Appendix B, C, D.

Exxon Minerals Company
Rhinelander, Wisconsin: Exxon Minerals Company, [s.d.]

https://digital.library.wisc.edu/1711.dl/P2UZQOJG3C4GW8Z

APPENDIX B

AIR EMISSION RATE CALCULATIONS

DECEMBER 1985

APPENDIX B

AIR EMISSION RATE CALCULATIONS

I. MINE CONSTRUCTION

1. Drilling and Blasting - These procedures were used to estimate TSP emissions from the different shaft sinkings (i.e., main, exhaust) and general underground development, and are presented under its respective heading below.

a. Construct Mine Support Facilities - Blasting of bedrock to designated shaft depth using dynamite.

Emission Factor and Source: TSP-EF for emitted particles of less than or equal to 30 um; U.S. EPA (EPA, 1983) AP-42, Table 8.24-2, Blasting - Surface Coal Mining

$$TSP\text{-}EF = \frac{344(A)^{0.8}}{(D)^{1.8}(M)^{1.9}}$$

where:

A = area blasted - m^2
D = hole depth - m
M = material moisture content - %

$SO_2(H_2S)$ - 3.0 kg/t of dynamite, AP-42, Table 11.3-1
CO - 141.0 kg/t of dynamite, AP-42, Table 11.3-1

Sink Main Shaft

A = $(7.9\ m/2)^2$ x 3.14 ÷ 2 = 24.5 m^2 (i.e., one-half of area/blast)
D = 2.12 m
M = 15%

$$TSP\text{-}EF = \frac{344(24.5)^{0.8}}{(2.12)^{1.8}(15)^{1.9}} = 6.6 \text{ kg/blast x 2 blasts/day} = 13.2 \text{ kg/d}$$

Process Rate:

TSP - 2 blasts/day, 30 blast days/month and 400 blast days/13.3 months

SO_2(CO) - 160 kg dynamite/blast
- 160 kg dynamite/h, 320 kg dynamite/d, 116 t dynamite/y

Example Calculation:

TSP - 400 blast days/13.3 months x 13.2 kg/day x t/1000 kg = 5.3 t/13.3 months

SO_2 - 160 kg dynamite/h x 3.0 kg/t x t/1000 kg = 0.48 kg/h

Total TSP (Sink Main Shaft) = 5.8 st/13.3 months (Construction Phase - Years 1-2); 5.3 st/yr (Year 2)

SO_2 = 0.38 t/13.3 months (0.42 st/13.3 months); 0.35 t/y (0.39 st/yr)

CO = 18.1 t/13.3 month (19.9 st/13.3 months); 16.4 t/y (18.0 st/yr)

Construct East Exhaust Shaft (Raise) - EER

A = $(6.1 \text{ m}/2)^2 \times 3.14 \div 2 = 14.6 \text{ m}^2$ (i.e., one-half of area/blast)
D = 2.12 m
M = 15%

$$\text{TSP-EF} = \frac{344(14.6)^{0.8}}{(2.12)^{1.8}(15)^{1.9}} = 4.4 \text{ kg/blast} \times 3 \text{ blasts/day} = 13.2 \text{ kg/d}$$

Process Rate:

TSP - 3 blasts/day, 30 blast days/month, 270 blast days/9 months

SO_2(CO) - 220 kg dynamite/blast
- 220 kg dynamite/h, 660 kg dynamite/d, 178.2 t dynamite/y

Example Calculation:

TSP - 270 blast days/y (9 months) x 13.2 kg/day x t/1000 kg = 3.6 t/y

SO_2 - 178.2 t dynamite/y (9 months) x 3.0 kg/t x t/1000 kg = 0.54 t/y

Total TSP (EER) = 4.0 st/yr (Construction Phase - Year 2)

SO_2 = 0.6 st/yr

CO = 27.6 st/yr

Construct West Exhaust Shaft (Raise) - WER

TSP = Same as EER

Total TSP (WER) = 4.0 st/yr (Operation Phase - Year 5)

SO_2 = 0.6 st/yr

CO = 27.6 st/yr

b. Underground Mine Development - Use of 90% ANFO and 10% water gel for blasting rock openings of varying dimensions during drift construction and stope development.

Emission Factors and Source:

TSP - 0.0013 kg/t (for blasting overburden and coal); From American Mining Congress report on "Fugitive Dust Emission Factors for the Mining Industry," Appendix D, p. D-3 - Colorado Fugitive Emissions.

SO_2 - 1.0 kg/t of ANFO, AP-42, Table 11.3-1

NO_x - 8.0 kg/t of ANFO, AP-42, Table 11.3-1

CO - 34.0 kg/t of ANFO, AP-42, Table 11.3-1

Pb - 0.005 kg/t of rock, AP-42, Tables 7.18-1 and 8.23-1.

Process Rate:

Construction Year	Waste Rock (k-st)	Ore (k-st)	Total (k=st)	TSP st/yr
1	2	-	2	0.03
2	130	-	130	0.17
3	583	385	968 (97)*	1.3

*See Table 4.1 - Mill/Concentrator Operations, 1. Coarse Ore Transport, Construction Phase - Year 3; includes approximately 10% contingency for rock blasted but in inventory in the mine.

Peak Production Levels Expected

	Hourly	Daily	Yearly
Rock			
Stope	34,000 t	34,000 t	350,000 t
Drifts	1,550 t	4,650 t	530,000 t
ANFO Ratio			
Stope	0.45 kg/t	0.45 kg/t	0.45 kg/t
Drifts	1.81 kg/t	1.81 kg/t	1.81 kg/t
ANFO Total	18.1 t	23.7 t	1,117 t

Duration: As required by process rate.

