerns.

Steve Rosenbaum, Regional Water Quality Control Board
Brian Hunter, Fish and Game
Will Selleck, Napa County Conservation, Development & Planning
Bob Isaac. Solano Irrigation District

File

MEMO

To: Distribution
From: Ray Krauss, Environmental Manager
Re: Homestake Mining Company, McLaughlin Mine
Date: May 13, 1997

This is to advise you of a short term slurry line leak that occurred on May 12, in the late afternoon. The leak resulted in a minor release of ore/water slurry. The leak occurred at a flanged joint in the pipeline and was detected by the line's automatic flow monitors which immediately shut down the slurry pumps. Consequently the small amount (estimated to be approximately 10 tons) of slurry released was largely contained within the line's secondary containment system.

As the line depressurized, a small amount of slurry sprayed up to 30 feet beyond the containment system onto surrounding grassland. No slurry entered any waterway, wet or dry. All will be allowed to dry in place and then be removed to the tailings pond.

Please let me know if I can provide any additional information regarding this matter.

Bill Marshall, Regional Water Quality Control Board
Terry Gabarino, Napa County
Brain Hunter, Fish and Game
Bob Issac, SID

HOMESTAKE MINING COMPANY

McLaughlin Mine

RK

January 19, 1996

Steve Rosenbaum
California Regional Water Quality Control Board
Central Valley Region
3443 Routier Road, Suite A
Sacramento, CA 95827-3098

Dear Steve,

This letter is in confirmation of our phone notification to you on 17 January 1996 regarding exceedences to NPDES effluent criteria for storm water discharge samples collected on 12 and 13 December 1995.

During the high intensity storm event which started on 11 December 1996 a total of 3.78 inches of precipitation was received within the first 24 hours with a subsequent 1.37 inches received by the following morning. (See attached rainfall report.) As a result, elevated surface water runoff rates and corresponding increases in naturally occurring sediment load were observed in both the receiving stream and effluent as demonstrated by the reported TSS values. The analytical results received to date for December NPDES samples are attached.

NPDES monitoring for the 1995-1996 season was initiated on 12 December 1996 with the onset of the first seasonal storm water discharge at monitoring station 003. Subsequent sampling has been conducted at frequencies specified by permit. Data review has been completed and compliance with NPDES permit criteria determined as described below for data received to date.

1. The 12 December 1995 samples were collected during peak storm flows. Effluent values were in compliance with NPDES permit criteria with the exception of TSS which was reported at 100 mg/l, and total chromium which was reported at 0.12 mg/l. These exceedences had no impact on Hunting Creek with upstream and downstream TSS levels reported as 820 mg/l and 280 mg/l respectively, and total chromium levels reported as 0.33 mg/l and 0.22 mg/l respectively. Data for monitoring stations HC-05R and HC-10R were in compliance with all receiving stream criteria.

2. Samples collected on 13 December 1996 demonstrate compliance with NPDES permit criteria with the exception of the effluent TSS level which was reported at 48 mg/l. This exceedence again had no impact on Hunting Creek with upstream and downstream levels reported as 23 mg/l and 19 mg/l respectively.

Homestake Mining Co., McLaughlin Mine
26775 Morgan Valley Road
Lower Lake, CA 95457

Telephone (707) 995-6070
FAX (707) 995-6078

3. Samples collected on 20 December 1996 demonstrate compliance with all NPDES permit criteria.

In general, numbers reflect the increased sediment load naturally occurring as a result of the high intensity storm event.

If you should have any additional questions, please feel free to call.

Sincerely,

Dolora M. Koontz
Sr. Environmental Engineer

Attachments

xc: R. E. Krauss
Terry Garbarino, Napa County

McLAUGHLIN MINE

WATER QUALITY MANAGEMENT PROGRAM

NPDES MONITORING

Station	Date	Lab ID	Settleable Solids* ml/Lhr	Oil/Grease Total mg/l	Oil/Grease Non-Polar mg/l
OO3	95,12,12	257200	ND	ND	ND
HC-05R	95,12,12	257201	1.2	ND	ND
HC-10R	95,12,12	257202	0.6	ND	ND
OO3	95,12,13	257328	ND	ND	ND
HC-05R	95,12,13	257329	ND	ND	ND
HC-10R	95,12,13	257327	ND	ND	ND
OO3	95,12,20	257635	ND	ND	ND
HC-05R	95,12,20	257634	ND	ND	ND
HC-10R	95,12,20	257636	ND	ND	ND

ND = Not detectable

Note: Minimum reporting limit achievable by contract lab is 0.5 ml/Lhr.

HOMESTAKE McLAUGHLIN MINE

QUARTERLY RAIN SUMMARY, OCT, NOV, DEC, 1995

(Inches Rainfall)

MONTH/DAY	MET2 (Davis Cr)	MET7 (Process)
OCTOBER		
00	0.00	0.00
	0.00	0.00
NOVEMBER		
11/21	0.02	0.00
11/25	0.02	0.03
	0.04	0.03
DECEMBER		
12/01	0.03	0.16
12/02	0.01	0.05
12/03	0.06	0.23
12/04	0.04	0.15
12/05	0.08	0.30
12/06	0.12	0.46
12/07	0.01	0.04
12/10	0.25	0.00
12/11	2.43	3.78
12/12	1.51	1.37
12/13	0.23	0.00
12/14	0.12 *	0.12
12/15	0.54	1.17
12/17	0.81	0.00
12/18	0.17	0.30
12/19	0.10	0.00
12/22	0.00	0.12
12/28	0.52 *	0.52
	7.03	8.77
4TH QUARTER, 1995	7.07	8.80

* Note: MET1 rain gage operating only intermittently. MET2 data supplemented or verified by MET7.

MCLAUGHLIN MINE WATER QUALITY MANAGEMENT PROGRAM - SURFACE-WATER QUALITY DATA FOR MONTH(S) SHOWN BELOW UNDER "DATE." PART 1 OF 4. (Notes: 00.000 = no measurement NOWTR = dry INACS = inaccessible NOLVL = dry R = replicate.)

STATION	DATE (yy,mm, dd)	TIME (hours)	TYPE	SAMPLER (Initials or NOWTR or INACS)	FLOW (gpm)	TEMP (Cel)	SPEC COND (umhos /cm)	DISSOL VED OXYGEN (mg/l)	pH (Field) (s.u.)	pH (Lab) (s.u.)	ACIDITY (mg/l)	ALKALIN- ITY (mg/l)	HARDNESS (mg/l)	TDS (mg/l)	TSS (mg/l)	TURBID- ITY (NTU)	CHEMICAL OXYGEN DEMAND (mg/l)	MBAS (mg/l)	CHLOR- IDE (mg/l)	CYANIDE TOTAL) (mg/l)	CYANIDE FREE (mg/l)	THIO- CYANATE (mg/l)	LABORATORY ID NUMBER
003	95,12,12	13:31	SURFACE WATER TM		1389	13.0	350	12.2	7.48	0.00	0.00	57.00	0.00	0.00	100.00	60.00	0.00	0.000	6.000	0.0000	0.0000	0.0000	257200.00
HC-05R	95,12,12	13:14	SURFACE WATER TM		126292	12.7	110	13.4	8.10	0.00	0.00	91.00	0.00	0.00	820.00	390.00	0.00	0.000	4.000	0.0000	0.0000	0.0000	257201.00
HC-10R	95,12,12	14:27	SURFACE WATER TM		263760	12.6	170	12.4	7.73	0.00	0.00	83.00	0.00	0.00	280.00	300.00	0.00	0.000	5.000	0.0000	0.0000	0.0000	257202.00
003	95,12,13	10:18	SURFACE WATER TM		695	12.5	390	12.0	8.14	0.00	0.00	62.00	0.00	0.00	48.00	35.00	0.00	0.000	7.000	0.0000	0.0000	0.0000	257328.00
HC-05R	95,12,13	09:34	SURFACE WATER TM		28566	10.5	230	12.8	8.72	0.00	0.00	130.00	0.00	0.00	23.00	20.00	0.00	0.000	7.000	0.0000	0.0000	0.0000	257329.00
HC-10R	95,12,13	10:44	SURFACE WATER TM		37680	11.5	280	12.6	8.73	0.00	0.00	140.00	0.00	0.00	19.00	18.00	0.00	0.000	8.000	0.0000	0.0000	0.0000	257327.00
003	95,12,20	14:40	SURFACE WATER TM		53	11.2	650	0.0	7.42	0.00	0.00	91.00	0.00	0.00	8.00	6.10	0.00	0.000	9.000	0.0000	0.0000	0.0000	257635.00
HC-05R	95,12,20	14:27	SURFACE WATER TM		601	9.4	460	12.2	8.45	0.00	0.00	300.00	0.00	0.00	1.00	1.10	0.00	0.000	11.000	0.0000	0.0000	0.0000	257634.00
HC-10R	95,12,20	14:51	SURFACE WATER TM		726	10.3	660	11.8	8.12	0.00	0.00	340.00	0.00	0.00	0.99	0.60	0.00	0.000	13.000	0.0000	0.0000	0.0000	257636.00

MCLAUGHLIN MINE WATER QUALITY MANAGEMENT PROGRAM - SURFACE-
WATER QUALITY DATA FOR MONTH(S) SHOWN BELOW UNDER "DATE."
PART 2 OF 4. (NOTES: 00.0000 = no measurement NOWTR = dry
INACS = inaccessible NDLVL = dry R = replicate.)

STATION	DATE (yy,mm, dd)	SAMPLER (Initials or NOWTR or INACS)	FLUOR-IDE (mg/l)	NITRATE as N (mg/l)	NITRITE as N (mg/l)	AMMONIA as N (mg/l)	TKN (mg/l)	SULFATE (mg/l)	ALUMINUM TOTAL (mg/l)	ALUMINUM FILTERD (mg/l)	ANTIMONY TOTAL (mg/l)	ANTIMONY FILTERED (mg/l)	ARSENIC TOTAL (mg/l)	ARSENIC FILTERED (mg/l)	BARIUM TOTAL (mg/l)	BARIUM FILTERED (mg/l)	BERYLLIUM TOTAL (mg/l)	BERYLLIUM FILTERED (mg/l)	BORON TOTAL (mg/l)	BORON FILTERED (mg/l)	CADMIUM TOTAL (mg/l)	CADMIUM FILTERED (mg/l)	LABORATORY ID NUMBER
003	95,12,12	TM	0.0000	0.1100	0.0000	0.0000	0.0000	220.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.099	0.000	0.00499	0.00000	257200.00
HC-05R	95,12,12	TM	0.0000	0.0900	0.0000	0.0000	0.0000	15.00	0.000	0.000	0.000	0.000	0.00800	0.00000	0.0000	0.0000	0.0000	0.0000	0.100	0.000	0.00499	0.00000	257201.00
HC-10R	95,12,12	TM	0.0000	0.2000	0.0000	0.0000	0.0000	50.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.099	0.000	0.00499	0.00000	257202.00
003	95,12,13	TM	0.0000	0.1300	0.0000	0.0000	0.0000	260.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.100	0.000	0.00499	0.00000	257328.00
HC-05R	95,12,13	TM	0.0000	0.2900	0.0000	0.0000	0.0000	37.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.100	0.000	0.00499	0.00000	257329.00
HC-10R	95,12.13	TM	0.0000	0.2400	0.0000	0.0000	0.0000	100.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.100	0.000	0.00499	0.00000	257327.00
003	95,12,20	TM	0.0000	0.3200	0.0000	0.0000	0.0000	400.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.100	0.000	0.00499	0.00000	257635.00
HC-05R	95,12.20	TM	0.0000	0.0800	0.0000	0.0000	0.0000	49.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.100	0.000	0.00499	0.00000	257634.00
HC-10R	95,12,20	TM	0.0000	0.0600	0.0000	0.0000	0.0000	180.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.200	0.000	0.00499	0.00000	257636.00

MCLAUGHLIN MINE WATER QUALITY MANAGEMENT PROGRAM - SURFACE-
WATER QUALITY DATA FOR MONTH(S) SHOWN BELOW UNDER "DATE."
PART 3 OF 4. (NOTES: 00.0000 = no measurement NOWTR = dry
INACS = inaccessible NOLVL = dry # = replicate.)

STATION	DATE (yy,mm dd)	SAMPLER (Initials or NOWTR or INACS)	CALCIUM TOTAL (mg/l)	CALCIUM FILTERED (mg/l)	CHROMIUM TOTAL (mg/l)	CHROMIUM FILTERED (mg/l)	COBALT TOTAL (mg/l)	COBALT FILTERED (mg/l)	COPPER TOTAL (mg/l)	COPPER FILTERED (mg/l)	IRON TOTAL (mg/l)	IRON FILTERED (mg/l)	LEAD TOTAL (mg/l)	LEAD FILTERED (mg/l)	LITHIUM TOTAL (mg/l)	LITHIUM FILTERED (mg/l)	MAGNESIUM TOTAL (mg/l)	MAGNESIUM FILTERED (mg/l)	MANGANESE TOTAL (mg/l)	MANGANESE FILTERED (mg/l)	MERCURY TOTAL (mg/l)	MERCURY FILTERED (mg/l)	LABORATORY ID NUMBER
003	95,12,12	TM	15.00	0.00	0.12000	0.00000	0.0000	0.0000	0.0100	0.0000	8.8000	0.0000	0.0199	0.0000	0.0000	0.0000	66.0000	0.0000	0.00000	0.00000	0.001300	0.000000	257[illegible].00
MC-05R	95,12,12	TM	14.00	0.00	0.33000	0.00000	0.0000	0.0000	0.0900	0.0000	57.0000	0.0000	0.0199	0.0000	0.0000	0.0000	83.0000	0.0000	0.00000	0.00000	0.000500	0.000000	257201.00
MC-10R	95,12,12	TM	12.00	0.00	0.22000	0.00000	0.0000	0.0000	0.0600	0.0000	43.0000	0.0000	0.0199	0.0000	0.0000	0.0000	66.0000	0.0000	0.00000	0.00000	0.000199	0.000000	[illegible]1.00
003	95,12,13	TM	18.00	0.00	0.03000	0.00000	0.0000	0.0000	0.0099	0.0000	2.7000	0.0000	0.0199	0.0000	0.0000	0.0000	71.0000	0.0000	0.00000	0.00000	0.000199	0.000000	25[illegible]8.00
MC-05R	95,12,13	TM	12.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	2.1000	0.0000	0.0199	0.0000	0.0000	0.0000	35.0000	0.0000	0.00000	0.00000	0.000199	0.000000	257329.00
MC-10R	95,12,13	TM	14.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0200	0.0000	1.7000	0.0000	0.0199	0.0000	0.0000	0.0000	51.0000	0.0000	0.00000	0.00000	0.000199	0.000000	257327.00
003	95,12,20	TM	32.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.4400	0.0000	0.0199	0.0000	0.0000	0.0000	100.0000	0.0000	0.00000	0.00000	0.000300	0.000000	257635.00
MC-05R	95,12,20	TM	19.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.0800	0.0000	0.0199	0.0000	0.0000	0.0000	71.0000	0.0000	0.00000	0.00000	0.000199	0.000000	257634.00
MC-10R	95,12,20	TM	24.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.0400	0.0000	0.0199	0.0000	0.0000	0.0000	110.0000	0.0000	0.00000	0.00000	0.000199	0.000000	257636.00

MCLAUGHLIN MINE WATER QUALITY MANAGEMENT PROGRAM - SURFACE-
WATER QUALITY DATA FOR MONTH(S) SHOWN BELOW UNDER "DATE."
PART 4 OF 4. (NOTES: 00.0000 = no measurement NOWTR = dry
INACS = inaccessible NOLVL = dry 0 = replicate.)

STATION	DATE (yy,mm, dd)	SAMPLER (Initials or NOWTR or INACS)	MOLYBDENUM TOTAL (mg/l)	MOLYBDENUM FILTERED (mg/l)	NICKEL TOTAL (mg/l)	NICKEL FILTERED (mg/l)	POTASSIUM TOTAL (mg/l)	POTASSIUM FILTERED (mg/l)	SELENIUM TOTAL (mg/l)	SELENIUM FILTERED (mg/l)	SODIUM TOTAL (mg/l)	SODIUM FILTERED (mg/l)	SILVER TOTAL (mg/l)	SILVER FILTERED (mg/l)	THALLIUM TOTAL (mg/l)	THALLIUM FILTERED (mg/l)	VANADIUM TOTAL (mg/l)	VANADIUM FILTERED (mg/l)	ZINC TOTAL (mg/l)	ZINC FILTERED (mg/l)	CATIONS (meq/l)	ANIONS (meq/l)	ION BALANCE (%)
003	95,12,12	TM	0.0000	0.0000	0.1900	0.0000	1.300	0.000	0.00000	0.00000	3.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0199	0.0000	6.82	5.89	115.80
MC-05R	95,12,12	TM	0.0000	0.0000	0.5600	0.0000	1.200	0.000	0.00000	0.00000	3.800	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.1100	0.0000	2.25	11.56	513.50
MC-10R	95,12,12	TM	0.0000	0.0000	0.4400	0.0000	1.500	0.000	0.00000	0.00000	3.800	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0700	0.0000	2.86	8.56	299.70
003	95,12,13	TM	0.0000	0.0000	0.1000	0.0000	1.400	0.000	0.00000	0.00000	3.500	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0500	0.0000	6.85	7.08	96.90
MC-05R	95,12,13	TM	0.0000	0.0000	0.0300	0.0000	1.000	0.000	0.00000	0.00000	7.800	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0900	0.0000	3.39	3.96	90.80
MC-10R	95,12,13	TM	0.0000	0.0000	0.0400	0.0000	1.000	0.000	0.00000	0.00000	7.600	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0199	0.0000	5.12	5.34	95.90
003	95,12,20	TM	0.0000	0.0000	0.0600	0.0000	0.140	0.000	0.00000	0.00000	6.600	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0199	0.0000	10.40	10.10	97.40
MC-05R	95,12,20	TM	0.0000	0.0000	0.0199	0.0000	0.740	0.000	0.00000	0.00000	11.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0199	0.0000	7.30	7.30	99.40
MC-10R	95,12,20	TM	0.0000	0.0000	0.0199	0.0000	0.720	0.000	0.00000	0.00000	12.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0199	0.0000	10.80	10.90	98.90

Dolora

HOMESTAKE MINING COMPANY

McLaughlin Mine

June 6, 1995

Steve Rosenbaum
Regional Water Quality Control Board
Central Valley Region
3443 Routier Road, Suite A
Sacramento, CA 95827-3098

Dear Mr. Rosenbaum:

This letter provides the follow-up information promised in our letter of 26 April, 1995. As previously reported, Homestake Mining Company's McLaughlin Mine experienced an inadvertent discharge of storm waters which were being pumped from the mine area to the tailings impoundment in order to ensure continued containment and permit compliance. As reported earlier, the discharge occurred between the evening of 24 April, 1995, and the time of discovery during a routine inspection on the morning of 25 April, 1995. The problem was immediately corrected by closing and locking out the containment pond valve which an operator had inadvertently opened, and repair of a leak at the adjacent in-line booster pump.

Follow-up monitoring was conducted as previously reported, and subsequent data review has been completed as described below:

1. Effluent data was evaluated per NPDES permit criteria. Data was found to be in compliance with the exception of pH which was reported at 4.2, TSS which was reported as 43 mg/l, total boron which was reported as 6.8 mg/l, and total zinc which was reported as 2.4 mg/l. The total discharge was estimated to be approximately 35,000 gallons based on pond capacity and remaining water volume.

2. The stream sample collected at station HC-05R was evaluated per NPDES permit criteria and compared to historic data. Analyses reviewed for NPDES compliance were reported as not detectable or near the detection limit. Analytical data and field readings, including the reported pH of 8.64, were within the historic range of natural variation with the exception of sulfate.

Homestake Mining Co., McLaughlin Mine
26775 Morgan Valley Road
Telephone (707) 995-6070

As discussed earlier, the problem has been corrected and there has been no evidence of damage to aquatic life in Hunting Creek or it's tributary into which the released storm water reported. If you should have any additional questions, please feel free to call.

Sincerely,

Dolora M. Koontz

Dolora M. Koontz
Environmental Engineer

Attachments

xc: R. E. Krauss
Terry Garbarino, Napa County
Ken Aasen, Dept. of Fish and Game
Charles Whitcomb, BLM

MCLAUGHLIN MINE WATER QUALITY MANAGEMENT PROGRAM - SURFACE-WATER QUALITY DATA FOR MONTH(S) SHOWN BELOW UNDER "DATE." PART 1 OF 4. (Notes: 00.000 = no measurement NOWTR = dry INACS = inaccessible NOLVL = dry 0 = replicate.)

STATION	DATE (yy,mm, dd)	TIME (hours)	TYPE	SAMPLER (Initials or NOWTR or INACS)	FLOW (gpm)	TEMP (Cel)	SPEC COND (umhos /cm)	DISSOLVED OXYGEN (mg/l)	pH (Field) (s.u.)	pH (Lab) (s.u.)	ACIDITY (mg/l)	ALKALINITY (mg/l)	HARDNESS (mg/l)	TDS (mg/l)	TSS (mg/l)	TURBIDITY (NTU)	CHEMICAL OXYGEN DEMAND (mg/l)	MBAS (mg/l)	CHLORIDE (mg/l)	CYANIDE TOTAL (mg/l)	CYANIDE FREE (mg/l)	THIOCYANATE (mg/l)	LABORATORY ID NUMBER
SC POND	95,04,25	12:20	SURFACE WATER	TM	0	25.0	3500	0.0	4.22	0.00	0.00	0.99	0.00	0.00	43.00	45.00	0.00	0.000	94.000	0.0000	0.0000	0.0000	240776.00
MC-05R	95,04,25	13:22	SURFACE WATER	TM	0	19.0	1100	0.0	8.64	0.00	0.00	380.00	0.00	0.00	5.00	4.30	0.00	0.000	15.000	0.0000	0.0000	0.0000	240775.00

McLAUGHLIN MINE

WATER QUALITY MANAGEMENT PROGRAM

NPDES MONITORING

Station	Date	Lab ID	Settleable Solids* ml/Lhr	Oil/Grease Total mg/l
SC POND	95,04,25	240775	ND	ND
HC-05R	95,04,25	240776	ND	ND

ND = Not detectable

* – Minimum reporting limit achievable by contract lab is 0.5 ml/Lhr.

MCLAUGHLIN MINE WATER QUALITY MANAGEMENT PROGRAM - SURFACE-WATER QUALITY DATA FOR MONTH(S) SHOWN BELOW UNDER "DATE."
PART 2 OF 4. (NOTES: 00.0000 = no measurement NOWTR = dry INACS = inaccessible NOLVL = dry 0 = replicate.)

STATION	DATE (yy,mm, dd)	SAMPLER (Initials or NOWTR or INACS)	FLUORIDE (mg/l)	NITRATE as N (mg/l)	NITRITE as N (mg/l)	AMMONIA as N (mg/l)	TKN (mg/l)	SULFATE (mg/l)	ALUMINUM TOTAL (mg/l)	ALUMINUM FILTERD (mg/l)	ANTIMONY TOTAL (mg/l)	ANTIMONY FILTERED (mg/l)	ARSENIC TOTAL (mg/l)	ARSENIC FILTERED (mg/l)	BARIUM TOTAL (mg/l)	BARIUM FILTERED (mg/l)	BERYLLIUM TOTAL (mg/l)	BERYLLIUM FILTERED (mg/l)	BORON TOTAL (mg/l)	BORON FILTERED (mg/l)	CADMIUM TOTAL (mg/l)	CADMIUM FILTERED (mg/l)	LABORATORY ID NUMBER
SC POND	95,04,25	TM	0.0000	2.8000	0.0000	0.0000	0.0000	5100.00	0.000	0.000	0.000	0.000	0.00800	0.00000	0.0000	0.0000	0.0000	0.0000	6.800	0.000	0.01000	0.00000	240776.00
MC-05R	95,04,25	TM	0.0000	0.1000	0.0000	0.0000	0.0000	420.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.300	0.000	0.00499	0.00000	240775.00

MCLAUGHLIN MINE WATER QUALITY MANAGEMENT PROGRAM - SURFACE-WATER QUALITY DATA FOR MONTH(S) SHOWN BELOW UNDER "DATE."
PART 3 OF 4. (NOTES: 00.0000 = no measurement NOWTR = dry INACS = inaccessible NOLVL = dry 0 = replicate.)

STATION	DATE (yy,mm dd)	SAMPLER (Initials or NOWTR or INACS)	CALCIUM TOTAL (mg/l)	CALCIUM FILTERED (mg/l)	CHROMIUM TOTAL (mg/l)	CHROMIUM FILTERED (mg/l)	COBALT TOTAL (mg/l)	COBALT FILTERED (mg/l)	COPPER TOTAL (mg/l)	COPPER FILTERED (mg/l)	IRON TOTAL (mg/l)	IRON FILTERED (mg/l)	LEAD TOTAL (mg/l)	LEAD FILTERED (mg/l)	LITHIUM TOTAL (mg/l)	LITHIUM FILTERED (mg/l)	MAGNESIUM TOTAL (mg/l)	MAGNESIUM FILTERED (mg/l)	MANGANESE TOTAL (mg/l)	MANGANESE FILTERED (mg/l)	MERCURY TOTAL (mg/l)	MERCURY FILTERED (mg/l)	LABORATORY ID NUMBER
SC POND	95,04,25	TM	450.00	0.00	0.05000	0.00000	0.0000	0.0000	0.2800	0.0000	14.0000	0.0000	0.0199	0.0000	0.0000	0.0000	960.0000	0.0000	0.00000	0.00000	0.002000	0.000000	240776.00
MC-05R	95,04,25	TM	26.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.1100	0.0000	0.0199	0.0000	0.0000	0.0000	81.0000	0.0000	0.00000	0.00000	0.000199	0.000000	240775.00

MCLAUGHLIN MINE WATER QUALITY MANAGEMENT PROGRAM - SURFACE-
WATER QUALITY DATA FOR MONTH(S) SHOWN BELOW UNDER "DATE."
PART 4 OF 4. (NOTES: 00.0000 = no measurement NOWTR = dry
INACS = inaccessible NOLVL = dry R = replicate.)

STATION	DATE (yy,mm, dd)	SAMPLER (Initials or NOWTR or INACS)	MOLYBDENUM TOTAL (mg/l)	MOLYBDENUM FILTERED (mg/l)	NICKEL TOTAL (mg/l)	NICKEL FILTERED (mg/l)	POTASSIUM TOTAL (mg/l)	POTASSIUM FILTERED (mg/l)	SELENIUM TOTAL (mg/l)	SELENIUM FILTERED (mg/l)	SODIUM TOTAL (mg/l)	SODIUM FILTERED (mg/l)	SILVER TOTAL (mg/l)	SILVER FILTERED (mg/l)	THALLIUM TOTAL (mg/l)	THALLIUM FILTERED (mg/l)	VANADIUM TOTAL (mg/l)	VANADIUM FILTERED (mg/l)	ZINC TOTAL (mg/l)	ZINC FILTERED (mg/l)	CATIONS (meq/l)	ANIONS (meq/l)	ION BALANCE (%)
SC POND	95,04,25	TM	0.0000	0.0000	10.0000	0.0000	10.000	0.000	0.00000	0.00000	170.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	2.4000	0.0000	110.00	109.00	101.00
MC-05R	95,04,25	TM	0.0000	0.0000	0.3000	0.0000	0.800	0.000	0.00000	0.00000	11.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0300	0.0000	8.70	17.00	51.00

REK
File
RWQCB
RK

HOMESTAKE MINING COMPANY

McLaughlin Mine

April 26, 1995

Mr. Steve Rosenbaum
California Regional Water
Quality Control Board
Central Valley Region
3443 Routier Road, Suite A
Sacramento, CA 95827-3098

Dear Steve,

This letter is in confirmation of our phone notification to you on 25 April 1995 of the inadvertent discharge of storm waters which are currently being pumped from the mine area to the tailings impoundment.

As you are aware, Homestake Mining Company's McLaughlin Mine has previously implemented a program for containment, pump back and utilization in our process of all storm water runoff from our mine pit, grinding, and low grade pad areas, flows from the waste rock under drains, as well as any storm water runoff from the waste rock area which does not meet discharge criteria.

As a result of the flood level storm events which hit California in January and March of this year, the resulting storm water runoff rate was greater than our process consumption rate. In an effort to ensure continued containment and permit compliance, our spare slurry pipeline was put into service to facilitate pumping of excess storm water runoff to the tailings impoundment for containment and subsequent evaporation over the summer.

In order to pump the water from the mine area to the tailings impoundment, a booster pump was installed on the spare slurry pipeline adjacent to one of our slurry line containment ponds. Due to a low volume leak which developed at the booster pump installation, pump back water reported to and was contained in the adjacent containment pond. Between the evening of 24 April 1995 and the morning of 25 April 1995, an operator inadvertently opened the valve on the pond thereby discharging the contained storm water to a tributary of Hunting Creek. The problem was noted and corrected during a routine inspection of the slurry line and booster pump on the morning of 25 April, 1995.

Homestake Mining Co., McLaughlin Mine
26775 Morgan Valley Road
Lower Lake, CA 95457

Telephone (707) 995-6070
FAX (707) 995-6078

The containment pond is situated approximately one mile from Hunting Creek on a small, intermittent tributary. Current tributary flow is less than 50 gpm. There is no evidence of damage to aquatic life in the tributary and water quality sampling has been conducted. Field readings are normal approximately 200 feet down stream from the containment pond at Morgan Valley Road.

Follow-up monitoring has been conducted with no impact measurable in Hunting Creek. The pH of water remaining in the slurry line pond was measured at 4.2 which is below our permitted discharge limit. There is some iron staining immediately below the containment pond along with a small amount of sulfate precipitation. Samples have been collected with results pending.

Immediately upon discovery on the morning of 25 April 1995, the leak at the booster pump was repaired and the valve on the slurry line containment pond locked closed. Sample analyses will be forwarded as soon as available. If you should have any additional questions, please feel free to call.

Sincerely,

Dolora M. Koontz

Dolora M. Koontz
Environmental Engineer

xc: R. E. Krauss
Terry Garbarino, Napa County
Ken Aasen, Dept. of Fish and Game
Charles Whitcomb, BLM

File Rwocks
KK

HOMESTAKE MINING COMPANY

McLaughlin Mine

April 21, 1995

Steve Rosenbaum
Regional Water Quality Control Board
Central Valley Region
3443 Routier Road, Suite A
Sacramento, CA 95827-3098

Dear Mr. Rosenbaum,

This letter provides the follow-up information promised in our letter of 17 March 1995. As previously reported, Homestake Mining Company's McLaughlin Mine experienced short-term underdrain flows in excess of the capacity of the recently upgraded containment and pumpback system at our waste rock disposal facility on 10 March 1995, and exceedence of our NPDES effluent pH criteria at NPDES discharge point 002. As reported earlier, these difficulties were encountered during the high intensity flood level storm events which hit California in March.

The analytical results for March NPDES samples demonstrate that neither the capacity exceedence of the pumpback systems nor the discharge from NPDES monitoring site 002 were of sufficient volume or duration to impact receiving stream waters. In general, the numbers reflect the increased TSS levels and associated total metal values naturally resulting from the extraordinarily high run-off and stream flow conditions. The analytical results for the March NPDES samples are attached.

Data review has been completed and compliance with NPDES permit criteria determined as described below:

1. An extra series of samples was collected on 10 March 1995 during high volume flows at the time of the capacity exceedence of our pumpback system. The TSS value for station 003, reported at 140 mg/l, exceeded the allowable daily effluent limit. This exceedence, however, had no impact on Hunting Creek with an upstream reading of 1100 mg/l and a downstream reading of 660 mg/l. The effluent total chromium level of 0.13 mg/l also exceeded the daily effluent limit. This exceedence, again had no impact on Hunting Creek with upstream and downstream levels reported as 0.19 and 0.13 mg/l respectively.

2. An extra series of samples was again collected on 11 March 1995. The TSS value for station 003, reported at 37 mg/l, exceeded the allowable daily effluent limit. This exceedence, again had no impact on Hunting Creek with upstream and downstream levels reported as 68 mg/l and 67 mg/l respectively.

3. Samples collected in conjunction with the low flow discharge (tens of gallons) from NPDES station 002, which first occurred on 11 March 1995, were in compliance with all permit criteria. Subsequent samples collected on 12 March 1995 were again in compliance with the exception of the effluent pH level which was reported as 6.23. This recorded effluent pH level had no impact on Hunting Creek with an upstream reading of 8.60 and downstream reading of 8.17.

4. Three extra series of NPDES samples were collected in conjunction with the continued low flow discharge from station 002 on 13, 14, and 15 March 1995. All three effluent samples were in compliance with permit criteria with the exception of the pH levels which were reported as 6.2, 5.3, and 5.16 respectively. These effluent pH levels again had no impact on the pH in the receiving stream with respective upstream readings of 8.02, 8.18, and 8.23, and respective downstream readings of 8.14, 8.18, and 8.06. Technical exceedences to the instream allowable incremental increase criteria for total zinc were observed on 13 and 15 March 1995 with upstream values reported as not detectable and downstream readings reported as 0.08 mg/l and 0.09 mg/l respectively. Reanalyses of these samples have identified potential laboratory contamination in the downstream samples. Additionally, the reported effluent total zinc levels did not exceed the permitted effluent limits. Given the reported total zinc levels and observed flow rates, it can be concluded that the potential incremental increase was not the result of the Mine's storm water discharge. Discharge from station 002 was contained as of 21 March 1995.

5. The NPDES samples collected on 20 March 1995 in conjunction with discharge from site 003 demonstrate the discharge was again in compliance with both effluent and receiving stream standards.

6. NPDES samples were again collected on 24 March 1995 in association with low flow discharge (tens of gallons) which was again observed at station 002 following an additional series of storms. Results demonstrate permit compliance with the exception of the effluent pH level which was reported at 5.2. The effluent pH level had no impact on the receiving stream waters with a pH reading of

8.65 reported at the upstream station, and a pH of 8.39 reported at the downstream station.

7. NPDES samples collected in conjunction with the discharge from station 002 on 27 March 1995 again demonstrate permit compliance with the exception of the effluent pH which was reported as 5.16. No impact was observed in the receiving stream with an upstream pH reading of 8.84 and a downstream reading of 8.56. Discharge was contained as of 28 March 1995 and continues to be contained.

We believe our ongoing containment efforts have been successful at protecting the quality of downstream waters despite the flood level storms. If you should have any additional questions, please feel free to call.

Sincerely,

Dolora M. Koontz

Dolora M. Koontz
Environmental Engineer

Attachments

xc: R. E. Krauss

McLAUGHLIN MINE

WATER QUALITY MANAGEMENT PROGRAM

NPDES MONITORING

Station	Date	Lab ID	Settleable Solids* ml/Lhr	Oil/Grease Total mg/l
OO3	95,03,10	237960	ND	ND
HC-05R	95,03,10	237958	ND	ND
HC-10R	95,03,10	237959	ND	ND
002	95,03,11	237962	ND	ND
OO3	95,03,11	237963	ND	ND
HC-05R	95,03,11	237964	ND	ND
HC-10R	95,03,11	237965	ND	ND
OO2	95,03,12	237955	ND	ND
HC-05R	95,03,12	237956	ND	ND
HC-10R	95,03,12	237954	ND	ND
002	95,03,13	238147	ND	ND
HC-05R	95,03,13	238148	ND	ND
HC-10R	95,03,13	238149	ND	ND
002	95,03,14	238151	ND	ND
HC-05R	95,03,14	238152	ND	ND
HC-10R	95,03,14	238153	ND	ND
002	95,03,15	238363	ND	ND
HC-05R	95,03,15	238364	ND	ND
HC-10R	95,03,15	238365	ND	ND
OO3	95,03,20	238660	ND	ND
HC-05R	95,03,20	238661	ND	ND
HC-10R	95,03,20	238659	ND	ND
002	95,03,24	238978	ND	ND
HC-05R	95,03,24	238979	ND	ND
HC-10R	95,03,24	238981	ND	ND
002	95,03,27	239116	ND	ND
003	95,03,27	239120	ND	ND
HC-05R	95,03,27	239119	ND	ND
HC-10R	95,03,27	239117	ND	ND

ND = Not detectable

* – Minimum reporting limit achievable by contract lab is 0.05 ml/Lhr.

MCLAUGHLIN MINE WATER QUALITY MANAGEMENT PROGRAM - SURFACE-WATER QUALITY DATA FOR MONTH(S) SHOWN BELOW UNDER "DATE." PART 1 OF 4. (Notes: 00.000 = no measurement NOWTR = dry INACS = inaccessible NOLVL = dry 0 = replicate.)

STATION	DATE (yy,mm, dd)	TIME (hours)	TYPE	SAMPLER (Initials or NOWTR or INACS)	FLOW (gpm)	TEMP (Cel)	SPEC COND (umhos /cm)	DISSOL VED OIXYGEN (mg/l)	pH (Field) (s.u.)	pH (Lab) (s.u.)	ACIDITY (mg/l)	ALKALIN- ITY (mg/l)	HARDNESS (mg/l)	TDS (mg/l)	TSS (mg/l)	TURBID- ITY (NTU)	CHEMICAL OIXYGEN DEMAND (mg/l)	MBAS (mg/l)	CHLOR- IDE (mg/l)	CYANIDE TOTAL) (mg/l)	CYANIDE FREE (mg/l)	THIO- CYANATE (mg/l)	LABORATORY ID NUMBER
003	93,03,10	13:33	SURFACE WATER	TM	7217	11.6	390	15.0	7.53	0.00	0.00	49.00	0.00	0.00	140.00	850.00	0.00	0.000	2.300	0.0000	0.0000	0.0000	237960.00
MC-05R	93,03,10	15:10	SURFACE WATER	TM	135313	10.8	120	14.2	7.88	0.00	0.00	49.00	0.00	0.00	1100.00	390.00	0.00	0.000	1.100	0.0000	0.0000	0.0000	237958.00
MC-10R	93,03,10	15:26	SURFACE WATER	TM	394800	11.0	130	14.0	8.00	0.00	0.00	77.00	0.00	0.00	640.00	250.00	0.00	0.000	1.300	0.0000	0.0000	0.0000	237959.00
002	93,03,11	08:55	SURFACE WATER	DMK	70	10.8	1450	12.5	6.51	0.00	0.00	12.00	0.00	0.00	8.00	5.00	0.00	0.000	9.300	0.0000	0.0000	0.0000	237962.00
003	93,03,11	09:40	SURFACE WATER	DMK	1443	11.2	530	12.4	7.73	0.00	0.00	58.00	0.00	0.00	37.00	30.00	0.00	0.000	3.000	0.0000	0.0000	0.0000	237963.00
MC-05R	93,03,11	08:30	SURFACE WATER	DMK	112761	10.0	170	13.3	8.40	0.00	0.00	110.00	0.00	0.00	68.00	32.00	0.00	0.000	2.800	0.0000	0.0000	0.0000	237964.90
MC-10R	93,03,11	10:00	SURFACE WATER	DMK	149160	10.5	210	13.4	8.33	0.00	0.00	110.00	0.00	0.00	67.00	34.00	0.00	0.000	2.900	0.0000	0.0000	0.0000	237965.00
002	93,03,12	11:14	SURFACE WATER	TM	78	12.1	1500	14.8	6.23	0.00	0.00	9.99	0.00	0.00	3.40	4.00	0.00	0.000	9.500	0.0000	0.0000	0.0000	237955.00
MC-05R	93,03,12	10:54	SURFACE WATER	TM	45104	10.7	270	14.0	8.17	0.00	0.00	160.00	0.00	0.00	11.00	15.00	0.00	0.000	2.800	0.0000	0.0000	0.0000	237956.00
MC-10R	93,03,12	11:34	SURFACE WATER	TM	49200	11.5	290	15.0	8.60	0.00	0.00	160.00	0.00	0.00	12.00	12.00	0.00	0.000	3.100	0.0000	0.0000	0.0000	237954.00
002	93,03,13	14:12	SURFACE WATER	TM	24	11.0	1400	13.0	6.20	0.00	0.00	9.99	0.00	0.00	12.00	10.00	0.00	0.000	10.000	0.0000	0.0000	0.0000	238147.00
MC-05R	93,03,13	14:00	SURFACE WATER	TM	90209	10.6	200	13.4	8.02	0.00	0.00	130.00	0.00	0.00	86.00	50.00	0.00	0.000	2.600	0.0000	0.0000	0.0000	238148.00
MC-10R	93,03,13	14:25	SURFACE WATER	TM	113280	10.7	210	13.4	8.16	0.00	0.00	130.00	0.00	0.00	86.00	38.00	0.00	0.000	2.800	0.0000	0.0000	0.0000	238149.00
002	93,03,14	13:46	SURFACE WATER	TM	60	11.8	1500	14.0	5.30	0.00	0.00	9.99	0.00	0.00	3.40	3.00	0.00	0.000	9.600	0.0000	0.0000	0.0000	238151.00
MC-05R	93,03,14	13:20	SURFACE WATER	TM	43300	11.7	270	13.4	8.18	0.00	0.00	170.00	0.00	0.00	7.30	12.00	0.00	0.000	3.300	0.0000	0.0000	0.0000	238152.00
MC-10R	93,03,14	14:00	SURFACE WATER	TM	49920	12.3	285	14.6	8.10	0.00	0.00	180.00	0.00	0.00	5.70	11.00	0.00	0.000	3.600	0.0000	0.0000	0.0000	238153.00
002	93,03,15	13:48	SURFACE WATER	TM	40	13.8	1150	13.6	5.16	0.00	0.00	9.99	0.00	0.00	12.00	8.00	0.00	0.000	12.000	0.0000	0.0000	0.0000	238363.00
MC-05R	93,03,15	13:27	SURFACE WATER	TM	37570	13.0	315	13.6	8.23	0.00	0.00	170.00	0.00	0.00	3.60	9.50	0.00	0.000	3.600	0.0000	0.0000	0.0000	238364.00
MC-10R	93,03,15	14:15	SURFACE WATER	TM	44880	13.8	320	13.6	8.06	0.00	0.00	180.00	0.00	0.00	3.50	8.50	0.00	0.000	3.900	0.0000	0.0000	0.0000	238365.00
003	93,03,20	13:18	SURFACE WATER	TM	441	13.0	750	13.4	7.64	0.00	0.00	160.00	0.00	0.00	9.00	5.00	0.00	0.000	4.400	0.0000	0.0000	0.0000	238660.00
MC-05R	93,03,20	12:40	SURFACE WATER	TM	135313	10.4	180	13.6	7.99	0.00	0.00	100.00	0.00	0.00	170.00	110.00	0.00	0.000	1.800	0.0000	0.0000	0.0000	238661.00
MC-10R	93,03,20	13:30	SURFACE WATER	TM	195120	10.9	210	13.4	7.80	0.00	0.00	120.00	0.00	0.00	120.00	85.00	0.00	0.000	2.800	0.0000	0.0000	0.0000	238659.00
002	93,03,24	12:15	SURFACE WATER	TM	30	13.5	1700	13.4	5.20	0.00	0.00	0.99	0.00	0.00	3.00	2.50	0.00	0.000	12.000	0.0000	0.0000	0.0000	238978.00
MC-05R	93,03,24	11:58	SURFACE WATER	TM	54125	9.6	280	13.6	8.65	0.00	0.00	190.00	0.00	0.00	5.00	6.50	0.00	0.000	3.200	0.0000	0.0000	0.0000	238979.00
MC-10R	93,03,24	12:30	SURFACE WATER	TM	68580	10.1	300	13.4	8.39	0.00	0.00	190.00	0.00	0.00	6.00	6.50	0.00	0.000	3.500	0.0000	0.0000	0.0000	238981.00
002	93,03,27	11:52	SURFACE WATER	TM	36	12.2	1800	13.2	5.16	0.00	0.00	0.99	0.00	0.00	2.90	1.20	0.00	0.000	15.000	0.0000	0.0000	0.0000	239116.00
003	93,03,27	14:25	SURFACE WATER	TM	175	13.2	800	15.0	8.25	0.00	0.00	140.00	0.00	0.00	3.60	2.00	0.00	0.000	5.300	0.0000	0.0000	0.0000	239120.00
MC-05R	93,03,27	11:20	SURFACE WATER	TM	31573	10.6	390	14.0	8.84	0.00	0.00	290.00	0.00	0.00	1.00	1.00	0.00	0.000	4.700	0.0000	0.0000	0.0000	239119.00
MC-10R	93,03,27	12:14	SURFACE WATER	TM	47280	11.8	450	13.5	8.56	0.00	0.00	290.00	0.00	0.00	1.00	1.00	0.00	0.000	5.500	0.0000	0.0000	0.0000	239117.00

MCLAUGHLIN MINE WATER QUALITY MANAGEMENT PROGRAM - SURFACE-
WATER QUALITY DATA FOR MONTH(S) SHOWN BELOW UNDER "DATE."
PART 2 OF 4. (NOTES: 00.0000 = no measurement MONTR = dry
INACS = inaccessible MOLVL = dry 0 = replicate.)