Control Method and Efficiency: Residence settling and humid underground environment.

Example Calculation:

Process Rate x Emission Factor = Emission Rate

TSP - 968,000 st/yr x 0.0026 lb/st x st/2000 lbs = 1.3 st/yr
SO_2 - 1,117 t/yr x 1.0 kg/t x 2.2 lb/kg x t/1.1 st x st/2000 lbs = 1.1 st/yr

Total TSP (Underground Mine Development) = 1.3 st/yr

SO_2 = 1.1 st/yr

NO_x = 8.9 st/yr

CO = 38.0 st/yr

Pb = 0.001 st/yr

Emitting Device: Total quantity of component air emissions will exit the mine at the east exhaust shaft (EER). The shaft will have three fans, similar to the Joy M96-58-880, which will produce approximately 220,000 cfm at 450 hp each.

2. Power Generation (Construction) - The use of temporary diesel generators may be necessary for the first six months of the construction phase if transmission line electrical power is not available at the site. One 1000-kw unit will be required during these months to supply electrical power for mine shaft and mine/mill surface facilities construction. The resultant emissions from this unit were estimated as follows:

Diesel Generator

Emission Factors and Source: AP-42, Appendix - C, Internal Combustion - electric generation - diesel

TSP	-	13.0 lbs/10^3 gal
SO_x	-	140.0 lbs/10^3 gal
NO_x	-	370.0 lbs/10^3 gal
CO	-	225.0 lbs/10^3 gal
HC	-	37.0 lbs/10^3 gal

Process Rate: 74 gal/hr, 1,764 gal/day, and 49,392 gal/month

Duration: First six months of construction phase

Control Method and Efficiency: None

Example Calculation:

TSP - 49,392 gal/month x 13.0 lbs/10^3 gal x 6 months x st/2000 lbs = 1.9 st/yr

	st/yr
TSP:	1.9
SO_x:	20.8
NO_x:	54.8
CO :	33.3
HC :	5.5

3. Mine Air Heating - Use of natural gas for direct-fired mine air heating during construction. Heat content is 1000 btu/ft^3.

Emission Factors and Source:

TSP	-	10.0 lb/$10^6 ft^3$, NEDS-APP.C-12/75, Nat. Gas 10-100 10^6btu/hr
SO_2	-	0.6 lb/$10^6 ft^3$, NEDS-APP.C-12/75, Nat. Gas 10-100 10^6btu/hr
NO_x	-	120.0 lb/$10^6 ft^3$, NEDS-APP.C-12/75, Nat. Gas 10-100 10^6btu/hr
CO	-	20.0 lb/$10^6 ft^3$, NEDS-APP.C-12/75, Nat. Gas 10-100 10^6btu/hr
HC	-	8.0 lb/$10^6 ft^3$, NEDS-APP.C-12/75, Nat. Gas 10-100 10^6btu/hr

Process Rate:

Estimated Peak Production Levels

Hourly	Daily	Yearly
0.0383 $10^6 ft^3$	0.734 $10^6 ft^3$	43.99 $10^6 ft^3$

Duration: As required by process rate.

Control Method and Efficiency: Use of clean burning natural gas in a highly efficient direct fired furnace.

Example Calculation:

Process Rate x Emission Factor = Emission Rate

TSP:

0.0383 $10^6 ft^3/hr$ x 10.0 $lb/10^6 ft^3$ = 0.38 lb/hr

Emitting Device: Same as drilling and blasting

4. Mine Vehicles - Use of diesel equipment to move personnel, materials, and rock during mine construction. Diesel fuel will contain no more than 0.3 weight percent sulfur.

Emission Factors and Source:

TSP - 11.5 $lb/10^3$ gal fuel (1.61 g/kg fuel)*

SO_2 - 42.8 $lb/10^3$ gal fuel (6.0 g/kg fuel)**

NO_x - 43.6 $lb/10^3$ gal fuel (6.1 g/kg fuel)**

CO - 21.4 $lb/10^3$ gal fuel (3.0 g/kg fuel)**

HC - 2.4 $lb/10^3$ gal fuel (0.34 g/kg fuel)**

---

*Estimate from data provided in Steward, D.B., Ebersole, J.A.D., and Mogan, J.P. 1978. Baseline exhaust emissions from a new Deutz F6L 912W after fifty hours of engine operation. CANMET. Mining Research Laboratories Report MRP/MRL 78-50(TR). Ottawa, Ontario, Canada.

**Emission factors were obtained from personal communications with the Deutz Corporation for their FL-413FW or FL-912W series diesel engines (letters dated September 10 and October 11, 1985).

Process Rate:

Peak Volumes of Diesel Fuel Used

Hourly	Daily	Yearly
130 gal	1800 gal	542,000 gal

Duration: As noted by process rate.

Control Method and Efficiency: Use of cleaning burning air cooled Deutz engines with a ceramic filter and recirculation of exhaust gas. All emission factors include control, except SO_2.

Example Calculation:

Process Rate x Emission Factor = Emission Rate

TSP:

0.13×10^3 gal/hr x 11.5 lb/10^3 gal fuel = 1.5 lb/hr

542.0×10^3 gal/yr x 11.5 lb/10^3 gal fuel x st/2000 lbs = 3.1 st/yr

Total TSP (Mine Vehicles) = 3.1 st/yr

SO_2 = 11.6 st/yr

NO_x = 11.8 st/yr

CO = 5.8 st/yr

HC = 0.7 st/yr

II. MINE OPERATION

1. Drilling and Blasting - Blasting of rock using 90% ANFO and 10% water gel for production stope blasting and drift development.

a. Underground Blasting

Emission Factors and Source: AP-42, Table 8.24-2, Blasting-Surface Coal Mining.

TSP-EF = $\leq$ 30 um

$$\text{TSP-EF} = \frac{344(A)^{0.8}}{(D)^{1.8}(M)^{1.9}}$$

where:

A = area blasted - m^2
D = hole depth - m
M = material moisture content - %

SO_2 - 1.0 kg/t of ANFO, AP-42, Table 11.3-1

NO_x - 8.0 kg/t of ANFO, AP-42, Table 11.3-1

CO - 34.0 kg/t of ANFO, AP-42, Table 11.3-1

Pb - 0.005 kg/t of rock, AP-42, Tables 7.18-1 and 8.23-1

Process Rate:

Estimated Peak Production Levels (Operation Phase - Years 2-16)

	Hourly	Daily	Yearly
Rock			
Stope	165,900 t	331,800 t	2,700,000 t
Drifts	1,400 t	4,200 t	477,000 t
ANFO Ratio			
Stope	0.45 kg/t	0.45 kg/t	0.45 kg/t
Drifts	1.81 kg/t	1.81 kg/t	1.81 kg/t
ANFO Total	77.2 t	156.9 t	2,078.4 t

Production Stopes

A = 39.4 m x 14.6 m = 575 m^2
D = depth of stope drillhole - 78.8 m
M = material moisture content - 4% minimum

$$\text{TSP-EF} = \frac{344(575)^{0.8}}{(78.8)^{1.8}(4)^{1.9}} = 1.5 \text{ kg/blast}$$

Stope blast material weight (W) = Volume (V) x Density
V = 575 m^2 x 78.8 m = 45,310 m^3/stope blast
Density = 3.66 t/m^3

W = 45,310 m^3/stope blast x 3.66 t/m^3 =
165834.6 (165,900) t/stope blast
2,700,000 t/yr ÷ 165,900 t/stope blast x
1.5 kg/blast x t/1000 kg = 0.02 t/yr

Development Headings

A = 3.6 m x 4.9 m = 17.6 m^2
D = depth of heading drill hole - 3.2 m
M = material moisture content - 4%

$$\text{TSP-EF} = \frac{344(17.6)^{0.8}}{(3.2)^{1.8}(4)^{1.9}} = 30.3 \text{ kg/blast}$$

W = V x Density
V = 17.6 m^2 x 3.2 m = 56.3 m^3
Density = 3.66 t/m^3

Duration: As required by process rate.

Control Method and Efficiency: Residence settling and humid underground environment.

Example Calculation:

Process Rate x Emission Factor = Emission Rate

SO_2 - 77.2 t/h x 1.0 kg/t = 77.2 kg/h

TSP:

W = 56.3 m^3/heading blast x 3.66 t/m^3 = 206.1 t/heading blast
477,000 t/yr ÷ 206.1 t/heading blast x 30.3 kg/heading blast x t/1000 kg = 70.1 t/yr

Total TSP (underground blasting) = 70.1 t/yr before gravity settling.

Underground Blasting Emissions With Gravity Settling:

Production Stopes and Development Headings - using average distances and velocities to the mine exhaust shafts (Use 350 level stope 3-18 as a typical scheme).

Mine ventilation air stream branch velocities:

Horizontal Velocity ft/minute	Distance ft	Time Minutes
137	345	2.5
86	267	3.1
621	628	1.0
417	510	1.2
732	979	1.3

Total = 9.1 minutes (546 seconds) - (i.e. horizontal airways only) for travel time from blast area to exhaust shaft.

Emission Factor and Source: AP-42, Appendix A-1, Stone quarrying and processing - crushing

Particle Size Distribution				
< 5 um	5 to 10 um	10 to 20 um	20 to 30 um	>30 um
25%	25%	25%	25%	0

Settling velocity: Particle density = 3.66 t/m^3

Settling height, average: 2.0 m

Weight Percent	Particle Size (um)	Vertical Settling Velocity (m/sec)		Time (sec)		Settled Distance
25%	<5	0.0036	x	546	=	1.96 m passed
25%	7.5 (5-10)	0.00637	x	546	=	3.48 m settled
25%	15 (10-20)	0.0254	x	546	=	13.87 m settled
25%	25 (20-30)	0.058	x	546	=	31.67 m settled

Determination of % Control (i.e. percent settled): Using a settling height of 2 m, all particles in the <5 um range are assumed to remain in the air stream. Therefore, 75% overall control (i.e. percent settled) is estimated for gravity settling of blasting TSP emissions.

Total TSP (underground blasting) with gravity settling estimated in the air stream from mine exhaust shafts.

70.1 t/yr x 0.25 (i.e. 1 - decimal fraction settled) = 17.5 t(19.3 st)/yr

b. Rock Handling

Handling Emissions at Stope Drawpoints and Development Headings:

Rock handling performed by LHD equipment. A maximum of 12 units in operation at any given time.

Emission Factor and Source: AP-42, Table 8.23-1, p. 8.23-4.