STATION	DATE (yy,mm, dd)	SAMPLER (initials or MONTR or INACS)	FLUORIDE (mg/l)	NITRATE as N (mg/l)	NITRITE as N (mg/l)	AMMONIA as N (mg/l)	TKN (mg/l)	SULFATE (mg/l)	ALUMINUM TOTAL (mg/l)	ALUMINUM FILTERED (mg/l)	ANTIMONY TOTAL (mg/l)	ANTIMONY FILTERED (mg/l)	ARSENIC TOTAL (mg/l)	ARSENIC FILTERED (mg/l)	BARIUM TOTAL (mg/l)	BARIUM FILTERED (mg/l)	BERYLLIUM TOTAL (mg/l)	BERYLLIUM FILTERED (mg/l)	BORON TOTAL (mg/l)	BORON FILTERED (mg/l)	CADMIUM TOTAL (mg/l)	CADMIUM FILTERED (mg/l)	LABORATORY ID NUMBER
003	93,03,10	TM	0.0000	0.3600	0.0600	0.0000	0.0000	370.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.099	0.000	0.00499	0.00000	237956.00
MC-05R	93,03,10	TM	0.0000	0.0300	0.0000	0.0000	0.0000	5.70	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.099	0.000	0.00499	0.00000	237958.00
MC-10R	93,03,10	TM	0.0000	0.0299	0.0000	0.0000	0.0000	25.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.099	0.000	0.00499	0.00000	237959.00
002	93,03,11	DRK	0.0000	4.0000	0.0000	0.0000	0.0000	1300.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.300	0.000	0.00499	0.00000	237962.00
003	93,03,11	DRK	0.0000	0.4500	0.0000	0.0000	0.0000	360.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.099	0.000	0.00499	0.00000	237963.00
MC-05R	93,03,11	DRK	0.0000	0.0299	0.0000	0.0000	0.0000	16.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.099	0.000	0.00499	0.00000	237964.00
MC-10R	93,03,11	DRK	0.0000	0.0400	0.0000	0.0000	0.0000	43.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.099	0.000	0.00499	0.00000	237965.00
002	93,03,12	TM	0.0000	3.1000	0.0000	0.0000	0.0000	1300.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.300	0.000	0.00499	0.00000	237955.00
MC-05R	93,03,12	TM	0.0000	0.0400	0.0000	0.0000	0.0000	24.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.099	0.000	0.00499	0.00000	237956.00
MC-10R	93,03,12	TM	0.0000	0.2200	0.0000	0.0000	0.0000	53.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.099	0.000	0.00499	0.00000	237957.00
002	93,03,13	TM	0.0000	0.4800	0.0000	0.0000	0.0000	1300.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.300	0.000	0.00499	0.00000	238147.00
MC-05R	93,03,13	TM	0.0000	0.0299	0.0000	0.0000	0.0000	19.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.099	0.000	0.00499	0.00000	238148.00
MC-10R	93,03,13	TM	0.0000	0.0299	0.0000	0.0000	0.0000	29.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.099	0.000	0.00499	0.00000	238149.00
002	93,03,14	TM	0.0000	0.7600	0.0000	0.0000	0.0000	1300.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.300	0.000	0.00499	0.00000	238151.00
MC-05R	93,03,14	TM	0.0000	0.0400	0.0000	0.0000	0.0000	26.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.099	0.000	0.00499	0.00000	238152.00
MC-10R	93,03,14	TM	0.0000	0.0700	0.0000	0.0000	0.0000	44.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.099	0.000	0.00499	0.00000	238153.00
002	93,03,15	TM	0.0000	1.8000	0.0000	0.0000	0.0000	1200.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.300	0.000	0.00499	0.00000	238363.00
MC-05R	93,03,15	TM	0.0000	0.0400	0.0000	0.0000	0.0000	28.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.099	0.000	0.00499	0.00000	238364.00
MC-10R	93,03,15	TM	0.0000	0.0700	0.0000	0.0000	0.0000	46.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.099	0.000	0.00499	0.00000	238365.00
003	93,03,20	TM	0.0000	0.6300	0.0000	0.0000	0.0000	450.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.100	0.000	0.00499	0.00000	238660.00
MC-05R	93,03,20	TM	0.0000	0.0299	0.0000	0.0000	0.0000	16.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.099	0.000	0.00499	0.00000	238661.00
MC-10R	93,03,20	TM	0.0000	0.0299	0.0000	0.0000	0.0000	40.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.099	0.000	0.00499	0.00000	238659.00
002	93,03,24	TM	0.0000	6.0000	0.0000	0.0000	0.0000	1800.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.300	0.000	0.00499	0.00000	238978.00
MC-05R	93,03,24	TM	0.0000	0.0400	0.0000	0.0000	0.0000	28.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.099	0.000	0.00499	0.00000	238979.00
MC-10R	93,03,24	TM	0.0000	0.0800	0.0000	0.0000	0.0000	50.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.099	0.000	0.00499	0.00000	238981.00
002	93,03,27	TM	0.0000	6.1000	0.0000	0.0000	0.0000	1700.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.400	0.000	0.00499	0.00000	239116.00
003	93,03,27	TM	0.0000	0.6200	0.0000	0.0000	0.0000	440.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.100	0.000	0.00499	0.00000	239120.00
MC-05R	93,03,27	TM	0.0000	0.0299	0.0000	0.0000	0.0000	35.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.099	0.000	0.00499	0.00000	239119.00
MC-10R	93,03,27	TM	0.0000	0.0300	0.0000	0.0000	0.0000	57.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.099	0.000	0.00499	0.00000	239117.00

MCLAUGHLIN MINE WATER QUALITY MANAGEMENT PROGRAM - SURFACE-
WATER QUALITY DATA FOR MONTH(S) SHOWN BELOW UNDER "DATE."
PART 3 OF 4. (NOTES: 00.0000 = no measurement MONTR = dry
INACS = inaccessible NOLVL = dry R = replicate.)

STATION	DATE (yy,mm dd)	SAMPLER (Initials or MONTR or INACS)	CALCIUM TOTAL (mg/l)	CALCIUM FILTERED (mg/l)	CHROMIUM TOTAL (mg/l)	CHROMIUM FILTERED (mg/l)	COBALT TOTAL (mg/l)	COBALT FILTERED (mg/l)	COPPER TOTAL (mg/l)	COPPER FILTERED (mg/l)	IRON TOTAL (mg/l)	IRON FILTERED (mg/l)	LEAD TOTAL (mg/l)	LEAD FILTERED (mg/l)	LITHIUM TOTAL (mg/l)	LITHIUM FILTERED (mg/l)	MAGNESIUM TOTAL (mg/l)	MAGNESIUM FILTERED (mg/l)	MANGANESE TOTAL (mg/l)	MANGANESE FILTERED (mg/l)	MERCURY TOTAL (mg/l)	MERCURY FILTERED (mg/l)	LABORATORY ID NUMBER
003	95,03,10	TR	27.00	0.00	0.13000	0.00000	0.0000	0.0000	0.0099	0.0000	10.0000	0.0000	0.0199	0.0000	0.0000	0.0000	66.0000	0.0000	0.00000	0.00000	0.002000	0.000000	237966.00
MC-05R	95,03,10	TR	11.00	0.00	0.19000	0.00000	0.0000	0.0000	0.0600	0.0000	46.0000	0.0000	0.0199	0.0000	0.0000	0.0000	44.0000	0.0000	0.00000	0.00000	0.001400	0.000000	237958.00
MC-10R	95,03,10	TR	8.40	0.00	0.13000	0.00000	0.0000	0.0300	0.0000	27.0000	0.0000	0.0199	0.0000	0.0000	0.0000	0.0000	43.0000	0.0000	0.00000	0.00000	0.000900	0.000000	237959.00
002	95,03,11	DMK	110.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	1.0000	0.0000	0.0199	0.0000	0.0000	0.0000	240.0000	0.0000	0.00000	0.00000	0.000199	0.000000	237962.00
003	95,03,11	DMK	38.00	0.00	0.03000	0.00000	0.0000	0.0000	0.0099	0.0000	2.3000	0.0000	0.0199	0.0000	0.0000	0.0000	79.0000	0.0000	0.00000	0.00000	0.000800	0.000000	237963.00
MC-05R	95,03,11	DMK	11.00	0.00	0.02000	0.00000	0.0000	0.0000	0.0099	0.0000	4.0000	0.0000	0.0199	0.0000	0.0000	0.0000	26.0000	0.0000	0.00000	0.00000	0.000199	0.000000	237964.00
MC-10R	95,03,11	DMK	13.00	0.00	0.03000	0.00000	0.0000	0.0000	0.0099	0.0000	3.9000	0.0000	0.0199	0.0000	0.0000	0.0000	31.0000	0.0000	0.00000	0.00000	0.000199	0.000000	237965.00
002	95,03,12	TR	110.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.8000	0.0000	0.0199	0.0000	0.0000	0.0000	250.0000	0.0000	0.00000	0.00000	0.000199	0.000000	237955.00
MC-05R	95,03,12	TR	14.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	1.4000	0.0000	0.0199	0.0000	0.0000	0.0000	34.0000	0.0000	0.00000	0.00000	0.000199	0.000000	237956.00
MC-10R	95,03,12	TR	16.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	1.2000	0.0000	0.0199	0.0000	0.0000	0.0000	40.0000	0.0000	0.00000	0.00000	0.000199	0.000000	237954.00
002	95,03,13	TR	110.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	1.3000	0.0000	0.0199	0.0000	0.0000	0.0000	250.0000	0.0000	0.00000	0.00000	0.000500	0.000000	238147.00
MC-05R	95,03,13	TR	12.00	0.00	0.03000	0.00000	0.0000	0.0000	0.0099	0.0000	3.3000	0.0000	0.0199	0.0000	0.0000	0.0000	31.0000	0.0000	0.00000	0.00000	0.000199	0.000000	238148.00
MC-10R	95,03,13	TR	13.00	0.00	0.04000	0.00000	0.0000	0.0000	0.0099	0.0000	5.4000	0.0000	0.0199	0.0000	0.0000	0.0000	33.0000	0.0000	0.00000	0.00000	0.000199	0.000000	238149.00
002	95,03,14	TR	110.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.6100	0.0000	0.0199	0.0000	0.0000	0.0000	260.0000	0.0000	0.00000	0.00000	0.000199	0.000000	238151.00
MC-05R	95,03,14	TR	15.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	1.3000	0.0000	0.0199	0.0000	0.0000	0.0000	37.0000	0.0000	0.00000	0.00000	0.000199	0.000000	238152.00
MC-10R	95,03,14	TR	16.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.8700	0.0000	0.0199	0.0000	0.0000	0.0000	42.0000	0.0000	0.00000	0.00000	0.000199	0.000000	238153.00
002	95,03,15	TR	130.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	1.3000	0.0000	0.0199	0.0000	0.0000	0.0000	300.0000	0.0000	0.00000	0.00000	0.000199	0.000000	238363.00
MC-05R	95,03,15	TR	16.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.8300	0.0000	0.0199	0.0000	0.0000	0.0000	39.0000	0.0000	0.00000	0.00000	0.000199	0.000000	238364.00
MC-10R	95,03,15	TR	17.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.9000	0.0000	0.0199	0.0000	0.0000	0.0000	44.0000	0.0000	0.00000	0.00000	0.000199	0.000000	238365.00
003	95,03,20	TR	47.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	1.0000	0.0000	0.0199	0.0000	0.0000	0.0000	120.0000	0.0000	0.00000	0.00000	0.000199	0.000000	238440.00
MC-05R	95,03,20	TR	11.00	0.00	0.06000	0.00000	0.0000	0.0000	0.0100	0.0000	12.0000	0.0000	0.0199	0.0000	0.0000	0.0000	32.0000	0.0000	0.00000	0.00000	0.000199	0.000000	238441.00
MC-10R	95,03,20	TR	13.00	0.00	0.05000	0.00000	0.0000	0.0000	0.0100	0.0000	10.0000	0.0000	0.0199	0.0000	0.0000	0.0000	38.0000	0.0000	0.00000	0.00000	0.000199	0.000000	238439.00
002	95,03,24	TR	120.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.5300	0.0000	0.0199	0.0000	0.0000	0.0000	300.0000	0.0000	0.00000	0.00000	0.000199	0.000000	238978.00
MC-05R	95,03,24	TR	15.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.6200	0.0000	0.0199	0.0000	0.0000	0.0000	41.0000	0.0000	0.00000	0.00000	0.000199	0.000000	238979.00
MC-10R	95,03,24	TR	16.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.4200	0.0000	0.0199	0.0000	0.0000	0.0000	47.0000	0.0000	0.00000	0.00000	0.000199	0.000000	238981.00
002	95,03,27	TR	120.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0200	0.0000	0.4900	0.0000	0.0199	0.0000	0.0000	0.0000	330.0000	0.0000	0.00000	0.00000	0.000199	0.000000	239116.00
003	95,03,27	TR	50.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.2600	0.0000	0.0199	0.0000	0.0000	0.0000	140.0000	0.0000	0.00000	0.00000	0.000199	0.000000	239120.00
MC-05R	95,03,27	TR	21.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.2000	0.0000	0.0199	0.0000	0.0000	0.0000	65.0000	0.0000	0.00000	0.00000	0.000199	0.000000	239119.00
MC-10R	95,03,27	TR	21.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.1100	0.0000	0.0199	0.0000	0.0000	0.0000	70.0000	0.0000	0.00000	0.00000	0.000199	0.000000	239117.00

MCLAUGHLIN MINE WATER QUALITY MANAGEMENT PROGRAM - SURFACE-
WATER QUALITY DATA FOR MONTH(S) SHOWN BELOW UNDER "DATE."
PART 4 OF 4. (NOTES: 00.0000 = no measurement MONTR = dry
INACS = inaccessible MOLYL = dry 0 = replicate.)

STATION	DATE (yy,mo, dd)	SAMPLER (Initials or MONTR or INACS)	MOLYBDENUM TOTAL (mg/l)	MOLYBDENUM FILTERED (mg/l)	NICKEL TOTAL (mg/l)	NICKEL FILTERED (mg/l)	POTASSIUM TOTAL (mg/l)	POTASSIUM FILTERED (mg/l)	SELENIUM TOTAL (mg/l)	SELENIUM FILTERED (mg/l)	SODIUM TOTAL (mg/l)	SODIUM FILTERED (mg/l)	SILVER TOTAL (mg/l)	SILVER FILTERED (mg/l)	THALLIUM TOTAL (mg/l)	THALLIUM FILTERED (mg/l)	VANADIUM TOTAL (mg/l)	VANADIUM FILTERED (mg/l)	ZINC TOTAL (mg/l)	ZINC FILTERED (mg/l)	CATIONS (meq/l)	ANIONS (meq/l)	ION BALANCE (%)
003	95,03,10	TM	0.0000	0.0000	0.3500	0.0000	1.700	0.000	0.00000	0.00000	4.400	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0300	0.0000	7.60	8.30	86.00
MC-05R	95,03,10	TM	0.0000	0.0000	0.4100	0.0000	3.100	0.000	0.00000	0.00000	2.500	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.1000	0.0000	6.80	1.10	0.00
MC-10R	95,03,10	TM	0.0000	0.0000	0.2700	0.0000	2.000	0.000	0.00000	0.00000	2.100	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0600	0.0000	5.60	2.10	0.00
002	95,03,11	DMK	0.0000	0.0000	3.0000	0.0000	4.400	0.000	0.00000	0.00000	22.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.5000	0.0000	26.00	28.00	95.00
003	95,03,11	DMK	0.0000	0.0000	0.2700	0.0000	1.200	0.000	0.00000	0.00000	5.900	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0200	0.0000	8.00	8.00	100.00
MC-05R	95,03,11	DMK	0.0000	0.0000	0.0400	0.0000	1.200	0.000	0.00000	0.00000	3.100	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0300	0.0000	3.20	2.60	121.00
MC-10R	95,03,11	DMK	0.0000	0.0000	0.0600	0.0000	1.200	0.000	0.00000	0.00000	3.100	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0199	0.0000	3.70	3.20	115.00
002	95,03,12	TM	0.0000	0.0000	3.1000	0.0000	4.300	0.000	0.00000	0.00000	23.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.4300	0.0000	27.00	28.00	99.00
MC-05R	95,03,12	TM	0.0000	0.0000	0.0199	0.0000	0.900	0.000	0.00000	0.00000	6.400	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0199	0.0000	3.90	3.80	102.00
MC-10R	95,03,12	TM	0.0000	0.0000	0.0200	0.0000	1.300	0.000	0.00000	0.00000	6.600	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0200	0.0000	4.50	4.60	102.00
002	95,03,13	TM	0.0000	0.0000	3.1000	0.0000	4.200	0.000	0.00000	0.00000	22.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.4200	0.0000	27.00	27.00	99.00
MC-05R	95,03,13	TM	0.0000	0.0000	0.0600	0.0000	1.100	0.000	0.00000	0.00000	5.300	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0199	0.0000	3.70	3.10	120.00
MC-10R	95,03,13	TM	0.0000	0.0000	0.0700	0.0000	1.300	0.000	0.00000	0.00000	5.200	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0800	0.0000	3.90	3.30	119.00
002	95,03,14	TM	0.0000	0.0000	3.2000	0.0000	4.200	0.000	0.00000	0.00000	23.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.4600	0.0000	28.00	27.00	102.00
MC-05R	95,03,14	TM	0.0000	0.0000	0.0199	0.0000	0.800	0.000	0.00000	0.00000	6.700	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0199	0.0000	4.20	4.00	103.00
MC-10R	95,03,14	TM	0.0000	0.0000	0.0199	0.0000	0.800	0.000	0.00000	0.00000	6.600	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0199	0.0000	4.60	4.60	100.00
002	95,03,15	TM	0.0000	0.0000	3.7000	0.0000	5.000	0.000	0.00000	0.00000	26.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.5400	0.0000	32.00	25.00	128.00
MC-05R	95,03,15	TM	0.0000	0.0000	0.0199	0.0000	0.900	0.000	0.00000	0.00000	7.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0199	0.0000	4.40	4.10	107.00
MC-10R	95,03,15	TM	0.0000	0.0000	0.0199	0.0000	1.300	0.000	0.00000	0.00000	7.100	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0900	0.0000	4.90	4.70	104.00
003	95,03,20	TM	0.0000	0.0000	0.1800	0.0000	1.200	0.000	0.00000	0.00000	7.900	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0199	0.0000	13.00	13.00	99.00
MC-05R	95,03,20	TM	0.0000	0.0000	0.1000	0.0000	1.600	0.000	0.00000	0.00000	4.300	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0300	0.0000	4.10	2.40	0.00
MC-10R	95,03,20	TM	0.0000	0.0000	0.1000	0.0000	1.400	0.000	0.00000	0.00000	4.600	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0300	0.0000	4.60	3.30	137.00
002	95,03,24	TM	0.0000	0.0000	3.6000	0.0000	4.600	0.000	0.00000	0.00000	25.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.5800	0.0000	32.00	38.00	84.00
MC-05R	95,03,24	TM	0.0000	0.0000	0.0199	0.0000	0.600	0.000	0.00000	0.00000	7.200	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0199	0.0000	4.50	4.50	100.00
MC-10R	95,03,24	TM	0.0000	0.0000	0.0199	0.0000	0.700	0.000	0.00000	0.00000	7.100	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0199	0.0000	5.00	4.90	102.00
002	95,03,27	TM	0.0000	0.0000	4.0000	0.0000	4.800	0.000	0.00000	0.00000	2.700	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.6800	0.0000	34.00	36.00	95.00
003	95,03,27	TM	0.0000	0.0000	0.1800	0.0000	1.100	0.000	0.00000	0.00000	8.700	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0199	0.0000	14.00	12.00	119.00
MC-05R	95,03,27	TM	0.0000	0.0000	0.0199	0.0000	0.600	0.000	0.00000	0.00000	9.300	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0199	0.0000	6.80	6.70	103.00
MC-10R	95,03,27	TM	0.0000	0.0000	0.0199	0.0000	0.600	0.000	0.00000	0.00000	9.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0199	0.0000	7.20	7.10	101.00

RK
File
Rwaelk
RK

HOMESTAKE MINING COMPANY

McLaughlin Mine

March 17, 1995

Mr. Steve Rosenbaum
Regional Water Quality Control Board
Central Valley Region
3443 Routier Road, Suite A
Sacramento, CA 95827-3098

Dear Mr. Rosenbaum,

This letter is in confirmation of our phone notification to you on 10 March 1995 of the occurrence of waste dump underdrain flows in excess of the capacity of the recently upgraded containment and pumpback system at our waste rock disposal facility, and the subsequent phone notification on 13 March 1995 regarding the exceedence of our NPDES effluent pH criteria at NPDES discharge point 002. These difficulties were encountered during our recent high intensity flood level storm events.

As you know, Homestake Mining Company's McLaughlin Mine took immediate steps to upgrade existing pumpback systems in response to problems encountered during the exceptional rainfall experienced in January 1995. Upgrades implemented to contain increased flows from the underdrains included installation of additional pumps and pipelines as previously discussed in our 20 January 1995 and 3 February 1995 letters to your office.

During the recent flood level storm events which hit California again on 8 March 1995 we received 7.53 inches of high intensity precipitation at a time when soils were already saturated resulting in elevated underdrain and surface water runoff flow rates. (See attached rainfall report.) As per our discussion on 10 March 1995, during this period of unusually heavy rainfall, the volume of underdrain flow in some cases exceeded the maximum capacity of some components of our recently upgraded containment and pumpback system.

The carrying capacity of our S-12 underdrain collection system, which was upgraded in January 1995, was exceeded from 10 to 13 March 1995. The low level underdrain flow which bypassed this system entered into the lower sediment ponds where it commingled with surface runoff and subsequently discharged to Hunting Creek from discharge point 003. In response, two additional (extra) series of NPDES samples were collected. Field readings recorded during the additional sampling conducted on 10 and 11 March 1995 were within permit compliance for both effluent and receiving stream criteria.

Also as a result of the exceptionally high runoff associated with the flood level storm events, the storage capacity of our sediment ponds at the main waste rock disposal facility was

Homestake Mining Co., McLaughlin Mine
26775 Morgan Valley Road
Lower Lake, CA 95457

Telephone (707) 995-6070

consumed, resulting in a low volume discharge (tens of gallons) from the Pond 1 emergency overflow spillway (NPDES discharge point 002). As per our phone notification on 13 March 1995, flow from discharge point 002 was first reported and sampled on 11 March 1995 at which time field readings were in compliance with both effluent and receiving stream criteria. As reported, field readings recorded during the 12 March 1995 NPDES sampling were within compliance limits with the exception of the effluent pH reading at discharge point 002 which was recorded as 6.2. The recorded effluent pH level had no impact on the pH in receiving stream waters with an upstream reading of 8.2 at station HC-05R and a downstream reading of 8.6 at station HC-10R. Additional (extra) NPDES samples were collected 13 March 1995, 14 March 1995, and 15 March 1995. Again, all readings were within permit criteria with the exception of the effluent pH readings which were 6.2, 5.3, and 5.2 respectively. No impact was reported in the receiving stream waters with an upstream reading of 8.0 and a downstream reading of 8.1 on 13 March 1995, an upstream reading of 8.1 and a downstream reading of 8.1 on 14 March 1995, and an upstream reading of 8.2 and downstream reading of 8.1 on 15 March 1995.

As reported on 13 March 1995, all underdrain flows have been and continue to be contained. The parallel Site 5 pumpback system installed earlier this year in response to the January 1995 storm events, is currently being utilized to pumpback surface water runoff contained in the upper sediment pond system at the main waste rock disposal facility in an effort to eliminate the continued low flow discharge from discharge point 002. Containment is anticipated by end of day 17 March 1995.

We believe our ongoing containment efforts have been successful at protecting the quality of downstream waters despite the flood level storms. Initial field data suggests that the pumpback exceedences and upper sediment pond discharge were not of sufficient volume or duration to impact receiving water quality. We will continue to keep you appraised, and forward NPDES sample analyses as soon as they become available. If you should have any additional questions, please feel free to call.

Sincerely,

Dolora M. Koontz

Dolora M. Koontz
Environmental Engineer

Attachment

xc: R. E. Krauss

[15] From: Jim Jackson at MCL-MAIN-ML-01 3/13/95 1:17PM (1601 bytes: 35 ln)
To: Alan Jones, Bill Davis at MCL-MENG-ML-01, Blaine Olson, Blake Brown, Brad Dennett, Cal Moyle, Colin Ross, Dave Hyatt at MCL-MENG-ML-01, Dean Enderlin at MCL-MENG-ML-01, Dolora Koontz, Don Field, Greg Brasel at MCL-MENG-ML-01, Ivan Markland, Jim Whitlock at MCL-MENG-ML-01, John Mack, Kent Billhartz, Larry Reimann, Larry Underwood, Lee Woodberry, Pam Lucas, Pat Purtell, Ray Krauss, Red Outen at MCL-MENG-ML-01, Roger Lucas, Royce Smith, Sheri Snyder, Stephanie Drake, Steve F. Mitchell, Tom Milligan, Mary Soderstrom, Rick Jensen
Subject: Rain Update

---------- Message Contents ----------

MINE AREA AVERAGE RAIN FALL 1994/95 SEASON (inches)

JULY	AUG	SEPT	OCTOBER	NOVEMBER	DECEMBER
0.00	0.00	0.06	0.81	5.16	3.69

JAN	FEB	MARCH	APRIL	MAY	JUNE	SEASON TOTAL
18.93	0.60	* 8.59 (Mill, 3/13)				37.84"

* Measured at Environ Office; Mine values still pending validation.

Rainfall measured so far this month:

3/2	1.06"
3/8-9	3.20"
3/9-10	1.56"
3/10-11	1.52"
3/12-13	1.25"

Any Questions? ... Call J.Jackson x241

HOMESTAKE MINING COMPANY

McLaughlin Mine

February 3, 1995

Steve Rosenbaum
Regional Water Quality Control Board
Central Valley Region
3443 Routier Road, Suite A
Sacramento, CA 95827-3098

Dear Mr. Rosenbaum,

This letter provides the follow-up information promised in our letter of 20 January 1995. As previously reported, Homestake Mining Company's McLaughlin Mine experienced short-term underdrain flows in excess of the capacity of the containment and pumpback system at our waste rock disposal facility on 10 January 1995 during the flood level storm events which hit the State. Upgrades to the systems were immediately implemented as previously described and have been successful at providing ongoing containment.

The analytical results received to date for January NPDES samples demonstrate that the capacity exceedence of the pumpback system was not of sufficient volume or duration to impact receiving stream waters. In general, the numbers reflect the increased TSS levels and associated total metal values naturally resulting from the extraordinarily high run-off and stream flow conditions. The analytical results received to date for January NPDES samples are attached.

Data review has been completed and compliance with NPDES permit criteria determined as described below:

1. The 4 January 1995 samples were collected during high flows prior to the capacity exceedence of our pumpback system. The TSS value for station 003, reported at 140 mg/l, exceeded the allowable daily effluent limit. This exceedence, however, had no impact on Hunting Creek with upstream and downstream readings both reported as 200 mg/l. The effluent total chromium level of 0.16 mg/l also exceeded the daily effluent limit. This exceedence, again, had no impact on Hunting Creek with upstream and downstream levels reported as 0.10 and 0.09 mg/l respectively. The calculated incremental increase for total mercury in the receiving waters was 37% with a reported value of 0.0011 mg/l at station HC-05R and a reported value of 0.0016 mg/l at station HC-10R. This is greater than the criteria of 10% plus allowable laboratory error, or 30% at the reported levels. However, the

Homestake Mining Co., McLaughlin Mine
26775 Morgan Valley Road

Telephone (707) 995-6070

reported effluent total mercury level did not exceed the allowable daily limit. Given the reported total mercury levels and observed flow rates, it can be concluded that the incremental increase was not the result of the Mine's storm water discharge.

2. The 11 January 1995 samples demonstrate compliance with NPDES permit criteria with the exception of the effluent pH reading which as previously reported was 6.0. This recorded effluent pH level had no impact on the pH in receiving stream waters with an upstream reading of 8.1 at station HC-05R and downstream reading of 8.2 at station HC-10R.

3. The extra series of samples collected 13 January 1995 demonstrate compliance with all NPDES permit criteria.

As previously reported, minor seepage observed from an abandoned and sealed culvert which runs through the East Waste Rock Disposal Facility has been temporarily directed to the containment pond below the facility. A contractor specializing in pressure grouting is currently working on resealing the culvert with completion of work anticipated 3 February 1995.

In response to the continuing rains (see attached rainfall report) and ongoing monitoring, Homestake has taken additional steps to ensure our continued compliance with permit criteria. In addition to the booster pump installed on the main Site 5 pumpback system on 11 January 1995, a barge pump was installed on 25 January 1995 to further upgrade the pumping capacity of this system. Installation of a second parallel Site 5 pumpback system is in progress with completion expected 3 February 1995. The parallel system will more than double the current pumping capacity.

We believe the steps taken have not only protected receiving stream waters, but should provide for our continued NPDES permit compliance. If you should have any additional questions, please feel free to call.

Sincerely,

Dolora M. Koontz

Dolora M. Koontz
Environmental Engineer

Attachments

xc: R. Krauss

[16] From: Jim Jackson at MCL-MAIN-ML-01 1/31/95 12:20PM (1648 bytes: 34 ln)
To: Alan Jones, Bill Davis at MCL-MENG-ML-01, Blaine Olson, Blake Brown, Brad Dennett, Cal Moyle, Colin Ross, Dave Hyatt at MCL-MENG-ML-01, Dean Enderlin at MCL-MENG-ML-01, Dolora Koontz, Don Field, Greg Brasel at MCL-MENG-ML-01, Ivan Markland, Jim Whitlock at MCL-MENG-ML-01, John Mack, Kent Billhartz, Larry Reimann, Larry Underwood, Lee Woodberry, Pam Lucas, Pat Purtell, Ray Krauss, Red Outen at MCL-MENG-ML-01, Roger Lucas, Royce Smith, Sheri Snyder, Stephanie Drake, Steve F. Mitchell, Tom Milligan, Mary Soderstrom, Rick Jensen
Subject: Rain Update

---------- Message Contents ----------

MINE AREA AVERAGE RAIN FALL 1994/95 SEASON (inches)*

JULY	AUG	SEPT	OCTOBER	NOVEMBER	DECEMBER
0.00	0.00	0.06	0.81	5.16	3.69

JAN	FEB	MARCH	APRIL	MAY	JUNE	
25.07 (MILL)	(1/30)					TOTAL
18.93 (MINE)						28.65 (MINE)

The 10-Year average for January is 3.81" and for the July through January season is 11.85".

Our ten year average total seasonal rainfall (July through June) is 23.20 inches.

* The difference between the mill and mine totals are verified by duplicate measurements at the Mine (Met1 and Met2) and the manual (Met7) measurements near the Mill.

Any Questions? ... Call J.Jackson x241

McLAUGHLIN MINE

WATER QUALITY MANAGEMENT PROGRAM

NPDES MONITORING

Station	Date	Lab ID	Settleable Solids ml/Lhr	Oil/Grease Total mg/l
OO3	95,01,04	232983	<1	ND
HC-05R	95,01,04	232987	<1	ND
HC-10R	95,01,04	232986	<1	ND
OO3	95,01,11	233601	<1	ND
HC-05R	95,01,11	233600	<1	ND
HC-10R	95,01,11	233599	<1	ND
OO3	95,01,13	233753	<1	ND
HC-05R	95,01,13	233751	<1	ND
HC-10R	95,01,13	233752	<1	ND

ND = Not detectable

Note: Insufficient sample volume available to achieve lower detection limit for settleable solids. Additional sample volume is being submitted for all subsequent samples.

KENNECOTT MINE WATER QUALITY MANAGEMENT PROGRAM - SURFACE-WATER QUALITY DATA FOR MONTH(S) SHOWN BELOW UNDER "DATE." PART 1 OF 4. (Notes: 00.000 = no measurement NOWTR = dry NWCS = inaccessible NOLVL = dry 0 = replicate.)

STATION	DATE (yy,mm, dd)	TIME (hours)	TYPE	SAMPLER (Initials or NOWTR or INACS)	FLOW (gpm)	TEMP (Cel)	SPEC COND (umhos /cm)	DISSOL VED OXYGEN (mg/l)	pH (Field) (s.u.)	pH (Lab) (s.u.)	ACIDITY (mg/l)	ALKALIN-ITY (mg/l)	HARDNESS (mg/l)	TDS (mg/l)	TSS (mg/l)	TURBID-ITY (NTU)	CHEMICAL OXYGEN DEMAND (mg/l)	MBAS (mg/l)	CHLOR-IDE (mg/l)	CYANIDE TOTAL (mg/l)	CYANIDE FREE (mg/l)	THIO-CYANATE (mg/l)	LABORATORY ID NUMBER
003	95,01,04	12:46	SURFACE WATER	TH	2406	7.4	625	14.8	8.27	0.00	0.00	130.00	0.00	0.00	140.00	0.00	0.00	0.000	11.000	0.0000	0.0000	0.0000	232983.00
MC-05R	95,01,04	11:58	SURFACE WATER	TH	0	6.8	130	15.0	8.47	0.00	0.00	84.00	0.00	0.00	200.00	0.00	0.00	0.000	1.800	0.0000	0.0000	0.0000	232987.00
MC-10R	95,01,04	13:00	SURFACE WATER	TH	230400	7.1	240	15.0	8.25	0.00	0.00	92.00	0.00	0.00	200.00	0.00	0.00	0.000	3.200	0.0000	0.0000	0.0000	232986.00
003	95,01,11	10:52	SURFACE WATER	TH	802	10.5	1350	15.0	6.00	0.00	0.00	0.99	0.00	0.00	15.00	0.00	0.00	0.000	8.600	0.0000	0.0000	0.0000	233601.00
MC-05R	95,01,11	11:16	SURFACE WATER	TH	0	8.0	100	14.0	8.10	0.00	0.00	61.00	0.00	0.00	730.00	0.00	0.00	0.000	2.400	0.0000	0.0000	0.0000	233599.00
MC-10R	95,01,11	11:16	SURFACE WATER	TH	240600	9.5	220	15.0	8.20	0.00	0.00	120.00	0.00	0.00	430.00	0.00	0.00	0.000	2.700	0.0000	0.0000	0.0000	233599.00
003	95,01,13	14:00	SURFACE WATER	DMK	2165	11.4	1700	14.2	7.10	0.00	0.00	21.00	0.00	0.00	16.00	0.00	0.00	0.000	14.000	0.0000	0.0000	0.0000	233753.00
MC-05R	95,01,13	13:40	SURFACE WATER	DMK	90209	11.0	110	14.8	8.10	0.00	0.00	67.00	0.00	0.00	200.00	0.00	0.00	0.000	1.500	0.0000	0.0000	0.0000	233751.00
MC-10R	95,01,13	14:15	SURFACE WATER	DMK	116820	11.1	273	14.8	8.10	0.00	0.00	80.00	0.00	0.00	240.00	0.00	0.00	0.000	2.400	0.0000	0.0000	0.0000	233752.00

MCLAUGHLIN MINE WATER QUALITY MANAGEMENT PROGRAM - SURFACE-WATER QUALITY DATA FOR MONTH(S) SHOWN BELOW UNDER "DATE."
PART 2 OF 4. (NOTES: 00.0000 = no measurement MDWTR = dry
INACS = inaccessible MDLVL = dry 0 = replicate.)

STATION	DATE (yy,mm, dd)	SAMPLER (Initials or MDWTR or INACS)	FLUORIDE (mg/l)	NITRATE as N (mg/l)	NITRITE as N (mg/l)	AMMONIA as N (mg/l)	TKN (mg/l)	SULFATE (mg/l)	ALUMINUM TOTAL (mg/l)	ALUMINUM FILTERD (mg/l)	ANTIMONY TOTAL (mg/l)	ANTIMONY FILTERED (mg/l)	ARSENIC TOTAL (mg/l)	ARSENIC FILTERED (mg/l)	BARIUM TOTAL (mg/l)	BARIUM FILTERED (mg/l)	BERYLLIUM TOTAL (mg/l)	BERYLLIUM FILTERED (mg/l)	BORON TOTAL (mg/l)	BORON FILTERED (mg/l)	CADMIUM TOTAL (mg/l)	CADMIUM FILTERED (mg/l)	LABORATORY ID NUMBER
003	95,01,04	TM	0.0000	0.0600	0.0000	0.0000	0.0000	390.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.099	0.000	0.00499	0.00000	232983.00
MC-05R	95,01,04	TM	0.0000	0.0900	0.0000	0.0000	0.0000	14.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.099	0.000	0.00499	0.00000	232987.00
MC-10R	95,01,04	TM	0.0000	0.1000	0.0000	0.0000	0.0000	82.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.099	0.000	0.00499	0.00000	232986.00
003	95,01,11	TM	0.0000	1.5000	0.0000	0.0000	0.0000	1100.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.200	0.000	0.00499	0.00000	233601.00
MC-05R	95,01,11	TM	0.0000	0.0800	0.0000	0.0000	0.0000	11.00	0.000	0.000	0.000	0.000	0.00400	0.00000	0.0000	0.0000	0.0000	0.0000	0.099	0.000	0.00499	0.00000	233599.00
MC-10R	95,01,11	TM	0.0000	0.0600	0.0000	0.0000	0.0000	44.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.099	0.000	0.00499	0.00000	233599.00
003	95,01,13	DMK	0.0000	3.1000	0.0000	0.0000	0.0000	1400.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.300	0.000	0.00499	0.00600	233753.00
MC-05R	95,01,13	DMK	0.0000	0.0400	0.0000	0.0000	0.0000	11.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.099	0.000	0.00499	0.00000	233751.00
MC-10R	95,01,13	DMK	0.0000	0.2800	0.0000	0.0000	0.0000	100.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.099	0.000	0.00499	0.00000	233752.00

MCLAUGHLIN MINE WATER QUALITY MANAGEMENT PROGRAM - SURFACE-WATER QUALITY DATA FOR MONTH(S) SHOWN BELOW UNDER "DATE."
PART 3 OF 4. (NOTES: 00.0000 = no measurement MOUTR = dry INACS = inaccessible NOLVL = dry 0 = replicate.)

STATION	DATE (yy,mm dd)	SAMPLER (Initials or MOUTR or INACS)	CALCIUM TOTAL (mg/l)	CALCIUM FILTERED (mg/l)	CHROMIUM TOTAL (mg/l)	CHROMIUM FILTERED (mg/l)	COBALT TOTAL (mg/l)	COBALT FILTERED (mg/l)	COPPER TOTAL (mg/l)	COPPER FILTERED (mg/l)	IRON TOTAL (mg/l)	IRON FILTERED (mg/l)	LEAD TOTAL (mg/l)	LEAD FILTERED (mg/l)	LITHIUM TOTAL (mg/l)	LITHIUM FILTERED (mg/l)	MAGNESIUM TOTAL (mg/l)	MAGNESIUM FILTERED (mg/l)	MANGANESE TOTAL (mg/l)	MANGANESE FILTERED (mg/l)	MERCURY TOTAL (mg/l)	MERCURY FILTERED (mg/l)	LABORATORY ID NUMBER
003	95,01,04	TH	200.00	0.00	0.16000	0.00000	0.0000	0.0000	0.0100	0.0000	10.0000	0.0000	0.0199	0.0000	0.0000	0.0000	140.0000	0.0000	0.00000	0.00000	0.001600	0.000000	232983.00
MC-05R	95,01,04	TH	8.20	0.00	0.10000	0.00000	0.0000	0.0000	0.0200	0.0000	13.0000	0.0000	0.0199	0.0000	0.0000	0.0000	29.0000	0.0000	0.00000	0.00000	0.001100	0.000000	232987.00
MC-10R	95,01,04	TH	12.00	0.00	0.09000	0.00000	0.0000	0.0000	0.0200	0.0000	13.0000	0.0000	0.0199	0.0000	0.0000	0.0000	48.0000	0.0000	0.00000	0.00000	0.001600	0.000000	232986.00
003	95,01,11	TH	88.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0200	0.0000	3.9000	0.0000	0.0199	0.0000	0.0000	0.0000	230.0000	0.0000	0.00000	0.00000	0.000199	0.000000	233601.00
MC-05R	95,01,11	TH	10.00	0.00	0.13000	0.00000	0.0000	0.0000	0.0500	0.0000	38.0000	0.0000	0.0199	0.0000	0.0000	0.0000	39.0000	0.0000	0.00000	0.00000	0.000600	0.000000	233599.00
MC-10R	95,01,11	TH	12.00	0.00	0.11000	0.00000	0.0000	0.0000	0.0400	0.0000	27.0000	0.0000	0.0199	0.0000	0.0000	0.0000	51.0000	0.0000	0.00000	0.00000	0.000199	0.000000	233599.00
003	95,01,13	DMK	120.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0200	0.0000	3.8000	0.0000	0.0199	0.0000	0.0000	0.0000	300.0000	0.0000	0.00000	0.00000	0.000199	0.000000	233753.00
MC-05R	95,01,13	DMK	8.30	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	1.7000	0.0000	0.0199	0.0000	0.0000	0.0000	17.0000	0.0000	0.00000	0.00000	0.000199	0.000000	233751.00
MC-10R	95,01,13	DMK	15.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	2.1000	0.0000	0.0199	0.0000	0.0000	0.0000	39.0000	0.0000	0.00000	0.00000	0.000199	0.000000	233752.00

MCLAUGHLIN MINE WATER QUALITY MANAGEMENT PROGRAM - SURFACE-
WATER QUALITY DATA FOR MONTH(S) SHOWN BELOW UNDER "DATE."
PART 4 OF 4. (NOTES: 00.0000 = no measurement MOUTR = dry
INACS = inaccessible MOLYL = dry 0 = replicate.)