The use of this AP-42 section is not directly applicable because of the large size of the mined rock. However, the ore and waste rock is expected to have a moisture content of no less than 4% by weight and is considerably larger than that encountered after coarse rock crushing. Therefore, the values presented in EPA Table 8.23-1 are a conservative estimate of TSP emissions.

TSP-EF = 0.005 kg/t - Handling of high moisture rock

Process Rate: 900 t/hr, 12,000 t/day, 3,177,000 t/yr for ore and waste rock at maximum production rate.

Duration: As noted in process rate.

Control Method and Efficiency: Wetting dry piles.

Example Calculation:

TSP - 3,177,000 t/yr x 0.005 kg/t ÷ 1000 kg/t = 15.9 t/yr

Total TSP (stope drawpoints and development headings) = 15.9 t/yr before gravity settling.

Handling Emissions at Stope Drawpoints and Development Headings With Gravity Settling:

Emission Factor and Source: AP-42 Appendix A, Table A-1, p. A-3, Stone quarrying and processing - crushing

Particle Size Distribution

<5 um	5 to 10 um	10 to 20 um	20 to 44 um	>44 um
5%	5%	5%	10%	75%

Settling parameters and mine ventilation air stream branch velocities are the same as for the underground blasting emissions.

Weight Percent	Particle Size (um)	Vertical Settling Velocity (m/sec)		Time (sec)		Settled Distance
5%	<5	0.0036	x	546	=	1.96 m passed
5%	7.5 (5-10)	0.00637	x	546	=	3.48 m settled
5%	15 (10-20)	0.0254	x	546	=	13.87 m settled
10%	25 (20-44)	0.058	x	546	=	31.67 m settled
75%	>44	0.181	x	546	=	98.83 m settled

Determination of % Control (i.e. percent settled): Using a settling height of 2 m, all particles <5 um are assumed to settle. Therefore, 95% overall control (i.e. percent settled) is estimated for gravity settling of stope and development headings rock handling.

Total TSP (stope drawpoints and development headings) with gravity settling estimated in the air stream from the mine exhaust shafts.

15.9 t/yr x 0.05 (i.e. 1 - decimal fraction settled) = 0.8 t(0.9 st)/yr

Emissions from Handling at Orepasses and Waste Rock Passes:

Emission Factor and Source: AP-42, Table 8.23-1.

TSP-EF = 0.005 kg/t - Handling of high moisture rock

Process Rate: 900 t/hr, 12,000 t/day, 3,177,000 t/yr

Duration: As noted in process rate.

Control Method and Efficiency: Wetting if necessary.

Example Calculation:

TSP - 3,177,000 t/yr x 0.005 kg/t ÷ 1000 kg/t = 15.9 t/yr

Total TSP (orepasses and waste rock passes) = 15.9 t/yr before gravity settling.

Emissions from Handling at Orepasses and Waste Rock Passes with Gravity Settling:

Mine ventilation air stream branch velocities:

Horizontal Velocity ft/Minute	Distance ft	Time Minutes
621	628	1.0
417	510	1.2
732	979	1.3

Total = 3.5 minutes (210 seconds) - (i.e. horizontal airways only) for air travel time from load area to exhaust shaft.

Emission Factor and Source: AP-42, Appendix A, Table A-1, p. A-3, Stone quarrying and processing - crushing

Particle Size Distribution				
<5 um	5 to 10 um	10 to 20 um	20 to 44 um	>44 um
5%	5%	5%	10%	75%

Settling parameters are the same as for the underground blasting emissions.

Weight Percent	Particle Size (um)	Vertical Settling Velocity (m/sec)		Time (sec)		Settled Distance
5	<5	0.0036	x	210	=	0.76 m passed
5	7.5 (5-10)	0.00637	x	210	=	1.34 m passed
5	15 (10-20)	0.0254	x	210	=	5.33 m settled
10	25 (20-44)	0.058	x	210	=	12.18 m settled
75	>44	0.181	x	210	=	38.01 m settled

Determination of % Control (i.e. percent settled) Using a settling height of 2 m, all particles >10 um are assumed to settle. Therefore, 90% overall control (i.e. percent settled) is estimated for gravity settling for rock handling at orepasses and waste rock passes.

Total TSP (orepasses and waste rock passes) with gravity settling estimated in the air stream from mine exhaust shafts.

15.9 t/yr x 0.10 (i.e. 1 - decimal fraction settled) = 1.6 t(1.8 st)/yr

Emissions from Handling - Chute to Haulage Truck:

Emission Factor and Source: AP-42, Table 8.23-1

TSP-EF = 0.005 kg/t - Handling of high moisture ore

Process Rate: 775 t/hr, 14,000 t/day, 2,700,000 t/yr

Duration: As noted in process rate.

Control Method and Efficiency: Wetting if necessary.

Example Calculation:

TSP = 2,700,000 t/yr x 0.005 kg/t ÷ 1000 kg/t = 13.5 t/yr

Total TSP (chute to railcar) = 13.5 t/yr before gravity settling.

Emissions from Handling - Chute to Haulage Truck with Gravity Settling:

Particle size ranges are the same as for handling at orepasses and waste rock passes.

Mine ventilation air stream branch velocities:

Horizontal Velocity ft/minute	Distance ft	Time Minutes
285	50	0.18
285	100	0.35
1156	1235	1.07
1077	498	0.46
1268	479	0.38
1268	403	0.32
2536	160	0.06

Total = 2.82 minutes (169 seconds) - (i.e. horizontal airways only) for travel time from load area to exhaust shaft.

Settling parameters are the same as for the underground blasting emissions.

Weight Percent	Particle Size (um)	Vertical Settling Velocity (m/sec)		Time (sec)		Settled Distance
5	5	0.0036	x	169	=	0.61 m passed
5	7.5 (5-10)	0.00637	x	169	=	1.08 m passed
5	15 (10-20)	0.0254	x	169	=	4.29 m settled
10	25 (20-44)	0.058	x	169	=	9.80 m settled
75	>44	0.181	x	169	=	30.59 m settled

Determination of % Control (i.e. percent settled): Same as for handling at orepasses and waste rock passes.

Total TSP (chute to haulage trucks) with gravity settling estimated in the air stream from mine exhaust shafts.

13.5 t/yr x 0.10 (i.e. 1 - decimal fraction settled) = 1.4 t(1.5 st)/yr

Handling from Haulage Trucks into Crusher Feed Bins:

Emission Factor and Source: AP-42, Table 8.23-1

TSP-EF = 0.005 kg/t - Handling of high moisture ore

Process Rate: 775 t/hr, 14,000 t/day, 2,700,000 t/yr

Duration: As noted in process rate.

Control Method and Efficiency: Wetting if necessary.

Example Calculation:

TSP - 2,700,000 t/yr x 0.005 kg/t ÷ 1000 kg/t = 13.5 t/yr

Total TSP (haulage truck to crusher feed bins) = 13.5 t/yr before gravity settling.

Handling from Haulage Trucks into Crusher Feed Bins with Gravity Settling:

Particle size ranges are the same as for handling at orepasses and waste rock passes.

Mine ventilation air stream branch velocities:

Horizontal Velocity ft/minutes	Distance ft	Time Minutes
200	100	0.50
379	136	0.36
427	165	0.39
513	632	1.23
513	632	1.23
606	543	0.90
768	714	0.93
1609	890	0.55
1612	360	0.22
1610	242	0.15

Total = 6.46 minutes (387 seconds) - (i.e. horizontal airways only) for travel time from loadout area to exhaust shaft.

Settling parameters are the same as for the underground blasting emissions.

Weight Percent	Particle Size (um)	Vertical Settled Velocity (m/sec)		Time (sec)		Settled Distance
5	5	0.0036	x	387	=	1.39 m passed
5	7.5 (5-10)	0.00637	x	387	=	2.47 m settled
5	15 (10-20)	0.0254	x	387	=	9.83 m settled
10	25 (20-44)	0.058	x	387	=	22.45 m settled
75	>44	0.181	x	387	=	70.05 m settled

Determination of % Control (i.e. percent settled): Same as for handling at stope drawpoints and development headings.

Total TSP (haulage truck to crusher feed bins) with gravity settling estimated in the air stream from mine exhaust shafts.

13.5 t/yr x 0.05 (i.e. 1 - decimal fraction settled) = 0.7 t(0.8 st)/yr

Crusher Feed Bins to Primary Crusher:

Emission Factor and Source: AP-42, Table 8.23-1

TSP = 0.005 kg/t - Handling of high moisture rock

Process Rate: 550 t/hr, 12,000 t/day, 3,177,000 t/yr

Duration: As noted in process rate.

Control Method and Efficiency: Wetting if necessary.

Example Calculation:

TSP - 3,177,000 t/yr x 0.005 kg/t ÷ 1000 kg/t = 15.9 t/yr

Total TSP (feed bins to primary crusher) = 15.9 t/yr before gravity settling.

Crusher Feed Bins to Primary Crusher with Gravity Settling:

Particle size ranges, mine ventilation air stream branch velocities, settling parameters, and determination of % settled are the same as for handling from haulage trucks into crusher feed bins.

Total TSP (feed bins to primary crusher) with gravity settling estimated in the air stream from mine exhaust shafts.

15.9 t/yr x 0.05 (1 - decimal fraction settled) = 0.8 t(0.9 st)/yr

Coarse Crushing to -150 mm (-6 inches):

Emission Factor and Source: AP-42, Table 8.23-1

TSP = 0.01 kg/t - Primary crushing of high moisture rock

Process Rate: 550 t/hr, 12,000 t/day, 3,177,000 t/yr

Duration: As noted in process rate.

Control Method and Efficiency: Insertable Dust Collector, similar to DCE Vokes Model No. DLMV 45/15 F1 - 99% efficiency.

Example Calculation:

TSP - 3,177,000 t/yr x 0.01 kg/t ÷ 1000 kg/t x (1-0.99) = 0.3 t(0.3 st)/yr

Crusher Discharge to Picking Belt:

Emission Factor and Source: AP-42, Table 8.23-1

TSP - 0.005 kg/t - Transfer of high moisture rock

Process Rate: 550 t/hr, 12,000 t/day, 3,177,000 t/yr

Duration: As noted in process rate.

Control Method and Efficiency: Insertable Dust Collector, similar to DCE Vokes Model No. DLMV 45/15 F1 - 99% efficiency.

Example Calculation:

TSP - 3,177,000 t/yr x 0.005 kg/t ÷ 1000 kg/t x (1-0.99) = 0.2 t(0.2 st)/yr

Transfer from Picking Belt to Loading Belt:

Emission Factor and Source: AP-42, Table 8.23-1

TSP - 0.005 kg/t - Transfer of high moisture rock

Process Rate: 550 t/hr, 12,000 t/day, 3,177,000 t/yr

Duration: As noted in process rate.