STATION	DATE (yy,mm, dd)	SAMPLER (Initials or MOUTR or INACS)	MOLYBDENUM TOTAL (mg/l)	MOLYBDENUM FILTERED (mg/l)	NICKEL TOTAL (mg/l)	NICKEL FILTERED (mg/l)	POTASSIUM TOTAL (mg/l)	POTASSIUM FILTERED (mg/l)	SELENIUM TOTAL (mg/l)	SELENIUM FILTERED (mg/l)	SODIUM TOTAL (mg/l)	SODIUM FILTERED (mg/l)	SILVER TOTAL (mg/l)	SILVER FILTERED (mg/l)	THALLIUM TOTAL (mg/l)	THALLIUM FILTERED (mg/l)	VANADIUM TOTAL (mg/l)	VANADIUM FILTERED (mg/l)	ZINC TOTAL (mg/l)	ZINC FILTERED (mg/l)	CATIONS (meq/l)	ANIONS (meq/l)	ION BALANCE (%)
003	95,01,04	TM	0.0000	0.0000	0.2800	0.0000	1.300	0.000	0.00000	0.00000	4.800	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0199	0.0000	26.00	11.00	0.00
MC-05R	95,01,04	TM	0.0000	0.0000	0.1600	0.0000	1.600	0.000	0.00000	0.00000	4.300	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0300	0.0000	3.70	2.00	0.00
MC-10R	95,01,04	TM	0.0000	0.0000	0.1700	0.0000	1.900	0.000	0.00000	0.00000	4.400	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0200	0.0000	5.50	3.60	0.00
003	95,01,11	TM	0.0000	0.0000	1.9000	0.0000	2.400	0.000	0.00000	0.00000	12.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.1600	0.0000	24.00	23.00	104.00
MC-05R	95,01,11	TM	0.0000	0.0000	0.3300	0.0000	3.000	0.000	0.00000	0.00000	3.900	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0800	0.0000	6.00	1.50	0.00
MC-10R	95,01,11	TM	0.0000	0.0000	0.3000	0.0000	2.200	0.000	0.00000	0.00000	3.700	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0600	0.0000	6.50	3.40	0.00
003	95,01,13	DMK	0.0000	0.0000	2.9000	0.0000	4.200	0.000	0.00000	0.00000	23.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.3900	0.0000	32.00	30.00	106.00
MC-05R	95,01,13	DMK	0.0000	0.0000	0.0400	0.0000	0.830	0.000	0.00000	0.00000	3.600	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0199	0.0000	2.10	1.60	127.00
MC-10R	95,01,13	DMK	0.0000	0.0000	0.2100	0.0000	0.960	0.000	0.00000	0.00000	4.800	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0300	0.0000	4.30	3.80	114.00



xc: RK

(1-4-95 sampling) T Hg loading calcs - NPDES Samples

Station	Flow gpm	T Hg mg/l
HC-05R	225,000 estimation	.0011
003	2406	.0016
HC-10R	230,400	.0016

HC-10R

230,400 × 60 × 24 / 1,000,000 = 331.776 MGD flow rate

$\frac{8.35}{1 \text{ sample/day}} \times \frac{1}{\Sigma_i} \times 331.776 \text{ MGD} \times .0016 \text{ mg/l} = 4.43 \text{ lbs/day}$

003

2406 × 60 × 24 / 1,000,000 = 3.4646 MGD flow rate

$\frac{8.35}{1} \times \frac{1}{\Sigma_i} \times 3.4646 \times .0016 = 0.046 \text{ lbs/day}$

HC-05R

225,000 × 60 × 24 / 1,000,000 = 324.000 MGD flow rate

$\frac{8.35}{1} \frac{1}{\Sigma_i} \times 324.0 \times .0011 = 2.97594 \text{ lbs/day}$

HC-05R + 003 compared to HC-10R

3.4646 + 324 = 327.4646 MGD HC-05R+003 total flow rate

0.046 + 2.97594 = 3.022 lbs/day HC-05R+003 total

3.022 / (327.4646 × 8.35) = .0011 mg/l HC-05R+003 total

Does not account for T Hg increase between HC-05R & HC-10R increase due to either natural variation or analytical

File RWQCB Permit RC.
REK

HOMESTAKE MINING COMPANY

McLaughlin Mine

January 20, 1995

Mr. Steve Rosenbaum
Regional Water Quality Control Board
Central Valley Region
3443 Routier Road, Suite A
Sacramento, CA 95827-3098

Dear Mr. Rosenbaum,

This letter is in confirmation of our phone notification to you on 10 January 1995 of the occurrence of waste dump underdrain flows in excess of the capacity of the containment and pumpback system at our waste rock disposal facility during the recent period of exceptional rainfall.

As you know, Homestake Mining Company's McLaughlin Mine has in place a number of engineered interceptor drains and pumpback systems designed to collect and pump back (for use as process water) the accumulated flow from the underdrains in our waste rock disposal facility. Over the years, these systems have periodically been upgraded, as the need has been identified through our ongoing monitoring, to ensure continued compliance with our permit criteria.

During the flood level storm events which hit California between 5 January 1995 and 15 January 1995, we received in excess of 17 inches of rain on-site (see attached rainfall report). As per our discussion on 10 January 1995, during this period of unusually heavy and prolonged rainfall, the volume of underdrain flow in some cases exceeded the maximum capacity of some components of our containment and pumpback system. System upgrades have been undertaken which should prevent similar occurrences in the future.

In particular, the carrying capacity of our S-12 underdrain collection system was exceeded from 10 to 16 January 1995. The underdrain flow which bypassed this system entered into the sediment ponds where it commingled with surface runoff and subsequently discharged to Hunting Creek. Although analytical results for the NPDES samples collected during this time are pending, we did want to keep you appraised of our efforts to correct the problem and report on the field readings recorded during sampling.

Homestake Mining Co., McLaughlin Mine
26775 Morgan Valley Road
Telephone (707) 995-6070

This seasons' NPDES samples have been collected per permit criteria since 27 December 1994 when passive discharge over the spillway first occurred at discharge point 003. Sampling has since continued at the required frequency.

Field readings collected during our 11 January 1995 NPDES sampling were within compliance limits with the exception of the pH reading at discharge point 003 which was recorded at 6.0. The recorded effluent pH level had no impact on the pH in receiving stream waters with an upstream reading of 8.1 at station HC-05R and a downstream reading of 8.2 at station HC-10R. An additional (extra) series of NPDES samples was collected on 13 January 1995. All field readings recorded during this sampling were in compliance with permit criteria. A pH of 7.1 was observed at discharge point 003 with a pH of 8.1 reported at both HC-05R and HC-10R. Readings collected during our regularly scheduled weekly NPDES sampling on 18 January 1995 again demonstrated the pH was in compliance with a pH of 7.4 recorded at station 003, a pH of 8.9 at HC-05R, and a pH of 8.6 at HC-10R.

In an effort to contain the increased flows from the underdrains, Homestake immediately took steps to upgrade the pumping capacity of the underdrain pumpback systems. Pumps for the S-12 system were pulled, cleaned and reinstalled on 10 January 1995 in order to improve pumping efficiency. Work on laying a larger diameter pipe for this system was initiated on 11 January 1995 and has been completed. The larger pipe has provided for increased pumping capacity. With the improved weather conditions and continuous operation of the system, flow from this underdrain system was within the capacity of the system by 16 January 1995 and continues to be fully contained at this time. Work to correct some minor additional seepage from the dump toe is currently nearing completion.

Additionally, a booster pump was delivered and installed on the main Site 5 pumpback system on 11 January 1995. All flow to this system has been contained with the booster added to ensure continued containment.

On 12 January 1995, minor seepage was observed from an abandoned and sealed culvert which runs through the East Waste Rock Disposal Facility (EWRDF). This culvert, originally installed for transport of surface runoff from unreclaimed areas on the upstream side of the facility during its construction, was abandoned and sealed with cement several years ago. Seepage has temporarily been directed to the containment pond below the EWRDF. A contractor specializing in pressure grouting was contacted 12 January 1995. They have made a site inspection of the work, and are anticipated back on-site 30 January 1995 to reseal the culvert.

We believe our containment efforts have been successful at protecting the quality of downstream waters despite the exceptional rainfall. Initial field data suggests that the pumpback system exceedences were not of sufficient volume or duration to impact receiving water quality. The additional containment capacity recently installed should provide protection from any similar future events. We will continue to keep you appraised of our progress and forward NPDES sample analyses as soon as they become available. If you should have any additional questions, please feel free to call.

Sincerely,

Dolora M. Koontz

Dolora M. Koontz
Environmental Engineer

Attachment

xc: R. Krauss

[9] From: Jim Jackson at MCL-MAIN-ML-01 1/17/95 7:50AM (1799 bytes: 29 ln)
To: Alan Jones, Bill Davis at MCL-MENG-ML-01, Blaine Olson, Blake Brown, Brad Dennett, Cal Moyle, Colin Ross, Linda Estes, Dave Barr, Dave Hyatt at MCL-MENG-ML-01, Dean Enderlin at MCL-MENG-ML-01, Dolora Koontz, Don Field, Greg Brasel at MCL-MENG-ML-01, Ivan Markland, Jeff Snyder at MCL-MENG-ML-01, Jim Whitlock at MCL-MENG-ML-01, John Mack, Kent Billhartz, Larry Reimann, Larry Underwood, Lee Woodberry, Pam Lucas, Pat Purtell, Ray Krauss, Red Outen at MCL-MENG-ML-01, Roger Lucas, Royce Smith, Sheri Snyder, Stephanie Drake, Steve F. Mitchell, Tom Milligan, Mary Soderstrom, Rick Jensen
Subject: Rain Update

---------- Message Contents ----------

MINE AREA AVERAGE RAIN FALL 1994/95 SEASON (inches)*

JULY	AUG	SEPT	OCTOBER	NOVEMBER	DECEMBER
0.00	0.00	0.06	0.81	5.16	3.69

JAN	FEB	MARCH	APRIL	MAY	JUNE	TOTAL
17.96 (1/17)						27.68

We are presently at 471% of normal (3.81") for January and 233% of our seasonal normal (July through January, 11.85").

Our ten year average total seasonal rainfall (July through June) is 23.20 inches.

* The January rainfall value above is preliminary (fence post) collected at the environmental office. Once final values from Met1 and MET2 are validated this report will be updated. The difference is usually minimal.

Any Questions? ... Call J.Jackson x241

HOMESTAKE MINING COMPANY

McLaughlin Mine

March 17, 1995

Mr. Steve Rosenbaum
Regional Water Quality Control Board
Central Valley Region
3443 Routier Road, Suite A
Sacramento, CA 95827-3098

Dear Mr. Rosenbaum,

This letter is in confirmation of our phone notification to you on 10 March 1995 of the occurrence of waste dump underdrain flows in excess of the capacity of the recently upgraded containment and pumpback system at our waste rock disposal facility, and the subsequent phone notification on 13 March 1995 regarding the exceedence of our NPDES effluent pH criteria at NPDES discharge point 002. These difficulties were encountered during our recent high intensity flood level storm events.

As you know, Homestake Mining Company's McLaughlin Mine took immediate steps to upgrade existing pumpback systems in response to problems encountered during the exceptional rainfall experienced in January 1995. Upgrades implemented to contain increased flows from the underdrains included installation of additional pumps and pipelines as previously discussed in our 20 January 1995 and 3 February 1995 letters to your office.

During the recent flood level storm events which hit California again on 8 March 1995 we received 7.53 inches of high intensity precipitation at a time when soils were already saturated resulting in elevated underdrain and surface water runoff flow rates. (See attached rainfall report.) As per our discussion on 10 March 1995, during this period of unusually heavy rainfall, the volume of underdrain flow in some cases exceeded the maximum capacity of some components of our recently upgraded containment and pumpback system.

The carrying capacity of our S-12 underdrain collection system, which was upgraded in January 1995, was exceeded from 10 to 13 March 1995. The low level underdrain flow which bypassed this system entered into the lower sediment ponds where it commingled with surface runoff and subsequently discharged to Hunting Creek from discharge point 003. In response, two additional (extra) series of NPDES samples were collected. Field readings recorded during the additional sampling conducted on 10 and 11 March 1995 were within permit compliance for both effluent and receiving stream criteria.

Also as a result of the exceptionally high runoff associated with the flood level storm events, the storage capacity of our sediment ponds at the main waste rock disposal facility was

Homestake Mining Co., McLaughlin Mine
26775 Morgan Valley Road
Lower Lake, CA 95457

Telephone (707) 995-6070

consumed, resulting in a low volume discharge (tens of gallons) from the Pond 1 emergency overflow spillway (NPDES discharge point 002). As per our phone notification on 13 March 1995, flow from discharge point 002 was first reported and sampled on 11 March 1995 at which time field readings were in compliance with both effluent and receiving stream criteria. As reported, field readings recorded during the 12 March 1995 NPDES sampling were within compliance limits with the exception of the effluent pH reading at discharge point 002 which was recorded as 6.2. The recorded effluent pH level had no impact on the pH in receiving stream waters with an upstream reading of 8.2 at station HC-05R and a downstream reading of 8.6 at station HC-10R. Additional (extra) NPDES samples were collected 13 March 1995, 14 March 1995, and 15 March 1995. Again, all readings were within permit criteria with the exception of the effluent pH readings which were 6.2, 5.3, and 5.2 respectively. No impact was reported in the receiving stream waters with an upstream reading of 8.0 and a downstream reading of 8.1 on 13 March 1995, an upstream reading of 8.1 and a downstream reading of 8.1 on 14 March 1995, and an upstream reading of 8.2 and downstream reading of 8.1 on 15 March 1995.

As reported on 13 March 1995, all underdrain flows have been and continue to be contained. The parallel Site 5 pumpback system installed earlier this year in response to the January 1995 storm events, is currently being utilized to pumpback surface water runoff contained in the upper sediment pond system at the main waste rock disposal facility in an effort to eliminate the continued low flow discharge from discharge point 002. Containment is anticipated by end of day 17 March 1995.

We believe our ongoing containment efforts have been successful at protecting the quality of downstream waters despite the flood level storms. Initial field data suggests that the pumpback exceedences and upper sediment pond discharge were not of sufficient volume or duration to impact receiving water quality. We will continue to keep you appraised, and forward NPDES sample analyses as soon as they become available. If you should have any additional questions, please feel free to call.

Sincerely,

Dolora M. Koontz

Dolora M. Koontz
Environmental Engineer

Attachment

xc: R. E. Krauss

[15] From: Jim Jackson at MCL-MAIN-ML-01 3/13/95 1:17PM (1601 bytes: 35 ln)
To: Alan Jones, Bill Davis at MCL-MENG-ML-01, Blaine Olson, Blake Brown, Brad Dennett, Cal Moyle, Colin Ross, Dave Hyatt at MCL-MENG-ML-01, Dean Enderlin at MCL-MENG-ML-01, Dolora Koontz, Don Field, Greg Brasel at MCL-MENG-ML-01, Ivan Markland, Jim Whitlock at MCL-MENG-ML-01, John Mack, Kent Billhartz, Larry Reimann, Larry Underwood, Lee Woodberry, Pam Lucas, Pat Purtell, Ray Krauss, Red Outen at MCL-MENG-ML-01, Roger Lucas, Royce Smith, Sheri Snyder, Stephanie Drake, Steve F. Mitchell, Tom Milligan, Mary Soderstrom, Rick Jensen
Subject: Rain Update

---------- Message Contents ----------

MINE AREA AVERAGE RAIN FALL 1994/95 SEASON (inches)

JULY	AUG	SEPT	OCTOBER	NOVEMBER	DECEMBER
0.00	0.00	0.06	0.81	5.16	3.69

JAN	FEB	MARCH	APRIL	MAY	JUNE	SEASON TOTAL
18.93	0.60	* 8.59 (Mill, 3/13)				37.84"

* Measured at Environ Office; Mine values still pending validation.

Rainfall measured so far this month:

3/2	1.06"
3/8-9	3.20"
3/9-10	1.56"
3/10-11	1.52"
3/12-13	1.25"

Any Questions? ... Call J.Jackson x241

HOMESTAKE MINING COMPANY

McLaughlin Mine

February 3, 1995

Steve Rosenbaum
Regional Water Quality Control Board
Central Valley Region
3443 Routier Road, Suite A
Sacramento, CA 95827-3098

Dear Mr. Rosenbaum,

This letter provides the follow-up information promised in our letter of 20 January 1995. As previously reported, Homestake Mining Company's McLaughlin Mine experienced short-term underdrain flows in excess of the capacity of the containment and pumpback system at our waste rock disposal facility on 10 January 1995 during the flood level storm events which hit the State. Upgrades to the systems were immediately implemented as previously described and have been successful at providing ongoing containment.

The analytical results received to date for January NPDES samples demonstrate that the capacity exceedence of the pumpback system was not of sufficient volume or duration to impact receiving stream waters. In general, the numbers reflect the increased TSS levels and associated total metal values naturally resulting from the extraordinarily high run-off and stream flow conditions. The analytical results received to date for January NPDES samples are attached.

Data review has been completed and compliance with NPDES permit criteria determined as described below:

1. The 4 January 1995 samples were collected during high flows prior to the capacity exceedence of our pumpback system. The TSS value for station 003, reported at 140 mg/l, exceeded the allowable daily effluent limit. This exceedence, however, had no impact on Hunting Creek with upstream and downstream readings both reported as 200 mg/l. The effluent total chromium level of 0.16 mg/l also exceeded the daily effluent limit. This exceedence, again, had no impact on Hunting Creek with upstream and downstream levels reported as 0.10 and 0.09 mg/l respectively. The calculated incremental increase for total mercury in the receiving waters was 37% with a reported value of 0.0011 mg/l at station HC-05R and a reported value of 0.0016 mg/l at station HC-10R. This is greater than the criteria of 10% plus allowable laboratory error, or 30% at the reported levels. However, the

Homestake Mining Co., McLaughlin Mine
26775 Morgan Valley Road

Telephone (707) 995-6070

reported effluent total mercury level did not exceed the allowable daily limit. Given the reported total mercury levels and observed flow rates, it can be concluded that the incremental increase was not the result of the Mine's storm water discharge.

2. The 11 January 1995 samples demonstrate compliance with NPDES permit criteria with the exception of the effluent pH reading which as previously reported was 6.0. This recorded effluent pH level had no impact on the pH in receiving stream waters with an upstream reading of 8.1 at station HC-05R and downstream reading of 8.2 at station HC-10R.

3. The extra series of samples collected 13 January 1995 demonstrate compliance with all NPDES permit criteria.

As previously reported, minor seepage observed from an abandoned and sealed culvert which runs through the East Waste Rock Disposal Facility has been temporarily directed to the containment pond below the facility. A contractor specializing in pressure grouting is currently working on resealing the culvert with completion of work anticipated 3 February 1995.

In response to the continuing rains (see attached rainfall report) and ongoing monitoring, Homestake has taken additional steps to ensure our continued compliance with permit criteria. In addition to the booster pump installed on the main Site 5 pumpback system on 11 January 1995, a barge pump was installed on 25 January 1995 to further upgrade the pumping capacity of this system. Installation of a second parallel Site 5 pumpback system is in progress with completion expected 3 February 1995. The parallel system will more than double the current pumping capacity.

We believe the steps taken have not only protected receiving stream waters, but should provide for our continued NPDES permit compliance. If you should have any additional questions, please feel free to call.

Sincerely,

Dolora M. Koontz

Dolora M. Koontz
Environmental Engineer

Attachments

xc: R. Krauss

[16] From: Jim Jackson at MCL-MAIN-ML-01 1/31/95 12:20PM (1648 bytes: 34 ln)
To: Alan Jones, Bill Davis at MCL-MENG-ML-01, Blaine Olson, Blake Brown, Brad Dennett, Cal Moyle, Colin Ross, Dave Hyatt at MCL-MENG-ML-01, Dean Enderlin at MCL-MENG-ML-01, Dolora Koontz, Don Field, Greg Brasel at MCL-MENG-ML-01, Ivan Markland, Jim Whitlock at MCL-MENG-ML-01, John Mack, Kent Billhartz, Larry Reimann, Larry Underwood, Lee Woodberry, Pam Lucas, Pat Purtell, Ray Krauss, Red Outen at MCL-MENG-ML-01, Roger Lucas, Royce Smith, Sheri Snyder, Stephanie Drake, Steve F. Mitchell, Tom Milligan, Mary Soderstrom, Rick Jensen
Subject: Rain Update

---------- Message Contents ----------

MINE AREA AVERAGE RAIN FALL 1994/95 SEASON (inches)*

JULY	AUG	SEPT	OCTOBER	NOVEMBER	DECEMBER
0.00	0.00	0.06	0.81	5.16	3.69

JAN	FEB	MARCH	APRIL	MAY	JUNE
25.07 (MILL)	(1/30)				
18.93 (MINE)					

TOTAL

28.65 (MINE)

The 10-Year average for January is 3.81" and for the July through January season is 11.85".

Our ten year average total seasonal rainfall (July through June) is 23.20 inches.

* The difference between the mill and mine totals are verified by duplicate measurements at the Mine (Met1 and Met2) and the manual (Met7) measurements near the Mill.

Any Questions? ... Call J.Jackson x241

McLAUGHLIN MINE

WATER QUALITY MANAGEMENT PROGRAM

NPDES MONITORING

Station	Date	Lab ID	Settleable Solids ml/Lhr	Oil/Grease Total mg/l
OO3	95,01,04	232983	<1	ND
HC-05R	95,01,04	232987	<1	ND
HC-10R	95,01,04	232986	<1	ND
OO3	95,01,11	233601	<1	ND
HC-05R	95,01,11	233600	<1	ND
HC-10R	95,01,11	233599	<1	ND
OO3	95,01,13	233753	<1	ND
HC-05R	95,01,13	233751	<1	ND
HC-10R	95,01,13	233752	<1	ND

ND = Not detectable

Note: Insufficient sample volume available to achieve lower detection limit for settleable solids. Additional sample volume is being submitted for all subsequent samples.

MCLAUGHLIN MINE WATER QUALITY MANAGEMENT PROGRAM - SURFACE-WATER QUALITY DATA FOR MONTH(S) SHOWN BELOW UNDER "DATE." PART 1 OF 4. (Notes: 00.000 = no measurement MONTR = dry INACS = inaccessible MOLVL = dry 0 = replicate.)

STATION	DATE (yy,mo, dd)	TIME (hours)	TYPE	SAMPLER (Initials or MONTR or INACS)	FLOW (gpm)	TEMP (Cel)	SPEC COND (umhos /cm)	DISSOL VED OXYGEN (mg/l)	pH (Field) (s.u.)	pH (Lab) (s.u.)	ACIDITY (mg/l)	ALKALIN-ITY (mg/l)	HARDNESS (mg/l)	TDS (mg/l)	TSS (mg/l)	TURBID-ITY (NTU)	CHEMICAL OXYGEN DEMAND (mg/l)	MBAS (mg/l)	CHLOR-IDE (mg/l)	CYANIDE TOTAL (mg/l)	CYANIDE FREE (mg/l)	THIO-CYANATE (mg/l)	LABORATORY ID NUMBER
003	95,01,04	12:46	SURFACE WATER	TH	2406	7.4	625	14.8	8.27	0.00	0.00	130.00	0.00	0.00	140.00	0.00	0.00	0.000	11.000	0.0000	0.0000	0.0000	232983.00
MC-05R	95,01,04	11:58	SURFACE WATER	TH	0	6.8	130	15.0	8.47	0.00	0.00	84.00	0.00	0.00	200.00	0.00	0.00	0.000	1.800	0.0000	0.0000	0.0000	232987.00
MC-10R	95,01,04	13:00	SURFACE WATER	TH	230400	7.1	240	15.0	8.25	0.00	0.00	92.00	0.00	0.00	200.00	0.00	0.00	0.000	3.200	0.0000	0.0000	0.0000	232986.00
003	95,01,11	10:52	SURFACE WATER	TH	802	10.5	1350	15.0	6.00	0.00	0.00	0.99	0.00	0.00	15.00	0.00	0.00	0.000	8.600	0.0000	0.0000	0.0000	233601.00
MC-05R	95,01,11	11:16	SURFACE WATER	TH	0	0.0	100	14.0	8.10	0.00	0.00	61.00	0.00	0.00	730.00	0.00	0.00	0.000	2.400	0.0000	0.0000	0.0000	233599.00
MC-10R	95,01,11	11:16	SURFACE WATER	TH	240600	9.5	220	15.0	8.20	0.00	0.00	120.00	0.00	0.00	450.00	0.00	0.00	0.000	2.700	0.0000	0.0000	0.0000	233599.00
003	95,01,13	14:00	SURFACE WATER	BMK	2165	11.4	1700	14.2	7.10	0.00	0.00	21.00	0.00	0.00	16.00	0.00	0.00	0.000	14.000	0.0000	0.0000	0.0000	233753.00
MC-05R	95,01,13	13:40	SURFACE WATER	BMK	90209	11.0	110	14.8	8.10	0.00	0.00	67.00	0.00	0.00	280.00	0.00	0.00	0.000	1.500	0.0000	0.0000	0.0000	233751.00
MC-10R	95,01,13	14:15	SURFACE WATER	BMK	116820	11.1	273	14.8	8.10	0.00	0.00	80.00	0.00	0.00	240.00	0.00	0.00	0.000	2.400	0.0000	0.0000	0.0000	233752.00

MCLAUGHLIN MINE WATER QUALITY MANAGEMENT PROGRAM - SURFACE-WATER QUALITY DATA FOR MONTH(S) SHOWN BELOW UNDER "DATE."
PART 2 OF 4. (NOTES: 00.0000 = no measurement NOWTR = dry INACS = inaccessible NOLVL = dry D = replicate.)

STATION	DATE (yy,mm, dd)	SAMPLER (Initials or NOWTR or INACS)	FLUORIDE (mg/l)	NITRATE as N (mg/l)	NITRITE as N (mg/l)	AMMONIA as N (mg/l)	TKN (mg/l)	SULFATE (mg/l)	ALUMINUM TOTAL (mg/l)	ALUMINUM FILTERD (mg/l)	ANTIMONY TOTAL (mg/l)	ANTIMONY FILTERED (mg/l)	ARSENIC TOTAL (mg/l)	ARSENIC FILTERED (mg/l)	BARIUM TOTAL (mg/l)	BARIUM FILTERED (mg/l)	BERYLLIUM TOTAL (mg/l)	BERYLLIUM FILTERED (mg/l)	BORON TOTAL (mg/l)	BORON FILTERED (mg/l)	CADMIUM TOTAL (mg/l)	CADMIUM FILTERED (mg/l)	LABORATORY ID NUMBER
003	95,01,04	TR	0.0000	0.0600	0.0000	0.0000	0.0000	390.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.099	0.000	0.00499	0.00000	232983.00
MC-05R	95,01,04	TR	0.0000	0.0900	0.0000	0.0000	0.0000	14.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.099	0.000	0.00499	0.00000	232987.00
MC-10R	95,01,04	TR	0.0000	0.1000	0.0000	0.0000	0.0000	82.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.099	0.000	0.00499	0.00000	232986.00
003	95,01,11	TR	0.0000	1.5000	0.0000	0.0000	0.0000	1100.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.200	0.000	0.00499	0.00000	233601.00
MC-05R	95,01,11	TR	0.0000	0.0800	0.0000	0.0000	0.0000	11.00	0.000	0.000	0.000	0.000	0.00600	0.00000	0.0000	0.0000	0.0000	0.0000	0.099	0.000	0.00499	0.00000	233599.00
MC-10R	95,01,11	TR	0.0000	0.0600	0.0000	0.0000	0.0000	44.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.099	0.000	0.00499	0.00000	233599.00
003	95,01,13	BMK	0.0000	3.1000	0.0000	0.0000	0.0000	1400.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.099	0.000	0.00499	0.00000	233599.00
MC-05R	95,01,13	BMK	0.0000	0.0400	0.0000	0.0000	0.0000	11.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.099	0.000	0.00499	0.00000	233753.00
MC-10R	95,01,13	BMK	0.0000	0.2800	0.0000	0.0000	0.0000	100.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.099	0.000	0.00499	0.00000	233752.00

MCLAUGHLIN MINE WATER QUALITY MANAGEMENT PROGRAM - SURFACE-WATER QUALITY DATA FOR MONTH(S) SHOWN BELOW UNDER "DATE."
PART 3 OF 4. (NOTES: 00.0000 = no measurement NOWTR = dry INACS = inaccessible NOLVL = dry 0 = replicate.)

STATION	DATE (yy,mm dd)	SAMPLER (Initials or NOWTR or INACS)	CALCIUM TOTAL (mg/l)	CALCIUM FILTERED (mg/l)	CHROMIUM TOTAL (mg/l)	CHROMIUM FILTERED (mg/l)	COBALT TOTAL (mg/l)	COBALT FILTERED (mg/l)	COPPER TOTAL (mg/l)	COPPER FILTERED (mg/l)	IRON TOTAL (mg/l)	IRON FILTERED (mg/l)	LEAD TOTAL (mg/l)	LEAD FILTERED (mg/l)	LITHIUM TOTAL (mg/l)	LITHIUM FILTERED (mg/l)	MAGNESIUM TOTAL (mg/l)	MAGNESIUM FILTERED (mg/l)	MANGANESE TOTAL (mg/l)	MANGANESE FILTERED (mg/l)	MERCURY TOTAL (mg/l)	MERCURY FILTERED (mg/l)	LABORATORY ID NUMBER
003	95,01,04	TM	280.00	0.00	0.16000	0.00000	0.0000	0.0000	0.0100	0.0000	10.0000	0.0000	0.0199	0.0000	0.0000	0.0000	140.0000	0.0000	0.00000	0.00000	0.001600	0.000000	232983.00
MC-05R	95,01,04	TM	8.20	0.00	0.10000	0.00000	0.0000	0.0000	0.0200	0.0000	13.0000	0.0000	0.0199	0.0000	0.0000	0.0000	29.0000	0.0000	0.00000	0.00000	0.001100	0.000000	232987.00
MC-10R	95,01,04	TM	12.00	0.00	0.09000	0.00000	0.0000	0.0000	0.0200	0.0000	13.0000	0.0000	0.0199	0.0000	0.0000	0.0000	48.0000	0.0000	0.00000	0.00000	0.001600	0.000000	232986.00
003	95,01,11	TM	88.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0200	0.0000	3.9000	0.0000	0.0199	0.0000	0.0000	0.0000	230.0000	0.0000	0.00000	0.00000	0.000199	0.000000	233601.00
MC-05R	95,01,11	TM	10.00	0.00	0.15000	0.00000	0.0000	0.0000	0.0500	0.0000	38.0000	0.0000	0.0199	0.0000	0.0000	0.0000	39.0000	0.0000	0.00000	0.00000	0.000600	0.000000	233599.00
MC-10R	95,01,11	TM	12.00	0.00	0.11000	0.00000	0.0000	0.0000	0.0400	0.0000	27.0000	0.0000	0.0199	0.0000	0.0000	0.0000	51.0000	0.0000	0.00000	0.00000	0.000199	0.000000	233599.00
003	95,01,13	DMK	120.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0200	0.0000	3.8000	0.0000	0.0199	0.0000	0.0000	0.0000	300.0000	0.0000	0.00000	0.00000	0.000199	0.000000	233753.00
MC-05R	95,01,13	DMK	8.30	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	1.7000	0.0000	0.0199	0.0000	0.0000	0.0000	17.0000	0.0000	0.00000	0.00000	0.000199	0.000000	233751.00
MC-10R	95,01,13	DMK	13.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	2.1000	0.0000	0.0199	0.0000	0.0000	0.0000	29.0000	0.0000	0.00000	0.00000	0.000199	0.000000	233752.00

MCLAUGHLIN MINE WATER QUALITY MANAGEMENT PROGRAM - SURFACE-
WATER QUALITY DATA FOR MONTH(S) SHOWN BELOW UNDER "DATE."
PART 4 OF 4. (NOTES: 99.9999 = no measurement MONTR = dry
INACS = inaccessible MOLVL = dry 0 = replicate.)

STATION	DATE (yy,mm, dd)	SAMPLER (Initials or MONTR or INACS)	MOLYBDENUM TOTAL (mg/l)	MOLYBDENUM FILTERED (mg/l)	NICKEL TOTAL (mg/l)	NICKEL FILTERED (mg/l)	POTASSIUM TOTAL (mg/l)	POTASSIUM FILTERED (mg/l)	SELENIUM TOTAL (mg/l)	SELENIUM FILTERED (mg/l)	SODIUM TOTAL (mg/l)	SODIUM FILTERED (mg/l)	SILVER TOTAL (mg/l)	SILVER FILTERED (mg/l)	THALLIUM TOTAL (mg/l)	THALLIUM FILTERED (mg/l)	VANADIUM TOTAL (mg/l)	VANADIUM FILTERED (mg/l)	ZINC TOTAL (mg/l)	ZINC FILTERED (mg/l)	CATIONS (meq/l)	ANIONS (meq/l)	ION BALANCE (%)
003	95,01,04	TM	0.0000	0.0000	0.2800	0.0000	1.300	0.000	0.00000	0.00000	4.800	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0199	0.0000	26.00	11.00	0.00
MC-05R	95,01,04	TM	0.0000	0.0000	0.1600	0.0000	1.600	0.000	0.00000	0.00000	4.300	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0300	0.0000	3.70	2.00	0.00
MC-10R	95,01,04	TM	0.0000	0.0000	0.1700	0.0000	1.900	0.000	0.00000	0.00000	4.400	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0200	0.0000	5.50	3.60	0.00
003	95,01,11	TM	0.0000	0.0000	1.9000	0.0000	2.400	0.000	0.00000	0.00000	12.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.1600	0.0000	24.00	23.00	104.00
MC-05R	95,01,11	TM	0.0000	0.0000	0.3300	0.0000	3.000	0.000	0.00000	0.00000	3.900	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0800	0.0000	6.00	1.50	0.00
MC-10R	95,01,11	TM	0.0000	0.0000	0.3000	0.0000	2.200	0.000	0.00000	0.00000	3.700	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0600	0.0000	6.50	3.40	0.00
003	95,01,13	BMK	0.0000	0.0000	2.9000	0.0000	4.200	0.000	0.00000	0.00000	23.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.3900	0.0000	32.00	30.00	106.00
MC-05R	95,01,13	BMK	0.0000	0.0000	0.0400	0.0000	0.830	0.000	0.00000	0.00000	3.600	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0199	0.0000	2.10	1.60	127.00
MC-10R	95,01,13	BMK	0.0000	0.0000	0.2100	0.0000	0.960	0.000	0.00000	0.00000	4.800	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0300	0.0000	4.30	3.80	114.00

xc: RK

1-4-95 Sampling) T Hg loading calcs - NPDES Samples

Station	Flow gpm	T Hg mg/l
HC-05R	225,000 estimation	.0011
003	2406	.0016
HC-10R	230,400	.0016

HC-10R

230,400 × 60 × 24 / 1,000,000 = 331.776 MGD flow rate

$\frac{8.35}{1 \text{ sample/day}} \times \sum_{i}^{1} \times 331.776 \text{ MGD} \times .0016 \text{ mg/l} = 4.43 \text{ lbs/day}$

003

2406 × 60 × 24 / 1,000,000 = 3.4646 MGD flow rate

$\frac{8.35}{1} \times \sum_{i}^{1} \times 3.4646 \times .0016 = 0.046 \text{ lbs/day}$

HC-05R

225,000 × 60 × 24 / 1,000,000 = 324.000 MGD flow rate

$\frac{8.35}{1} \sum_{i}^{1} \times 324.0 \times .0011 = 2.97594 \text{ lbs/day}$

HC-05R + 003 compared to HC-10R

3.4646 + 324 = 327.4646 MGD HC-05R-003 total flow rate

0.046 - 2.97594 = 3.022 lbs/day HC-05R+003 total

3.022 / (327.4646 × 8.35) = .0011 mg/l HC-05R+003 total

Does not account for T Hg increase between HC 05R & HC-10R
Increase due to either natural variation or analytical variability due to elevated TSS levels.

HOMESTAKE MINING COMPANY

McLaughlin Mine

January 20, 1995

Mr. Steve Rosenbaum
Regional Water Quality Control Board
Central Valley Region
3443 Routier Road, Suite A
Sacramento, CA 95827-3098

Dear Mr. Rosenbaum,

This letter is in confirmation of our phone notification to you on 10 January 1995 of the occurrence of waste dump underdrain flows in excess of the capacity of the containment and pumpback system at our waste rock disposal facility during the recent period of exceptional rainfall.

As you know, Homestake Mining Company's McLaughlin Mine has in place a number of engineered interceptor drains and pumpback systems designed to collect and pump back (for use as process water) the accumulated flow from the underdrains in our waste rock disposal facility. Over the years, these systems have periodically been upgraded, as the need has been identified through our ongoing monitoring, to ensure continued compliance with our permit criteria.

During the flood level storm events which hit California between 5 January 1995 and 15 January 1995, we received in excess of 17 inches of rain on-site (see attached rainfall report). As per our discussion on 10 January 1995, during this period of unusually heavy and prolonged rainfall, the volume of underdrain flow in some cases exceeded the maximum capacity of some components of our containment and pumpback system. System upgrades have been undertaken which should prevent similar occurrences in the future.

In particular, the carrying capacity of our S-12 underdrain collection system was exceeded from 10 to 16 January 1995. The underdrain flow which bypassed this system entered into the sediment ponds where it commingled with surface runoff and subsequently discharged to Hunting Creek. Although analytical results for the NPDES samples collected during this time are pending, we did want to keep you appraised of our efforts to correct the problem and report on the field readings recorded during sampling.

Homestake Mining Co., McLaughlin Mine
26775 Morgan Valley Road
Lower Lake, CA 95457

Telephone (707) 995-6070
FAX (707) 995-6078

This seasons' NPDES samples have been collected per permit criteria since 27 December 1994 when passive discharge over the spillway first occurred at discharge point 003. Sampling has since continued at the required frequency.

Field readings collected during our 11 January 1995 NPDES sampling were within compliance limits with the exception of the pH reading at discharge point 003 which was recorded at 6.0. The recorded effluent pH level had no impact on the pH in receiving stream waters with an upstream reading of 8.1 at station HC-05R and a downstream reading of 8.2 at station HC-10R. An additional (extra) series of NPDES samples was collected on 13 January 1995. All field readings recorded during this sampling were in compliance with permit criteria. A pH of 7.1 was observed at discharge point 003 with a pH of 8.1 reported at both HC-05R and HC-10R. Readings collected during our regularly scheduled weekly NPDES sampling on 18 January 1995 again demonstrated the pH was in compliance with a pH of 7.4 recorded at station 003, a pH of 8.9 at HC-05R, and a pH of 8.6 at HC-10R.

In an effort to contain the increased flows from the underdrains, Homestake immediately took steps to upgrade the pumping capacity of the underdrain pumpback systems. Pumps for the S-12 system were pulled, cleaned and reinstalled on 10 January 1995 in order to improve pumping efficiency. Work on laying a larger diameter pipe for this system was initiated on 11 January 1995 and has been completed. The larger pipe has provided for increased pumping capacity. With the improved weather conditions and continuous operation of the system, flow from this underdrain system was within the capacity of the system by 16 January 1995 and continues to be fully contained at this time. Work to correct some minor additional seepage from the dump toe is currently nearing completion.

Additionally, a booster pump was delivered and installed on the main Site 5 pumpback system on 11 January 1995. All flow to this system has been contained with the booster added to ensure continued containment.

On 12 January 1995, minor seepage was observed from an abandoned and sealed culvert which runs through the East Waste Rock Disposal Facility (EWRDF). This culvert, originally installed for transport of surface runoff from unreclaimed areas on the upstream side of the facility during its construction, was abandoned and sealed with cement several years ago. Seepage has temporarily been directed to the containment pond below the EWRDF. A contractor specializing in pressure grouting was contacted 12 January 1995. They have made a site inspection of the work, and are anticipated back on-site 30 January 1995 to reseal the culvert.

We believe our containment efforts have been successful at protecting the quality of downstream waters despite the exceptional rainfall. Initial field data suggests that the pumpback system exceedences were not of sufficient volume or duration to impact receiving water quality. The additional containment capacity recently installed should provide protection from any similar future events. We will continue to keep you appraised of our progress and forward NPDES sample analyses as soon as they become available. If you should have any additional questions, please feel free to call.

Sincerely,

Dolora M. Koontz

Dolora M. Koontz
Environmental Engineer

Attachment

xc: R. Krauss

[9] From: Jim Jackson at L-MAIN-ML-01 1/17/95 7:50 (1799 bytes: 29 ln)
To: Alan Jones, Bill Davis at MCL-MENG-ML-01, Blaine Olson, Blake Brown, Brad Dennett, Cal Moyle, Colin Ross, Linda Estes, Dave Barr, Dave Hyatt at MCL-MENG-ML-01, Dean Enderlin at MCL-MENG-ML-01, Dolora Koontz, Don Field, Greg Brasel at MCL-MENG-ML-01, Ivan Markland, Jeff Snyder at MCL-MENG-ML-01, Jim Whitlock at MCL-MENG-ML-01, John Mack, Kent Billhartz, Larry Reimann, Larry Underwood, Lee Woodberry, Pam Lucas, Pat Purtell, Ray Krauss, Red Outen at MCL-MENG-ML-01, Roger Lucas, Royce Smith, Sheri Snyder, Stephanie Drake, Steve F. Mitchell, Tom Milligan, Mary Soderstrom, Rick Jensen
Subject: Rain Update

---------- Message Contents ----------

MINE AREA AVERAGE RAIN FALL 1994/95 SEASON (inches)*

JULY	AUG	SEPT	OCTOBER	NOVEMBER	DECEMBER
0.00	0.00	0.06	0.81	5.16	3.69

JAN	FEB	MARCH	APRIL	MAY	JUNE	
17.96 (1/17)						TOTAL
						27.68

We are presently at 471% of normal (3.81") for January and 233% of our seasonal normal (July through January, 11.85").

Our ten year average total seasonal rainfall (July through June) is 23.20 inches.

* The January rainfall value above is preliminary (fence post) collected at the environmental office. Once final values from Met1 and MET2 are validated this report will be updated. The difference is usually minimal.

Any Questions? ... Call J.Jackson x241

HOMESTAKE
MINING COMPANY

McLaughlin Mine

March 15, 1993

Mr. Steve Rosenbaum
Regional Water Quality Control Board
Central Valley Region
3443 Routier Road, Suite A
Sacramento, CA 95827-3098

Dear Steve,

Attached you will find the finalized data for samples collected on February 10, 1993 in accordance with our NPDES Permit (Order No. 88-181, NPDES No. CA081477).

As indicated in our letter of March 10, 1993, results for this data set demonstrate that both effluent and receiving waters are back in compliance for all constituents.

If we can provide any further information regarding this matter, please let us know.

Sincerely,

Dolora M. Koontz

Dolora M. Koontz
ENVIRONMENTAL ENGINEER

Attachments

xc: R. E. Krauss

Homestake Mining Co., McLaughlin Mine
26775 Morgan Valley Road
Lower Lake, CA 95457

Telephone (707) 995-6070
FAX (707) 995-6078

MCLAUGHLIN MINE WATER QUALITY MANAGEMENT PROGRAM - SURFACE-WATER QUALITY DATA FOR MONTH(S) SHOWN BELOW UNDER "DATE."
PART 2 OF 4. (NOTES: 00.0000 = no measurement NOWTR = dry INACS = inaccessible NOL'YL = dry 0 = replicate.)