Control Method and Efficiency: Insertable Dust Collector, similar to DCE Vokes Model No. DLMV 45/15 F1 - 99% efficiency.

Example Calculation:

TSP - 3,177,000 t/yr x 0.005 kg/t ÷ 1000 kg/t x (1-0.99) = 0.2 t(0.2 st)/yr

Transfer from Loading Belt to Hoisting Pocket:

Emission Factor and Source: AP-42, Table 8.23-1

TSP - 0.005 kg/t - Transfer of high moisture rock

Process Rate: 1200 t/hr, 22,000 t/day, 3,177,000 t/yr

Duration: As noted in process rate.

Control Method and Efficiency: Insertable Dust Collector, similar to DCE Vokes Model No. DLMV 45/15 F1 - 99% efficiency.

Example Calculation:

TSP - 3,177,000 x 0.005 kg/t ÷ 1000 kg/t x (1-0.99) = 0.2 t(0.2 st)/yr

Transfer from Hoisting Pocket into Skip:

Emission Factor and Source: AP-42, Table 8.23-1

TSP = 0.005 kg/t - Transfer of high moisture rock

Process Rate: 550 t/hr, 12,000 t/day, 3,177,000 t/yr

Duration: As noted in process rate.

Control Method and Efficiency: Insertable Dust Collector, similar to DCE Vokes Model No. DLMV 45/15 F1 - 99% efficiency.

Example Calculation:

TSP - 3,177,000 t/yr x 0.005 kg/t ÷ 1000 kg/t x (1-0.99) = 0.2 t (0.2 st)/yr

TOTAL Estimated Underground Emissions

	st/yr
TSP	
Blasting	19.3
Rock Handling	
Stope Drawpoints and development headings	0.9
Orepasses and waste rock passes	1.8
Chute to haulage trucks	1.5
Haulage truck into crusher feed bins	0.8
Feed bins to primary crusher	0.9
Coarse crushing	0.3
Crusher discharge to picking belt	0.2
Picking belt to loading belt	0.2
Loading belt to hoisting pocket	0.2
Hoisting pocket into skip	0.2
Total	26.3

SO_2 = 2.3 st/yr

NO_x = 18.3 st/yr

CO = 77.8 st/yr

Pb = 0.005 st/yr

2. Mine Air Heating - Use of natural gas (heat content 1000 BTU/SCF) for direct-fired mine air heating.

Emission Factor and Source: EPA NEDS - Source classification codes, Appendix C, p. C-5, 12/75.

TSP - 10.0 lb/10^6 SCF (4.54 kg/10^6 SCF)

SO_x - 0.6 lb/10^6 SCF (0.27 kg/10^6 SCF)

NO_x - 120.0 lb/10^6 SCF (54.48 kg/10^6 SCF)

CO - 20.0 lb/10^6 SCF (9.08 kg/10^6 SCF)

HC - 8.0 lb/10^6 SCF (3.63 kg/10^6 SCF)

Process Rate: 76,500 SCF/hr, 1.5 x 10^6 SCF/day, 88.0 x 10^6 SCF/yr

Duration: When weather conditions require.

Control Method and Efficiency: Use of natural gas.

Example Calculation:

TSP - 88.0 x 10^6 SCF/yr x 4.54 kg/10^6 SCF ÷ 1000 kg/t = 0.4 t (0.4 st)/yr

3. Mine Vehicles (Mobile Equipment) - Use of diesel equipment to move personnel, materials, and rock. Diesel fuel will contain no more than 0.3 weight percent sulfur.

Emission Factor and Source: Emission factors were obtained from personal communications with the Deutz Corporation for their FL-413W or FL-912W series diesel engines (letters dated September 10 and October 11, 1985).

TSP - 11.5 lb/10^3 gal (1.61 g/kg)*

SO_x - 42.8 lb/10^3 gal (6.0 g/kg)

NO_x - 43.6 lb/10^3 gal (6.1 g/kg)

CO - 21.4 lb/10^3 gal (3.0 g/kg)

HC - 2.4 lb/10^3 gal (0.34 g/kg)

*Estimate from data provided in Stewart, D.B., Ebensole, J. A. D., and Morgan, J.P. 1978. Baseline exhaust emissions from a new Deutz F6L 912W aafter fifty hours of engine operation. CANMET. Mining Research Laboratories Report MPR/MRL 78-50 (TR). Ottawa, Ontario, Canada.

Process Rate: 950 l/hr, 13,076 l/day, 4,246,316 l/yr

Duration: As noted by process rate.

Control Method and Efficiency: Use of clean burning air cooled Deutz engines with a ceramic filter and recirculation of exhaust gas. All emission factors include control, except SO_2.

Example Calculation:

$$TSP - \frac{4,246,316\ l/yr \times 0.845\ kg/l \times 0.00161\ kg(TSP)/kg}{1000\ kg/t} = 5.8\ t(6.4\ st)/yr$$

Emitting Device (Mine Operation): Total quantities of component air emissions will exit the mine at the east and west exhaust shafts (EER and WER). Each shaft will have two fans similar to a Joy M96-58-880 that will produce approximately 220,000 cfm at 450 hp each.