STATION	DATE (yy,aa, dd)	SAMPLER (Initials or NOWTR or INACS)	FLUOR-IDE (mg/l)	NITRATE as N (mg/l)	NITRITE as N (mg/l)	AMMONIA as N (mg/l)	TKN (mg/l)	SULFATE (mg/l)	ALUMINUM TOTAL (mg/l)	ALUMINUM FILTERE (mg/l)	ANTIMONY TOTAL (mg/l)	ANTIMONY FILTERED (mg/l)	ARSENIC TOTAL (mg/l)	ARSENIC FILTERED (mg/l)	BARIUM TOTAL (mg/l)	BARIUM FILTERED (mg/l)	BERYLLIUM TOTAL (mg/l)	BERYLLIUM FILTERED (mg/l)	BORON TOTAL (mg/l)	BORON FILTERED (mg/l)	CADMIUM TOTAL (mg/l)	CADMIUM FILTERED (mg/l)	LABORATORY ID NUMBER
003	93,02,10	TM	0.0000	0.5300	0.0000	0.0000	0.0000	380.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.130	0.000	0.00499	0.00000	15107.70
MC-05R	93,02,10	TM	0.0000	0.0400	0.0000	0.0000	0.0000	36.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.110	0.000	0.00499	0.00000	15107.80
MC-10R	93,02,10	TM	0.0000	0.0600	0.0000	0.0000	0.0000	81.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.120	0.000	0.00499	0.00000	15107.60

MCLAUGHLIN MINE WATER QUALITY MANAGEMENT PROGRAM - SURFACE-WATER QUALITY DATA FOR MONTH(S) SHOWN BELOW UNDER "DATE." PART 3 OF 4. (NOTES: 00.0000 = no measurement NOWTR = dry INACS = inaccessible NOLVL = dry R = replicate.)

STATION	DATE (yy,mm dd)	SAMPLER (Initials or NOWTR or INACS)	CALCIUM TOTAL (mg/l)	CALCIUM FILTERED (mg/l)	CHROMIUM TOTAL (mg/l)	CHROMIUM FILTERED (mg/l)	COBALT TOTAL (mg/l)	COBALT FILTERED (mg/l)	COPPER TOTAL (mg/l)	COPPER FILTERED (mg/l)	IRON TOTAL (mg/l)	IRON FILTERED (mg/l)	LEAD TOTAL (mg/l)	LEAD FILTERED (mg/l)	LITHIUM TOTAL (mg/l)	LITHIUM FILTERED (mg/l)	MAGNESIUM TOTAL (mg/l)	MAGNESIUM FILTERED (mg/l)	MANGANESE TOTAL (mg/l)	MANGANESE FILTERED (mg/l)	MERCURY TOTAL (mg/l)	MERCURY FILTERED (mg/l)	LABORATORY ID NUMBER
003	93,02,10	TM	30.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	1.1000	0.0000	0.0199	0.0000	0.0000	0.0000	93.0000	0.0000	0.00000	0.00000	0.000199	0.000000	15107.70
MC-05R	93,02,10	TM	18.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.2700	0.0000	0.0199	0.0000	0.0000	0.0000	55.0000	0.0000	0.00000	0.00000	0.000199	0.000000	15107.50
MC-10R	93,02,10	TM	19.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.3100	0.0000	0.0199	0.0000	0.0000	0.0000	66.0000	0.0000	0.00000	0.00000	0.000199	0.000000	15107.60

MCLAUGHLIN MINE WATER QUALITY MANAGEMENT PROGRAM - SURFACE-
WATER QUALITY DATA FOR MONTH(S) SHOWN BELOW UNDER "DATE."
PART 4 OF 4. (NOTES: 00.0000 = no measurement NOWTR = dry
INACS = inaccessible NOLVL = dry # = replicate.)

STATION	DATE (yy,mm, dd)	SAMPLER (Initials or NOWTR or INACS)	MOLYBDENUM TOTAL (mg/l)	MOLYBDENUM FILTERED (mg/l)	NICKEL TOTAL (mg/l)	NICKEL FILTERED (mg/l)	POTASSIUM TOTAL (mg/l)	POTASSIUM FILTERED (mg/l)	SELENIUM TOTAL (mg/l)	SELENIUM FILTERED (mg/l)	SODIUM TOTAL (mg/l)	SODIUM FILTERED (mg/l)	SILVER TOTAL (mg/l)	SILVER FILTERED (mg/l)	THALLIUM TOTAL (mg/l)	THALLIUM FILTERED (mg/l)	VANADIUM TOTAL (mg/l)	VANADIUM FILTERED (mg/l)	ZINC TOTAL (mg/l)	ZINC FILTERED (mg/l)	CATIONS (meq/l)	ANIONS (meq/l)	ION BALANCE (%)
003	93,02,10	TM	0.0000	0.0000	0.3600	0.0000	0.860	0.000	0.00000	0.00000	5.300	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0700	0.0000	9.59	10.00	95.00
MC-05R	93,02,10	TM	0.0000	0.0000	0.0200	0.0000	0.580	0.000	0.00000	0.00000	9.100	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0199	0.0000	5.80	6.50	89.00
MC-10R	93,02,10	TM	0.0000	0.0000	0.0400	0.0000	0.510	0.000	0.00000	0.00000	9.400	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0199	0.0000	6.80	7.30	94.00

MCLAUGHLIN MINE WATER QUALITY MANAGEMENT PROGRAM - SURFACE-WATER QUALITY DATA FOR MONTH(S) SHOWN BELOW UNDER "DATE." PART 1 OF 4. (Notes: 00.000 = no measurement NDWTR = dry INACS = inaccessible NOLVL = dry # = replicate.)

STATION	DATE (yy,mm, dd)	TIME (hours)	TYPE	SAMPLER (Initials or NDWTR or INACS)	FLOW (gpm)	TEMP (Cel)	SPEC COND (umhos /cm)	DISSOLVED OXYGEN (mg/l)	pH (Field) (s.u.)	pH (Lab) (s.u.)	ACIDITY (mg/l)	ALKALINITY (mg/l)	HARDNESS (mg/l)	TDS (mg/l)	TSS (mg/l)	TURBIDITY (NTU)	CHEMICAL OXYGEN DEMAND (mg/l)	MBAS (mg/l)	CHLORIDE (mg/l)	CYANIDE TOTAL) (mg/l)	CYANIDE FREE (mg/l)	THIOCYANATE (mg/l)	LABORATORY ID NUMBER
003	93,02,10	14:04	SURFACE WATER	TM	289	9.6	500	11.2	8.00	0.00	0.00	310.00	0.00	0.00	3.80	0.00	0.00	0.000	6.100	0.0000	0.0000	0.0000	15107.70
MC-05R	93,02,10	13:45	SURFACE WATER	TM	3237	9.3	345	15.0	8.10	0.00	0.00	280.00	0.00	0.00	0.99	0.00	0.00	0.000	5.700	0.0000	0.0000	0.0000	15107.69
MC-10R	93,02,10	14:20	SURFACE WATER	TM	4686	9.9	370	14.8	8.30	0.00	0.00	270.00	0.00	0.00	0.99	0.00	0.00	0.000	6.900	0.0000	0.0000	0.0000	15107.68

HOMESTAKE MINING COMPANY

McLaughlin Mine

March 10, 1993

Mr. Steve Rosenbaum
Regional Water Quality Control Board
Central Valley Region
3443 Routier Road, Suite A
Sacramento, CA 95827-3098

Dear Mr. Rosenbaum,

This letter is to advise you of the occurrence of technical exceedances of our NPDES Permit (Order No. 88-181, NPDES No. CA081477) for the McLaughlin Mine.

As you know, over the last several years, Homestake Mining Company has constructed a number of interceptor drains and pumpback systems, to intercept and pump back for use as process water collected flow from the underdrains in our waste rock disposal facility.

These systems were installed to prevent dump leachate from commingling with the surface runoff from the waste rock area which is collected in our "rice paddy" sediment control ponds and discharged to Hunting Creek in accordance with permit criteria.

From 1-7-93 through 2-3-93, during the recent series of exceptionally heavy and prolonged rain fall events (see attached rainfall record), the volume of underdrain flow exceeded the capacity of the pumpback systems. The underdrain flow which bypassed the collection and pumpback system during storm events entered into the sediment ponds where it was mixed with surface runoff and subsequently discharged to Hunting Creek (see attached data sheets).

Two technical exceedances were noted on 1-7-93. The pH exceeded the 0.5 allowable incremental increase between receiving stream stations, however, a pH of 8.1 was recorded (during sampling) in Hunting Creek immediately upstream of the confluence with Pond 7 discharge indicating the observed change was not due to discharge waters. The TSS value for station 003, reported as 35 mg/l, exceeded the allowable daily maximum of 30 mg/l. This exceedance had no impact on Hunting Creek with upstream and downstream levels reported at 70 mg/l and 50 mg/l respectively. The reported effluent nickel level had no impact on receiving waters.

The nickel observed in discharge waters on 1-13-93 had no impact on receiving waters with an observed incremental increase of

Homestake Mining Co., McLaughlin Mine
26775 Morgan Valley Road
Telephone (707) 995-6070

25% between stream stations. This is less than the criteria of 10% plus allowable laboratory error, or 70%, at the reported levels.

Three technical exceedances were noted on 1-20-93. The effluent TSS level of 62 mg/l exceeded the allowable daily maximum of 30 mg/l, however, the impact to Hunting Creek was negligible with TSS levels reported as 1100 mg/l at the upstream station and 1700 mg/l at the downstream station. Calculated incremental increases for mercury and zinc in receiving waters were 40% and 34% respectively, both of which are above the 30% allowable at the reported levels. It should be noted that mercury and zinc levels in discharge waters were within allowable limits and well below values observed in Hunting Creek. Nickel levels in receiving waters showed an incremental increase on 26% which is less than the 10% plus allowable laboratory error (or 30% in this instance). Values for this data set reflect high flow conditions observed during sampling as confirmed by TSS levels.

The incremental increase in nickel levels reported for 1-28-93 and 2-3-93 exceeded receiving water permit criteria.

Review of preliminary data for 2-10-93 indicates that both effluent and receiving waters are back in compliance for all constituents. We will forward the data as soon as it is finalized.

Although the concentrations involved in the measured exceedances are extremely low, Homestake has undertaken a program to immediately upgrade the capacity of the waste rock disposal facility pumpback systems in order to prevent any such future occurrences. Recent installation of a booster pump has increased pumping capacity from 240 GPM to 360 GPM. The system will be further upgraded to a pumping capacity of approximately 600 GPM.

In addition, we are now engineering measures to improve the interception of the underdrain flows. These additional measures will be implemented over the summer with work initiated as soon as construction conditions allow.

If we can provide any further information regarding this matter, please let us know.

Sincerely,

Dolora M. Koontz

Dolora M. Koontz
ENVIRONMENTAL ENGINEER

Attachments

xc: R. Krauss

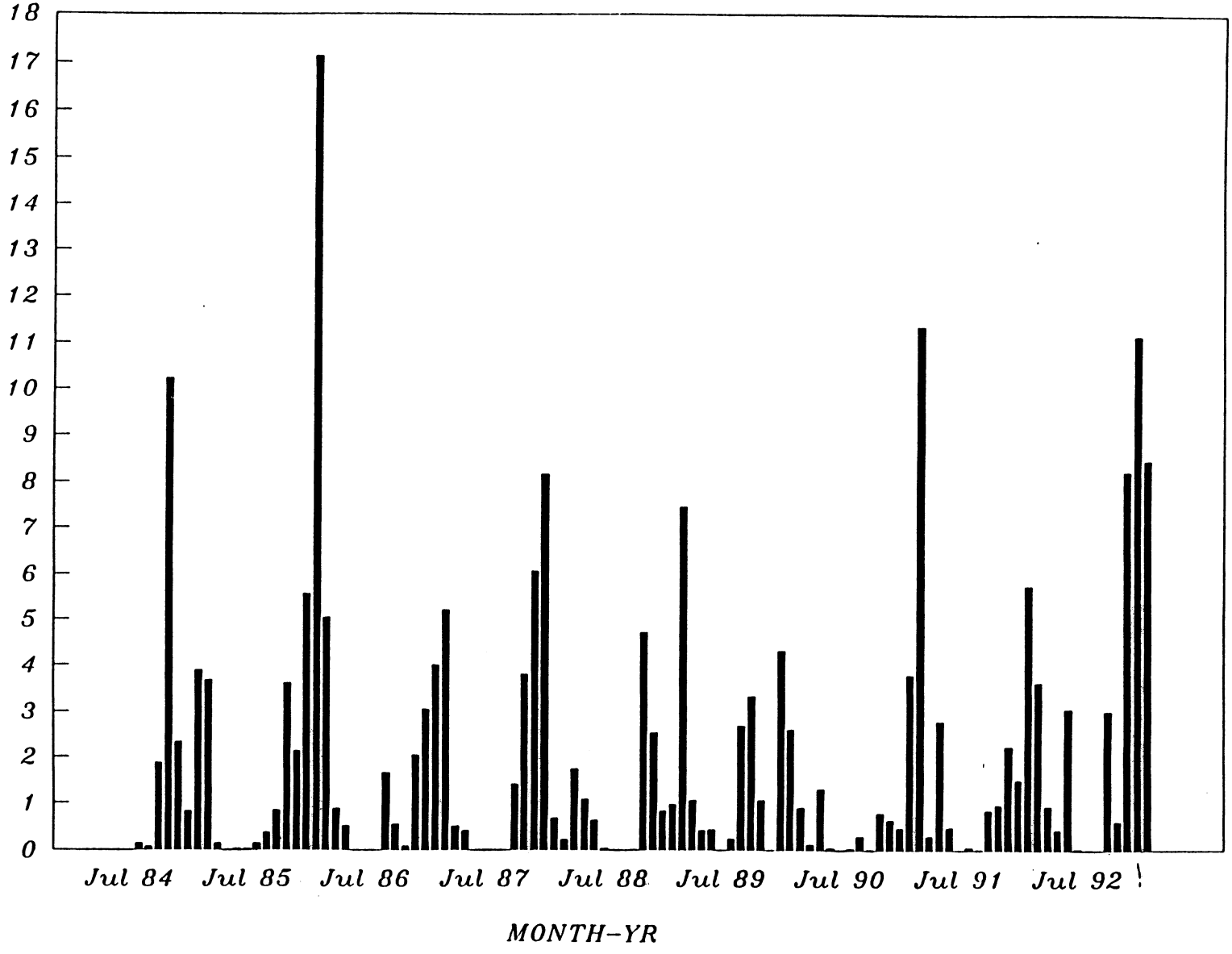
RAINFALL AT DAVIS CREEK IN INCHES

SEASON	7/84-6/85	7/85-6/86	7/86-6/87	7/87-6/88	7/88-6/89
JULY	0.00	0.02	0.00	0.00	0.04
AUGUST	0.15	0.15	0.00	0.00	0.00
SEPTEMBER	0.08	0.38	1.66	0.00	0.00
OCTOBER	1.88	0.84	0.55	1.41	0.01
NOVEMBER	10.22	3.61	0.09	3.80	4.73
DECEMBER	2.32	2.14	2.05	6.07	2.54
JANUARY	0.83	5.55	3.05	8.16	0.83
FEBRUARY	3.88	17.13	4.00	0.68	0.98
MARCH	3.68	5.03	5.20	0.24	7.47
APRIL	0.15	0.87	0.51	1.75	1.07
MAY	0.00	0.51	0.41	1.09	0.42
JUNE	0.03	0.00	0.00	0.63	0.43
TOTALS	23.22	36.23	17.52	23.83	18.52

SEASON	7/89-6/90	7/90-6/91	7/91-6/92	7/92-6/93	MEAN
JULY	0.00	0.00	0.00	0.02	0.01
AUGUST	0.25	0.04	0.06	0.00	0.07
SEPTEMBER	2.69	0.28	0.01	0.00	0.57
OCTOBER	3.33	0.01	0.84	3.01	1.32
NOVEMBER	1.06	0.77	0.96	0.61	2.87
DECEMBER	0.00	0.64	2.23	8.22	2.91
JANUARY	4.32	0.47	1.52	11.14	3.99
FEBRUARY	2.60	3.78	5.74	8.46	5.91
MARCH	0.89	11.32	3.63		4.68
APRIL	0.13	0.30	0.93		0.71
MAY	1.30	2.77	0.43		0.87
JUNE	0.05	0.48	3.05		0.58
TOTALS	16.62	20.86	19.40	31.45	23.07

RAINFALL AT DAVIS CREEK RESERVOIR

1984–1993



MCLAUGHLIN MINE WATER QUALITY MANAGEMENT PROGRAM - SURFACE-
WATER QUALITY DATA FOR MONTH(S) SHOWN BELOW UNDER "DATE."
PART 1 OF 4. (Notes: 00.000 = no measurement NOWTR = dry
INACS = inaccessible NOLVL = dry R = replicate.)

STATION	DATE (yy.mm. dd)	TIME (hours)	TYPE	SAMPLER (Initials or NOWTR or INACS)	FLOW (gpm)	TEMP (Cel)	SPEC COND (umhos /cm)	DISSOL VED OXYGEN (mg/l)	pH (Field) (s.u.)	pH (Lab) (s.u.)	ACIDITY (mg/l)	ALKALIN- ITY (mg/l)	HARDNESS (mg/l)	TDS (mg/l)	TSS (mg/l)	TURBID- ITY (NTU)	CHEMICAL OXYGEN DEMAND (mg/l)	MBAS (mg/l)	CHLOR- IDE (mg/l)	CYANIDE TOTAL (mg/l)	CYANIDE FREE (mg/l)	THIO- CYANATE (mg/l)	LABORATORY ID NUMBER
003	93,02,03	11:17	SURFACE WATER TM,		39	8.6	1050	12.0	7.10	0.00	0.00	110.00	0.00	0.00	4.90	0.00	0.00	0.000	23.000	0.0000	0.0000	0.0000	15052.60
003	93,01,28	09:21	SURFACE WATER TM		360	7.9	800	14.8	7.10	0.00	0.00	95.00	0.00	0.00	8.40	0.00	0.00	0.000	14.000	0.0000	0.0000	0.0000	14992.20
003	93,01,20	12:08	SURFACE WATER TM		767	9.0	700	10.4	8.00	0.00	0.00	120.00	0.00	0.00	62.00	0.00	0.00	0.000	11.000	0.0000	0.0000	0.0000	14946.40
003	93,01,13	14:24	SURFACE WATER TM		84	6.9	340	13.2	8.30	0.00	0.00	83.00	0.00	0.00	28.00	0.00	0.00	0.000	6.400	0.0000	0.0000	0.0000	14905.60
003	93,01,07	10:23	SURFACE WATER TM		78	6.7	315	15.0	8.00	0.00	0.00	82.00	0.00	0.00	35.00	0.00	0.00	0.000	6.700	0.0000	0.0000	0.0000	14864.80
MC-05R	93,02,03	10:51	SURFACE WATER TM		2105	8.4	480	11.8	8.30	0.00	0.00	310.00	0.00	0.00	0.99	0.00	0.00	0.000	9.700	0.0000	0.0000	0.0000	15052.50
MC-05R	93,01,29	09:02	SURFACE WATER TM		3468	6.9	370	14.0	8.40	0.00	0.00	330.00	0.00	0.00	5.60	0.00	0.00	0.000	8.100	0.0000	0.0000	0.0000	14992.30
MC-05R	93,01,20	11:38	SURFACE WATER TM		101034	9.6	80	12.0	8.10	0.00	0.00	42.00	0.00	0.00	1100.00	0.00	0.00	0.000	0.999	0.0000	0.0000	0.0000	14946.60
MC-05R	93,01,13	14:05	SURFACE WATER TM		36084	5.2	900	14.4	8.40	0.00	0.00	71.00	0.00	0.00	61.00	0.00	0.00	0.000	2.100	0.0000	0.0000	0.0000	14905.50
MC-05R	93,01,07	09:52	SURFACE WATER TM		36083	5.8	120	11.6	8.80	0.00	0.00	80.00	0.00	0.00	70.00	0.00	0.00	0.000	2.600	0.0000	0.0000	0.0000	14864.60
MC-10R	93,02,03	11:33	SURFACE WATER TM		2454	9.4	1000	12.4	8.50	0.00	0.00	360.00	0.00	0.00	0.99	0.00	0.00	0.000	14.000	0.0000	0.0000	0.0000	15052.70
MC-10R	93,01,28	09:43	SURFACE WATER TM		4284	8.5	690	14.4	8.00	0.00	0.00	310.00	0.00	0.00	2.20	0.00	0.00	0.000	11.000	0.0000	0.0000	0.0000	14992.40
MC-10R	93,01,20	12:30	SURFACE WATER TM		106080	8.9	100	13.2	8.10	0.00	0.00	49.00	0.00	0.00	1700.00	0.00	0.00	0.000	0.999	0.0000	0.0000	0.0000	14946.50
MC-10R	93,01,13	14:46	SURFACE WATER TM		37580	6.2	130	13.6	8.40	0.00	0.00	75.00	0.00	0.00	71.00	0.00	0.00	0.000	2.600	0.0000	0.0000	0.0000	14905.70
MC-10R	93,01,07	11:01	SURFACE WATER TM		41340	6.4	160	13.2	8.00	0.00	0.00	86.00	0.00	0.00	50.00	0.00	0.00	0.000	3.100	0.0000	0.0000	0.0000	14864.70

MCLAUGHLIN MINE WATER QUALITY MANAGEMENT PROGRAM - SURFACE-
WATER QUALITY DATA FOR MONTH(S) SHOWN BELOW UNDER "DATE."
PART 2 OF 4. (NOTES: 00.0000 = no measurement NOWTR = dry
INACS = inaccessible NOWL = dry R = replicate.)

STATION	DATE (yy.mm.dd)	SAMPLER (Initials or NOWTR or INACS)	FLUORIDE (mg/l)	NITRATE as N (mg/l)	NITRITE as N (mg/l)	AMMONIA as N (mg/l)	TKN (mg/l)	SULFATE (mg/l)	ALUMINUM TOTAL (mg/l)	ALUMINUM FILTERED (mg/l)	ANTIMONY TOTAL (mg/l)	ANTIMONY FILTERED (mg/l)	ARSENIC TOTAL (mg/l)	ARSENIC FILTERED (mg/l)	BARIUM TOTAL (mg/l)	BARIUM FILTERED (mg/l)	BERYLLIUM TOTAL (mg/l)	BERYLLIUM FILTERED (mg/l)	BORON TOTAL (mg/l)	BORON FILTERED (mg/l)	CADMIUM TOTAL (mg/l)	CADMIUM FILTERED (mg/l)	LABORATORY ID NUMBER
003	93.02.03	TM.	0.0010	1.7000	0.0000	0.0000	0.0000	1000.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.390	0.000	0.04997	0.00000	15052.60
003	93.01.28	TM	0.0000	1.2000	0.0000	0.0000	0.0000	770.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.200	0.000	0.00499	0.00000	14946.40
003	93.01.20	TM	0.0000	0.4900	0.0000	0.0000	0.0000	590.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.100	0.000	0.00499	0.00000	14905.50
003	93.01.13	TM	0.0000	0.1000	0.0000	0.0000	0.0000	220.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.099	0.000	0.00499	0.00000	14864.80
003	93.01.07	TM	0.0000	0.0900	0.0000	0.0000	0.0000	210.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.120	0.000	0.00499	0.00000	15052.50
MC-05R	93.02.03	TM	0.0000	0.0300	0.0000	0.0000	0.0000	48.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.100	0.000	0.00499	0.00000	14952.30
MC-05R	93.01.28	TM	0.0000	0.1100	0.0000	0.0000	0.0000	48.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.100	0.000	0.00499	0.00000	14946.60
MC-05R	93.01.20	TM	0.0000	0.1100	0.0000	0.0000	0.0000	9.30	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.099	0.000	0.00499	0.00000	14905.50
MC-05R	93.01.13	TM	0.0000	0.0800	0.0000	0.0000	0.0000	16.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.099	0.000	0.00499	0.00000	14864.60
MC-05R	93.01.07	TM	0.0000	0.1500	0.0000	0.0000	0.0000	21.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.150	0.000	0.00499	0.00000	15052.70
MC-10R	93.02.03	TM	0.0000	0.2000	0.0000	0.0000	0.0000	190.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.100	0.000	0.00499	0.00000	14952.40
MC-10R	93.01.28	TM	0.0000	0.2200	0.0000	0.0000	0.0000	350.00	0.000	0.000	0.000	0.000	0.00800	0.00000	0.0000	0.0000	0.0000	0.0000	0.200	0.000	0.02000	0.00000	14946.50
MC-10R	93.01.20	TM	0.0000	0.0900	0.0000	0.0000	0.0000	31.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.099	0.000	0.00499	0.00000	14905.70
MC-10R	93.01.13	TM	0.0000	0.1100	0.0000	0.0000	0.0000	35.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.099	0.000	0.00499	0.00000	14864.70
MC-10R	93.01.07	TM	0.0000	0.1400	0.0000	0.0000	0.0000	44.00	0.000	0.000	0.000	0.000	0.00499	0.00000	0.0000	0.0000	0.0000	0.0000	0.099	0.000	0.00499	0.00000	14864.70

MCLAUGHLIN MINE WATER QUALITY MANAGEMENT PROGRAM - SURFACE-
WATER QUALITY DATA FOR MONTH(S) SHOWN BELOW UNDER "DATE."
PART 3 OF 4. (NOTES: 00.0000 = no measurement NOWTR = dry
INACS = inaccessible NOLVL = dry D = replicate.)

STATION	DATE (yy,mm,dd)	SAMPLER (Initials or NOWTR or INACS)	CALCIUM TOTAL (mg/l)	CALCIUM FILTERED (mg/l)	CHROMIUM TOTAL (mg/l)	CHROMIUM FILTERED (mg/l)	COBALT TOTAL (mg/l)	COBALT FILTERED (mg/l)	COPPER TOTAL (mg/l)	COPPER FILTERED (mg/l)	IRON TOTAL (mg/l)	IRON FILTERED (mg/l)	LEAD TOTAL (mg/l)	LEAD FILTERED (mg/l)	LITHIUM TOTAL (mg/l)	LITHIUM FILTERED (mg/l)	MAGNESIUM TOTAL (mg/l)	MAGNESIUM FILTERED (mg/l)	MANGANESE TOTAL (mg/l)	MANGANESE FILTERED (mg/l)	MERCURY TOTAL (mg/l)	MERCURY FILTERED (mg/l)	LABORATORY ID NUMBER
003	93,02,03	TM,	90.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.3300	0.0000	0.0199	0.0000	0.0000	0.0000	240.0000	0.0000	0.00000	0.00000	0.000199	0.000000	15052.60
003	93,01,28	TM	63.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.4100	0.0000	0.0199	0.0000	0.0000	0.0000	180.0000	0.0000	0.00000	0.00000	0.000199	0.000000	14992.20
003	93,01,20	TM	38.00	0.00	0.06000	0.00000	0.0000	0.0000	0.0099	0.0000	3.4000	0.0000	0.0199	0.0000	0.0000	0.0000	150.0000	0.0000	0.00000	0.00000	0.000199	0.000000	14946.40
003	93,01,13	TM	14.00	0.00	0.04000	0.00000	0.0000	0.0000	0.0099	0.0000	2.7000	0.0000	0.0199	0.0000	0.0000	0.0000	57.0000	0.0000	0.00000	0.00000	0.000199	0.000000	14905.60
003	93,01,07	TM	15.00	0.00	0.05000	0.00000	0.0000	0.0000	0.0099	0.0000	3.9000	0.0000	0.0199	0.0000	0.0000	0.0000	61.0000	0.0000	0.00000	0.00000	0.000599	0.000000	14864.80
MC-05R	93,02,03	TM	35.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.1000	0.0000	0.0199	0.0000	0.0000	0.0000	85.0000	0.0000	0.00000	0.00000	0.000199	0.000000	15052.60
MC-05R	93,01,28	TM	23.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.1850	0.0000	0.0199	0.0000	0.0000	0.0000	68.0000	0.0000	0.00000	0.00000	0.000199	0.000000	14992.20
MC-05R	93,01,20	TM	11.00	0.00	0.26000	0.00000	0.0000	0.0000	0.0760	0.0000	55.0000	0.0000	0.0199	0.0000	0.0000	0.0000	55.0000	0.0000	0.00000	0.00000	0.000199	0.000000	14946.40
MC-05R	93,01,13	TM	6.90	0.00	0.02000	0.00000	0.0000	0.0000	0.0099	0.0000	5.4000	0.0000	0.0199	0.0000	0.0000	0.0000	19.0000	0.0000	0.00000	0.00000	0.000199	0.000000	14905.60
MC-05R	93,01,07	TM	7.70	0.00	0.03000	0.00000	0.0000	0.0000	0.0099	0.0000	5.0000	0.0000	0.0199	0.0000	0.0000	0.0000	23.0000	0.0000	0.00000	0.00000	0.000199	0.000000	14864.80
MC-10R	93,02,03	TM	32.00	0.00	0.02000	0.00000	0.0000	0.0000	0.0099	0.0000	0.4200	0.0000	0.0199	0.0000	0.0000	0.0000	110.0000	0.0000	0.00000	0.00000	0.000199	0.000000	15052.60
MC-10R	93,01,28	TM	37.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.4900	0.0000	0.0199	0.0000	0.0000	0.0000	130.0000	0.0000	0.00000	0.00000	0.000199	0.000000	14992.20
MC-10R	93,01,20	TM	15.00	0.00	0.36000	0.00000	0.0000	0.0000	0.0830	0.0000	70.0000	0.0000	0.0199	0.0000	0.0000	0.0000	78.0000	0.0000	0.00000	0.00000	0.000199	0.000000	14946.40
MC-10R	93,01,13	TM	8.00	0.00	0.04000	0.00000	0.0000	0.0000	0.0200	0.0000	6.0000	0.0000	0.0199	0.0000	0.0000	0.0000	23.0000	0.0000	0.00000	0.00000	0.000199	0.000000	14905.60
MC-10R	93,01,07	TM	9.00	0.00	0.04000	0.00000	0.0000	0.0000	0.0099	0.0000	5.1000	0.0000	0.0199	0.0000	0.0000	0.0000	27.0000	0.0000	0.00000	0.00000	0.000199	0.000000	14864.80

MCLAUGHLIN MINE WATER QUALITY MANAGEMENT PROGRAM - SURFACE-
WATER QUALITY DATA FOR MONTH(S) SHOWN BELOW UNDER "DATE."
PART 4 OF 4. (NOTES: 00.0000 = no measurement NOWTR = dry
INACS = inaccessible NOLVL = dry 0 = replicate.)

STATION	DATE (yy.mm. dd)	SAMPLER (Initials or NOWTR or INACS)	MOLYBDENUM TOTAL (mg/l)	MOLYBDENUM FILTERED (mg/l)	NICKEL TOTAL (mg/l)	NICKEL FILTERED (mg/l)	POTASSIUM TOTAL (mg/l)	POTASSIUM FILTERED (mg/l)	SELENIUM TOTAL (mg/l)	SELENIUM FILTERED (mg/l)	SODIUM TOTAL (mg/l)	SODIUM FILTERED (mg/l)	SILVER TOTAL (mg/l)	SILVER FILTERED (mg/l)	THALLIUM TOTAL (mg/l)	THALLIUM FILTERED (mg/l)	VANADIUM TOTAL (mg/l)	VANADIUM FILTERED (mg/l)	ZINC TOTAL (mg/l)	ZINC FILTERED (mg/l)	CATIONS (meq/l)	ANIONS (meq/l)	ION BALANCE (%)
302	93.02.23	TM.	0.0000	0.0000	1.1000	0.0000	2.300	0.000	0.00000	0.00000	15.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.1000	0.0000	25.00	24.00	105.00
303	93.01.22	TM	0.0000	0.0000	0.6500	0.0000	2.100	0.000	0.00000	0.00000	10.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0199	0.0000	17.00	19.00	92.00
304	93.01.21	TM	0.0000	0.0000	0.5200	0.0000	0.870	0.000	0.00000	0.00000	5.700	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0400	0.0000	16.00	15.00	104.00
305	93.01.13	TM	0.0000	0.0000	0.1300	0.0000	0.450	0.000	0.00000	0.00000	2.200	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0300	0.0000	5.60	6.40	89.00
307	93.01.07	TM	0.0000	0.0000	0.1300	0.0000	0.019	0.000	0.00000	0.00000	2.300	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0400	0.0000	6.10	6.20	98.00
MC-05	93.02.13	TM	0.0000	0.0000	0.0199	0.0000	0.472	0.000	0.00000	0.00000	12.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0159	0.0000	8.90	7.50	119.00
MC-05R	93.01.23	TM	0.0000	0.0000	0.0199	0.0000	1.000	0.000	0.00000	0.00000	10.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0199	0.0000	7.20	7.80	92.00
MC-05R	93.01.20	TM	0.0000	0.0000	0.0600	0.0000	3.000	0.000	0.00000	0.00000	2.700	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.1200	0.0000	0.00	0.00	0.00
MC-05R	93.01.13	TM	0.0000	0.0000	0.0700	0.0000	0.840	0.000	0.00000	0.00000	3.900	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0300	0.0000	2.30	1.80	127.00
MC-05R	93.01.07	TM	0.0000	0.0000	0.0700	0.0000	1.100	0.000	0.00000	0.00000	4.600	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0300	0.0000	2.50	2.10	119.00
MC-10R	93.02.03	TM	0.0000	0.0000	0.1000	0.0000	0.540	0.000	0.00000	0.00000	12.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0199	0.0000	11.00	12.00	96.00
MC-10R	93.01.23	TM	0.0000	0.0000	0.3900	0.0000	1.200	0.000	0.00000	0.00000	11.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0199	0.0000	13.00	14.00	92.00
MC-10R	93.01.20	TM	0.0000	0.0000	0.8600	0.0000	3.900	0.000	0.00000	0.00000	3.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.1700	0.0000	0.00	0.00	0.00
MC-10R	93.01.13	TM	0.0000	0.0000	0.0900	0.0000	0.630	0.000	0.00000	0.00000	3.900	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0400	0.0000	2.80	2.30	122.00
MC-10R	93.01.07	TM	0.0000	0.0000	0.0749	0.0000	0.199	0.000	0.00000	0.00000	4.700	0.000	0.00000	0.00000	0.0000	0.0000	0.0000	0.0000	0.0600	0.0000	3.20	2.70	118.00

File
RWQCB

HOMESTAKE

MINING COMPANY

McLAUGHLIN MINE

P.O. BOX 1010
(916) 446-1029
(916) 446-1070

LOWER LAKE, CALIFORNIA 95457

September 8, 1989

Mr. Ed Crawford
Water Quality Control Board
Central Valley Region
3443 Routier Rd.
Sacramento, CA 95827-3098

Dear Ed:

Each year at about this time, Homestake has provided the Central Valley Region with a compliance summary of the NPDES monitoring data collected throughout the year as previously reported in the quarterly monitoring reports. This letter transmittal has served to provide the Region with the summary findings of the analyses of discharge data conducted by Homestake during preparation of our Annual Environmental Monitoring Report.

Discharge point 003, from Pond 7 in the Waste Rock Sediment Control System, discharged intermittently throughout the winter season beginning in November and generally ending in March. Individual discharges occurred in September 1988 to facilitate annual inspection and maintenance.

The discharge from Pond 7 was in compliance with applicable discharge requirements for all parameters. Receiving waters were monitored at stations HC-10 and HC-05. The receiving stream data also demonstrate compliance for all parameters.

Discharge point 001, from the East Waste Rock Disposal Facility Pond, discharged in October and November 1988. The discharge was in compliance with applicable requirements for both the discharge and receiving stream.

Sincerely,

Phil Barnes

Phil Barnes
Sr. Environmental Engineer

PB:gm

cc: Ray Krauss

HOMESTAKE
MINING COMPANY
McLAUGHLIN MINE
P.O. BOX 1010
(916) 446-1029
(916) 446-1070

File: CR[illegible] CS

January 5, 1989

Mr. Ed Crawford
Central Valley Regional
Water Quality Control Board
3443 Routier Rd.
Sacramento, CA 95827-3098

Dear Ed:

This letter serves as written follow-up to our telephone conversation on December 30, 1988.

We are in the first stages of start-up for the plant expansion project which consists of parallel grinding and process circuits, and a water line to carry treated recycle water from the Mill to the grinding facility. The start-up involves testing of all new plant components followed by a period of operation to identify any modifications and fine tuning required for routine operations. It also involves calibration of process control and monitoring systems including calibration of the recycle water automatic shutdown system.

The treated recycle water line was placed in service as part of the plant start-up operations. The line had previously been tested and operated with potable water to assure proper operation. The line is inspected on approximately two-hour intervals as part of the plant start-up procedures.

At approximately 1:00 a.m. on December 30, 1988 the shift foreman inspecting the line found a malfunctioning mechanical vacuum break. The vacuum break had jammed in the open position allowing treated water to exit from the vent line into the containment ditch. The flow was estimated at approximately twenty gallons per minute. The vacuum break was immediately isolated from the line by closing a valve thus precluding further flow.

The treated recycle water is of acceptable quality as predicted during project permitting and meets drinking water standards for metals. Cyanide levels are below the limits of analytical detection.

The flow from the vent line entered the secondary containment ditch and flowed to a culvert connecting to the secondary containment pond. At some point, the culvert became plugged with sediment and a portion of the flow was diverted from the ditch and continued overland, soaking into the soil. Some amount of this treated water flowed to Hunting Creek. The flow of treated water would have been insignificant compared to the flow volumes of Hunting Creek as measured at monitoring station HC-10.

The Creek was monitored for conductance and pH near the recycle water line and also downstream at HC-10. Measurements indicated values within the range of naturally occurring concentrations at both locations. The incident was minor and of no environmental consequence as confirmed by monitoring.

We have isolated the vacuum breaks along the line, thus removing them from service, and are continuing our increased frequency of inspections during the start-up period.

Sincerely,

Raymond E. Krauss
Environmental Manager

REK:gm

cc: James Cool
Ron Parker
John Turney

September 12, 1988

Mr. Ed Crawford
Water Quality Control Board
Central Valley Region
3443 Routier Rd.
Sacramento, CA 95827-3098

Dear Ed:

Each year at about this time, Homestake has provided the Central Valley Region with a summary of the NPDES monitoring data collected throughout the year as previously reported in the quarterly monitoring reports. This letter transmittal has served to provide the Region with the summary findings of the analyses of discharge data conducted by Homestake during preparation of our Annual Environmental Monitoring Report.

Discharge point 003, from Pond 7 in the Waste Rock Sediment Control System, discharged intermittently throughout the winter season beginning in November and generally ending in February. Individual discharges occurred in July 1987 to drain the pond for annual inspection and maintenance, and again in April to discharge accumulated rainfall from late winter and early spring.

The discharge from Pond 7 was in compliance with applicable discharge requirements for all parameters. Receiving waters were monitored at stations HC-10 and HC-05. The receiving stream data demonstrate compliance for all parameters with the exception of some elevated values for nickel as discussed below. The pH of the discharge water ranged from a pH of 7.1 to 8.2 while the receiving stream pH remained within the range of natural variation (pH 7.0 and above) with recorded instream values ranging from pH 7.7 to 8.6.

A review of the receiving stream data indicate six values of elevated nickel. A review of solubility curves for nickel indicate that nickel remains soluble throughout the range of neutral or alkaline pH values up to a pH of approximately 8.8. Some metals precipitate at less alkaline pH values and trace amounts settle out with the total suspended solids material in

the pond system. It appears that nickel may remain in solution in the range of natural pH values seen in the watershed and as a result is transported in solution.

Compliance was maintained for all general chemistry parameters and for all metals with the exception as discussed above. Summary results are listed in the attached table.

Sincerely,

Phil Barnes
Sr. Environmental Engineer

PB:gm

cc: Ray Krauss

Attachment

NPDES RECEIVING WATER MONITORING
PROGRAM NO. 83-125
NPDES NO. CA0081477

NPDES REPORT

DISCHARGE POINT	DATE	PARAMETER	UNIT	EFFLUENT LEVEL (*=EXCEEDANCE)	UPSTREAM STATION	UPSTREAM LEVEL	DOWNSTREAM STATION	DOWNSTREAM LEVEL	INCREASE	ALLOWABLE INCREMENT/ LIMIT
003	88/02/09	pH:Field	unit	7.400	HC-05R	8.500	HC-10R	7.800	-0.700	+/-0.5
003	88/02/09	Nickel	mg/l	3.7000	HC-05R	0.0199	HC-10R	2.5000	2.4801	0.001990
003	88/02/02	Nickel	mg/l	3.4000	HC-05R	0.0199	HC-10R	1.9000	1.8801	0.001990
003	88/01/20	Nickel	mg/l	5.0000	HC-05R	0.0199	HC-10R	1.3000	1.2801	0.001990
003	88/01/19	pH:Field	unit	7.400	HC-05R	8.800	HC-10R	8.100	-0.700	+/-0.5
003	88/01/19	Nickel	mg/l	4.4000	HC-05R	0.0199	HC-10R	0.8300	0.8101	0.001990
003	88/01/14	Nickel	mg/l	4.4000	HC-05R	0.0200	HC-10R	2.1000	2.0800	0.002000
003	88/01/05	pH:Field	unit	7.300	HC-05R	8.500	HC-10R	7.700	-0.800	+/-0.5
003	87/12/23	Nickel	mg/l	2.3000	HC-05R	0.0200	HC-10R	1.1000	1.0800	0.002000

HOMESTAKE
MINING COMPANY

McLAUGHLIN MINE

LOWER LAKE, CALIFORNIA 95457

P.O. BOX 1010
(916) 446-1029
(916) 446-1070

June 24, 1987

Mr. Ed Crawford
State of California
Water Quality Control Board
Central Valley Region
3443 Routier
Sacramento, CA 95827-3098

Dear Ed:

Please find the enclosed data reports for discharge points 001 and 003, T-1 Pond and Pond 7 respectively for the period of January through March, 1987.

Discharge point 001 from T-1 Pond, located below the revegetated topsoil stockpile continues to operate essentially as a stock pond, discharging over the spillway during storm events. Compliance was maintained with all parameters with the exception of total suspended solids at the discharge point and for all parameters at the receiving stream. Total suspended solids levels were at times above the daily limit of 30 ppm (essentially clear water) at the discharge point as were upstream receiving waters during these periods of discharge in all but one occasion. Discharge on February 13, 1987 was measured as having 38 ppm total suspended solids, only 8 parts per million above the standard of 30 ppm, still essentially clear water, with stream values also at low levels.

Discharge 003, from Pond 7 in the waste rock area, was in compliance with discharge and receiving stream limits for all parameters for the reporting period.

Sincerely,

Phil Barnes
Environmental Engineer

PB:gm

cc: R. E. Krauss

Enclosures

McLaughlin Project

Homestake Mining Company
P. O. Box 1010
Lower Lake, CA 95457

3201 S Street
Sacramento, CA 95816
MCLAUGHLIN 19 Attention: Mr. Greg Vaughn 87,01,01 87,03,31 06 CA0081477 06/17/87

LIST of NPDES PERMIT EXCEDENCES FOR DISCHARGES

DATE	LOCATION	PARAMETER	EXCEDENCE	DAILY LIMIT
87,03,12	001	Suspended Solids	50.	30 mg/l
87,03,05	001	Suspended Solids	67.	30 mg/l
87,02,13	001	Suspended Solids	38.	30 mg/l

DISCHARGE	PARAMETER	AVERAGE LEVEL	DISCHARGE DAYS	30-DAY AVERAGE LIMIT

MCLAUGHLIN MINE WATER QUALITY MANAGEMENT PROGRAM - SURFACE-WATER QUALITY DATA FOR MONTH(S) SHOWN BELOW UNDER "DATE." PART 1 OF 4. (Notes: 00.000 = no measurement NOWTR = dry INACS = inaccessible NOLVL = dry R = replicate.)

STATION	DATE (yy,mm, dd)	TIME (hours)	TYPE	SAMPLER (Initials or NOWTR or INACS)	FLOW (gpm)	TEMP (Cel)	SPEC COND (umhos /cm)	DISSOLVED OXYGEN (mg/l)	pH (Field) (s.u.)	pH (Lab) (s.u.)	ACIDITY (mg/l)	ALKALINITY (mg/l)	HARDNESS (mg/l)	TDS (mg/l)	TSS (mg/l)	TURBIDITY (NTU)	CHEMICAL OXYGEN DEMAND (mg/l)	MBAS (mg/l)	CHLORIDE (mg/l)	CYANIDE TOTAL (mg/l)	CYANIDE FREE (mg/l)	THIOCYANATE (mg/l)	LABORATORY ID NUMBER
003	87,03,18	14:30	SURFACE WATER PMS		1200	12.0	1490	10.2	8.10	7.00	0.99	164.00	1030.00	0.99	5.00	5.00	0.00	0.000	32.000	0.0000	0.0000	0.0000	28614.01
MC-05R	87,03,18	15:10	SURFACE WATER PMS		2706	12.0	620	10.2	8.50	7.80	0.99	306.00	370.00	400.00	0.99	0.99	0.00	0.000	13.000	0.0000	0.0000	0.0000	28614.02
MC-10R	87,03,18	14:45	SURFACE WATER PMS		7620	12.5	1310	10.1	8.30	7.10	0.99	364.00	948.00	1110.00	3.00	3.30	0.00	0.000	28.000	0.0000	0.0000	0.0000	28614.03
003	87,03,13	14:30	SURFACE WATER PMS		1200	11.0	920	10.4	0.00	8.20	93.00	201.00	779.00	925.00	18.00	5.60	0.00	0.000	23.000	0.0000	0.0000	0.0000	28501.04
MC-05R	87,03,13	14:10	SURFACE WATER PMS		31573	10.0	215	10.3	8.00	8.40	9.00	120.00	186.00	207.00	20.00	19.00	0.00	0.000	3.600	0.0000	0.0000	0.0000	28501.05
MC-10R	87,03,13	15:00	SURFACE WATER PMS		38905	11.0	430	10.2	8.00	8.30	9.00	160.00	387.00	452.00	40.00	13.00	0.00	0.000	10.000	0.0000	0.0000	0.0000	28501.06
003	87,03,06	14:10	SURFACE WATER PMS		200	12.0	850	10.2	8.30	8.10	56.00	582.00	814.00	233.00	17.00	3.20	0.00	0.000	2.200	0.0000	0.0000	0.0000	28405.01
MC-05R	87,03,06	13:30	SURFACE WATER PMS		6315	12.0	270	10.1	8.10	8.20	19.00	221.00	263.00	265.00	10.00	12.00	0.00	0.000	6.100	0.0000	0.0000	0.0000	28405.02
MC-10R	87,03,06	14:20	SURFACE WATER PMS		49200	13.5	370	10.0	8.10	8.20	9.00	241.00	324.00	361.00	17.00	9.80	0.00	0.000	8.700	0.0000	0.0000	0.0000	28405.03
003	87,03,05	10:40	SURFACE WATER PMS		1200	11.0	870	10.8	8.50	8.50	0.99	336.00	839.00	999.00	15.00	5.70	0.00	0.000	24.000	0.0000	0.0000	0.0000	28387.04
MC-05R	87,03,05	11:20	SURFACE WATER PMS		541253	10.0	105	10.8	7.10	7.90	19.00	71.00	105.00	126.00	296.00	146.00	0.00	0.000	0.099	0.0000	0.0000	0.0000	28387.05
MC-10R	87,03,05	11:00	SURFACE WATER PMS		394800	10.0	145	10.8	7.20	7.80	19.00	87.00	139.00	157.00	142.00	136.00	0.00	0.000	1.000	0.0000	0.0000	0.0000	28387.06
003	87,02,23	15:00	SURFACE WATER PMS		800	9.0	780	10.9	8.40	8.40	0.99	388.00	709.00	831.00	2.00	2.00	0.00	0.000	17.000	0.0000	0.0000	0.0000	28244.02
MC-05R	87,02,23	14:35	SURFACE WATER PMS		920	9.0	450	10.8	8.50	8.50	0.99	390.00	440.00	459.00	1.00	0.99	0.00	0.000	18.000	0.0000	0.0000	0.0000	28244.01
MC-10R	87,02,23	15:20	SURFACE WATER PMS		5004	9.5	760	10.7	8.50	8.40	0.99	392.00	711.00	839.00	1.00	3.00	0.00	0.000	18.000	0.0000	0.0000	0.0000	28244.03
003	87,02,02	11:15	SURFACE WATER PMS		700	8.0	700	11.7	8.60	8.50	0.99	560.00	704.00	842.00	6.00	2.00	0.00	0.000	18.000	0.0000	0.0000	0.0000	27963.01
MC-05R	87,02,02	12:20	SURFACE WATER PMS		3007	8.5	415	11.0	8.60	8.40	0.99	369.00	423.00	489.00	21.00	8.10	0.00	0.000	12.000	0.0000	0.0000	0.0000	27963.02
MC-10R	87,02,02	11:30	SURFACE WATER PMS		4926	8.0	690	11.3	8.50	8.50	0.99	517.00	685.00	972.00	12.00	1.30	0.00	0.000	20.000	0.0000	0.0000	0.0000	27964.00
001	87,03,23	12:20	SURFACE WATER PMS		100	11.0	430	10.1	8.30	8.40	0.99	124.00	336.00	452.00	0.99	2.00	0.00	0.000	8.500	0.0000	0.0000	0.0000	28667.01
MC-07R	87,03,23	13:00	SURFACE WATER PMS		5413	10.0	240	10.4	8.20	8.30	0.99	103.00	178.00	258.00	14.00	37.00	0.00	0.000	5.600	0.0000	0.0000	0.0000	28667.03
MC-11R	87,03,23	12:40	SURFACE WATER PMS		4736	11.0	210	10.1	8.30	8.40	0.99	109.00	146.00	224.00	3.00	33.00	0.00	0.000	4.700	0.0000	0.0000	0.0000	28667.02
001	87,03,22	10:00	SURFACE WATER PMS		30	9.0	370	10.2	8.20	8.00	1.40	124.00	346.00	449.00	0.99	1.20	0.00	0.000	8.500	0.0000	0.0000	0.0000	28628.01
MC-07R	87,03,22	11:00	SURFACE WATER PMS		1368	8.0	289	11.1	8.30	8.00	1.90	146.00	254.00	346.00	2.00	6.30	0.00	0.000	10.000	0.0000	0.0000	0.0000	28628.03
MC-11R	87,03,22	10:25	SURFACE WATER PMS		674	6.0	255	11.5	8.20	8.20	0.99	166.00	228.00	295.00	1.00	3.40	0.00	0.000	9.900	0.0000	0.0000	0.0000	28628.02
001	87,03,14	11:00	SURFACE WATER PMS		75	9.5	340	10.5	7.90	8.10	4.80	113.00	300.00	377.00	0.99	7.40	0.00	0.000	8.000	0.0000	0.0000	0.0000	28516.01
MC-07R	87,03,14	12:50	SURFACE WATER PMS		7217	9.0	240	10.3	8.00	8.10	4.80	124.00	201.00	235.00	8.00	15.00	0.00	0.000	7.100	0.0000	0.0000	0.0000	28516.03
MC-11R	87,03,14	11:20	SURFACE WATER PMS		3248	9.0	180	10.2	8.10	8.20	4.80	115.00	146.00	190.00	10.00	16.00	0.00	0.000	4.200	0.0000	0.0000	0.0000	28516.02
001	87,03,13	12:00	SURFACE WATER PMS		100	10.0	370	10.4	7.80	8.10	65.00	120.00	304.00	398.00	11.00	13.00	0.00	0.000	8.200	0.0000	0.0000	0.0000	28501.01
MC-07R	87,03,13	12:25	SURFACE WATER PMS		7517	10.0	190	10.2	7.80	7.90	9.00	120.00	141.00	182.00	11.00	15.00	0.00	0.000	4.100	0.0000	0.0000	0.0000	28501.03
MC-11R	87,03,13	12:15	SURFACE WATER PMS		4210	10.0	170	10.2	7.80	8.10	28.00	140.00	125.00	162.00	4.00	11.00	0.00	0.000	4.100	0.0000	0.0000	0.0000	28501.02
001	87,03,12	11:30	SURFACE WATER PMS		600	10.0	370	10.3	7.20	7.90	9.00	100.00	336.00	460.00	30.00	30.00	0.00	0.000	9.700	0.0000	0.0000	0.0000	28490.04
MC-11R	87,03,12	12:10	SURFACE WATER PMS		42097	9.0	70	10.4	7.30	7.80	19.00	60.00	68.00	91.00	150.00	97.00	0.00	0.000	0.099	0.0000	0.0000	0.0000	28490.05
MC-07R	87,03,12	13:10	SURFACE WATER PMS		46909	10.0	85	10.2	7.40	7.80	19.00	80.00	91.00	147.00	238.00	104.00	0.00	0.000	0.510	0.0000	0.0000	0.0000	28490.06
001	87,03,11	12:00	SURFACE WATER PMS		100	10.0	430	10.4	8.10	8.10	9.00	140.00	379.00	488.00	2.00	2.40	0.00	0.000	11.000	0.0000	0.0000	0.0000	28490.01
MC-11R	87,03,11	12:20	SURFACE WATER PMS		1624	10.0	240	10.4	7.90	8.20	9.00	160.00	184.00	248.00	14.00	12.00	0.00	0.000	7.700	0.0000	0.0000	0.0000	28490.02
MC-07R	87,03,11	12:40	SURFACE WATER PMS		2923	10.0	275	10.4	7.90	8.10	9.00	80.00	213.00	323.00	8.00	23.00	0.00	0.000	8.700	0.0000	0.0000	0.0000	28490.03
001	87,03,07	12:20	SURFACE WATER PMS		40	12.0	400	9.7	8.00	7.90	9.00	80.00	344.00	449.00	16.00	1.80	0.00	0.000	10.000	0.0000	0.0000	0.0000	28405.07
MC-11R	87,03,07	12:40	SURFACE WATER PMS		842	11.0	270	10.1	7.90	8.10	9.00	201.00	218.00	276.00	2.00	1.10	0.00	0.000	12.000	0.0000	0.0000	0.0000	28405.08
MC-07R	87,03,07	13:30	SURFACE WATER PMS		842	11.0	310	10.1	7.60	8.00	9.00	120.00	243.00	333.00	2.00	1.90	0.00	0.000	12.000	0.0000	0.0000	0.0000	28405.09
001	87,03,06	12:05	SURFACE WATER PMS		150	10.0	395	10.0	8.00	7.80	19.00	100.00	344.00	454.00	10.00	3.60	0.00	0.000	9.700	0.0000	0.0000	0.0000	28405.04
MC-11R	87,03,06	12:20	SURFACE WATER PMS		1503	9.0	210	10.2	7.70	7.90	19.00	120.00	175.00	232.00	5.00	6.20	0.00	0.000	7.100	0.0000	0.0000	0.0000	28405.05
MC-07R	87,03,06	12:40	SURFACE WATER PMS		2255	10.0	255	10.2	7.60	7.80	28.00	100.00	196.00	268.00	14.00	8.60	0.00	0.000	7.700	0.0000	0.0000	0.0000	28405.06
001	87,03,05	13:15	SURFACE WATER PMS		400	9.0	325	10.3	7.10	8.10	19.00	101.00	293.00	392.00	67.00	51.00	0.00	0.000	7.700	0.0000	0.0000	0.0000	28387.01
MC-11R	87,03,05	13:40	SURFACE WATER PMS		27063	9.0	98	10.3	7.50	7.90	9.00	75.00	78.00	111.00	37.00	43.00	0.00	0.000	0.510	0.0000	0.0000	0.0000	28387.02
MC-07R	87,03,05	14:00	SURFACE WATER PMS		38489	9.0	125	10.4	7.00	7.80	9.00	63.00	103.00	154.00	109.00	71.00	0.00	0.000	1.000	0.0000	0.0000	0.0000	28387.03
001	87,02,16	12:00	SURFACE WATER PMS		150	10.0	430	10.2	7.70	8.00	1.90	120.00	360.00	523.00	1.00	1.00	0.00	0.000	11.000	0.0000	0.0000	0.0000	28149.04
MC-11R	87,02,16	12:30	SURFACE WATER PMS		1443	8.5	240	10.4	7.90	8.10	0.99	140.00	190.00	281.00	1.00	2.00	0.00	0.000	12.000	0.0000	0.0000	0.0000	28149.05

MCLAUGHLIN MINE WATER QUALITY MANAGEMENT PROGRAM - SURFACE-WATER QUALITY DATA FOR MONTH(S) SHOWN BELOW UNDER "DATE." PART 1 OF 4. (Notes: 00.000 = no measurement NOWTR = dry INACS = inaccessible NOLVL = dry R = replicate.)

STATION	DATE (yy,mm, dd)	TIME (hours)	TYPE	SAMPLER (Initials or NOWTR or INACS)	FLOW (gpm)	TEMP (Cel)	SPEC COND (uahos /cm)	DISSOL VED OXYGEN (mg/l)	pH (Field) (s.u.)	pH (Lab) (s.u.)	ACIDITY (mg/l)	ALKALIN- ITY (mg/l)	HARDNESS (mg/l)	TDS (mg/l)	TSS (mg/l)	TURBID- ITY (NTU)	CHEMICAL OXYGEN DEMAND (mg/l)	MBAS (mg/l)	CHLOR- IDE (mg/l)	CYANIDE TOTAL) (mg/l)	CYANIDE FREE (mg/l)	THIO- CYANATE (mg/l)	LABORATORY ID NUMBER
MC-07R	87,02,16	12:50	SURFACE WATER	PMS	1894	7.0	280	10.4	7.50	7.80	1.90	118.00	221.00	416.00	0.99	6.00	0.00	0.000	11.000	0.0000	0.0000	0.0000	28149.06
001	87,02,15	11:30	SURFACE WATER	PMS	250	10.0	365	10.1	8.00	7.80	2.90	116.00	360.00	520.00	1.00	3.00	0.00	0.000	12.000	0.0000	0.0000	0.0000	28149.01
MC-11R	87,02,15	12:00	SURFACE WATER	PMS	2526	9.0	175	10.3	7.60	7.90	1.90	105.00	131.00	200.00	1.00	16.00	0.00	0.000	5.600	0.0000	0.0000	0.0000	28149.02
MC-07R	87,02,15	12:30	SURFACE WATER	PMS	4150	8.5	230	10.2	7.50	7.70	1.90	87.00	178.00	295.00	5.00	28.00	0.00	0.000	6.100	0.0000	0.0000	0.0000	28149.03
001	87,02,13	08:00	SURFACE WATER	PMS	200	10.0	342	10.2	8.40	8.50	0.99	180.00	294.00	392.00	30.00	19.00	0.00	0.000	8.700	0.0000	0.0000	0.0000	28103.01
MC-11R	87,02,13	08:20	SURFACE WATER	PMS	9021	9.0	115	10.3	7.10	8.00	3.80	66.00	93.00	127.00	1.00	16.00	0.00	0.000	2.600	0.0000	0.0000	0.0000	28103.02
MC-07R	87,02,13	09:30	SURFACE WATER	PMS	9472	9.0	140	10.4	7.30	7.90	6.70	59.00	116.00	117.00	3.00	22.00	0.00	0.000	3.100	0.0000	0.0000	0.0000	28103.03

MCLAUGHLIN MINE WATER QUALITY MANAGEMENT PROGRAM - SURFACE-WATER QUALITY DATA FOR MONTH(S) SHOWN BELOW UNDER "DATE."
PART 2 OF 4. (NOTES: 00.0000 = no measurement NOWTR = dry INACS = inaccessible NOLVL = dry R = replicate.)

STATION	DATE (yy,mm, dd)	SAMPLER (Initials or NOWTR or INACS)	FLUORIDE (mg/l)	NITRATE as N (mg/l)	NITRITE as N (mg/l)	AMMONIA as N (mg/l)	TKN (mg/l)	SULFATE (mg/l)	ALUMINUM TOTAL (mg/l)	ALUMINUM FILTERD (mg/l)	ANTIMONY TOTAL (mg/l)	ANTIMONY FILTERED (mg/l)	ARSENIC TOTAL (mg/l)	ARSENIC FILTERED (mg/l)	BARIUM TOTAL (mg/l)	BARIUM FILTERED (mg/l)	BERYLLIUM TOTAL (mg/l)	BERYLLIUM FILTERED (mg/l)	BORON TOTAL (mg/l)	BORON FILTERED (mg/l)	CADMIUM TOTAL (mg/l)	CADMIUM FILTERED (mg/l)	LABORATORY ID NUMBER
003	87,03,18	PMS	0.0000	0.3500	0.0000	0.0499	0.0000	900.00	0.170	0.000	0.099	0.000	0.00499	0.00000	0.0499	0.0000	0.0499	0.0000	0.680	0.000	0.00499	0.00000	28614.01
MC-05R	87,03,18	PMS	0.0000	0.0199	0.0000	0.0499	0.0000	58.00	0.099	0.000	0.099	0.000	0.00499	0.00000	0.0499	0.0000	0.0499	0.0000	0.310	0.000	0.00999	0.00000	28614.02
MC-10R	87,03,18	PMS	0.0000	0.2100	0.0000	0.0499	0.0000	490.00	0.100	0.000	0.099	0.000	0.00499	0.00000	0.0499	0.0000	0.0499	0.0000	0.570	0.000	0.00499	0.00000	28614.03
003	87,03,13	PMS	0.0000	0.0380	0.0000	0.0499	0.0000	500.00	0.950	0.000	0.099	0.000	0.00499	0.00000	0.0499	0.0000	0.0499	0.0000	0.300	0.000	0.00499	0.00000	28501.04
MC-05R	87,03,13	PMS	0.0000	0.0370	0.0000	0.0499	0.0000	36.00	0.820	0.000	0.099	0.000	0.00499	0.00000	0.0499	0.0000	0.0499	0.0000	0.110	0.000	0.00499	0.00000	28501.05
MC-10R	87,03,13	PMS	0.0000	0.0280	0.0000	0.0499	0.0000	193.00	0.850	0.000	0.099	0.000	0.00499	0.00000	0.0499	0.0000	0.0499	0.0000	0.170	0.000	0.00499	0.00000	28501.06
003	87,03,06	PMS	0.0000	0.1300	0.0000	0.0499	0.0000	440.00	1.200	0.000	0.099	0.000	0.00499	0.00000	0.0499	0.0000	0.0499	0.0000	0.290	0.000	0.00499	0.00000	28405.01
MC-05R	87,03,06	PMS	0.0000	0.0470	0.0000	0.0499	0.0000	46.00	0.850	0.000	0.099	0.000	0.00499	0.00000	0.0499	0.0000	0.0499	0.0000	0.160	0.000	0.00499	0.00000	28405.02
MC-10R	87,03,06	PMS	0.0000	0.0410	0.0000	0.0499	0.0000	92.00	0.840	0.000	0.099	0.000	0.00499	0.00000	0.0499	0.0000	0.0499	0.0000	0.180	0.000	0.00499	0.00000	28405.03
003	87,03,05	PMS	0.0000	0.1300	0.0000	0.2500	0.0000	551.00	1.200	0.000	0.099	0.000	0.00530	0.00000	0.0499	0.0000	0.0499	0.0000	0.270	0.000	0.00499	0.00000	28387.04
MC-05R	87,03,05	PMS	0.0000	0.0520	0.0000	0.2900	0.0000	19.00	1.700	0.000	0.099	0.000	0.00499	0.00000	0.0580	0.0000	0.0499	0.0000	0.099	0.000	0.00499	0.00000	28387.05
MC-10R	87,03,05	PMS	0.0000	0.0580	0.0000	0.3600	0.0000	42.00	1.900	0.000	0.099	0.000	0.00499	0.00000	0.0580	0.0000	0.0499	0.0000	0.099	0.000	0.00499	0.00000	28387.06
003	87,02,23	PMS	0.0000	0.1100	0.0000	0.2800	0.0000	320.00	1.100	0.000	0.099	0.000	0.00580	0.00000	0.0499	0.0000	0.0499	0.0000	0.200	0.000	0.00499	0.00000	28244.02
MC-05R	87,02,23	PMS	0.0000	0.0199	0.0000	0.1500	0.0000	62.00	0.720	0.000	0.099	0.000	0.00499	0.00000	0.0499	0.0000	0.0499	0.0000	0.260	0.000	0.00499	0.00000	28244.01
MC-10R	87,02,23	PMS	0.0000	0.0820	0.0000	0.3300	0.0000	240.00	1.200	0.000	0.099	0.000	0.00550	0.00000	0.0499	0.0000	0.0499	0.0000	0.220	0.000	0.00499	0.00000	28244.03
003	87,02,02	PMS	0.0000	0.0199	0.0000	0.2500	0.0000	150.00	0.099	0.000	0.099	0.000	0.00930	0.00000	0.0499	0.0000	0.0499	0.0000	0.250	0.000	0.00499	0.00000	27963.01
MC-05R	87,02,02	PMS	0.0000	0.0270	0.0000	0.2800	0.0000	50.00	0.120	0.000	0.099	0.000	0.00499	0.00000	0.0499	0.0000	0.0499	0.0000	0.270	0.000	0.00499	0.00000	27963.02
MC-10R	87,02,02	PMS	0.0000	0.0199	0.0000	0.3000	0.0000	130.00	0.099	0.000	0.099	0.000	0.00840	0.00000	0.0499	0.0000	0.0499	0.0000	0.027	0.000	0.00499	0.00000	27964.00
001	87,03,23	PMS	0.0000	0.0199	0.0000	0.0499	0.0000	170.00	0.099	0.000	0.099	0.000	0.00499	0.00000	0.0499	0.0000	0.0499	0.0000	0.460	0.000	0.00499	0.00000	28667.01
MC-07R	87,03,23	PMS	0.0000	0.0199	0.0000	0.0499	0.0000	71.00	0.830	0.000	0.099	0.000	0.00499	0.00000	0.0499	0.0000	0.0499	0.0000	0.170	0.000	0.00499	0.00000	28667.03
MC-11R	87,03,23	PMS	0.0000	0.0199	0.0000	0.0499	0.0000	41.00	0.720	0.000	0.099	0.000	0.00499	0.00000	0.0499	0.0000	0.0499	0.0000	0.120	0.000	0.00499	0.00000	28667.02
001	87,03,22	PMS	0.0000	0.0199	0.0000	0.0499	0.0000	175.00	0.099	0.000	0.099	0.000	0.00499	0.00000	0.0500	0.0000	0.0499	0.0000	0.490	0.000	0.00499	0.00000	28628.01
MC-07R	87,03,22	PMS	0.0000	0.0199	0.0000	0.0499	0.0000	87.00	0.490	0.000	0.099	0.000	0.00499	0.00000	0.0499	0.0000	0.0499	0.0000	0.210	0.000	0.00499	0.00000	28628.03
MC-11R	87,03,22	PMS	0.0000	0.0199	0.0000	0.0499	0.0000	39.00	0.290	0.000	0.099	0.000	0.00499	0.00000	0.0510	0.0000	0.0499	0.0000	0.150	0.000	0.00499	0.00000	28628.02
001	87,03,14	PMS	0.0000	0.0199	0.0000	0.0499	0.0000	197.00	0.440	0.000	0.099	0.000	0.00499	0.00000	0.0499	0.0000	0.0499	0.0000	0.360	0.000	0.00499	0.00000	28516.01
MC-07R	87,03,14	PMS	0.0000	0.0199	0.0000	0.0499	0.0000	81.00	0.570	0.000	0.099	0.000	0.00499	0.00000	0.0499	0.0000	0.0499	0.0000	0.150	0.000	0.00499	0.00000	28516.03
MC-11R	87,03,14	PMS	0.0000	0.0199	0.0000	0.0499	0.0000	41.00	0.690	0.000	0.099	0.000	0.00499	0.00000	0.0499	0.0000	0.0499	0.0000	0.099	0.000	0.00499	0.00000	28516.02
001	87,03,13	PMS	0.0000	0.0320	0.0000	0.0499	0.0000	190.00	0.570	0.000	0.099	0.000	0.00499	0.00000	0.0499	0.0000	0.0499	0.0000	0.360	0.000	0.00499	0.00000	28501.01
MC-07R	87,03,13	PMS	0.0000	0.0330	0.0000	0.0499	0.0000	50.00	0.530	0.000	0.099	0.000	0.00499	0.00000	0.0499	0.0000	0.0499	0.0000	0.099	0.000	0.00499	0.00000	28501.03
MC-11R	87,03,13	PMS	0.0000	0.0460	0.0000	0.0499	0.0000	30.00	0.540	0.000	0.099	0.000	0.00499	0.00000	0.0499	0.0000	0.0499	0.0000	0.099	0.000	0.00499	0.00000	28501.02
001	87,03,12	PMS	0.0000	0.0290	0.0000	0.0499	0.0000	220.00	0.980	0.000	0.099	0.000	0.00499	0.00000	0.0530	0.0000	0.0499	0.0000	0.390	0.000	0.00499	0.00000	28490.04
MC-11R	87,03,12	PMS	0.0000	0.0370	0.0000	0.0499	0.0000	35.00	1.800	0.000	0.099	0.000	0.00499	0.00000	0.0590	0.0000	0.0499	0.0000	0.099	0.000	0.00499	0.00000	28490.05
MC-07R	87,03,12	PMS	0.0000	0.0430	0.0000	0.0499	0.0000	47.00	2.100	0.000	0.099	0.000	0.00499	0.00000	0.0670	0.0000	0.0499	0.0000	0.099	0.000	0.00499	0.00000	28490.06
001	87,03,11	PMS	0.0000	0.0490	0.0000	0.0499	0.0000	230.00	0.450	0.000	0.099	0.000	0.00499	0.00000	0.0540	0.0000	0.0499	0.0000	0.460	0.000	0.00499	0.00000	28490.01
MC-11R	87,03,11	PMS	0.0000	0.0340	0.0000	0.0499	0.0000	52.00	0.670	0.000	0.099	0.000	0.00499	0.00000	0.0499	0.0000	0.0499	0.0000	0.100	0.000	0.00499	0.00000	28490.02
MC-07R	87,03,11	PMS	0.0000	0.0390	0.0000	0.0499	0.0000	100.00	0.800	0.000	0.099	0.000	0.00499	0.00000	0.0499	0.0000	0.0499	0.0000	0.150	0.000	0.00499	0.00000	28490.03
001	87,03,07	PMS	0.0000	0.0300	0.0000	0.0499	0.0000	220.00	0.510	0.000	0.099	0.000	0.00499	0.00000	0.0570	0.0000	0.0499	0.0000	0.450	0.000	0.00499	0.00000	28405.07
MC-11R	87,03,07	PMS	0.0000	0.0340	0.0000	0.0499	0.0000	58.00	0.380	0.000	0.099	0.000	0.00499	0.00000	0.0540	0.0000	0.0499	0.0000	0.120	0.000	0.00499	0.00000	28405.08
MC-07R	87,03,07	PMS	0.0000	0.0520	0.0000	0.0499	0.0000	100.00	0.440	0.000	0.099	0.000	0.00499	0.00000	0.0499	0.0000	0.0499	0.0000	0.150	0.000	0.00499	0.00000	28405.09
001	87,03,06	PMS	0.0000	0.0420	0.0000	0.0499	0.0000	230.00	0.590	0.000	0.099	0.000	0.00499	0.00000	0.0520	0.0000	0.0499	0.0000	0.430	0.000	0.00499	0.00000	28405.04
MC-11R	87,03,06	PMS	0.0000	0.0380	0.0000	0.0499	0.0000	47.00	0.660	0.000	0.099	0.000	0.00499	0.00000	0.0499	0.0000	0.0499	0.0000	0.110	0.000	0.00499	0.00000	28405.05
MC-07R	87,03,06	PMS	0.0000	0.0400	0.0000	0.0499	0.0000	82.00	0.630	0.000	0.099	0.000	0.00499	0.00000	0.0499	0.0000	0.0499	0.0000	0.140	0.000	0.00499	0.00000	28405.06
001	87,03,05	PMS	0.0000	0.0510	0.0000	0.1700	0.0000	200.00	1.200	0.000	0.099	0.000	0.00499	0.00000	0.0499	0.0000	0.0499	0.0000	0.350	0.000	0.00499	0.00000	28387.01
MC-11R	87,03,05	PMS	0.0000	0.0550	0.0000	0.2800	0.0000	30.00	0.960	0.000	0.099	0.000	0.00499	0.00000	0.0499	0.0000	0.0499	0.0000	0.099	0.000	0.00499	0.00000	28387.02
MC-07R	87,03,05	PMS	0.0000	0.0620	0.0000	0.2500	0.0000	40.00	1.200	0.000	0.099	0.000	0.00499	0.00000	0.0499	0.0000	0.0499	0.0000	0.099	0.000	0.00499	0.00000	28387.03
001	87,02,16	PMS	0.0000	0.0340	0.0000	0.3300	0.0000	250.00	0.370	0.000	0.099	0.000	0.00499	0.00000	0.0600	0.0000	0.0499	0.0000	0.480	0.000	0.00499	0.00000	28149.04
MC-11R	87,02,16	PMS	0.0000	0.0930	0.0000	0.4100	0.0000	60.00	0.300	0.000	0.099	0.000	0.00499	0.00000	0.0499	0.0000	0.0499	0.0000	0.099	0.000	0.00499	0.00000	28149.05

MCLAUGHLIN MINE WATER QUALITY MANAGEMENT PROGRAM - SURFACE-WATER QUALITY DATA FOR MONTH(S) SHOWN BELOW UNDER "DATE."
PART 2 OF 4. (NOTES: 00.0000 = no measurement NOWTR = dry INACS = inaccessible NOLVL = dry R = replicate.)

STATION	DATE (yy,mm, dd)	SAMPLER (Initials or NOWTR or INACS)	FLUORIDE (mg/l)	NITRATE as N (mg/l)	NITRITE as N (mg/l)	AMMONIA as N (mg/l)	TKN (mg/l)	SULFATE (mg/l)	ALUMINUM TOTAL (mg/l)	ALUMINUM FILTERED (mg/l)	ANTIMONY TOTAL (mg/l)	ANTIMONY FILTERED (mg/l)	ARSENIC TOTAL (mg/l)	ARSENIC FILTERED (mg/l)	BARIUM TOTAL (mg/l)	BARIUM FILTERED (mg/l)	BERYLLIUM TOTAL (mg/l)	BERYLLIUM FILTERED (mg/l)	BORON TOTAL (mg/l)	BORON FILTERED (mg/l)	CADMIUM TOTAL (mg/l)	CADMIUM FILTERED (mg/l)	LABORATORY ID NUMBER
HC-07R	87,02,16	PMS	0.0000	0.1200	0.0000	0.3700	0.0000	110.00	0.450	0.000	0.099	0.000	0.00499	0.00000	0.0499	0.0000	0.0499	0.0000	0.140	0.000	0.00499	0.00000	28149.06
001	87,02,15	PMS	0.0000	0.0670	0.0000	0.3500	0.0000	230.00	0.460	0.000	0.099	0.000	0.00499	0.00000	0.0520	0.0000	0.0499	0.0000	0.470	0.000	0.00499	0.00000	28149.01
HC-11R	87,02,15	PMS	0.0000	0.1200	0.0000	0.2800	0.0000	42.00	0.570	0.000	0.099	0.000	0.00499	0.00000	0.0499	0.0000	0.0499	0.0000	0.099	0.000	0.00499	0.00000	28149.02
HC-07R	87,02,15	PMS	0.0000	0.1400	0.0000	0.4100	0.0000	100.00	0.810	0.000	0.099	0.000	0.00499	0.00000	0.0499	0.0000	0.0499	0.0000	0.140	0.000	0.00499	0.00000	28149.03
001	87,02,13	PMS	0.0000	0.0199	0.0000	0.0499	0.0000	164.00	0.470	0.000	0.099	0.000	0.00499	0.00000	0.0520	0.0000	0.0499	0.0000	0.430	0.000	0.00499	0.00000	28103.01
HC-11R	87,02,13	PMS	0.0000	0.1800	0.0000	0.2300	0.0000	31.00	0.710	0.000	0.099	0.000	0.00499	0.00000	0.0499	0.0000	0.0499	0.0000	0.099	0.000	0.00499	0.00000	28103.02
HC-07R	87,02,13	PMS	0.0000	0.0199	0.0000	0.2700	0.0000	60.00	1.000	0.000	0.099	0.000	0.00499	0.00000	0.0499	0.0000	0.0499	0.0000	0.120	0.000	0.00499	0.00000	28103.03

MCLAUGHLIN MINE WATER QUALITY MANAGEMENT PROGRAM - SURFACE-WATER QUALITY DATA FOR MONTH(S) SHOWN BELOW UNDER "DATE."
PART 3 OF 4. (NOTES: 00.0000 = no measurement NOWTR = dry INACS = inaccessible NOLVL = dry R = replicate.)

STATION	DATE (yy,mm dd)	SAMPLER (Initials or NOWTR or INACS)	CALCIUM TOTAL (mg/l)	CALCIUM FILTERED (mg/l)	CHROMIUM TOTAL (mg/l)	CHROMIUM FILTERED (mg/l)	COBALT TOTAL (mg/l)	COBALT FILTERED (mg/l)	COPPER TOTAL (mg/l)	COPPER FILTERED (mg/l)	IRON TOTAL (mg/l)	IRON FILTERED (mg/l)	LEAD TOTAL (mg/l)	LEAD FILTERED (mg/l)	LITHIUM TOTAL (mg/l)	LITHIUM FILTERED (mg/l)	MAGNESIUM TOTAL (mg/l)	MAGNESIUM FILTERED (mg/l)	MANGANESE TOTAL (mg/l)	MANGANESE FILTERED (mg/l)	MERCURY TOTAL (mg/l)	MERCURY FILTERED (mg/l)	LABORATORY ID NUMBER
003	87,03,18	PMS	84.00	0.00	0.02500	0.00000	0.0000	0.0000	0.0099	0.0000	0.3300	0.0000	0.0199	0.0000	0.0000	0.0000	199.0000	0.0000	1.80000	0.00000	0.000199	0.000000	28614.01
MC-05R	87,03,18	PMS	23.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.0290	0.0000	0.0199	0.0000	0.0000	0.0000	76.0000	0.0000	0.01999	0.00000	0.000199	0.000000	28614.02
MC-10R	87,03,18	PMS	66.00	0.00	0.02200	0.00000	0.0000	0.0000	0.0099	0.0000	0.1800	0.0000	0.0199	0.0000	0.0000	0.0000	166.0000	0.0000	1.20000	0.00000	0.000199	0.000000	28614.03
003	87,03,13	PMS	58.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.4100	0.0000	0.0199	0.0000	0.0000	0.0000	154.0000	0.0000	0.64000	0.00000	0.000199	0.000000	28501.04
MC-05R	87,03,13	PMS	15.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.7400	0.0000	0.0199	0.0000	0.0000	0.0000	36.0000	0.0000	0.02000	0.00000	0.000199	0.000000	28501.05
MC-10R	87,03,13	PMS	28.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.5800	0.0000	0.0199	0.0000	0.0000	0.0000	77.0000	0.0000	0.21000	0.00000	0.000199	0.000000	28501.06
003	87,03,06	PMS	54.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.2400	0.0000	0.0199	0.0000	0.0000	0.0000	165.0000	0.0000	0.35000	0.00000	0.000199	0.000000	28405.01
MC-05R	87,03,06	PMS	18.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.5200	0.0000	0.0199	0.0000	0.0000	0.0000	48.0000	0.0000	0.01999	0.00000	0.000199	0.000000	28405.02
MC-10R	87,03,06	PMS	21.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.4100	0.0000	0.0199	0.0000	0.0000	0.0000	66.0000	0.0000	0.04600	0.00000	0.000199	0.000000	28405.03
003	87,03,05	PMS	54.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.1300	0.0000	0.0199	0.0000	0.0000	0.0000	171.0000	0.0000	0.37000	0.00000	0.000199	0.000000	28387.04
MC-05R	87,03,05	PMS	9.20	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	2.0000	0.0000	0.0199	0.0000	0.0000	0.0000	20.0000	0.0000	0.18000	0.00000	0.000520	0.000000	28387.05
MC-10R	87,03,05	PMS	11.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	2.2000	0.0000	0.0199	0.0000	0.0000	0.0000	27.0000	0.0000	0.20000	0.00000	0.000670	0.000000	28387.06
003	87,02,23	PMS	40.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.0099	0.0000	0.0199	0.0000	0.0000	0.0000	148.0000	0.0000	0.05400	0.00000	0.000199	0.000000	28244.02
MC-05R	87,02,23	PMS	23.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.0099	0.0000	0.0199	0.0000	0.0000	0.0000	93.0000	0.0000	0.01999	0.00000	0.000199	0.000000	28244.01
MC-10R	87,02,23	PMS	39.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.1500	0.0000	0.0199	0.0000	0.0000	0.0000	149.0000	0.0000	0.07000	0.00000	0.000310	0.000000	28244.03
003	87,02,02	PMS	28.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.0520	0.0000	0.0199	0.0000	0.0000	0.0000	154.0000	0.0000	0.01999	0.00000	0.000199	0.000000	27963.01
MC-05R	87,02,02	PMS	18.00	0.00	0.00199	0.00000	0.0000	0.0000	0.0099	0.0000	0.2700	0.0000	0.0199	0.0000	0.0000	0.0000	92.0000	0.0000	0.05300	0.00000	0.000199	0.000000	27963.02
MC-10R	87,02,02	PMS	27.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.0880	0.0000	0.0199	0.0000	0.0000	0.0000	150.0000	0.0000	0.03400	0.00000	0.000199	0.000000	27964.00
001	87,03,23	PMS	47.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.0940	0.0000	0.0199	0.0000	0.0000	0.0000	53.0000	0.0000	0.01999	0.00000	0.000199	0.000000	28667.01
MC-07R	87,03,23	PMS	30.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.7300	0.0000	0.0199	0.0000	0.0000	0.0000	25.0000	0.0000	0.02900	0.00000	0.000199	0.000000	28667.03
MC-11R	87,03,23	PMS	24.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.6400	0.0000	0.0199	0.0000	0.0000	0.0000	21.0000	0.0000	0.02200	0.00000	0.000199	0.000000	28667.02
001	87,03,22	PMS	48.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.0910	0.0000	0.0199	0.0000	0.0000	0.0000	55.0000	0.0000	0.01999	0.00000	0.000199	0.000000	28628.01
MC-07R	87,03,22	PMS	44.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.3600	0.0000	0.0199	0.0000	0.0000	0.0000	35.0000	0.0000	0.01999	0.00000	0.000199	0.000000	28628.03
MC-11R	87,03,22	PMS	37.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.2000	0.0000	0.0199	0.0000	0.0000	0.0000	33.0000	0.0000	0.01999	0.00000	0.000199	0.000000	28628.02
001	87,03,14	PMS	41.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.2500	0.0000	0.0199	0.0000	0.0000	0.0000	48.0000	0.0000	0.01999	0.00000	0.000199	0.000000	28516.01
MC-07R	87,03,14	PMS	36.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.4600	0.0000	0.0199	0.0000	0.0000	0.0000	27.0000	0.0000	0.02100	0.00000	0.000410	0.000000	28516.03
MC-11R	87,03,14	PMS	24.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.5500	0.0000	0.0199	0.0000	0.0000	0.0000	21.0000	0.0000	0.01999	0.00000	0.000199	0.000000	28516.02
001	87,03,13	PMS	41.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.5100	0.0000	0.0199	0.0000	0.0000	0.0000	49.0000	0.0000	0.02200	0.00000	0.000199	0.000000	28501.01
MC-07R	87,03,13	PMS	25.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.4700	0.0000	0.0199	0.0000	0.0000	0.0000	19.0000	0.0000	0.01999	0.00000	0.000199	0.000000	28501.03
MC-11R	87,03,13	PMS	22.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.4300	0.0000	0.0199	0.0000	0.0000	0.0000	17.0000	0.0000	0.01999	0.00000	0.000199	0.000000	28501.02
001	87,03,12	PMS	44.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	1.3000	0.0000	0.0199	0.0000	0.0000	0.0000	55.0000	0.0000	0.05900	0.00000	0.000700	0.000000	28490.04
MC-07R	87,03,12	PMS	15.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	2.1000	0.0000	0.0199	0.0000	0.0000	0.0000	9.9000	0.0000	0.11000	0.00000	0.000340	0.000000	28490.05
MC-11R	87,03,12	PMS	29.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.1500	0.0000	0.0199	0.0000	0.0000	0.0000	61.0000	0.0000	0.01999	0.00000	0.000199	0.000000	28490.06
001	87,03,11	PMS	51.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	2.7000	0.0000	0.0199	0.0000	0.0000	0.0000	13.0000	0.0000	0.16000	0.00000	0.000850	0.000000	28490.01
MC-07R	87,03,11	PMS	36.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.4500	0.0000	0.0199	0.0000	0.0000	0.0000	27.0000	0.0000	0.01999	0.00000	0.000199	0.000000	28490.02
001	87,03,07	PMS	47.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.6400	0.0000	0.0199	0.0000	0.0000	0.0000	30.0000	0.0000	0.02700	0.00000	0.000199	0.000000	28490.03
MC-11R	87,03,07	PMS	36.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.1600	0.0000	0.0199	0.0000	0.0000	0.0000	55.0000	0.0000	0.01999	0.00000	0.000199	0.000000	28405.07
MC-07R	87,03,07	PMS	43.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.0960	0.0000	0.0199	0.0000	0.0000	0.0000	31.0000	0.0000	0.01999	0.00000	0.000199	0.000000	28405.08
001	87,03,06	PMS	47.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.2800	0.0000	0.0199	0.0000	0.0000	0.0000	33.0000	0.0000	0.02100	0.00000	0.000199	0.000000	28405.09
MC-11R	87,03,06	PMS	29.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.3800	0.0000	0.0199	0.0000	0.0000	0.0000	55.0000	0.0000	0.01999	0.00000	0.000199	0.000000	28405.04
MC-07R	87,03,06	PMS	34.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.4000	0.0000	0.0199	0.0000	0.0000	0.0000	25.0000	0.0000	0.01999	0.00000	0.000199	0.000000	28405.05
001	87,03,05	PMS	40.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	1.3000	0.0000	0.0199	0.0000	0.0000	0.0000	27.0000	0.0000	0.02400	0.00000	0.000630	0.000000	28405.06
MC-11R	87,03,05	PMS	13.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.9900	0.0000	0.0199	0.0000	0.0000	0.0000	47.0000	0.0000	0.04800	0.00000	0.000960	0.000000	28387.01
MC-07R	87,03,05	PMS	18.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	1.3000	0.0000	0.0199	0.0000	0.0000	0.0000	11.0000	0.0000	0.04000	0.00000	0.000199	0.000000	28387.02
001	87,02,16	PMS	47.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.1300	0.0000	0.0199	0.0000	0.0000	0.0000	59.0000	0.0000	0.07500	0.00000	0.000280	0.000000	28387.03
MC-11R	87,02,16	PMS	30.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.1600	0.0000	0.0199	0.0000	0.0000	0.0000	28.0000	0.0000	0.01999	0.00000	0.000199	0.000000	28149.04
																							28149.05

MCLAUGHLIN MINE WATER QUALITY MANAGEMENT PROGRAM - SURFACE-
WATER QUALITY DATA FOR MONTH(S) SHOWN BELOW UNDER "DATE."
PART 3 OF 4. (NOTES: 00.0000 = no measurement NOWTR = dry
INACS = inaccessible NOLVL = dry 8 = replicate.)