III. MINE/MILL SURFACE FACILITIES CONSTRUCTION

1. Concrete Batch Plant - Mixing of aggregate, sand, and cement for use during plant construction activities:

Emission Factor and Source: AP-42, Table 8.10-2

		kg/t
TSP -	Transfer of sand and aggregate to elevated bins	= 0.02
	Cement unloading to elevated storage silos	= 0.118
	Weight hopper loading of cement, sand, and aggregate	= 0.118
	Mixer loading of cement, sand, and aggregate	= 0.01
	Loading of dry-batch truck	= 0.02

Process Rate: 38.3 m^3/shift, 1 shift/day, 5 days/wk, 52 wks/yr

Sand and Aggregate	75.2 t/day	19,558 t/yr
Cement	16.7 t/day	4,342 t/yr
Total	91.9 t/day	23,900 t/yr

Control Method and Efficiency: Baghouse with ducting and insertable collector - 99% control efficiency, AP-42, Table 8.10-1; Other - 90% control efficiency.

Example Calculation:

Yearly -
19,558 t/yr x 0.02 kg/t x (1-0.90) ÷ 1000 kg/t = 0.04 t/yr
4,342 t/yr x 0.118 kg/t x (1-0.99) ÷ 1000 kg/t = 0.005 t/yr
23,900 t/yr x 0.118 kg/t x (1-0.90) ÷ 1000 kg/t = 0.282 t/yr
23,900 t/yr x 0.01 kg/t x (1-0.90) ÷ 1000 kg/t = 0.024 t/yr
23,900 t/yr x 0.02 kg/t x (1-0.90) ÷ 1000 kg/t = 0.048 t/yr
0.399 t/yr
(0.44 st/yr)

Total Annual Estimated Emissions = 0.40 t/yr (0.44 st/yr)

2. Site Preparation

a. Mine Shafts - The surface construction activities necessary to prepare for sinking of the main mine shaft, east and west exhaust shafts (i.e. raises), and development of the explosives magazine, the preproduction ore storage pad, and the road to the potable water supply well are the estimates provided under the heading of mine/mill surface facilities construction. The estimated TSP air emissions for the construction of these individual areas are provided below.

Emission Factor and Source: AP-42, Section 11.2.4

TSP-EF - 1.2 st/acre/month

Access road to potable water supply well with pad - outside fence

Process Rate:

Road - $\frac{235\ m \times 6\ m}{4047\ m^2/acre}$ = 0.35 acres

Pad - $\frac{(25\ m/2)2}{4047\ m^2/acre}$ = 0.12 acres

0.47 acres

Access road to east exhaust shaft (EER) with pad - outside fence

Process Rate:

Road - $\frac{135\ m \times 6\ m}{4047\ m^2/acre}$ = 0.20 acres

Pad - $\frac{20\ m \times 20\ m}{4047\ m^2/acre}$ = 0.10 acres

0.30 acres

Access road to west exhaust shaft (WER) with pad - outside fence

Process Rate:

Road - $\frac{45\ m \times 6\ m}{4047\ m^2/acre}$ = 0.07 acres

Pad - $\frac{20\ m \times 20\ m}{4047\ m^2/acre}$ = 0.10 acres

0.17 acres

Access road to explosives magazine and pad - outside fence

Process Rate:

Road - $\frac{88\ m \times 6\ m}{4047\ m^2/acre}$ = 0.13 acres

- $\frac{527\ m \times 8\ m}{4047\ m^2/acre}$ = 1.04 acres

Pad - $\frac{55\ m \times 120\ m}{4047\ m^2/acre}$ = 1.63 acres

2.80 acres

Access road to preproduction ore storage pad - outside fence

Process Rate:

Road - $\frac{240 \text{ m} \times 24 \text{ m}}{4047 \text{ m}^2/\text{acre}}$ = 1.42 acres

Pad - $\frac{188 \text{ m} \times 188 \text{ m}}{4047 \text{ m}^2/\text{acre}}$ = 8.73 acres

- $\frac{125 \text{ m} \times 25 \text{ m}}{4047 \text{ m}^2/\text{acre}}$ = 0.77 acres

10.92 acres

Total All = 14.7 acres

Duration: Assume all activities occur in the same month.

Control Method and Efficiency: Watering of disburbed area if necessary

Example Calculation:

TSP - 1.2 st/acre/month x 14.7 acres = 17.6 st

b. Mine/Mill Site - Earthmoving and excavation activities will occur to clear and grade the site to allow foundation work for structures and roads.

Major mine/mill surface facilities development will be completed within the first 12 months of the construction phase.

The following calculations estimate the air emissions if burning instead of mulching occurs for the tree stumps and brush accumulated from the mine/mill site construction (see also Kulibert, 1984). Burning will be on the surface in an open area.

Emission Factors and Source: AP-42, Table 2.4-2, Forest residues - unspecified.

Particulate (TSP)	NO_x	CO	HC
lb/st	lb/st	lb/st	lb/st
17	4	140	24.7

Process Rate: Total burn

Duration: 12 months

Control Method and Efficiency: None

Example Calculations: 960 st of Forest residues for 104 acres

TSP: st of brush/yr x TSP lbs/st x st/2000 lbs =
960 st/yr x 17 lb/st x st/2000 lbs = 8.2 st/yr

NO_x: 960 x 4 ÷ 2000 = 1.9 st/yr

CO : 960 x 140 ÷ 2000 = 67.2 st/yr

HC : 960 x 24.7 ÷ 2000 = 11.9 st/yr

Construction Activities

Emission Factors and Source: Two emission factors are used to represent fugitive dust (TSP) emissions from mine/mill site construction activities. On-site construction activities will be represented by the general factor 1.2 st/acre/month. This general factor was not adjusted based on the site area estimated silt content of 15% from soil classification tests. In addition, some of the surface till will be hauled to the MWDF. Hauling emissions will be based on the following factor from AP-42 and as specified by WDNR in the September 12, 1983, letter.