STATION	DATE (yy,mm dd)	SAMPLER (Initials or NOWTR or INACS)	CALCIUM TOTAL (mg/l)	CALCIUM FILTERED (mg/l)	CHROMIUM TOTAL (mg/l)	CHROMIUM FILTERED (mg/l)	COBALT TOTAL (mg/l)	COBALT FILTERED (mg/l)	COPPER TOTAL (mg/l)	COPPER FILTERED (mg/l)	IRON TOTAL (mg/l)	IRON FILTERED (mg/l)	LEAD TOTAL (mg/l)	LEAD FILTERED (mg/l)	LITHIUM TOTAL (mg/l)	LITHIUM FILTERED (mg/l)	MAGNESIUM TOTAL (mg/l)	MAGNESIUM FILTERED (mg/l)	MANGANESE TOTAL (mg/l)	MANGANESE FILTERED (mg/l)	MERCURY TOTAL (mg/l)	MERCURY FILTERED (mg/l)	LABORATORY ID NUMBER
HC-07R	87,02,16	PMS	39.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.2900	0.0000	0.0199	0.0000	0.0000	0.0000	30.0000	0.0000	0.01999	0.00000	0.000199	0.000000	28149.06
001	87,02,15	PMS	47.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.2900	0.0000	0.0199	0.0000	0.0000	0.0000	59.0000	0.0000	0.02000	0.00000	0.000199	0.000000	28149.01
HC-11R	87,02,15	PMS	21.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.5000	0.0000	0.0199	0.0000	0.0000	0.0000	19.0000	0.0000	0.01999	0.00000	0.000199	0.000000	28149.02
HC-07R	87,02,15	PMS	30.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.8600	0.0000	0.0199	0.0000	0.0000	0.0000	25.0000	0.0000	0.04500	0.00000	0.000240	0.000000	28149.03
001	87,02,13	PMS	37.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.8200	0.0000	0.0199	0.0000	0.0000	0.0000	49.0000	0.0000	0.03500	0.00000	0.000400	0.000000	28103.01
HC-11R	87,02,13	PMS	16.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	0.8500	0.0000	0.0199	0.0000	0.0000	0.0000	13.0000	0.0000	0.03000	0.00000	0.000199	0.000000	28103.02
HC-07R	87,02,13	PMS	20.00	0.00	0.01999	0.00000	0.0000	0.0000	0.0099	0.0000	1.3000	0.0000	0.0199	0.0000	0.0000	0.0000	16.0000	0.0000	0.07400	0.00000	0.000240	0.000000	28103.03

MCLAUGHLIN MINE WATER QUALITY MANAGEMENT PROGRAM - SURFACE-
WATER QUALITY DATA FOR MONTH(S) SHOWN BELOW UNDER "DATE."
PART 4 OF 4. (NOTES: 00.0000 = no measurement NOWTR = dry
INACS = inaccessible NOLVL = dry R = replicate.)

STATION	DATE (yy,mm, dd)	SAMPLER (Initials or NOWTR or INACS)	MOLYBDENUM TOTAL (mg/l)	MOLYBDENUM FILTERED (mg/l)	NICKEL TOTAL (mg/l)	NICKEL FILTERED (mg/l)	POTASSIUM TOTAL (mg/l)	POTASSIUM FILTERED (mg/l)	SELENIUM TOTAL (mg/l)	SELENIUM FILTERED (mg/l)	SODIUM TOTAL (mg/l)	SODIUM FILTERED (mg/l)	SILVER TOTAL (mg/l)	SILVER FILTERED (mg/l)	THALLIUM TOTAL (mg/l)	THALLIUM FILTERED (mg/l)	VANADIUM TOTAL (mg/l)	VANADIUM FILTERED (mg/l)	ZINC TOTAL (mg/l)	ZINC FILTERED (mg/l)	CATIONS (meq/l)	ANIONS (meq/l)	ION BALANCE (%)
003	87,03,18	PMS	0.0000	0.0000	1.4000	0.0000	0.000	0.000	0.00499	0.00000	12.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0240	0.0000	0.0440	0.0000	21.10	23.00	4.05
MC-05R	87,03,18	PMS	0.0000	0.0000	0.0199	0.0000	0.000	0.000	0.00499	0.00000	12.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0199	0.0000	0.0199	0.0000	7.92	7.69	1.01
MC-10R	87,03,18	PMS	0.0000	0.0000	0.9000	0.0000	0.000	0.000	0.00499	0.00000	12.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0220	0.0000	0.0230	0.0000	17.50	18.30	2.10
003	87,03,13	PMS	0.0000	0.0000	0.4600	0.0000	0.000	0.000	0.00499	0.00000	9.200	0.000	0.00000	0.00000	0.0000	0.0000	0.0199	0.0000	0.0199	0.0000	16.00	15.10	2.58
MC-05R	87,03,13	PMS	0.0000	0.0000	0.0199	0.0000	0.000	0.000	0.00499	0.00000	7.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0199	0.0000	0.0199	0.0000	4.01	3.25	4.85
MC-10R	87,03,13	PMS	0.0000	0.0000	0.1500	0.0000	0.000	0.000	0.00499	0.00000	7.700	0.000	0.00000	0.00000	0.0000	0.0000	0.0199	0.0000	0.0199	0.0000	8.07	7.50	2.52
003	87,03,06	PMS	0.0000	0.0000	0.3100	0.0000	0.000	0.000	0.00499	0.00000	9.700	0.000	0.00000	0.00000	0.0000	0.0000	0.0199	0.0000	0.0199	0.0000	16.70	20.90	9.73
MC-05R	87,03,06	PMS	0.0000	0.0000	0.0199	0.0000	0.000	0.000	0.00499	0.00000	8.900	0.000	0.00000	0.00000	0.0000	0.0000	0.0199	0.0000	0.0199	0.0000	5.23	5.55	1.66
MC-10R	87,03,06	PMS	0.0000	0.0000	0.0440	0.0000	0.000	0.000	0.00499	0.00000	9.300	0.000	0.00000	0.00000	0.0000	0.0000	0.0199	0.0000	0.0199	0.0000	6.88	6.98	0.48
003	87,03,05	PMS	0.0000	0.0000	0.3300	0.0000	0.000	0.000	0.00499	0.00000	10.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0199	0.0000	0.0199	0.0000	16.76	18.88	5.93
MC-05R	87,03,05	PMS	0.0000	0.0000	0.0630	0.0000	0.000	0.000	0.00499	0.00000	3.900	0.000	0.00000	0.00000	0.0000	0.0000	0.0199	0.0000	0.0199	0.0000	2.27	1.82	3.38
MC-10R	87,03,05	PMS	0.0000	0.0000	0.0770	0.0000	0.000	0.000	0.00499	0.00000	4.300	0.000	0.00000	0.00000	0.0000	0.0000	0.0199	0.0000	0.0199	0.0000	2.96	2.65	2.10
003	87,02,23	PMS	0.0000	0.0000	0.0730	0.0000	0.000	0.000	0.00499	0.00000	8.900	0.000	0.00000	0.00000	0.0000	0.0000	0.0199	0.0000	0.0199	0.0000	14.56	14.91	1.20
MC-05R	87,02,23	PMS	0.0000	0.0000	0.0199	0.0000	0.000	0.000	0.00499	0.00000	12.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0199	0.0000	0.0199	0.0000	9.32	9.60	1.47
MC-10R	87,02,23	PMS	0.0000	0.0000	0.0510	0.0000	0.000	0.000	0.00499	0.00000	10.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0199	0.0000	0.0199	0.0000	14.44	13.35	4.60
003	87,02,02	PMS	0.0000	0.0000	0.0199	0.0000	0.000	0.000	0.00499	0.00000	11.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0199	0.0000	0.0199	0.0000	14.50	14.80	0.97
MC-05R	87,02,02	PMS	0.0000	0.0000	0.0199	0.0000	0.000	0.000	0.00499	0.00000	11.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0199	0.0000	0.0199	0.0000	8.90	8.80	1.00
MC-10R	87,02,02	PMS	0.0000	0.0000	0.0260	0.0000	0.000	0.000	0.00499	0.00000	13.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0199	0.0000	0.0199	0.0000	14.00	14.00	2.40
001	87,03,23	PMS	0.0000	0.0000	0.0220	0.0000	0.000	0.000	0.00499	0.00000	17.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0199	0.0000	0.0199	0.0000	7.44	6.26	5.82
MC-07R	87,03,23	PMS	0.0000	0.0000	0.0230	0.0000	0.000	0.000	0.00499	0.00000	14.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0199	0.0000	0.0199	0.0000	4.16	3.70	2.85
MC-11R	87,03,23	PMS	0.0000	0.0000	0.0199	0.0000	0.000	0.000	0.00499	0.00000	13.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0199	0.0000	0.0199	0.0000	3.49	3.17	2.09
001	87,03,22	PMS	0.0000	0.0000	0.0199	0.0000	0.000	0.000	0.00499	0.00000	18.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0199	0.0000	0.0199	0.0000	7.70	6.36	6.52
MC-07R	87,03,22	PMS	0.0000	0.0000	0.0220	0.0000	0.000	0.000	0.00499	0.00000	21.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0199	0.0000	0.0199	0.0000	5.99	5.01	5.29
MC-11R	87,03,22	PMS	0.0000	0.0000	0.0199	0.0000	0.000	0.000	0.00499	0.00000	19.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0199	0.0000	0.0199	0.0000	5.39	4.83	5.48
001	87,03,14	PMS	0.0000	0.0000	0.0199	0.0000	0.000	0.000	0.00499	0.00000	15.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0199	0.0000	0.0199	0.0000	6.65	6.39	0.28
MC-07R	87,03,14	PMS	0.0000	0.0000	0.0199	0.0000	0.000	0.000	0.00499	0.00000	15.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0199	0.0000	0.0199	0.0000	4.67	4.37	1.74
MC-11R	87,03,14	PMS	0.0000	0.0000	0.0199	0.0000	0.000	0.000	0.00499	0.00000	12.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0199	0.0000	0.0199	0.0000	3.45	3.27	1.11
001	87,03,13	PMS	0.0000	0.0000	0.0199	0.0000	0.000	0.000	0.00499	0.00000	15.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0199	0.0000	0.0199	0.0000	6.73	6.59	0.66
MC-07R	87,03,13	PMS	0.0000	0.0000	0.0199	0.0000	0.000	0.000	0.00499	0.00000	11.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0199	0.0000	0.0199	0.0000	3.29	3.56	3.94
MC-11R	87,03,13	PMS	0.0000	0.0000	0.0199	0.0000	0.000	0.000	0.00499	0.00000	10.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0199	0.0000	0.0199	0.0000	2.93	3.54	3.79
001	87,03,12	PMS	0.0000	0.0000	0.0830	0.0000	0.000	0.000	0.00499	0.00000	16.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0199	0.0000	0.0199	0.0000	7.42	6.86	2.60
MC-11R	87,03,12	PMS	0.0000	0.0000	0.0370	0.0000	0.000	0.000	0.00499	0.00000	4.400	0.000	0.00000	0.00000	0.0000	0.0000	0.0199	0.0000	0.0199	0.0000	1.55	1.93	2.76
MC-07R	87,03,12	PMS	0.0000	0.0000	0.0450	0.0000	0.000	0.000	0.00499	0.00000	5.800	0.000	0.00000	0.00000	0.0000	0.0000	0.0199	0.0000	0.0199	0.0000	2.07	2.60	3.58
001	87,03,11	PMS	0.0000	0.0000	0.0310	0.0000	0.000	0.000	0.00499	0.00000	19.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0199	0.0000	0.0199	0.0000	8.39	7.90	2.12
MC-11R	87,03,11	PMS	0.0000	0.0000	0.0199	0.0000	0.000	0.000	0.00499	0.00000	16.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0199	0.0000	0.0199	0.0000	4.36	4.50	0.78
MC-07R	87,03,11	PMS	0.0000	0.0000	0.0199	0.0000	0.000	0.000	0.00499	0.00000	17.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0199	0.0000	0.0199	0.0000	5.00	3.93	6.41
001	87,03,07	PMS	0.0000	0.0000	0.0199	0.0000	0.000	0.000	0.00499	0.00000	17.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0199	0.0000	0.0199	0.0000	7.61	6.47	5.53
MC-11R	87,03,07	PMS	0.0000	0.0000	0.0199	0.0000	0.000	0.000	0.00499	0.00000	19.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0199	0.0000	0.0199	0.0000	5.17	5.57	2.03
MC-07R	87,03,07	PMS	0.0000	0.0000	0.0199	0.0000	0.000	0.000	0.00499	0.00000	20.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0199	0.0000	0.0199	0.0000	5.73	4.82	5.10
001	87,03,06	PMS	0.0000	0.0000	0.0250	0.0000	0.000	0.000	0.00499	0.00000	16.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0199	0.0000	0.0199	0.0000	7.57	7.07	2.30
MC-11R	87,03,06	PMS	0.0000	0.0000	0.0199	0.0000	0.000	0.000	0.00499	0.00000	15.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0199	0.0000	0.0199	0.0000	4.16	3.58	3.55
MC-07R	87,03,06	PMS	0.0000	0.0000	0.0199	0.0000	0.000	0.000	0.00499	0.00000	16.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0199	0.0000	0.0199	0.0000	4.61	3.93	4.10
001	87,03,05	PMS	0.0000	0.0000	0.0390	0.0000	0.000	0.000	0.00499	0.00000	14.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0199	0.0000	0.0199	0.0000	6.47	6.41	0.31
MC-11R	87,03,05	PMS	0.0000	0.0000	0.0199	0.0000	0.000	0.000	0.00499	0.00000	6.600	0.000	0.00000	0.00000	0.0000	0.0000	0.0199	0.0000	0.0199	0.0000	1.84	2.14	2.16
MC-07R	87,03,05	PMS	0.0000	0.0000	0.0270	0.0000	0.000	0.000	0.00499	0.00000	7.700	0.000	0.00000	0.00000	0.0000	0.0000	0.0199	0.0000	0.0199	0.0000	2.38	2.13	-1.86
001	87,02,16	PMS	0.0000	0.0000	0.0199	0.0000	0.000	0.000	0.00499	0.00000	19.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0199	0.0000	0.0199	0.0000	8.03	7.92	0.66
MC-11R	87,02,16	PMS	0.0000	0.0000	0.0199	0.0000	0.000	0.000	0.00499	0.00000	17.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0199	0.0000	0.0199	0.0000	4.54	4.39	1.63

MCLAUGHLIN MINE WATER QUALITY MANAGEMENT PROGRAM - SURFACE-
WATER QUALITY DATA FOR MONTH(S) SHOWN BELOW UNDER "DATE."
PART 4 OF 4. (NOTES: 00.0000 = no measurement MONTR = dry
INACS = inaccessible NOLVL = dry R = replicate.)

STATION	DATE (yy,mm, dd)	SAMPLER (Initials or MONTR or INACS)	MOLYBDENUM TOTAL (mg/l)	MOLYBDENUM FILTERED (mg/l)	NICKEL TOTAL (mg/l)	NICKEL FILTERED (mg/l)	POTASSIUM TOTAL (mg/l)	POTASSIUM FILTERED (mg/l)	SELENIUM TOTAL (mg/l)	SELENIUM FILTERED (mg/l)	SODIUM TOTAL (mg/l)	SODIUM FILTERED (mg/l)	SILVER TOTAL (mg/l)	SILVER FILTERED (mg/l)	THALLIUM TOTAL (mg/l)	THALLIUM FILTERED (mg/l)	VANADIUM TOTAL (mg/l)	VANADIUM FILTERED (mg/l)	ZINC TOTAL (mg/l)	ZINC FILTERED (mg/l)	CATIONS (meq/l)	ANIONS (meq/l)	ION BALANCE (%)
MC-07R	87,02,16	PMS	0.0000	0.0000	0.0199	0.0000	0.000	0.000	0.00499	0.00000	18.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0199	0.0000	0.0199	0.0000	5.20	4.97	2.24
001	87,02,15	PMS	0.0000	0.0000	0.0220	0.0000	0.000	0.000	0.00499	0.00000	19.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0199	0.0000	0.0199	0.0000	8.03	7.45	3.69
MC-11R	87,02,15	PMS	0.0000	0.0000	0.0199	0.0000	0.000	0.000	0.00499	0.00000	12.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0199	0.0000	0.0199	0.0000	3.13	3.14	0.13
MC-07R	87,02,15	PMS	0.0000	0.0000	0.0260	0.0000	0.000	0.000	0.00499	0.00000	14.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0199	0.0000	0.0199	0.0000	4.16	4.00	1.93
001	87,02,13	PMS	0.0000	0.0000	0.0210	0.0000	0.000	0.000	0.00499	0.00000	15.000	0.000	0.00000	0.00000	0.0000	0.0000	0.0199	0.0000	0.0199	0.0000	6.53	5.66	7.12
MC-11R	87,02,13	PMS	0.0000	0.0000	0.0199	0.0000	0.000	0.000	0.00499	0.00000	7.700	0.000	0.00000	0.00000	0.0000	0.0000	0.0199	0.0000	0.0199	0.0000	2.20	2.03	3.35
MC-07R	87,02,13	PMS	0.0000	0.0000	0.0400	0.0000	0.000	0.000	0.00499	0.00000	8.400	0.000	0.00000	0.00000	0.0000	0.0000	0.0199	0.0000	0.0199	0.0000	2.68	2.52	3.13

HOMESTAKE

McLAUGHLIN MINE

MINING COMPANY

P.O. BOX 1010
(916) 446-1029
(916) 446-1070

LOWER LAKE, CALIFORNIA 95457

August 12, 1986

Mr. Greg Vaughn
State of California
Regional Water Quality
Control Board
3201 S Street
Sacramento, CA 95816-7090

Dear Greg:

Please find the enclosed reports for discharge points 001 and 003, T-1 Pond and Pond 7 respectively for the period of September, 1985 through May, 1986. There was no discharge for either June or July of this year.

As per our previous discussion, I have reworked the reporting format for the data as requested to provide an upstream to downstream listing. Also enclosed are the summary reports for comparison of data to standards.

Discharge point 001 for T-1 Pond, located below the revegetated topsoil stockpile, is essentially operating as a typical stock pond, discharging over the spillway during storm periods. Compliance was maintained with all parameters with the exception of total suspended solids at the discharge point and for all parameters at the receiving stream. Total suspended solids levels were at times above the daily limit of 30 mg/l (essentially clear water) at the discharge point as were upstream receiving waters during these periods of discharge. Receiving stream standards were not exceeded.

Discharge point 003 from Pond 7 in the waste rock area was in compliance with discharge limits for all parameters with the exception of total suspended solids and four slightly elevated values for total mercury. Three of the four mercury readings were .001 mg/l above the daily allowable limit of .002 mg/l. These readings occurred during the 100 year storm in February as a result of a flushing of total suspended solids, some of which were naturally occurring cinnabar (mercury sulfide). It should be noted that cinnabar is not easily dissolved, or separated into mercury and sulfide in the environment, particularly under neutral or alkaline conditions. However, when subjected to

strong acid digestion for analytical purposes, cinnabar may be partially or completely dissolved--depending on the strength of the acid--thus showing a measurable value for mercury. Insoluble cinnabar transported as a suspended solid may then upon sampling, acid digestion, dissolution and analysis, indicate a measurable value of mercury when in actuality there is no elemental mercury present at the sampling site.

The total suspended solids values in excess of the daily limit were in conjunction with the 100 year storm event in February with the exception of two values prior to the storm and two following the storm. In all cases disharges were in compliance with the receiving stream standards for total suspended solids and all metals.

Receiving stream values were above the allowable increment for one turbidity reading and for one pH value. The turbidity reading was 2.4 NTU higher than the allowable increment while the pH value was .1 standard unit above the allowable increment. Neither of these incremental increases are considered to be significant.

Homestake is currently constructing a surface decant system for Pond 6 of the same design as is currently being utilized at Pond 7. This system should serve to minimize transport of solids from Pond 6 to Pond 7, thus minimizing suspended solids levels at discharge point 003.

Please do not hesitate to call should you have any questions or desire additional information.

Sincerely,

Phil Barnes

Phil Barnes
Environmental Engineer

PB:gm

Attachments

cc: R. E. Krauss

HOMESTAKE

MINING COMPANY

McLAUGHLIN MINE

LOWER LAKE, CALIFORNIA 95457

P.O. BOX 1010
(916) 446-1029
(916) 446-1070

May 23, 1986

Mr. Greg Vaughn
State of California
Regional Water Quality Control Board
Central Valley Region
3201 S Street
Sacramento, CA 95816-7090

RE: Final Report, Discharge of Storm Waters From M-1 Sediment Pond

Dear Greg:

This letter serves as the final report on the discharge of storm waters from M-1 Sediment Pond as previously noticed to you via telephone on February 14, 1986, and in writing with an initial report dated February 28, 1986. The initial report decribed the storm hydrology and Homestake's efforts to attenuate the resulting discharge. Also included in that transmittal were data received by telephone from the laboratory which indicated that the discharge was buffered by the natural alkalinity of the stream, resulting in metals values generally within the NPDES Daily Maximum Criteria at Homestake's property line, and below maximum recorded background levels at Station KC-7. This report is filed in addition to the initial report, but does summarize the information previously submitted.

Approximately 16.3 inches of precipitation occurred at the site from February 11 through February 20 generating approximately 400 acre feet of runoff from the M-1 drainage area. Prior to the storm the pond elevation was at 1,788 feet, providing 108 acre feet of available storage capacity of the 215 acre feet total pond volume. In addition, approximately 17 acre feet was recycled to the grinding circuit during the storm, thus providing for storage or utilization of approximately 125 acre feet.

M-1 Sediment Pond began to discharge over the spillway on February 15, 1986. Remedial measures initiated upon discharge from the pond included the addition of lime to the main pond inflow to raise the pH of incoming waters and the addition of flocculant at all points of inflow to enhance the settling of solids prior to discharge. These activities continued through the cessation of discharge on February 24, 1986. Special care was taken to assure that the barge pumps were operating at maximum capacity beginning on February 13. These pumps have operated continuously in an effort to provide additional storage capacity within the pond, removing approximately 45 acre feet of storm water from February 13 through March 9. However, sufficient freeboard to withhold runoff volumes generated by early March storms was not yet available, resulting in discharge on March 9 through March 13 and on March 15 through March 17. At the end of April there was approximately nine feet of freeboard providing 130 acre feet of available storage as a result of continued pumping efforts. Flocculation and lime addition was maintained through March 17, the last day of discharge.

As referenced in the letter of February 28, the pond operating criteria has been revised to provide for additional storage capacity in excess of the runoff volume generated by the design storm event. Mine pit development will also provide for additional emergency storage capacity of 340 acre feet by December of 1986, although use of this storage could preclude mining activities for some time.

The total volume discharged during February was approximately 275 acre feet with an additional 58 acre feet discharged as a result of March storms. Approximately 210 acre feet was retained within the pond or utilized as recycle water during the period from February 10 through March 17. Emergency storage capacity in excess of the volume discharged will be available in December, 1986, with a total emergency storage capacity of 610 acre feet available by April of 1987. This volume is in addition to the 215 acre feet provided by M-1 Pond.

Table 1 provides water quality data as compared to NPDES criteria and maximum observed background values as submitted on February 28. Table 2 presents all data collected during daily sampling of the discharge and receiving waters. As M-1 Sediment Pond is at the headwaters of Knoxville Creek, no upstream receiving water quality data is available. Therefore, the NPDES Daily Maximum Values and maximum background values noted in Knoxville Creek prior to construction were used for comparison. Stations are labeled numerically as shown on the attached map. It should be noted that values reported for metals are total concentrations, not filtered, and reflect the naturally occurring high suspended solids levels typically seen during a storm.

The data indicate that values downstream of M-1 in Knoxville Creek near Homestake's property line (Station KC-3R) were within the NPDES Daily Maximum levels for metals with the exception of mercury concentrations which were slightly elevated. Sampling Station KC-7, located three miles downstream of KC-3R, indicates values within the NPDES 30-day Average Limits and below maximum background levels recorded in Knoxville Creek at Station KC-3(Old) during 1980 through mid-1983, prior to construction activities at the site. The samples at KC-8, located one-half mile downstream of KC-7 after the confluence with drainage from Long Canyon (drainage unrelated to HMC land or HMC activity), indicate generally lower quality water than that measured at KC-7 upstream, thus indicating that water quality at KC-7 was similar to naturally occurring background levels as seen during the storm.

Also attached is a summary of the discharge as measured at point 004 compared to the applicable standards showing those values which exceeded the daily maximum or 30-day average criteria. Those parameters showing values in excess of the criteria are limited to pH, total suspended solids, arsenic, chromium, copper, mercury and zinc. While these parameters show elevated levels at the discharge point, they are within the NPDES criteria at the stream monitoring stations indicating no damage to the waters of Knoxville Creek. This is because of the natural alkalinity of the area rock and soils and the resulting natural buffering.

Also attached is a comparison of the maximum values measured at point 004 with the soluble threshold limit concentration (STLC). It should be noted that measured values are total values as compared to STLC values which refer to dissolved constituent limits, therefore biasing this comparison to the high side. In all cases the total measured is a small percentage of the STLC with the exception of nickel which is 43%, reflecting naturally elevated nickel levels in surrounding serpentine soil.

Summary and Conclusion

Excess storm waters were discharged from M-1 Sediment Pond as a result of the unprecedented precipitation in the amount of 16.3 inches occurring at the site during an eight-day period in February, 1986. All available storage capacity within M-1 Pond was utilized for retention of storm waters with additional volumes being pumped to the grinding circuit as recycle water.

Discharged waters were sampled daily and results indicate that while some parameter concentrations were in excess of maximum daily criteria at discharge point 004, those levels were rapidly buffered by the natural alkalinity

of the stream resulting in values generally within the daily maximum values at KC-3R and within the 30-day average criteria at KC-7. In fact, levels at KC-7 were generally within maximum background values observed in Knoxville Creek during baseline studies. Results indicate that no harm was done to Knoxville Creek.

Additional emergency storage capacity will be provided through pit development in an amount in excess of total volume discharged by December, 1986. This should assure no recurrence of this event.

If we can provide you with further information on this matter, please call.

Sincerely,

Phil Barnes

Phil Barnes
Environmental Engineer

PB:gm

cc: James Hickey
Brice Bledsoe
Ray Krauss

HOMESTAKE
MINING COMPANY
McLAUGHLIN MINE
P.O. BOX 1010
(916) 446-1029
(916) 446-1070
LOWER LAKE, CALIFORNIA 95457

May 31, 1985

Mr. Greg Vaughn
California Regional Water
Quality Control Board
3201 S Street
Sacramento, CA 95816

Dear Greg,

Please find the attached NPDES Self Monitoring Reports for the period of November, 1984 through February, 1985. The report consists of two sheets for each month summarizing any data that exceed permit limitations for discharge points or receiving waters. The difficulties encountered with the transfer of a data base system from a consultant to our offices has caused delays in reporting of the aforementioned data as we have discussed during the past months. The system is now operational with most of the program debugging completed and data will be forwarded to you monthly as scheduled.

Compliance with NPDES Permit levels was maintained for all parameters with the exception of several exceedances for total suspended solids and one exceedance for turbidity. A discussion of each discharge point for the reporting period is as follows:

Discharge Point 001, T-1 Pond

All discharges from point 001 were in compliance with receiving stream standards for the reporting period and with discharge point limitations for all but two days on which total suspended solids levels exceeded the daily maximum limit of 30 ppm. While total suspended solids levels exceeded permit limits for discharge points on these two occasions, discharged levels were below stream, indicating that the pond was adequately reducing suspended sediment from the topsoil stockpile area to levels below that of background concentrations in surrounding areas.

Discharge Point 002, Waste Rock Sediment Pond Overflow Spillway

This discharge point is designed to function as an overflow outlet for the upper five waste rock sediment ponds during storm events in excess of the 10-year, 24-hour design criteria. No discharges occurred at point 002 for the reporting period.

Discharge Point 003, Waste Rock Pond Number Seven Outlet

This pond is the last of the seven ponds in the waste rock sedimentation control system and functions as the discharge point for water draining from the waste rock area. The seven ponds were constructed in the summer and fall of 1984 with initial basin filling occurring during the first major precipitation events of the 1984-1985 water year. First flushing of this system and subsequent channel stabilization resulted in elevated total suspended solids levels as is anticipated following construction of such facilities. Flocculants were deployed as a settling aid and the ponds were managed to provide maximum retention time to minimize suspended particulates. Resultant discharges were in compliance with all receiving stream standards for the reporting period, with the exception of one reading indicating an increase in a downstream turbidity value in exceedance of the allowable limit. While total suspended solids levels exceeded the permit effluent limitations in some occassions, the ponds successfully retained sediment loads resulting in in-stream concentrations below those occurring in natural receiving waters in all cases.

Discharge Point 004, M-1 Pond

No discharge occurred from M-1 pond as retained water was recycled to the crushing and grinding circuit as make-up process water.

As construction of the project is now essentially complete, corresponding surface disturbances have decreased as construction crews and equipment are no longer onsite. Sediment transport will continue to decrease as channels stabilize and revegetated areas become fully established. Homestake will continue to

revegetate surface disturbances and actively manage recently revegetated areas to minimize potential erosion. The sedimentation ponds will continue to be managed to maximize retention time and to minimize suspended solids concentrations through the use of flocculants.

Sincerely,

Phil Barnes
Environmental Engineer

PB/gm

Attachments

cc: R. Krauss w/attachments

CALIFORNIA STATE WATER RESOURCES CONTROL BOARD
MONITORING REPORT

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
3201 S Street
Sacramento, CA 95816
Attention: Mr. Greg Vaugh

FACILITY NAME: McLaughlin Project
MAILING ADDRESS: Homestake Mining Company
P. O. Box 1010
Lower Lake, CA 95457

FACILITY I.D.	YEAR / MONTH FOR THIS REPORT	REPORTING PERIOD BEGINNING YEAR MO. DAY	REPORTING PERIOD ENDING YEAR MO. DAY	STATE CODE	NPDES PERMIT NUMBER	PRINTING DATE DAY MO. YEAR
5A2B200900	08 84	84 08 01	84 08 31	06	CA00B1477	09/20/84

No water discharges from any discharge point in the month of AUGUST

No excedences for discharge water locations AUGUST 1984

No excedances for recieving water locations AUGUST 1984

CALIFORNIA STATE WATER RESOURCES CONTROL BOARD

MONITORING REPORT

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
3201 S Street
Sacramento, CA 95816
Attention: Mr. Greg Vaugh

FACILITY NAME: McLaughlin Project
MAILING ADDRESS: Homestake Mining Company
P. O. Box 1010
Lower Lake, CA 95457

FACILITY I.D.	YEAR / MONTH FOR THIS REPORT	REPORTING PERIOD BEGINNING YEAR MO. DAY	REPORTING PERIOD ENDING YEAR MO. DAY	STATE CODE	NPDES PERMIT NUMBER	PRINTING DATE DAY MO. YEAR
5A2820900	09 84	84 09 01	84 09 30	04	CA0081477	10/29/84

No water discharges from any discharge point in the month of 09 84

No excedences for discharge water locations 09 84 1984

No excedences for recieving water locations 09 84 1984

DISTRIBUTION: WHITE - CENTRAL VALLEY YELLOW - EPA REGION 9 PINK - HOMESTAKE GOLDENROD - HOMESTAKE/CONSULTANT

CALIFORNIA STATE WATER RESOURCES CONTROL BOARD

MONITORING REPORT

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
3201 S Street
Sacramento, CA 95816
Attention: Mr. Greg Vaugh

FACILITY NAME: McLaughlin Project
MAILING ADDRESS: Homestake Mining Company
P. O. Box 1010
Lower Lake, CA 95457

FACILITY I.D.	YEAR / MONTH FOR THIS REPORT	REPORTING PERIOD BEGINNING YEAR MO. DAY	REPORTING PERIOD ENDING YEAR MO. DAY	STATE CODE	NPDES PERMIT NUMBER	PRINTING DATE DAY MO. YEAR
5A2B200900	10 84	84 10 01	84 10 31	06	CA0081477	01/18/8

No water discharges from any discharge point in the month of OCTOBER

~~No exceedences for discharge water locations OCTOBER 1984~~

No exceedences for recieving water locations OCTOBER 1984

DISTRIBUTION: STATE CENTRAL VALLEY YELLOW - EPA REGION 9 PINK - HOMESTAKE GO DENROD - HOMESTAKE CONSULTANT

McLaughlin Project

Homestake Mining Company
P. O. Box 1010
Lower Lake, CA 95457

3201 S Street
Sacramento, CA 95816
Attention: Mr. Greg Vaughn

SA2020900 11 04 84,11,01 84,11,30 06 CA0081477 05/13/85

NPDES RECEIVING WATER MONITORING • PROGRAM NO. 83-125 • NPDES NO. CA0081477

EXCEDENCE REPORT

DISCHARGE POINT	DATE	PARAMETER	UNIT	EFFLUENT LEVEL (*=EXCEDENCE)	UPSTREAM STATION	UPSTREAM LEVEL	DOWNSTREAM STATION	DOWNSTREAM LEVEL	INCREASE	ALLOWABLE INCREMENT/LIMIT

NO EXCEEDANCE.

McLaughlin Project

Homestake Mining Company
P. O. Box 1010
Lower Lake, CA 95457

3201 S Street
Sacramento, CA 95816
Attention: Mr. Greg Vaughn

5A286200900 11 84 04,11.01 04,11,30 06 CA0081477 05/13/85

LIST of NPDES PERMIT EXCEDENCES FOR DISCHARGES

DATE	LOCATION	PARAMETER	EXCEDENCE	DAILY LIMIT
84,11,27	003	Suspended Solids	360.	30 mg/l
84,11,27	001	Suspended Solids	38.	30 mg/l

DISCHARGE	PARAMETER	AVERAGE LEVEL	DISCHARGE DAYS	30-DAY AVERAGE LIMIT
001	Suspended Solids	38.00	1	20 mg/l
003	Suspended Solids	82.61	5	20 mg/l

McLaughlin Project

Homestake Mining Company
P. O. Box 1010
Lower Lake, CA 95457

3201 S Street
Sacramento, CA 95816
Attention: Mr. Greg Vaughn

5A0920000300 12 84 84,12,31 84,12,31 06 CA0001477 05/14/85

NPDES RECEIVING WATER MONITORING - PROGRAM NO. 83-125 - NPDES NO. CA0001477

.....EXCEDENCE REPORT.....

DISCHARGE POINT	DATE	PARAMETER	UNIT	EFFLUENT LEVEL (=EXCEDENCE)	UPSTREAM STATION	UPSTREAM LEVEL	DOWNSTREAM STATION	DOWNSTREAM LEVEL	INCREASE	ALLOWABLE INCREMENT/LIMIT
003	84,12,06	TURBIDITY	NTU	N/A	MC-05	1.200	MC-10R4	53.000	51.800	10.440000

McLaughlin Project

Homestake Mining Company
P. O. Box 1010
Lower Lake, CA 95457

3201 S Street
Sacramento, CA 95016
Attention: Mr. Greg Vaughn

5A2B200988 12 04 84,12,01 84,12,31 06 CA0001477 05/13/85

LIST of NPDES PERMIT EXCEDENCES FOR DISCHARGES

DATE	LOCATION	PARAMETER	EXCEDENCE	DAILY LIMIT
84,12,08	003	Suspended Solids	44.	30 mg/l
84,12,12	003	Suspended Solids	55.	30 mg/l
84,12,13	003	Suspended Solids	34.	30 mg/l
84,12,10	003	Suspended Solids	60.	30 mg/l

DISCHARGE	PARAMETER	AVERAGE LEVEL	DISCHARGE DAYS	30-DAY AVERAGE LIMIT

NO EXCEEDANCE FOR 30 DAY AVERAGE.

McLaughlin Project

Homestake Mining Company
P. O. Box 1310
Lower Lake, CA 95457

3201 S Street
Sacramento, CA 95816
Attention: Mr. Greg Vaughn

5A0B200900 01 05 05,01,01 05,01,31 06 CA0081477 05/14/05

NPDES RECEIVING WATER MONITORING • PROGRAM NO. 03-125 • NPDES NO. CA0081477

EXCEEDENCE REPORT

DISCHARGE POINT	DATE	PARAMETER	UNIT	EFFLUENT LEVEL (**EXCEEDENCE)	UPSTREAM STATION	UPSTREAM LEVEL	DOWNSTREAM STATION	DOWNSTREAM LEVEL	INCREASE	ALLOWABLE INCREMENT/LIMIT

NO EXCEEDANCE.

McLaughlin Project

Homestake Mining Company
P. O. Box 1010
Lower Lake, CA 95457

3201 S Street
Sacramento, CA 95816
Attention: Mr. Greg Vaughn

SACR000000 01 05 85,01,01 85,01,31 05 CA0081477 05/13/85

LIST of NPDES PERMIT EXCEEDENCES FOR DISCHARGES

DATE	LOCATION	PARAMETER	EXCEEDENCE	DAILY LIMIT

DISCHARGE	PARAMETER	AVERAGE LEVEL	DISCHARGE DAYS	30-DAY AVERAGE LIMIT

NO EXCEEDANCE.

McLaughlin Project

Homestake Mining Company
P. O. Box 1010
Lower Lake, CA 95457

3201 S Street
Sacramento, CA 95816
Attention: Mr. Greg Vaughn

5A28C00900 02 05 05.02.01 95.02.28 06 CA0001477 05/13/65

NPDES RECEIVING WATER MONITORING • PROGRAM NO. 93-125 • NPDES NO. CA0001477

EXCEEDANCE REPORT

DISCHARGE POINT	DATE	PARAMETER	UNIT	EFFLUENT LEVEL (=EXCEEDENCE)	UPSTREAM STATION	UPSTREAM LEVEL	DOWNSTREAM STATION	DOWNSTREAM LEVEL	INCREASE	ALLOWABLE INCREMENT/LIMIT

NO EXCEEDANCE.

McLaughlin Project

Homestake Mining Company
P. O. Box 1810
Lower Lake, CA 95457

3201 S Street
Sacramento, CA 95816
Attention: Mr. Greg Vaughn

5A2020000 02 05 85,02,01 85,02,28 05 CA0003477

LIST of NPDES PERMIT EXCEEDENCES FOR DISCHARGES

DATE	LOCATION	PARAMETER	EXCEEDENCE	DAILY LIMIT
85,02,06	001	Suspended Solids	81.	30 mg/l
85,02,26	003	Suspended Solids	35.	30 mg/l

DISCHARGE	PARAMETER	AVERAGE LEVEL	DISCHARGE DAYS	30 DAY AVERAGE LIMIT
003	Suspended Solids	21.66	3	20 mg/l

MONITORING REPORT

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
3201 S Street
Sacramento, CA 95816
Attention: Mr. Greg Vaughn

FACILITY NAME: Homestake Mining Company
MAILING ADDRESS: P. O. Box 1010, Lower Lake, CA 95457

FACILITY I.D.	YEAR / MONTH FOR THIS REPORT	REPORTING PERIOD BEGINNING YEAR MO. DAY	ENDING YEAR MO. DAY	STATE CODE	NPDES PERMIT NUMBER	PRINTING DATE DAY MO. YR
MCLAUGHLIN	03 85	85 03 01	85 03 31	06	CA0081477	08/30/8

LIST of NPDES PERMIT EXCEDENCES FOR DISCHARGES

DATE	LOCATION	PARAMETER	EXCEDENCE	DAILY LIMIT

DISCHARGE	PARAMETER	AVERAGE LEVEL	DISCHARGE DAYS	30-DAY AVERAGE LIMIT

NO EXCEEDANCES.

DISTRIBUTION: WHITE - CENTRAL VALLEY, YELLOW - EPA REGION 9, PINK - HOMESTAKE, GOLDENROD - HOMESTAKE / CONSULTANT

CALI IA S WA: ESO S CC DL B

MONITORING REPORT

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
3201 S Street
Sacramento, CA 95816
Attention: Mr. Greg Vaughn

FACIL... NAME: Laug Pr...

MAILING ADDRESS: Homestake Mining Company
P. O. Box 1010
Lower Lake, CA 95467

FACILITY I.D. MCLAUGHLIN

YEAR / MONTH FOR THIS REPORT: 03 85

REPORTING PERIOD: BEGINNING YEAR MO. DAY: 85,03,01 — ENDING YEAR MO. DAY: 85,03,31

STATE CODE: 06

NPDES PERMIT NUMBER: CA0081477

PRINTING DATE: DAY MO. YEA 08/30/85

NPDES RECEIVING WATER MONITORING * PROGRAM NO. 83-125 * NPDES NO. CA0081477

.....EXCEDENCE REPORT.....

DISCHARGE POINT	DATE	PARAMETER	UNIT	EFFLUENT LEVEL (*=EXCEDENCE)	UPSTREAM STATION	UPSTREAM LEVEL	DOWNSTREAM STATION	DOWNSTREAM LEVEL	INCREASE	ALLOWABLE INCREMENT/LIMIT

NO EXCEEDANCES.

DISTRIBUTION: WHITE - CENTRAL VALLEY, YELLOW - EPA, REGION 9, PINK - HOMESTAKE, GOLDENROD - HOMESTAKE / CONSULTANT

CALIFORNIA STATE WATER RESOURCES CONTROL BOARD

MONITORING REPORT

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
3201 S Street
Sacramento, CA 95816
Attention: Mr. Greg Vaughn

FACILITY NAME: McLaughlin Project
MAILING ADDRESS: Homestake Mining Company
P. O. Box 1010
Lower Lake, CA 95457

FACILITY I.D.: MCLAUGHLIN
YEAR / MONTH FOR THIS REPORT: 04 | 85
REPORTING PERIOD: BEGINNING YEAR MO. DAY: 85 | 04 | 01
ENDING YEAR MO. DAY: 85 | 04 | 30
STATE CODE: 06
NPDES PERMIT NUMBER: CA0081477
PRINTING DATE (DAY MO. YEAR): 08/30/85

LIST of NPDES PERMIT EXCEDENCES FOR DISCHARGES

DATE	LOCATION	PARAMETER	EXCEDENCE	DAILY LIMIT

DISCHARGE	PARAMETER	AVERAGE LEVEL	DISCHARGE DAYS	30-DAY AVERAGE LIMIT

NO EXCEEDANCES.

DISTRIBUTION: WHITE - CENTRAL VALLEY YELLOW - EPA REGION 9 PINK - HOMESTAKE GOLDENROD - HOMESTAKE/CONSULTANT

CALIFORNIA STATE WATER RESOURCES CONTROL BOARD
MONITORING REPORT

McLaughlin Project

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
3201 S Street
Sacramento, CA 95816
Attention: Mr. Greg Vaughn

FACILITY NAME: Homestake Mining Company
MAILING ADDRESS: P. O. Box 1010, Lower Lake, CA 95457

FACILITY I.D.: MCLAUGHLIN
YEAR / MONTH FOR THIS REPORT: 04 85
REPORTING PERIOD: BEGINNING YEAR MO. DAY 85 04 01 — ENDING YEAR MO. DAY 85 04 30
STATE CODE: 06
NPDES PERMIT NUMBER: CA0081477
PRINTING DATE: DAY MO. YEAR 08/30/85

NPDES RECEIVING WATER MONITORING * PROGRAM NO. 83-125 * NPDES NO. CA0081477

.....EXCEDENCE REPORT.....

DISCHARGE POINT	DATE	PARAMETER	UNIT	EFFLUENT LEVEL (*=EXCEDENCE)	UPSTREAM STATION	UPSTREAM LEVEL	DOWNSTREAM STATION	DOWNSTREAM LEVEL	INCREASE	ALLOWABLE INCREMENT/LIMIT

NO EXCEEDANCES.

CALIFORNIA STATE WATER RESOURCES CONTROL BOARD
MONITORING REPORT

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
3201 S Street
Sacramento, CA 95816
Attention: Mr. Greg Vaughn

FACILITY NAME: McLaughlin Project
MAILING ADDRESS: Homestake Mining Company
P. O. Box 1010
Lower Lake, CA 95457

FACILITY I.D.: MCLAUGHLIN
YEAR / MONTH FOR THIS REPORT: 05 | 85
REPORTING PERIOD: BEGINNING YEAR MO. DAY: 85 05 01 — ENDING YEAR MO. DAY: 85 05 31
STATE CODE: 06
NPDES PERMIT NUMBER: CA0001477
PRINTING DATE (DAY MO. YEAR): 09/02/85

LIST of NPDES PERMIT EXCEDENCES FOR DISCHARGES

DATE	LOCATION	PARAMETER	EXCEDENCE	DAILY LIMIT

DISCHARGE	PARAMETER	AVERAGE LEVEL	DISCHARGE DAYS	30-DAY AVERAGE LIMIT

NO DISCHARGES DURING THE MONTH OF MAY.

CALIFORNIA STATE WATER RESOURCES CONTROL BOARD

MONITORING REPORT

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
3201 S Street
Sacramento, CA 95816
Attention: Mr. Greg Vaughn

FACILITY NAME: McLaughlin Project
MAILING ADDRESS: ~~Homestake Mining Compa~~ P. O. Box 1010, Lower Lake, CA 95457

FACILITY I.D.: MCLAUGHLIN
YEAR / MONTH FOR THIS REPORT: 06 | 85

REPORTING PERIOD: BEGINNING YEAR MO. DAY: 85 06 01 | ENDING YEAR MO. DAY: 85 06 30
STATE CODE: 06
NPDES PERMIT NUMBER: CA0081477
PRINTING DATE: DAY MO. 09/02

LIST of NPDES PERMIT EXCEDENCES FOR DISCHARGES

DATE	LOCATION	PARAMETER	EXCEDENCE	DAILY LIMIT

DISCHARGE	PARAMETER	AVERAGE LEVEL	DISCHARGE DAYS	30-DAY AVERAGE LIMIT

NO DISCHARGES DURING THE MONTH OF JUNE.

State of California
DEPARTMENT OF CONSERVATION
OFFICE OF MINE RECLAMATION
MRRC-1 Page 1 (Rev. 04/94)

SURFACE MINING INSPECTION REPORT

Instructions for completing this form are on the reverse side. Attach notice(s) of violation(s) and order(s) to comply for all observed non-compliance.

I. Mine Name as Reported by Operator on Mining Operation Annual Report	CA MINE ID #
Homestake McLaughlin Mine	91 - 28 - 0003

II. SMARA Lead Agency Name (City or County only)

County of Napa

Inspector	Telephone
William L. Selleck	(707) 253 - 4417
Title	**Organization**
Planner III	Conservation, Development & Planning Dept.
Mailing Address	
1195 Third Street, Room 210	
City	**State** / **ZIP Code**
Napa	CA 94559

III. Mine Operator

Homestake Mining Company

Contact Person	Telephone
Dean Enderlin	(707) 995 - 6070
Mailing Address	
26775 Morgan Valley Road	
City	**State** / **ZIP Code**
Lower Lake	CA 95457

IV. Does the operation have:	P	NR	NO	ND	YES
An approved Reclamation Plan?					RP# U-198283 & 93544-MOD
A permit to mine?					Permit # U-198283
Approved financial assurance(s)?					Amount $ 12,596,797
Has the operator filed a Mining Operation Annual Report (form MRRC-2)?					Pending

V. Inspecting Agency Code(s):	Reason for Inspection Code(s):	BLM or USFS ID #
NRCS, BLM	RI	CA-050-82-01P
Is this operation on Federal Lands? Circle one:		**Inspection Date:**
(Yes) portion / No		April 20, 1998

DISTRIBUTION: White–Operator Green–State (by Lead Agency) Pink–Lead Agency Goldenrod–State (by Operator) Canary–BLM or USFS (if required)

94 97749

State of California
DEPARTMENT OF CONSERVATION
OFFICE OF MINE RECLAMATION
MRRC-1 Page 2 (Rev. 04/94)

SURFACE MINING INSPECTION REPORT

VI. Is the operation in compliance with provisions of the approved Reclamation Plan and Mining Permit with respect to:	OK	VN	NI	NA
Wildlife Habitat	X			
Revegetation	X			
Agricultural Land	X			
Stream Protection	X			
Tailings and Mine Waste Management	X			
Building, Structure, and Equipment Removal				X
Topsoil Salvage, Maintenance, and Redistribution	X			
Backfilling, Regrading, Slope Stability, and Recontouring	X			
Drainage, Diversion Structures, Waterways, and Erosion	X			
Other (list or explain below)				X

CA Mine ID# 91 - 28 - 0003

Weather Code(s): CR

Duration of Inspection: 3 hours

Approximate Disturbed Acreage: 800 acres

Status of Operation Code(s): A

Status of Reclamation Code(s): R

VII. Comments/Description of Violation(s) and Corrective Measure(s) Required [NOTE: please indicate if you have attached notice(s) of violation(s) and correction order(s), in lieu of description on this form]:

Comments:

(a) Continued shallow sliding on face of waste rock facility observed
(b) Woody species replanting still not initiated except on a very limited trial basis

Violations:

NONE

VIII. Number of Violations: 0	Inspector's Signature: William F Selleck	Date Signed: June 2, 1998

DISTRIBUTION: White—Operator Green—State (by Lead Agency) Pink—Lead Agency Goldenrod—State (by Operator) Canary—BLM or USFS (if required)

94 97750

State of California
DEPARTMENT OF CONSERVATION
OFFICE OF MINE RECLAMATION
MRRC-1 Page 1 of 2 (Rev. 04/97)

SURFACE MINING INSPECTION REPORT

Instructions for completing this form are on the reverse side. Attach notice(s) of violation(s) and order(s) to comply for all observed non-compliance.

I. Mine Name as Reported by Operator on Mining Operation Annual Report	CA MINE ID #
Homestake McLaughlin Mine	91 - 28 - 0003

II. SMARA Lead Agency Name (City or County only)

Yolo County Planning and Public Works Dept.

Inspector	Telephone
David Flores	(916) 666 - 8043
Title	**Organization**
Senior Planner	Planning
Mailing Address	
292 West Beamer Street	
City	**State** / **ZIP Code**
Woodland	CA 95695

III. Mine Operator

Homestake Mining Company

Contact Person	Telephone
Ray Krauss	(707) 995 - 6070
Mailing Address	
26775 Morgan Valley Road	
City	**State** / **ZIP Code**
Lower Lake	CA 95457

IV. Does the operation have:	P	NR	NO	YES
An approved Reclamation Plan?				RP# U-198283
A permit to mine?				Permit # Hmc-91
An approved financial assurance?				Amount $
Has the financial assurance undergone the required annual review?		X		Date:
Has the operator filed a Mining Operation Annual Report (form MRRC-2)?	✓			

V. Inspecting Agency Code(s):	Reason for Inspection Code(s):	BLM or USFS ID#
O	RI	
Is this operation on Federal Lands? Circle one: Yes (No)		Inspection Date: 4/20/98

DISTRIBUTION: White–Operator Green–State (by Lead Agency) Pink–Lead Agency Goldenrod–State (by Operator) Canary–BLM or USFS (if required)

97 90580

State of California
DEPARTMENT OF CONSERVATION
OFFICE OF MINE RECLAMATION
MRRC-1 Page 2 of 2 (Rev. 04/97)

SURFACE MINING INSPECTION REPORT

VI. Is the operation in compliance with provisions of the approved Reclamation Plan and Mining Permit with respect to:	OK	VN	NI	NA	CA Mine ID # 91 - 28 - 003
Wildlife Habitat	✓				Weather Code(s):
Revegetation	✓				CL
Agricultural Land	✓				Duration of Inspection:
Stream Protection	✓				
Tailings and Mine Waste Management	✓				Approximate Disturbed Acreage:
Building, Structure, and Equipment Removal	✓				
Topsoil Salvage, Maintenance, and Redistribution	✓				Status of Operation Code(s):
Backfilling, Regrading, Slope Stability, and Recontouring	✓				A
Drainage, Diversion Structures, Waterways, and Erosion	✓				Status of Reclamation Code(s):
Other (list or explain below)					R

VII. Comments/Description of Violation(s) and Corrective Measure(s) Required [NOTE: please indicate if you have attached notice(s) of violation(s) and correction order(s), in lieu of description on this form]:

NONE

VIII. Number of Violations:	Inspector's Signature:	Date Signed:
0		4/20/98

DISTRIBUTION: White–Operator Green–State (by Lead Agency) Pink–Lead Agency Goldenrod–State (by Operator) Canary–BLM or USFS (if required)

97 90880

• State of California
DEPARTMENT OF CONSERVATION
OFFICE OF MINE RECLAMATION
MRRC-1 Page 1 (Rev. 04/94)

SURFACE MINING INSPECTION REPORT

Instructions for completing this form are on the reverse side. Attach notice(s) of violation(s) and order(s) to comply for all observed non-compliance.

I. Mine Name as Reported by Operator on Mining Operation Annual Report	CA MINE ID #
McLaughlin Mine	91 - 28 - 0003

II. SMARA Lead Agency Name (City or County only)
Lake County Community Development Department

Inspector	Telephone
Andrew Peterson	(707) 263-2221

Title	Organization
Director	Community Development

Mailing Address: 255 N. Forbes St.

City	State	ZIP Code
Lakeport	CA	95453

III. Mine Operator
Homestake Mining Company

Contact Person	Telephone
Dean Enderlin	(707) 995 - 6070

Mailing Address: 26735 Morgan Valley Road

City	State	ZIP Code
Lower Lake	CA	95457

IV. Does the operation have:	P	NR	NO	ND	YES
An approved Reclamation Plan?					RP# RP 83-1
A permit to mine?					Permit # UP 83-64
Approved financial assurance(s)?					Amount $ 12,223,964
Has the operator filed a Mining Operation Annual Report (form MRRC-2)?					Yes

V. Inspecting Agency Code(s):	Reason for Inspection Code(s):	BLM or USFS ID #
BLM, AQ	RI	
Is this operation on Federal Lands? Circle one: Yes No		Inspection Date: 4/20/98

DISTRIBUTION: White–Operator Green–State (by Lead Agency) Pink–Lead Agency Goldenrod–State (by Operator) Canary–BLM or USFS (if required)

94 97749

State of California
DEPARTMENT OF CONSERVATION
OFFICE OF MINE RECLAMATION
MRRC-1 Page 2 (Rev. 04/94)

SURFACE MINING INSPECTION REPORT

VI. Is the operation in compliance with provisions of the approved Reclamation Plan and Mining Permit with respect to:	OK	VN	NI	NA	CA Mine ID# 91 - 28 - 0003
Wildlife Habitat	X				Weather Code(s):
Revegetation	X				
Agricultural Land				X	Duration of Inspection:
Stream Protection	X				4 hours
Tailings and Mine Waste Management	X				Approximate Disturbed Acreage:
Building, Structure, and Equipment Removal	X				441
Topsoil Salvage, Maintenance, and Redistribution	X				Status of Operation Code(s):
Backfilling, Regrading, Slope Stability, and Recontouring	X				A
Drainage, Diversion Structures, Waterways, and Erosion	X				Status of Reclamation Code(s):
Other (list or explain below)					R

VII. Comments/Description of Violation(s) and Corrective Measure(s) Required [NOTE: please indicate if you have attached notice(s) of violation(s) and correction order(s), in lieu of description on this form]:

Ore no longer being mined. Stockpiled ore being processed and will continue for an estimated 4-5 years. Pit being filled with some inconsequential erosion occuring on pit walls. Lake County portion of operation includes processing plant, tailings dam and pond roads and open space. Experimental efforts to determine most effective methods of restoration of tailings pond are in progress. Site is well maintained.

VIII. Number of Violations: 0	Inspector's Signature: Andrew Peterson	Date Signed: 24 April 98

DISTRIBUTION: White—Operator Green—State (by Lead Agency) Pink—Lead Agency Goldenrod—State (by Operator) Canary—BLM or USFS (if required)

94 97750

UNITED STATES
DEPARTMENT OF INTERIOR
BUREAU OF LAND MANAGEMENT

STATE OF CALIFORNIA
DEPARTMENT OF CONSERVATION
MINE REPORTING & RECLAMATION COMPLIANCE

SURFACE MINING INSPECTION REPORT

Form MRRC-1 Page 1 (Rev 6/91)

Instructions for completing this form are on the reverse side. Attach notices of violation and orders to comply for all observed non-compliance.

I. Mining Operation Name	CA Mine ID #
	91-28-003

II. Lead Agency Name		
Inspector		Telephone
Title	Organization	
Mailing Address		
City	State	ZIP

III. BLM ID #	Resource Area	
CA 29396	Ukiah Field Office	
Contact Person		Telephone
Charles W. Whitcomb		(707) 468-4000
Mailing Address		
2550 North State Street		
City	State	ZIP
Ukiah	California	95482-3023

IV. Mine Operator		
Homestake Mining Company		
Contact Person		Telephone
Dean Enderlin, Environmental Engineer		(707) 995-6070
Mailing Address		
26775 Morgan Valley Road		
City	State	ZIP
Lower Lake	California	95457

V. Date Inspection Began	Time Inspection Began	Duration of Inspection
4/20/98	10:00 (AM) PM	5 hours
Reason for Inspection Code(s)	Date Inspection Ended	Weather Code(s)
Routine	4/20/98	CR
Reinspection Code(s)	Joint Inspection Agency Code(s)	Post-Inspection Agency Code(s)

DISTRIBUTION: White - Operator; Green - State (by Lead Agency); Canary - BLM (if required); Pink - Lead Agency; Goldenrod - State (by Operator)

UNITED STATES
DEPARTMENT OF INTERIOR
BUREAU OF LAND MANAGEMENT

STATE OF CALIFOR
DEPARTMENT OF CONSERVAT
MINE REPORTING & RECLAMATION COMPLIAN

SURFACE MINING INSPECTION REPORT

Form MRRC-1 Page 2 (Rev 6/91)

VI. Does the operation have:	P	NR	YES	NO	ND
An approved Reclamation Plan?			X		
A permit to mine?			X		
Approved financial assurances?			X		
		NR	YES	NO	ND
Has the operator filed a Mining Operation Annual Report (MRRC-2)?			X		
FOR BLM USE		OK	VN	NA	NI
Approved Plan of Operations*		X			
Cyanide Management		X			
Other					

Is the operation in compliance with provisions of the approved reclamation plan with respect to:	OK	VN	NA	NI
Wildlife Habitat	X			
Revegetation	X			
Agricultural Land	X			
Stream Protection	X			
Tailings and Mine Waste Management	X			
Building, Structure and Equipment Removal	X			
Topsoil Salvage, Maintenance, and Redistribution	X			
Backfilling, Regrading, Slope Stability, and Recontouring	X			
Drainage, Diversion Structures, Waterways, and Erosion	X			
Other				

VII. Comments/Description of Violations and Corrective Measures Required
(Note: Please indicate if you have attached notices of violations and correction orders in lieu of description on this form.)

I met with people from Lake and Napa Counties at the McLaughlin Security office. Dean Enderlin, Ray Krawn and Lorraine Van Kekerix then gave us a tour of reclamation sites around the tailings pond, the mill, Hunting Creek and Barker Waste Dumps, the open pit and the crushing area. We saw one duck on the tailings pond. Reclamation and vegetation looks good. No sick or dead animals were observed during this inspection.

VIII. Number of Violations	Inspector's Signature	Date Signed
0	Charles W. Whitcomb	4/21/98

State of California
DEPARTMENT OF CONSERVATION
OFFICE OF MINE RECLAMATION
MRRC-1 Page 1 (Rev. 04/94)

SURFACE MINING INSPECTION REPORT

Instructions for completing this form are on the reverse side. Attach notice(s) of violation(s) and order(s) to comply for all observed non-compliance.

I. Mine Name as Reported by Operator on Mining Operation Annual Report	CA MINE ID #
HOMESTAKE McLAUGHLIN MINE	91 - 28 - 003

II. SMARA Lead Agency Name (City or County only)		
NAPA COUNTY CONSERVATION, DEVELOPMENT & PLANNING DEPT.		
Inspector: Therese Garbarino		Telephone: (707) 253 - 4416
Title: PLANNER III	Organization: PLANNING DIVISION	
Mailing Address: 1195 THIRD ST. ROOM 210		
City: NAPA	State: CA	ZIP Code: 94559

III. Mine Operator		
HOMESTAKE MINING COMPANY		
Contact Person: DEAN ENDERLIN		Telephone: (707) 995 - 6070
Mailing Address: 26775 MORGAN VALLEY ROAD		
City: LOWER LAKE	State: CA	ZIP Code: 95457

IV. Does the operation have:	P	NR	NO	ND	YES
An approved Reclamation Plan?					RP# U-198283/93544-MOD
A permit to mine?					Permit # U-198283
Approved financial assurance(s)?					Amount $ 12,228,964.00
Has the operator filed a Mining Operation Annual Report (form MRRC-2)?					PENDING

V. Inspecting Agency Code(s):	Reason for Inspection Code(s):	BLM or USFS ID #
BLM	RI	CA-050-82-01P
Is this operation on Federal Lands? Circle one: Yes / No PORTION		Inspection Date: 4-28-'97

DISTRIBUTION: White–Operator Green–State (by Lead Agency) Pink–Lead Agency Goldenrod–State (by Operator) Canary–BLM or USFS (if required)

94 97749

State of California
DEPARTMENT OF CONSERVATION
OFFICE OF MINE RECLAMATION
MRRC-1 Page 2 (Rev. 04/94)

SURFACE MINING INSPECTION REPORT

VI. Is the operation in compliance with provisions of the approved Reclamation Plan and Mining Permit with respect to:	OK	VN	NI	NA	CA Mine ID# 91-28-003
Wildlife Habitat	X				Weather Code(s): CL
Revegetation	X				
Agricultural Land	X				Duration of Inspection: 2 HOURS
Stream Protection	X				
Tailings and Mine Waste Management	X				Approximate Disturbed Acreage: 1400 acres
Building, Structure, and Equipment Removal				X	
Topsoil Salvage, Maintenance, and Redistribution	X				Status of Operation Code(s): A
Backfilling, Regrading, Slope Stability, and Recontouring	X				
Drainage, Diversion Structures, Waterways, and Erosion	X				Status of Reclamation Code(s): R
Other (list or explain below)				X	

VII. Comments/Description of Violation(s) and Corrective Measure(s) Required [NOTE: please indicate if you have attached notice(s) of violation(s) and correction order(s), in lieu of description on this form]:

NONE

VIII. Number of Violations: 0	Inspector's Signature: Steve Barbarino	Date Signed: 5.30.97

DISTRIBUTION: White—Operator Green—State (by Lead Agency) Pink—Lead Agency Goldenrod—State (by Operator) Canary—BLM or USFS (if required)

94 97750

State of California
DEPARTMENT OF CONSERVATION
OFFICE OF MINE RECLAMATION
MRRC-1 Page 1 (Rev. 04/94)

SURFACE MINING INSPECTION REPORT

Instructions for completing this form are on the reverse side. Attach notice(s) of violation(s) and order(s) to comply for all observed non-compliance.

I. Mine Name as Reported by Operator on Mining Operation Annual Report	CA MINE ID #
McLaughlin Mine	91 - 28 - 0003

II. SMARA Lead Agency Name (City or County only)
Lake County Community Development Department

Inspector	Telephone
Steve Zalusky	(707) 263-2221 -

Title	Organization
Environmental Officer	Planning Division

Mailing Address: 255 N. Forbes St.

City	State	ZIP Code
Lakeport	CA	95453

III. Mine Operator
Homestake Mining Company

Contact Person	Telephone
Ray Krauss	(707) 995-6070 -

Mailing Address: 26775 Morgan Valley Rd.

City	State	ZIP Code
Lower Lake	CA	95457

IV. Does the operation have:	P	NR	NO	ND	YES
An approved Reclamation Plan?					RP# RP 83-1
A permit to mine?					Permit # UP 83-64
Approved financial assurance(s)?					Amount $ 12,228, 964.00
Has the operator filed a Mining Operation Annual Report (form MRRC-2)?					Yes

V. Inspecting Agency Code(s):	Reason for Inspection Code(s):	BLM or USFS ID #
BLM	RI	
Is this operation on Federal Lands? Circle one: Yes No		Inspection Date: 4/28/97

DISTRIBUTION: White–Operator Green–State (by Lead Agency) Pink–Lead Agency Goldenrod–State (by Operator) Canary–BLM or USFS (if required)

94 97749

State of California
DEPARTMENT OF CONSERVATION
OFFICE OF MINE RECLAMATION
MRRC-1 Page 2 (Rev. 04/94)

SURFACE MINING INSPECTION REPORT

VI. Is the operation in compliance with provisions of the approved Reclamation Plan and Mining Permit with respect to:	OK	VN	NI	NA	CA Mine ID# 91 - 28 - 0003
Wildlife Habitat	X				Weather Code(s): CR
Revegetation	X				
Agricultural Land				X	Duration of Inspection: 2 hrs.
Stream Protection	X				
Tailings and Mine Waste Management	X				Approximate Disturbed Acreage:
Building, Structure, and Equipment Removal				X	441
Topsoil Salvage, Maintenance, and Redistribution	X				Status of Operation Code(s):
Backfilling, Regrading, Slope Stability, and Recontouring	X				A
Drainage, Diversion Structures, Waterways, and Erosion	X				Status of Reclamation Code(s):
Other (list or explain below)					R

VII. Comments/Description of Violation(s) and Corrective Measure(s) Required [NOTE: please indicate if you have attached notice(s) of violation(s) and correction order(s), in lieu of description on this form]:

All current processing is of stockpiled ore. Active mining has ceased. During the time since the last inspection the tailings dam has been raised one more lift. The new section of dam has been revegetated with grass which is now well established. All components of the operation in Lake County (tailings dam, processing site, roads, etc.)are being properly maintained. Minor sources of erosion noted during the last inspection have been repaired and revegetated.

VIII. Number of Violations:	Inspector's Signature:	Date Signed:
0	Steve Fahrni	6/19/97

DISTRIBUTION: White—Operator Green—State (by Lead Agency) Pink—Lead Agency Goldenrod—State (by Operator) Canary—BLM or USFS (if required)

94 97750

State of California
DEPARTMENT OF CONSERVATION
OFFICE OF MINE RECLAMATION
MRRC-1 Page 1 (Rev. 04/94)

SURFACE MINING INSPECTION REPORT

Instructions for completing this form are on the reverse side. Attach notice(s) of violation(s) and order(s) to comply for all observed non-compliance.

I. Mine Name as Reported by Operator on Mining Operation Annual Report	CA MINE ID #
Mc laughlin Project- Homestake Mining Company	91 - 28 - 003

II. SMARA Lead Agency Name (City or County only)

Yolo County

Inspector	Telephone
David Flores	(916) 666 - 8043
Title	**Organization**
Senior Planner	Community Development Agency
Mailing Address	
292 West Beamer Street	
City	**State** / **ZIP Code**
Woodland	CA / 95695

III. Mine Operator

Homestake Mining Company

Contact Person	Telephone
Ray Krauss- Environmental Manager	(~~916~~) (707) 995-6070
Mailing Address	
26775 Morgan Valley Road	
City	**State** / **ZIP Code**
Lower Lake	California / 95457

IV. Does the operation have:	P	NR	NO	ND	YES
An approved Reclamation Plan?					RP# U-198283
A permit to mine?					Permit # HMC-91
Approved financial assurance(s)?					Amount $ 11,577,178.46
Has the operator filed a Mining Operation Annual Report (form MRRC-2)?					YES

V. Inspecting Agency Code(s):	Reason for Inspection Code(s):	BLM or USFS ID #
	RI	
Is this operation on Federal Lands? Circle one: Yes (No)		**Inspection Date:** 4/28/97

DISTRIBUTION: White–Operator Green–State (by Lead Agency) Pink–Lead Agency Goldenrod–State (by Operator) Canary–BLM or USFS (if required)

94 97749

State of California
DEPARTMENT OF CONSERVATION
OFFICE OF MINE RECLAMATION
MRRC-1 Page 2 (Rev. 04/94)

SURFACE MINING INSPECTION REPORT

VI. Is the operation in compliance with provisions of the approved Reclamation Plan and Mining Permit with respect to:	OK	VN	NI	NA	CA Mine ID# 91-28 - 003
Wildlife Habitat	✓				Weather Code(s):
Revegetation	✓				CL
Agricultural Land				✓	Duration of Inspection:
Stream Protection				✓	3 hours
Tailings and Mine Waste Management	✓				Approximate Disturbed Acreage:
Building, Structure, and Equipment Removal	✓				
Topsoil Salvage, Maintenance, and Redistribution	✓				Status of Operation Code(s):
Backfilling, Regrading, Slope Stability, and Recontouring	✓				A
Drainage, Diversion Structures, Waterways, and Erosion	✓				Status of Reclamation Code(s):
Other (list or explain below)					R

VII. Comments/Description of Violation(s) and Corrective Measure(s) Required [NOTE: please indicate if you have attached notice(s) of violation(s) and correction order(s), in lieu of description on this form]:

VIII. Number of Violations:	Inspector's Signature:	Date Signed:
Ø		4/28/97

DISTRIBUTION: White—Operator Green—State (by Lead Agency) Pink—Lead Agency Goldenrod—State (by Operator) Canary—BLM or USFS (if required)

94 97750

State of California
DEPARTMENT OF CONSERVATION
OFFICE OF MINE RECLAMATION
MRRC-1 Page 1 (Rev. 04/94)

SURFACE MINING INSPECTION REPORT

Instructions for completing this form are on the reverse side. Attach notice(s) of violation(s) and order(s) to comply for all observed non-compliance.

I. Mine Name as Reported by Operator on Mining Operation Annual Report	CA MINE ID #
HOMESTAKE McLAUGHLIN MINE	91 - 28 - 003

II. SMARA Lead Agency Name (City or County only)		
NAPA COUNTY CONSERVATION, DEVELOPMENT & PLANNING DEPT		
Inspector: Therese Garbarino		Telephone: (707) 253-4416
Title: Planner III	Organization: Planning Division	
Mailing Address: 1195 THIRD ST. ROOM 210		
City: NAPA	State: CA	ZIP Code: 94559

III. Mine Operator		
HOMESTAKE MINING COMPANY		
Contact Person: DELORA KOONTZ / RAY KRAUSS		Telephone: (707) 995-6070
Mailing Address: 26775 MORGAN VALLEY ROAD		
City: LOWER LAKE	State: CA	ZIP Code: 95457

IV. Does the operation have:	P	NR	NO	ND	YES
An approved Reclamation Plan?					RP# U-198283/93544-MOD
A permit to mine?					Permit # U-198283
Approved financial assurance(s)?					Amount $ 11,577,178.46 3/22/96
Has the operator filed a Mining Operation Annual Report (form MRRC-2)?					PENDING

V. Inspecting Agency Code(s):	Reason for Inspection Code(s):	BLM or USFS ID #
BLM	RI	CA - 050 - 82 - 01P
Is this operation on Federal Lands? Circle one: (Yes) No PORTION		Inspection Date: 4-29-96

DISTRIBUTION: White–Operator Green–State (by Lead Agency) Pink–Lead Agency Goldenrod–State (by Operator) Canary–BLM or USFS (if required)

94 97749

State of California
DEPARTMENT OF CONSERVATION
OFFICE OF MINE RECLAMATION
MRRC-1 Page 2 (Rev. 04/94)

SURFACE MINING INSPECTION REPORT

VI. Is the operation in compliance with provisions of the approved Reclamation Plan and Mining Permit with respect to:	OK	VN	NI	NA	CA Mine ID# 91-28-003
Wildlife Habitat	X				Weather Code(s): CR
Revegetation	X				
Agricultural Land	X				Duration of Inspection: 2.5 HOURS
Stream Protection	X				
Tailings and Mine Waste Management	X				Approximate Disturbed Acreage: 1400 acres
Building, Structure, and Equipment Removal				X	
Topsoil Salvage, Maintenance, and Redistribution	X				Status of Operation Code(s): A
Backfilling, Regrading, Slope Stability, and Recontouring	X				
Drainage, Diversion Structures, Waterways, and Erosion	X				Status of Reclamation Code(s): R
Other (list or explain below)				X	

VII. Comments/Description of Violation(s) and Corrective Measure(s) Required [NOTE: please indicate if you have attached notice(s) of violation(s) and correction order(s), in lieu of description on this form]:

NONE

VIII. Number of Violations: 0	Inspector's Signature: Therese Barbarino	Date Signed: 5-10-96

DISTRIBUTION: White—Operator Green—State (by Lead Agency) Pink—Lead Agency Goldenrod—State (by Operator) Canary—BLM or USFS (if required)

94 97750

State of California
DEPARTMENT OF CONSERVATION
OFFICE OF MINE RECLAMATION
MRRC-1 Page 1 (Rev. 04/94)

RECEIVED
MAY 15 1996

SURFACE MINING INSPECTION REPORT

Instructions for completing this form are on the reverse side. Attach notice(s) of violation(s) and order(s) to comply for all observed non-compliance.

I. Mine Name as Reported by Operator on Mining Operation Annual Report	CA MINE ID #
McLaughlin Mine	91 _ 28 _ 0003

II. SMARA Lead Agency Name (City or County only)
Lake County Community Development Department

Inspector	Telephone
Steve Zalusky	(707) 263-2221 -

Title	Organization
Environmental Officer	Planning Division

Mailing Address: 255 N. Forbes St.

City	State	ZIP Code
Lakeport	CA	95457

III. Mine Operator
Homestake Mining Company

Contact Person	Telephone
Ray Krauss	(707) 995-6070 -

Mailing Address: 26775 Morgan Valley Rd.

City	State	ZIP Code
Lower Lake	CA	95457

IV. Does the operation have:	P	NR	NO	ND	YES
An approved Reclamation Plan?					RP# RP 83-1
A permit to mine?					Permit # UP 83-64
Approved financial assurance(s)?					Amount $ 11,577,178.46
Has the operator filed a Mining Operation Annual Report (form MRRC-2)?					

V. Inspecting Agency Code(s):	Reason for Inspection Code(s):	BLM or USFS ID #
BLM	RI	

Is this operation on Federal Lands? Circle one:	Inspection Date:
Yes No	4/29/96

DISTRIBUTION: White–Operator Green–State (by Lead Agency) Pink–Lead Agency Goldenrod–State (by Operator) Canary–BLM or USFS (if required)

94 97749

State of California
DEPARTMENT OF CONSERVATION
OFFICE OF MINE RECLAMATION
MRRC-1 Page 2 (Rev. 04/94)

SURFACE MINING INSPECTION REPORT

VI. Is the operation in compliance with provisions of the approved Reclamation Plan and Mining Permit with respect to:	OK	VN	NI	NA	CA Mine ID# 91 - 28 - 0003
Wildlife Habitat	X				Weather Code(s): CR
Revegetation	X				
Agricultural Land				X	Duration of Inspection: 3 hrs.
Stream Protection	X				
Tailings and Mine Waste Management	X				Approximate Disturbed Acreage:
Building, Structure, and Equipment Removal				X	441
Topsoil Salvage, Maintenance, and Redistribution	X				Status of Operation Code(s):
Backfilling, Regrading, Slope Stability, and Recontouring	X				A
Drainage, Diversion Structures, Waterways, and Erosion	X				Status of Reclamation Code(s):
Other (list or explain below)					R

VII. Comments/Description of Violation(s) and Corrective Measure(s) Required [NOTE: please indicate if you have attached notice(s) of violation(s) and correction order(s), in lieu of description on this form]:

Active mining will cease in June of this year. The operator plans to dismantle and remove much of the ore processing facility and use heap leaching to process the remaining low-grade ore stockpiles.

The minor slides above the borrow site ponds have been stabilized and revegetated. The tailings test plot has been flooded as the tailings in the pond have risen over the past year. The site was originally established as a wet meadow and now supports fresh water emergent wetland (tule; Typha latifolia) on approximately six inches of imported topsoil. This is a successful demonstration of the tailings pond to support a similar community.

VIII. Number of Violations:	Inspector's Signature:	Date Signed:
0		4/30/96

DISTRIBUTION: White—Operator Green—State (by Lead Agency) Pink—Lead Agency Goldenrod—State (by Operator) Canary—BLM or USFS (if required)

94 97750

State of California
DEPARTMENT OF CONSERVATION
OFFICE OF MINE RECLAMATION
MRRC-1 Page 1 (Rev. 04/94)

SURFACE MINING INSPECTION REPORT

Instructions for completing this form are on the reverse side. Attach notice(s) of violation(s) and order(s) to comply for all observed non-compliance.

I. Mine Name as Reported by Operator on Mining Operation Annual Report	CA MINE ID #
McLaughlin Project - Homestake Mining Company	91 - 28 - 003

II. SMARA Lead Agency Name (City or County only)		
Yolo County		
Inspector: David Flores		Telephone: (916) 666 - 8020
Title: Senior Planner	Organization: Yolo County Community Development Agy	
Mailing Address: 292 West Beamer Street		
City: Woodland	State: CA	ZIP Code: 95695

III. Mine Operator		
HomestAKE Mining Company		
Contact Person: Ray Krauss, Environmental Manager		Telephone: (707) 995 - 6070
Mailing Address: 26775 Morgan Valley Road		
City: Lower Lake	State: CA	ZIP Code: 95457

IV. Does the operation have:	P	NR	NO	ND	YES
An approved Reclamation Plan?	✓				RP# U-198283
A permit to mine?	✓				Permit # HMC-91
Approved financial assurance(s)?	✓				Amount $ 11,577,178.46
Has the operator filed a Mining Operation Annual Report (form MRRC-2)?					

V. Inspecting Agency Code(s):	Reason for Inspection Code(s):	BLM or USFS ID #
	RT	
Is this operation on Federal Lands? Circle one: Yes (No)		Inspection Date: 4/29/96

DISTRIBUTION: White–Operator Green–State (by Lead Agency) Pink–Lead Agency Goldenrod–State (by Operator) Canary–BLM or USFS (if required)

94 97749

State of California
DEPARTMENT OF CONSERVATION
OFFICE OF MINE RECLAMATION
MRRC-1 Page 2 (Rev. 04/94)

SURFACE MINING INSPECTION REPORT

VI. Is the operation in compliance with provisions of the approved Reclamation Plan and Mining Permit with respect to:	OK	VN	NI	NA	CA Mine ID# 91 - 28 - 003
Wildlife Habitat	✓				Weather Code(s):
Revegetation	✓				CL
Agricultural Land	✓				Duration of Inspection:
Stream Protection	✓				2 hours
Tailings and Mine Waste Management	✓				Approximate Disturbed Acreage:
Building, Structure, and Equipment Removal	✓				
Topsoil Salvage, Maintenance, and Redistribution	✓				Status of Operation Code(s):
Backfilling, Regrading, Slope Stability, and Recontouring	✓				A
Drainage, Diversion Structures, Waterways, and Erosion	✓				Status of Reclamation Code(s):
Other (list or explain below)					R

VII. Comments/Description of Violation(s) and Corrective Measure(s) Required [NOTE: please indicate if you have attached notice(s) of violation(s) and correction order(s), in lieu of description on this form]:

AT NORTH PIT RECLAIMED AREA, MINOR GULLIES formed DUE TO RECENT RAINS. TO BE RECOMPACTED & RESEEDED THIS YEAR

VIII. Number of Violations:	Inspector's Signature:	Date Signed:
0		4/29/96

DISTRIBUTION: White—Operator Green—State (by Lead Agency) Pink—Lead Agency Goldenrod—State (by Operator) Canary—BLM or USFS (if required)

94 97750

State of California
DEPARTMENT OF CONSERVATION
OFFICE OF MINE RECLAMATION
MRRC-1 Page 1 (Rev. 04/94)

SURFACE MINING INSPECTION REPORT

Instructions for completing this form are on the reverse side. Attach notice(s) of violation(s) and order(s) to comply for all observed non-compliance.

I. Mine Name as Reported by Operator on Mining Operation Annual Report	CA MINE ID #
HOMESTAKE MCLAUGLIN MINE	91 - 28 -003

II. SMARA Lead Agency Name (City or County only)		
NAPA COUNTY CONSERVATION, DEVELOPMENT & PLANNING DEPT.		
Inspector: Therese Garbarino		Telephone: (707) 253 -4416
Title: PLANNER III	Organization: PLANNING DIVISION-	
Mailing Address: 1195 THIRD ST. ROOM 210		
City: NAPA	State: CA	ZIP Code: 94559

III. Mine Operator		
HOMESTAKE MINING COMPANY		
Contact Person: DELORA KOONTZ		Telephone: (707) 995- 6070
Mailing Address: 26775 MORGAN VALLEY ROAD		
City: LOWER LAKE	State: CA	ZIP Code: 95457

IV. Does the operation have:	P	NR	NO	ND	YES
An approved Reclamation Plan?					RP# U-198283/92161 - MOD
A permit to mine?					Permit # U-198283
Approved financial assurance(s)?					Amount $ 11,577,178.46
Has the operator filed a Mining Operation Annual Report (form MRRC-2)?					PENDING

V. Inspecting Agency Code(s):	Reason for Inspection Code(s):	BLM or USFS ID #
BLM	RI	CA-050-82-01P
Is this operation on Federal Lands? Circle one: (Yes) No PORTION		Inspection Date: 5-9-95

DISTRIBUTION: White–Operator Green–State (by Lead Agency) Pink–Lead Agency Goldenrod–State (by Operator) Canary–BLM or USFS (if required)

94 97749

SURFACE MINING INSPECTION REPORT

VI. Is the operation in compliance with provisions of the approved Reclamation Plan and Mining Permit with respect to:	OK	VN	NI	NA	CA Mine ID #
					91-28-003
Wildlife Habitat	X				Weather Code(s):
Revegetation	X				CL/RN
Agricultural Land	X				Duration of Inspection:
Stream Protection	X				2 HOURS
Tailings and Mine Waste Management	X				Approximate Disturbed Acreage:
Building, Structure, and Equipment Removal				X	1400 ACRES
Topsoil Salvage, Maintenance, and Redistribution	X				Status of Operation Code(s):
Backfilling, Regrading, Slope Stability, and Recontouring	X				A
Drainage, Diversion Structures, Waterways, and Erosion	X				Status of Reclamation Code(s):
Other (list or explain below)				X	R

VII. Comments/Description of Violation(s) and Corrective Measure(s) Required [NOTE: please indicate if you have attached notice(s) of violation(s) and correction order(s), in lieu of description on this form]:

SLUMPING NOTED ON WASTE ROCK RECLAMATION AREAS OF PAST FEW YEARS. HOMESTAKE WILL BE REPAIRING SLUMP SITES THIS YEAR IN CONJUNCTION WITH ONGOING RECLAMATION PRIOR TO NOVEMBER 1995.

VIII. Number of Violations:	Inspector's Signature:	Date Signed:
0	Merrill Barbarino	5.9.95

DISTRIBUTION: White—Operator Green—State (by Lead Agency) Pink—Lead Agency Goldenrod—State (by Operator) Canary—BLM or USFS (if required)

State of California
DEPARTMENT OF CONSERVATION
OFFICE OF MINE RECLAMATION
MRRC-1 Page 1 (Rev. 04/94)

SURFACE MINING INSPECTION REPORT

Instructions for completing this form are on the reverse side. Attach notice(s) of violation(s) and order(s) to comply for all observed non-compliance.

I. Mine Name as Reported by Operator on Mining Operation Annual Report	CA MINE ID #
McLaughlin Mine	91 - 28 - 0003

II. SMARA Lead Agency Name (City or County only)		
Lake County Planning Division		
Inspector		**Telephone**
Steve Zalusky		(707) 263-2221
Title	**Organization**	
Environmental Officer	Community Development Department	
Mailing Address		
255 N Forbes St.		
City	**State**	**ZIP Code**
Lakeport	CA	95453

III. Mine Operator		
Homestake Mining Company		
Contact Person		**Telephone**
Ray Krauss		(707) 995-6070
Mailing Address		
26775 Morgan Valley Rd.		
City	**State**	**ZIP Code**
Lower Lake	CA	95457

IV. Does the operation have:	P	NR	NO	ND	YES
An approved Reclamation Plan?					RP # RP 83-1
A permit to mine?					Permit # UP 83-64
Approved financial assurance(s)?					Amount $ $5,720,314.61
Has the operator filed a Mining Operation Annual Report (form MRRC-2)?				X	

V. Inspecting Agency Code(s):	Reason for Inspection Code(s):	BLM or USFS ID #
NONE	RI	
Is this operation on Federal Lands? Circle one: Yes No		Inspection Date: 5/1/95

DISTRIBUTION: White–Operator Green–State (by Lead Agency) Pink–Lead Agency Goldenrod–State (by Operator) Canary–BLM or USFS (if required)

94 97749

SURFACE MINING INSPECTION REPORT

VI. Is the operation in compliance with provisions of the approved Reclamation Plan and Mining Permit with respect to:	OK	VN	NI	NA	CA Mine ID #
					91 - 28 - 0003
Wildlife Habitat	X				Weather Code(s):
Revegetation	X				CR
Agricultural Land				X	Duration of Inspection:
Stream Protection	X				2 1/2
Tailings and Mine Waste Management	X				Approximate Disturbed Acreage:
Building, Structure, and Equipment Removal				X	441 acres: Lake Cnty
Topsoil Salvage, Maintenance, and Rediatribution	X				Status of Operation Code(s):
Backfilling, Regrading, Slope Stability, and Recontouring	X				A
Drainage, Diversion Structures, Waterways, and Erosion	X				Status of Reclamation Code(s):
Other (list or explain below)					R

VII. Comments/Description of Violation(s) and Corrective Measure(s) Required [NOTE: please indicate if you have attached notice(s) of violation(s) and correction order(s), in lieu of description on this form]:

No new mine related activities have occurred at the site since the time of the last inspection (5/23/95). Minor to moderate rilling has occurred on a number of roads cuts and fill slopes as a result of exceptionally high rainfall during the winter. The operator plans to repair and revegetate these sites this year. All repair and revegetation projects noted in the 1993 and 1994 mine inspection reports have been successfully completed .

VIII. Number of Violations: 0	Inspector's Signature: Steve Lakusky	Date Signed: 5/29/95

DISTRIBUTION: White—Operator Green—State (by Lead Agency) Pink—Lead Agency Goldenrod—State (by Operator) Canary—BLM or USFS (if required)

State of California
DEPARTMENT OF CONSERVATION
OFFICE OF MINE RECLAMATION
MRRC-1 Page 1 (Rev. 04/94)

RECEIVED
MAY - 5 1995

SURFACE MINING INSPECTION REPORT

Instructions for completing this form are on the reverse side. Attach notice(s) of violation(s) and order(s) to comply for all observed non-compliance.

I. Mine Name as Reported by Operator on Mining Operation Annual Report	CA MINE ID #
McLaughlin Project - Homestake Mining Company	91 - 28 - 003

II. SMARA Lead Agency Name (City or County only)

Yolo County

Inspector	Telephone
David Flores	(916) 666 - 8020

Title	Organization
Senior Plannner	Yolo County Community Development

Mailing Address: 292 West Beamer Street

City	State	ZIP Code
Woodland	CA	95695

III. Mine Operator

Homestake Mining Company

Contact Person	Telephone
Ray Krauss - Environmental Manager	(707) 995 - 6070

Mailing Address: 26775 Morgan Valley Road

City	State	ZIP Code
Lower Lake	California	95457

IV. Does the operation have:	P	NR	NO	ND	YES
An approved Reclamation Plan?					RP# U-198283
A permit to mine?					Permit # HMC 91
Approved financial assurance(s)?					Amount $ 11,577,178.46
Has the operator filed a Mining Operation Annual Report (form MRRC-2)?					YES

V. Inspecting Agency Code(s):	Reason for Inspection Code(s):	BLM or USFS ID #
	RI	

Is this operation on Federal Lands? Circle one:	Inspection Date:
Yes (No)	MAY 1, 1995

DISTRIBUTION: White–Operator Green–State (by Lead Agency) Pink–Lead Agency Goldenrod–State (by Operator) Canary–BLM or USFS (if required)

94 97749

SURFACE MINING INSPECTION REPORT

VI. Is the operation in compliance with provisions of the approved Reclamation Plan and Mining Permit with respect to:	OK	VN	NI	NA	CA Mine ID# 91 - 28 - 003
Wildlife Habitat	✓				Weather Code(s):
Revegetation	✓				CL
Agricultural Land				✓	Duration of Inspection:
Stream Protection				✓	2.5 hrs.
Tailings and Mine Waste Management	✓				Approximate Disturbed Acreage:
Building, Structure, and Equipment Removal	✓				
Topsoil Salvage, Maintenance, and Redistribution	✓				Status of Operation Code(s):
Backfilling, Regrading, Slope Stability, and Recontouring	✓				A
Drainage, Diversion Structures, Waterways, and Erosion	✓				Status of Reclamation Code(s):
Other (list or explain below)					R

VII. Comments/Description of Violation(s) and Corrective Measure(s) Required [NOTE: please indicate if you have attached notice(s) of violation(s) and correction order(s), in lieu of description on this form]:

VIII. Number of Violations:	Inspector's Signature:	Date Signed:
Ø	[signature]	5/1/95

DISTRIBUTION: White—Operator Green—State (by Lead Agency) Pink—Lead Agency Goldenrod—State (by Operator) Canary—BLM or USFS (if required)

94 97750

UNITED STATES
DEPARTMENT OF INTERIOR
BUREAU OF LAND MANAGEMENT

STATE OF CALIFORNIA
DEPARTMENT OF CONSERVATION
MINE REPORTING & RECLAMATION COMPLIANCE

SURFACE MINING INSPECTION REPORT

Form MRRC-1 Page 1 (New 5/91)

Instructions for completing this form are on the reverse side. Attach notices of violation and orders to comply for all observed non-compliance.

I. Mining Operation Name	CA Mine ID #
McLaughlin Mine	91-28-0003

II. Lead Agency Name: Lake County Planning Department		
Inspector: Steve Zalusky		Telephone: (707) 263-2221
Title: Environmental Officer	Organization: Planning Department	
Mailing Address: 255 N. Forbes St.		
City: Lakeport	State: CA	ZIP: 95453

III. BLM ID #	Resource Area	
Contact Person		Telephone
Mailing Address		
City	State	ZIP

IV. Mine Operator: Homestake Mining Company		
Contact Person: Ray Krauss		Telephone: (707) 995-6070
Mailing Address: 26775 Morgan Valley Rd.		
City: Lower Lake	State: CA	ZIP: 95457

V. Date Inspection Began	Time Inspection Began	Duration of Inspection
5/23/94	10:00 AM PM	3 Hrs.
Reason for Inspection Code(s): RIM	Date Inspection Ended: 5/23/94	Weather Code(s): CR
Reinspection Code(s)	Joint Inspection Agency Code(s): BLM	Post-inspection Agency Code(s)

DISTRIBUTION: White - Operator; Green - State (by Lead Agency); Canary - BLM (if required); Pink - Lead Agency; Goldenrod - State (by Operator)

UNITED STATES
DEPARTMENT OF INTERIOR
BUREAU OF LAND MANAGEMENT

STATE OF CALIFORNIA
DEPARTMENT OF CONSERVATION
MINE REPORTING & RECLAMATION COMPLIANCE

SURFACE MINING INSPECTION REPORT

Form MRRC-1 Page 2 (New 5/91)

VI. Does the operation have:	P	NR	YES	NO	ND
An approved Reclamation Plan?			X		
A permit to mine?			X		
Approved financial assurances?			X		

	NR	YES	NO	ND
Has the operator filed a Mining Operation Annual Report (MRRC-2)?				

FOR BLM USE	OK	VN	NA	NI
Approved Plan of Operations*				
Cyanide Management				
Other				

Is the operation in compliance with provisions of the approved reclamation plan with respect to:	OK	VN	NA	NI
Wildlife Habitat	X			
Revegetation	X			
Agricultural Land			X	
Stream Protection	X			
Tailings and Mine Waste Management	X			
Building, Structure and Equipment Removal			X	
Topsoil Salvage, Maintenance, and Redistribution	X			
Backfilling, Regrading, Slope Stability, and Recontouring	X			
Drainage, Diversion Structures, Waterways, and Erosion	X			
Other				

VII. Comments/Description of Violations and Corrective Measures Required
(Note: Please indicate if you have attached notices of violations and correction orders in lieu of description on this form.)

No violations were noted during the inspection. The following actions have been taken by Homestake since the last inspection:

1. The slump adjacent to the borrow site ponds (north of the processing facility) has been successfully repaired and revegetated.
2. A slump on the northwest corner of the perimeter road has been repaired and revegetated.
3. Rills on the road cut above the northwest corner of the perimeter road are being monitored. These should be repaired repaired and revegetated prior to the rainy season.
4. A revegetation test-plot has been created on a portion of the tailings pond. Approximately one foot of topsoil has been placed over the clay sediment and revegetated with annual grasses. The test has been successfull. This same portion of the sediment pond is being invaded by cattail.
5. The reclamation consultant has recommended repair of the rilling on the tailings dam and #2 sediment pond. This work should be completed prior to November 1994.

VIII. Number of Violations	Inspector's Signature	Date Signed

DISTRIBUTION: White - Operator; Green - State (by Lead Agency); Canary - BLM (if required); Pink - Lead Agency; Goldenrod - State (by Operator)

UNITED STATES
DEPARTMENT OF INTERIOR
BUREAU OF LAND MANAGEMENT

STATE OF CALIFORNIA
DEPARTMENT OF CONSERVATION
MINE REPORTING & RECLAMATION COMPLIANCE

SURFACE MINING INSPECTION REPORT

Form MRRC-1 Page 1 (New 5/91)

Instructions for completing this form are on the reverse side. Attach notices of violation and orders to comply for all observed non-compliance.

I. Mining Operation Name	CA Mine ID #
Mc Laughlin Project-Homestake Mining Company	91-28-003

II. Lead Agency Name		
Yolo County		
Inspector: David Flores		Telephone: 916 666-8020
Title: Senior Planner	Organization: Community Development Agency	
Mailing Address: 292 West Beamer Street		
City: Woodland	State: CA	ZIP: 95695

III. BLM ID #	Resource Area	
Contact Person		Telephone
Mailing Address		
City	State	ZIP

IV. Mine Operator		
Homestake Mining Company		
Contact Person: Ray Krauss, Environmental Manager		Telephone: 707 [illegible]
Mailing Address: [illegible] Morgan Valley Road		
City: Lower Lake	State: CA	ZIP: 95457

V. Date Inspection Began: 5-23-94	Time Inspection Began: 10:15 (AM) PM	Duration of Inspection: 3 hrs
Reason for Inspection Code(s)	Date Inspection Ended: 5/23/94	Weather Code(s): CL
Reinspection Code(s)	Joint Inspection Agency Code(s)	Post-inspection Agency Code(s)

DISTRIBUTION: White - Operator; Green - State (by Lead Agency); Canary - BLM (if required); Pink - Lead Agency; Goldenrod - State (by Operator)

Homestake Mining Company

91-28-003

UNITED STATES
DEPARTMENT OF INTERIOR
BUREAU OF LAND MANAGEMENT

STATE OF CALIFORNIA
DEPARTMENT OF CONSERVATION
MINE REPORTING & RECLAMATION COMPL

SURFACE MINING INSPECTION REPORT

Form MRRC-1 Page 2 (New 5/91)

VI. Does the operation have:	P	NR	YES	NO	ND
An approved Reclamation Plan?			✓		
A permit to mine?			✓		
Approved financial assurances?			✓		
		NR	YES	NO	ND
Has the operator filed a Mining Operation Annual Report (MRRC-2)?			✓		
FOR BLM USE		OK	VN	NA	NI
Approved Plan of Operations*					
Cyanide Management					
Other					

Is the operation in compliance with provisions of the approved reclamation plan with respect to:	OK	VN	NA	NI
Wildlife Habitat	✓			
Revegetation	✓			
Agricultural Land			✓	
Stream Protection	✓			
Tailings and Mine Waste Management	✓			
Building, Structure and Equipment Removal	✓			
Topsoil Salvage, Maintenance, and Redistribution	✓			
Backfilling, Regrading, Slope Stability, and Recontouring	✓			
Drainage, Diversion Structures, Waterways, and Erosion	✓			
Other				

VII. Comments/Description of Violations and Corrective Measures Required
(Note: Please indicate if you have attached notices of violations and correction orders in lieu of description on this form.)

VIII. Number of Violations	Inspector's Signature	Date Signed
0		5/28/94

DISTRIBUTION: White - Operator; Green - State (by Lead Agency); Canary - BLM (if required); Pink - Lead Agency; Goldenrod - State (by Operator)

State of California
DEPARTMENT OF CONSERVATION
OFFICE OF MINE RECLAMATION
MRRC-1 Page 1 (Rev. 04/94)

SURFACE MINING INSPECTION REPORT

Instructions for completing this form are on the reverse side. Attach notice(s) of violation(s) and order(s) to comply for all observed non-compliance.

I. Mine Name as Reported by Operator on Mining Operation Annual Report	CA MINE ID #
Homestake McLaughlin Mine	91 - 28 - 003

II. SMARA Lead Agency Name (City or County only)
Napa County Conservation, Development and Planning Department

Inspector	Telephone
Therese Garbarino	(707) 253 - 4416
Title	**Organization**
Planner II	Planning Division
Mailing Address	
1195 Third Street Room 210	
City	**State** / **ZIP Code**
Napa	CA / 94559

III. Mine Operator
Homestake Mining Company

Contact Person	Telephone
Delora Koontz / Ray Krauss	(707) 995 - 6070
Mailing Address	
26775 Morgan Valley Road	
City	**State** / **ZIP Code**
Lower Lake	CA / 95457

IV. Does the operation have:	P	NR	NO	ND	YES
An approved Reclamation Plan?					RP# U-195253/92161-MOD
A permit to mine?					Permit # U-195253
Approved financial assurance(s)?					Amount $ 11,274,594.54 2/25/95
Has the operator filed a Mining Operation Annual Report (form MRRC-2)?					PENDING

V. Inspecting Agency Code(s):	Reason for Inspection Code(s):	BLM or USFS ID #
BLM	RI	CA - 050-52-01P
Is this operation on Federal Lands? Circle one:		**Inspection Date:**
portion (Yes) No		5-23-94

DISTRIBUTION: White–Operator Green–State (by Lead Agency) Pink–Lead Agency Goldenrod–State (by Operator) Canary–BLM or USFS (if required)

94 9774

State of California
DEPARTMENT OF CONSERVATION
OFFICE OF MINE RECLAMATION
MRRC-1 Page 2 (Rev. 04/94)

SURFACE MINING INSPECTION REPORT

VI. Is the operation in compliance with provisions of the approved Reclamation Plan and Mining Permit with respect to:	OK	VN	NI	NA	CA Mine ID# 91 - 28 - 003
Wildlife Habitat	X				Weather Code(s): CR
Revegetation	X				
Agricultural Land	X				Duration of Inspection: 2 HOURS
Stream Protection	X				
Tailings and Mine Waste Management	X				Approximate Disturbed Acreage: 1400 acres
Building, Structure, and Equipment Removal				X	
Topsoil Salvage, Maintenance, and Redistribution	X				Status of Operation Code(s): A
Backfilling, Regrading, Slope Stability, and Recontouring	X				
Drainage, Diversion Structures, Waterways, and Erosion	X				Status of Reclamation Code(s): R
Other (list or explain below)				X	

VII. Comments/Description of Violation(s) and Corrective Measure(s) Required [NOTE: please indicate if you have attached notice(s) of violation(s) and correction order(s), in lieu of description on this form]:

NONE

VIII. Number of Violations: 0	Inspector's Signature: Merrel Galbraith	Date Signed: 6-21-94

DISTRIBUTION: White—Operator Green—State (by Lead Agency) Pink—Lead Agency Goldenrod—State (by Operator) Canary—BLM or USFS (if required)

94 977

UNITED STATES
DEPARTMENT OF INTERIOR
BUREAU OF LAND MANAGEMENT

STATE OF CALIFORNIA
DEPARTMENT OF CONSERVATION
MINE REPORTING & RECLAMATION COMPLIANCE

SURFACE MINING INSPECTION REPORT

Form MRRC-1 Page 1 (New 5/91)

Instructions for completing this form are on the reverse side. Attach notices of violation and orders to comply for all observed non-compliance.

I. Mining Operation Name	CA Mine ID #
Homestake McLaughlin Mine	91-28-003

II. Lead Agency Name		
Napa County Conservation, Development & Planning Department		
Inspector		Telephone
Therese Armlin Garbarino		(707) 253-4416
Title	Organization	
Planner II	Planning Division	
Mailing Address		
1195 Third St. Room 210		
City	State	ZIP
Napa	CA	94559

III. BLM ID #	Resource Area	
CA 050-82-01P	Clearlake	
Contact Person		Telephone
Charles Whitcomb		(707) 462-3873
Mailing Address		
555 Leslie Street		
City	State	ZIP
Ukiah	CA	95482

IV. Mine Operator		
Homestake Mining Company		
Contact Person		Telephone
Delora Koontz/Ray Krauss		(707) 995-6070
Mailing Address		
P.O. Box 1010 / 26775 Morgan Valley Rd.		
City	State	ZIP
Lower Lake	CA	95457

V. Date Inspection Began	Time Inspection Began	Duration of Inspection
April 27, 1993	11:00 (AM) PM	2 hours
Reason for Inspection Code(s)	Date Inspection Ended	Weather Code(s)
RI	April 27, 1993	CR
Reinspection Code(s)	Joint Inspection Agency Code(s)	Post-inspection Agency Code(s)
N/A	BLM, O	N/A

DISTRIBUTION: White - Operator; Green - State (by Lead Agency); Canary - BLM (if required); Pink - Lead Agency; Goldenrod - State (by Operator)

UNITED STATES
DEPARTMENT OF INTERIOR
BUREAU OF LAND MANAGEMENT

STATE OF CALIFORNIA
DEPARTMENT OF CONSERVATION
MINE REPORTING & RECLAMATION COMPLIA

SURFACE MINING INSPECTION REPORT

Form MRRC-1 Page 2 (New 5/91)

VI. Does the operation have:	P	NR	YES	NO	ND
An approved Reclamation Plan?			X		
A permit to mine?			X		
Approved financial assurances?			X		
		NR	YES	NO	ND
Has the operator filed a Mining Operation Annual Report (MRRC-2)?			X		
FOR BLM USE		OK	VN	NA	NI
Approved Plan of Operations*		X			
Cyanide Management					
Other					

Is the operation in compliance with provisions of the approved reclamation plan with respect to:	OK	VN	NA	NI
Wildlife Habitat	X			
Revegetation	X			
Agricultural Land			X	
Stream Protection	X			
Tailings and Mine Waste Management	X			
Building, Structure and Equipment Removal			X	
Topsoil Salvage, Maintenance, and Redistribution	X			
Backfilling, Regrading, Slope Stability, and Recontouring	X			
Drainage, Diversion Structures, Waterways, and Erosion	X			
Other			X	

VII. Comments/Description of Violations and Corrective Measures Required
(Note: Please indicate if you have attached notices of violations and correction orders in lieu of description on this form.)

No violations noted.

VIII. Number of Violations	Inspector's Signature	Date Signed
-0-	Therese Conlin Gabarino	6-7-93

DISTRIBUTION: White - Operator: Green - State (by Lead Agency); Canary - BLM (if required); Pink - Lead Agency; Goldenrod - State (by Operator)

UNITED STATES
DEPARTMENT OF INTERIOR
BUREAU OF LAND MANAGEMENT

STATE OF CALIFORNIA
DEPARTMENT OF CONSERVATION
MINE REPORTING & RECLAMATION COMPLIANCE

SURFACE MINING INSPECTION REPORT

Form MRRC-1 Page 1 (New 5/91)

Instructions for completing this form are on the reverse side. Attach notices of violation and orders to comply for all observed non-compliance.

I. Mining Operation Name	CA Mine ID #
McLaughlin Project - Homestake Mining Company	91-28-003

II. Lead Agency Name		
Yolo County		
Inspector David Flores		Telephone (916) 666-8020
Title Senior Planner	Organization Yolo County Community Development Agency	
Mailing Address 292 West Beamer Street		
City Woodland	State California	ZIP 95695

III. BLM ID #	Resource Area	
Contact Person		Telephone
Mailing Address		
City	State	ZIP

IV. Mine Operator		
Homestake Mining Company		
Contact Person Ray Krauss Environmental Manager		Telephone (707) 995-6070
Mailing Address 26775 Morgan Valley Road		
City Lower Lake	State California	ZIP 95457

V. Date Inspection Began	Time Inspection Began	Duration of Inspection
4/27/93	10 45 (AM) PM	2 hrs 15 min
Reason for Inspection Code(s) RT	Date Inspection Ended 4/27/93	Weather Code(s) CR
Reinspection Code(s)	Joint Inspection Agency Code(s)	Post-inspection Agency Code(s)

DISTRIBUTION: White - Operator; Green - State (by Lead Agency); Canary - BLM (if required); Pink - Lead Agency; Goldenrod - State (by Operator)

McLaughlin Project - Homestake Mining Company

91-28-003

UNITED STATES
DEPARTMENT OF INTERIOR
BUREAU OF LAND MANAGEMENT

STATE OF CALIFORNIA
DEPARTMENT OF CONSERVATION
MINE REPORTING & RECLAMATION COMPLI

SURFACE MINING INSPECTION REPORT

Form MRRC-1 Page 2 (New 5/91)

VI. Does the operation have:	P	NR	YES	NO	ND
An approved Reclamation Plan?			✓		
A permit to mine?			✓		
Approved financial assurances?			✓		
		NR	YES	NO	ND
Has the operator filed a Mining Operation Annual Report (MRRC-2)?			✓		
FOR BLM USE		OK	VN	NA	NI
Approved Plan of Operations*					
Cyanide Management					
Other					

Is the operation in compliance with provisions of the approved reclamation plan with respect to:	OK	VN	NA	NI
Wildlife Habitat	✓			
Revegetation	✓			
Agricultural Land	✓			
Stream Protection	✓			
Tailings and Mine Waste Management	N/A			
Building, Structure and Equipment Removal	✓			
Topsoil Salvage, Maintenance, and Redistribution	✓			
Backfilling, Regrading, Slope Stability, and Recontouring	✓			
Drainage, Diversion Structures, Waterways, and Erosion	✓			
Other				

VII. Comments/Description of Violations and Corrective Measures Required
(Note: Please indicate if you have attached notices of violations and correction orders in lieu of description on this form.)

VIII. Number of Violations	Inspector's Signature	Date Signed
0		4/27/93

DISTRIBUTION: White - Operator; Green - State (by Lead Agency); Canary - BLM (if required); Pink - Lead Agency; Goldenrod - State (by Operator)

UNITED STATES
DEPARTMENT OF INTERIOR
BUREAU OF LAND MANAGEMENT

STATE OF CALIFORNIA
DEPARTMENT OF CONSERVATION
MINE REPORTING & RECLAMATION COMPLIANCE

SURFACE MINING INSPECTION REPORT

Form MRRC-1 Page 1 (New 5/91)

Instructions for completing this form are on the reverse side. Attach notices of violation and orders to comply for all observed non-compliance.

I. Mining Operation Name	CA Mine ID #
McLaughlin Mine	91-28-0003

II. Lead Agency Name		
Lake County Planning Department		
Inspector Steve Zalusky		Telephone (707) 263-2221
Title Environmental Officer	Organization Resource Management Division	
Mailing Address 255 N. Forbes St.		
City Lakeport	State CA	ZIP 95453

III. BLM ID #	Resource Area	
Contact Person		Telephone
Mailing Address		
City	State	ZIP

IV. Mine Operator		
Homestake Mining Company		
Contact Person Ray Krauss		Telephone (707) 995-6070
Mailing Address 26775 Morgan Valley Rd.		
City Lower Lake	State CA	ZIP 95457

V. Date Inspection Began	Time Inspection Began	Duration of Inspection
4/27/93	10:00 AM PM	2 hrs.
Reason for Inspection Code(s) RI	Date Inspection Ended 4/27/93	Weather Code(s) CL
Reinspection Code(s)	Joint Inspection Agency Code(s) BLM	Post-inspection Agency Code(s)

DISTRIBUTION: White - Operator; Green - State (by Lead Agency); Canary - BLM (if required); Pink - Lead Agency; Goldenrod - State (by Operator)

UNITED STATES
DEPARTMENT OF INTERIOR
BUREAU OF LAND MANAGEMENT

STATE OF CALIFORNIA
DEPARTMENT OF CONSERVATION
MINE REPORTING & RECLAMATION COMPLIA

SURFACE MINING INSPECTION REPORT

Form MRRC-1 Page 2 (New 5/91)

VI. Does the operation have:	P	NR	YES	NO	ND
An approved Reclamation Plan?			X		
A permit to mine?			X		
Approved financial assurances?			X		

	NR	YES	NO	ND
Has the operator filed a Mining Operation Annual Report (MRRC-2)?				

FOR BLM USE	OK	VN	NA	NI
Approved Plan of Operations*				
Cyanide Management				
Other				

Is the operation in compliance with provisions of the approved reclamation plan with respect to:	OK	VN	NA	NI
Wildlife Habitat	X			
Revegetation	X			
Agricultural Land	X			
Stream Protection	X			
Tailings and Mine Waste Management	X			
Building, Structure and Equipment Removal	X			
Topsoil Salvage, Maintenance, and Redistribution	X			
Backfilling, Regrading, Slope Stability, and Recontouring	X			
Drainage, Diversion Structures, Waterways, and Erosion	X			
Other				

VII. Comments/Description of Violations and Corrective Measures Required
(Note: Please indicate if you have attached notices of violations and correction orders in lieu of description on this form.)

No new soil disturbance has occured within the Lake County portion of the mine since the time of the last inspeciton on 5/4/92. Vegetation around the phase II borrow site continues to mature. Emergnet wetland vegetation has become established around the perimeter of the pond impounded within the borrow site. Homestake is in compliance with all terms and conditions of the reclamation plan.

VIII. Number of Violations	Inspector's Signature	Date Signed
-0-	Steve Taber	5/10/93

DISTRIBUTION: White - Operator; Green - State (by Lead Agency); Canary - BLM (if required); Pink - Lead Agency; Goldenrod - State (by Operator)

UNITED STATES
DEPARTMENT OF INTERIOR
BUREAU OF LAND MANAGEMENT

STATE OF CALIFORNI
DEPARTMENT OF CONSERVATIO
MINE REPORTING & RECLA .TION COMPLIANC

SURFACE MINING INSPECTION REPORT

Form MRRC-1 Page 1 (New 5/91)

Instructions for completing this form are on the reverse side. Attach notices of violation and orders to comply for all observed non-compliance.

I. Mining Operation Name	CA Mine ID #
McLaughlin Mine (Homestake Mining Company)	91-28-003

II. Lead Agency Name		
Inspector		Telephone
Title	Organization	
Mailing Address		
City	State	ZIP

III. BLM ID #	Resource Area	
CA 29393	Clear Lake	
Contact Person		Telephone
Charles W. Whitcomb		(707) 462-3873
Mailing Address		
555 Leslie Street, Ukiah, CA 95482		
City	State	ZIP
Ukiah	California	95482

IV. Mine Operator		
Homestake Mining Company		
Contact Person		Telephone
Ray Krauss Environmental Manager		(707) 995-6070
Mailing Address		
26775 Morgan Valley Road		
City	State	ZIP
Lower Lake	California	95457

V. Date Inspection Began	Time Inspection Began	Duration of Inspection
5/19/93	10:00 (AM) PM	3 hrs
Reason for Inspection Code(s)	Date Inspection Ended	Weather Code(s)
Routine (RI)	5/19/93	RN
Reinspection Code(s)	Joint Inspection Agency Code(s)	Post-Inspection Agency Code(s)

DISTRIBUTION: White - Operator; Green - State (by Lead Agency); Canary - BLM (if required); Pink - Lead Agency; Goldenrod - State (by Operator)

UNITED STATES
DEPARTMENT OF INTERIOR
BUREAU OF LAND MANAGEMENT

STATE OF CALIF
DEPARTMENT OF CONSE
MINE REPORTING & RECLAMATION COM

SURFACE MINING INSPECTION REPORT

Form MRRC-1 Page 2 (New 5/91)

VI. Does the operation have:	P	NR	YES	NO	ND
An approved Reclamation Plan?			X		
A permit to mine?			X		
Approved financial assurances?			X		
		NR	YES	NO	ND
Has the operator filed a Mining Operation Annual Report (MRRC-2)?			X		
FOR BLM USE		OK	VN	NA	NI
Approved Plan of Operations*		X			
Cyanide Management		X			
Other					

Is the operation in compliance with provisions of the approved reclamation plan with respect to:	OK	VN	NA
Wildlife Habitat	X		
Revegetation	X		
Agricultural Land	X		
Stream Protection	X		
Tailings and Mine Waste Management	X		
Building, Structure and Equipment Removal	X		
Topsoil Salvage, Maintenance, and Redistribution	X		
Backfilling, Regrading, Slope Stability, and Recontouring	X		
Drainage, Diversion Structures, Waterways, and Erosion	X		
Other			

VII. Comments/Description of Violations and Corrective Measures Required
(Note: Please indicate if you have attached notices of violations and correction orders in lieu of description on this form.)

I met Delora Koontz, Environmental Engineer, at the McLaughlin Mine Offices. We drove around the tailings pond, which is fairly full, and saw no ducks or other wildlife. We then drove to the drill site areas on the north side of the open pit to inspect the reclamation. Drill site have been reclaimed and grasses planted are doing very well. I then drove to the Davis Creek Reservoir. The reservoir is full and everything looks good. During this inspection no sick or dead wildlife was observed.

VIII. Number of Violations	Inspector's Signature	Date Signed
0	Charles W. Whitcomb	5/19/93

UNITED STATES
DEPARTMENT OF INTERIOR
BUREAU OF LAND MANAGEMENT

STATE OF CALIFORNIA
DEPARTMENT OF CONSERVATION
MINE REPORTING & RECLAMATION COMPLIANCE

SURFACE MINING INSPECTION REPORT

Form MRRC-1 Page 1 (New 5/91)

Instructions for completing this form are on the reverse side. Attach notices of violation and orders to comply for all observed non-compliance.

I. Mining Operation Name	CA Mine ID #
HOMESTAKE MINING COMPANY- MCLAUGHLIN MINE	91-28-0003

II. Lead Agency Name: NAPA COUNTY CONSERVATION, DEVLPMT, PLANNING		
Inspector: Terry Armlin		Telephone: (707) 253-4416
Title: Planner II	Organization: NAPA COUNTY	
Mailing Address: 1095 THIRD ST RM 210		
City: NAPA	State: CA	ZIP: 94559

III. BLM ID #	Resource Area	
Contact Person		Telephone
Mailing Address		
City	State	ZIP

IV. Mine Operator: HOMESTAKE MINING COMPANY		
Contact Person: RAYMOND KRAUSS		Telephone: (707) 995-6070
Mailing Address: 26775 MORGAN VALLEY ROAD		
City: LOWER LAKE	State: CA	ZIP: 95457

V. Date Inspection Began	Time Inspection Began	Duration of Inspection
6-23-92	10:30 (AM) PM	1.5 HOURS
Reason for Inspection Code(s): RI	Date Inspection Ended: 6-23-92	Weather Code(s): CR
Reinspection Code(s): N/A	Joint Inspection Agency Code(s): NONE	Post-inspection Agency Code(s): NONE

DISTRIBUTION: White - Operator; Green - State (by Lead Agency); Canary - BLM (if required); Pink - Lead Agency; Goldenrod - State (by Operator)

UNITED STATES
DEPARTMENT OF INTERIOR
BUREAU OF LAND MANAGEMENT

STATE OF CALIFORNI
DEPARTMENT OF CONSERV
MINE REPORTING & RECLAMATION COMPL

SURFACE MINING INSPECTION REPORT

Form MRRC-1 Page 2 (New 5/91)

VI. Does the operation have:	P	NR	YES	NO	ND
An approved Reclamation Plan?			✓		
A permit to mine?			✓		
Approved financial assurances?			✓		
		NR	YES	NO	ND
Has the operator filed a Mining Operation Annual Report (MRRC-2)?			✓		
FOR BLM USE		OK	VN	NA	NI
Approved Plan of Operations*					
Cyanide Management					
Other					

Is the operation in compliance with provisions of the approved reclamation plan with respect to:	OK	VN	NA	NI
Wildlife Habitat	✓			
Revegetation	✓			
Agricultural Land			✓	
Stream Protection			✓	
Tailings and Mine Waste Management	✓			
Building, Structure and Equipment Removal			✓	
Topsoil Salvage, Maintenance, and Redistribution	✓			
Backfilling, Regrading, Slope Stability, and Recontouring	✓			
Drainage, Diversion Structures, Waterways, and Erosion	✓			
Other			✓	

VII. Comments/Description of Violations and Corrective Measures Required
(Note: Please indicate if you have attached notices of violations and correction orders in lieu of description on this form.)

NO VIOLATIONS NOTED

NO CORRECTIVE MEASURES REQUIRED.

VIII. Number of Violations	Inspector's Signature	Date Signed
0	Jerry Armkin	6.23.92

DISTRIBUTION: White - Operator; Green - State (by Lead Agency); Canary - BLM (if required); Pink - Lead Agency; Goldenrod - State (by Operator)

UNITED STATES
DEPARTMENT OF INTERIOR
BUREAU OF LAND MANAGEMENT

STATE OF CALIFORNIA
DEPARTMENT OF CONSERVATION
MINE REPORTING & RECLAMATION COMPLIANCE

SURFACE MINING INSPECTION REPORT

Form MRRC-1 Page 1 (New 5/91)

Instructions for completing this form are on the reverse side. Attach notices of violation and orders to comply for all observed non-compliance.

I. Mining Operation Name	CA Mine ID #
MCLAUGHLIN PROJECT - HOMESTAKE MINING COMPANY	91-28-003

II. Lead Agency Name		
YOLO COUNTY		
Inspector David Flores		Telephone (916)666-8020
Title Senior Planner	Organization Yolo County Community Development Agency	
Mailing Address 292 West Beamer Street		
City Woodland	State California	ZIP 95695

III. BLM ID #	Resource Area	
Contact Person		Telephone
Mailing Address		
City	State	ZIP

IV. Mine Operator		
Homestake Mining Company		
Contact Person Ray Krauss Environmental Manager		Telephone (707)995-6070
Mailing Address 26775 Morgan Valley Road		
City Lower Lake	State California	ZIP 95457

V. Date Inspection Began	Time Inspection Began	Duration of Inspection
5/4/[illegible]	AM PM	
Reason for Inspection Code(s)	Date Inspection Ended	Weather Code(s)
Reinspection Code(s)	Joint Inspection Agency Code(s)	Post-inspection Agency Code(s)

DISTRIBUTION: White - Operator; Green - State (by Lead Agency); Canary - BLM (if required); Pink - Lead Agency; Goldenrod - State (by Operator)

UNITED STATES
DEPARTMENT OF INTERIOR
BUREAU OF LAND MANAGEMENT

STATE OF CALIFORNIA
DEPARTMENT OF CONSERVATION
MINE REPORTING & RECLAMATION COMPLIANCE

SURFACE MINING INSPECTION REPORT

Form MRRC-1 Page 2 (New 5/91)

VI. Does the operation have:	P	NR	YES	NO	ND
An approved Reclamation Plan?			✓		
A permit to mine?			✓		
Approved financial assurances?			✓		

	NR	YES	NO	ND
Has the operator filed a Mining Operation Annual Report (MRRC-2)?				

FOR BLM USE	OK	VN	NA	NI
Approved Plan of Operations*				
Cyanide Management				
Other				

Is the operation in compliance with provisions of the approved reclamation plan with respect to:	OK	VN	NA	NI
Wildlife Habitat	✓			
Revegetation	✓			
Agricultural Land	✓			
Stream Protection	✓			
Tailings and Mine Waste Management			✓	
Building, Structure and Equipment Removal	✓			
Topsoil Salvage, Maintenance, and Redistribution	✓			
Backfilling, Regrading, Slope Stability, and Recontouring	✓			
Drainage, Diversion Structures, Waterways, and Erosion	✓			
Other				

VII. Comments/Description of Violations and Corrective Measures Required
(Note: Please indicate if you have attached notices of violations and correction orders in lieu of description on this form.)

VIII. Number of Violations	Inspector's Signature	Date Signed
0		7-1-92

UNITED STATES
DEPARTMENT OF INTERIOR
BUREAU OF LAND MANAGEMENT

STATE OF CALIFORNIA
DEPARTMENT OF CONSERVATION
MINE REPORTING & RECLAMATION COMPLIANCE

SURFACE MINING INSPECTION REPORT

Form MRRC-1 Page 1 (New 5/91)

Instructions for completing this form are on the reverse side. Attach notices of violation and orders to comply for all observed non-compliance.

I. Mining Operation Name	CA Mine ID #
HOMESTAKE McLAUGHLIN MINE	91-28-003

II. Lead Agency Name: NAPA COUNTY CONSERVATION, DEVELOPMENT & PLANNING DEPARTMENT		
Inspector: THERESA ARMLIN		Telephone: (707) 253-4416
Title: PLANNER II	Organization: PLANNING DIVISION	
Mailing Address: 1195 THIRD STREET, ROOM 210		
City: NAPA	State: CA	ZIP: 94559

III. BLM ID #: CA050-82-01P	Resource Area: CLEAR LAKE	
Contact Person: CHARLES W. WHITCOMB		Telephone: (707) 462-3873
Mailing Address: 555 LESLIE STREET		
City: UKIAH	State: CA	ZIP: 95482

IV. Mine Operator: HOMESTAKE MINING COMPANY		
Contact Person: RAYMOND BRAUSS		Telephone: (707) 995-6070
Mailing Address: P.O. BOX 1010/26775 MORGAN VALLEY RD.		
City: LOWER LAKE	State: CA	ZIP: 95457

V. Date Inspection Began: OCTOBER 4, 1991	Time Inspection Began: (AM) PM	Duration of Inspection: 4 HOURS
Reason for Inspection Code(s): RI	Date Inspection Ended: OCTOBER 4, 1991	Weather Code(s): CR
Reinspection Code(s): N/A	Joint Inspection Agency Code(s): BLM, O	Post-inspection Agency Code(s): N/A

DISTRIBUTION: White - Operator; Green - State (by Lead Agency); Canary - BLM (if required); Pink - Lead Agency; Goldenrod - State (by Operator)

UNITED STATES
DEPARTMENT OF INTERIOR
BUREAU OF LAND MANAGEMENT

STATE OF CALIFORNIA
DEPARTMENT OF CONSERVATION
MINE REPORTING & RECLAMATION COMPLIANCE

SURFACE MINING INSPECTION REPORT

Form MRRC-1 Page 2 (New 5/91)

VI. Does the operation have:	P	NR	YES	NO	ND
An approved Reclamation Plan?			X		
A permit to mine?			X		
Approved financial assurances?			X		
		NR	YES	NO	ND
Has the operator filed a Mining Operation Annual Report (MRRC-2)?			X		
FOR BLM USE		OK	VN	NA	NI
Approved Plan of Operations*		X			
Cyanide Management				X	
Other					

Is the operation in compliance with provisions of the approved reclamation plan with respect to:	OK	VN	NA	NI
Wildlife Habitat	X			
Revegetation	X			
Agricultural Land			X	
Stream Protection	X			
Tailings and Mine Waste Management	X			
Building, Structure and Equipment Removal			X	
Topsoil Salvage, Maintenance, and Redistribution	X			
Backfilling, Regrading, Slope Stability, and Recontouring	X			
Drainage, Diversion Structures, Waterways, and Erosion	X			
Other				

VII. Comments/Description of Violations and Corrective Measures Required
(Note: Please indicate if you have attached notices of violations and correction orders in lieu of description on this form.)

NO VIOLATIONS NOTED.

VIII. Number of Violations	Inspector's Signature	Date Signed
-0-	THERESE AMLIN Therese Amlin	11/6/91 11/6/91

DISTRIBUTION: White - Operator; Green - State (by Lead Agency); Canary - BLM (if required); Pink - Lead Agency; Goldenrod - State (by Operator)

UNITED STATES
DEPARTMENT OF INTERIOR
BUREAU OF LAND MANAGEMENT

STATE OF CALIFORNIA
DEPARTMENT OF CONSERVATION
MINE REPORTING & RECLAMATION COMPLIANCE

SURFACE MINING INSPECTION REPORT

Form MRRC-1 Page 1 (New 5/91)

Instructions for completing this form are on the reverse side. Attach notices of violation and orders to comply for all observed non-compliance.

I. Mining Operation Name	CA Mine ID #
McLaughlin Mine	91-28-003

II. Lead Agency Name		
Lake County Planning Department, Resource Management Division		
Inspector: Steve Zalusky		Telephone: (707) 263-2221
Title: Environmental Officer	Organization: Planning Department	
Mailing Address: 255 N. Forbes St.		
City: Lakeport	State: CA	ZIP: 95453

III. BLM ID #	Resource Area	
Contact Person		Telephone
Mailing Address		
City	State	ZIP

IV. Mine Operator		
Homestake Mining Co.		
Contact Person: Ray Krauss		Telephone: (916) 446-1070
Mailing Address: 26775 Morgan Valley Rd.		
City: Lower Lake,	State: CA	ZIP: 95457

V. Date Inspection Began	Time Inspection Began	Duration of Inspection
10/4/91	10:00 AM PM	3 hrs.
Reason for Inspection Code(s): Routine (RI)	Date Inspection Ended: 10/4/91	Weather Code(s): CR
Reinspection Code(s)	Joint Inspection Agency Code(s): BLM	Post-inspection Agency Code(s)

DISTRIBUTION: White - Operator; Green - State (by Lead Agency); Canary - BLM (if required); Pink - Lead Agency; Goldenrod - State (by Operator)

UNITED STATES
DEPARTMENT OF INTERIOR
BUREAU OF LAND MANAGEMENT

STATE OF CALIFORNI
DEPARTMENT OF CONSERV
MINE REPORTING & RECLAMATION COMP

SURFACE MINING INSPECTION REPORT

Form MRRC-1 Page 2 (New 5/91)

VI. Does the operation have:	P	NR	YES	NO	ND
An approved Reclamation Plan?			X		
A permit to mine?			X		
Approved financial assurances?			X		
		NR	YES	NO	ND
Has the operator filed a Mining Operation Annual Report (MRRC-2)?			X		
FOR BLM USE		OK	VN	NA	NI
Approved Plan of Operations*					
Cyanide Management					
Other					

Is the operation in compliance with provisions of the approved reclamation plan with respect to:	OK	VN	NA	NI
Wildlife Habitat	X			
Revegetation	X			
Agricultural Land	X			
Stream Protection	X			
Tailings and Mine Waste Management	X			
Building, Structure and Equipment Removal	X			
Topsoil Salvage, Maintenance, and Redistribution	X			
Backfilling, Regrading, Slope Stability, and Recontouring	X			
Drainage, Diversion Structures, Waterways, and Erosion	X			
Other				

VII. Comments/Description of Violations and Corrective Measures Required
(Note: Please indicate if you have attached notices of violations and correction orders in lieu of description on this form.)

The pperator is in compliance with the permit to mine and reclamation plan. At the time of inspection all required seeding and revegetation had been completed in preparation for the winter. Phase II of the tailings pond had been completed and revegeta tated. The borrow site for material used in the phase two construction has been reclaimed as a wildlife pond. The area around the pond has been retopsoiled and replanto with grass.

VIII. Number of Violations	Inspector's Signature	Date Signed
	[signature]	10/2/91

DISTRIBUTION: White - Operator; Green - State (by Lead Agency); Canary - BLM (if required); Pink - Lead Agency; Goldenrod - State (by Operator)

UNITED STATES
DEPARTMENT OF INTERIOR
BUREAU OF LAND MANAGEMENT

STATE OF CALIFORNIA
DEPARTMENT OF CONSERVATION
MINE REPORTING & RECLAMATION COMPLIANCE

SURFACE MINING INSPECTION REPORT

Form MRRC-1 Page 1 (New 5/91)

Instructions for completing this form are on the reverse side. Attach notices of violation and orders to comply for all observed non-compliance.

I. Mining Operation Name	CA Mine ID #
MCLAUGHLIN PROJECT - HOMESTAKE MINING COMPANY	91-28-003

II. Lead Agency Name		
YOLO COUNTY		
Inspector: MICHAEL W. LUKEN		Telephone: (916) 666-8020
Title: ASSISTANT PLANNER	Organization: YOLO COUNTY COMMUNITY DEVELOPMENT AGENCY	
Mailing Address: 292 WST. BEAMER STREET		
City: WOODLAND	State: CALIFORNIA	ZIP: 95695

III. BLM ID #	Resource Area	
Contact Person		Telephone
Mailing Address		
City	State	ZIP

IV. Mine Operator		
HOMESTAKE MINING COMPANY		
Contact Person: RAY KRAUSS ENVIRONMENTAL MANAGER		Telephone: (707) 995-6070
Mailing Address: 26775 MORGAN VALLEY ROAD		
City: LOWER LAKE	State: CALIFORNIA	ZIP: 95457

V. Date Inspection Began	Time Inspection Began	Duration of Inspection
11/4/91	1:30 AM (PM)	1 HR 15 MIN
Reason for Inspection Code(s): ROUTINE (RI)	Date Inspection Ended: 11/4/91	Weather Code(s): CR
Reinspection Code(s)	Joint Inspection Agency Code(s)	Post-inspection Agency Code(s)

DISTRIBUTION: White - Operator; Green - State (by Lead Agency); Canary - BLM (if required); Pink - Lead Agency; Goldenrod - State (by Operator)

89063538714



B89063538714A

UNITED STATES
DEPARTMENT OF INTERIOR
BUREAU OF LAND MANAGEMENT

STATE OF CALIFORNIA
DEPARTMENT OF CONSERVATION
MINE REPORTING & RECLAMATION COMPLIANCE

SURFACE MINING INSPECTION REPORT

Form MRRC-1 Page 2 (New 5/91)

VI. Does the operation have:	P	NR	YES	NO	ND
An approved Reclamation Plan?			X		
A permit to mine?			X		
Approved financial assurances?			X		

	NR	YES	NO	ND
Has the operator filed a Mining Operation Annual Report (MRRC-2)?				

FOR BLM USE	OK	VN	NA	NI
Approved Plan of Operations*				
Cyanide Management				
Other				

Is the operation in compliance with provisions of the approved reclamation plan with respect to:	OK	VN	NA	NI
Wildlife Habitat	X			
Revegetation	X			
Agricultural Land	X			
Stream Protection	X			
Tailings and Mine Waste Management	N/A			
Building, Structure and Equipment Removal	X			
Topsoil Salvage, Maintenance, and Redistribution	X			
Backfilling, Regrading, Slope Stability, and Recontouring	X			
Drainage, Diversion Structures, Waterways, and Erosion	X			
Other	X			

VII. Comments/Description of Violations and Corrective Measures Required
(Note: Please indicate if you have attached notices of violations and correction orders in lieu of description on this form.)

VIII. Number of Violations	Inspector's Signature	Date Signed
0		11-1-91

DISTRIBUTION: White - Operator; Green - State (by Lead Agency); Canary - BLM (if required); Pink - Lead Agency; Goldenrod - State (by Operator)