Emission Factor and Source: AP-42 (i.e. May 1983), Section 11.2.1 - Unpaved roads

$$TSP\text{-}EF = k\ 5.9\ (s/12)(S/30)^{2*}(W/3)^{0.7}(w/4)^{0.5}\ (d/365) = lb/veh\text{-}mile$$

TSP-EF = Suspended particulate emissions - lb/veh-mile
k = Particle size multiplier - 0.8
s = Silt content of gravel road surface material in % - 6%**
S = Average vehicle speed - 15 mi/hr
W = Average vehicle weight - tons(st)
w = Average number of wheels per vehicle
d = Dry days per year - 230 days

* The factor (S/30) is valid for a speed range of 30 to 50 mph. Below 30 mph the square of the factor is recommended (WDEQ 1979. Fugitive dust emission factors. Cheyenne, WY: Wyoming Department of Environmental Quality, Division of Air Quality. January 24 Memorandum from Charles Collins).

** The silt content (i.e. 6%) used in this calculation was as recommended by the DNR. Further, the calculations estimating the emissions are for the total year and not just the summer months.

Process Rate: 12 months.

Control Method and Efficiency: Wetting of disturbed area if necessary.

Example Calculations:

On-site construction

Site preparation completed in 12 months
Mine/mill site = 104 acres
Area disturbed/month = 104 ÷ 12 = 8.7 acres

Emissions (uncontrolled) = 1.2 st/acre/month x 8.7 acres x 12 months/yr
= 125.3 st/yr

Emissions (controlled) = 125.3 x 0.5* = 62.6 st/yr

* Control factor for watering from AP-42, Section 11.2.4

Hauling of excavated till from mine/mill site to MWDF

Total soil material hauled:

96,396 yd^3 x 2,970 lb/yd^3 x st/2,000 lbs = 143,148 st
Assume 35 st/haul truck
Total number of trips = 4,090
Round trip miles from mine/mill site to MWDF = 4 miles
Total miles = 4,090 trips x 4 miles/trip = 16,360 miles

$$TSP\text{-}EF = (0.8)5.9(s/12)(S/30)^2(W/3)^{0.7}(w/4)^{0.5}(d/365) = lb/veh\text{-}mile$$
$$= (0.8)5.9(6/12)(15/30)^2(51/3)^{0.7}(6/4)^{0.5}(230/365) =$$
$$= 3.3\ lb/veh\text{-}mile$$

Emissions (uncontrolled) = 3.3 lb/veh-mile x 16,360 miles x st/2,000 lb
= 27.0 st/yr

Emissions (controlled) = 27.0 st x 0.15** = 4.1 st/yr

** 85% control with chemical stabilization

Total TSP emissions from mine/mill site development including earth-moving and excavation activites = 66.7 st/yr.

c. MWDF Area - Estimates included here are for clearing the land, and surface earthwork (excavation to approximately 10 ft). The estimates use the primary emission factor from AP-42 for construction activities for project facilities. However, where deep excavation (greater than 10 ft) and major hauling of soil material within the excavated area is involved, the TSP emissions from hauling and loading and dumping of the soil material were calculated separately (i.e., in addition to the general construction emissions).

Emission Factor and Source: 1.2 st/acre/month; EPA AP-42, Section 11.2.4; Clearing and excavation (i.e., heavy construction)

Assume: Based on surface area disturbed in one year - Tailing Pond T1 - approximately 60 acres (Construction Phase - Years 1 and 2). Therefore, approximately 30 acres will be disturbed each of the first two years of Tailings Pond T1 development.

Duration: 12 months (30 ÷12 = 2.5 acres/month)

Example Calculation:

TSP = 1.2 st/acre/month x 2.5 acres/month x 12 months/yr = 36.0 st/yr

d. Access Road/Powerline Clearing and Grading - The following calculations estimate the air emissions if burning instead of mulching occurs for the tree stumps and brush accumulated from the access road/powerline construction (see also Kulibert, 1984). Burning will be on the surface in an open area.

Emission Factors and Source: AP-42, Table 2.4-2; Forest residues - unspecified

Particulate (TSP)	NO_x	CO	HC
lb/st	lb/st	lb/st	lb/st
17	4	140	24.7

Process Rate: Total burn

Duration: 12 months

Control Method and Efficiency: None

Example Calculation: 316 st of Forest residues for 35 acres

TSP: st of brush/yr x TSP lbs/st x st/2000 lbs
316 st/yr x 17 lb/st x st/2000 lbs = 2.7 st/yr

NO_x: 316 x 4 ÷ 2000 = 0.6 st/yr

CO : 316 x 140 ÷ 2000 = 22.1 st/yr

HC : 316 x 24.7 ÷ 2000 = 3.9 st/yr

Mine/Mill Site Fugitive Dust TSP Emissions from Traffic During the Construction Phase after Access Road Completion

Current estimates indicate that approximately 620 operation phase personnel will be employed by the Crandon Project. It is also assumed that there will be 1.6 employees/vehicle traveling 2.5 miles (one way) of access road to the mine/mill site. Therefore, at this rate (2 trips/day x 2.5 miles/trip x 620/1.6 employees per vehicle), approximately 1,940 vehicle miles would be traveled per day. The calculation of fugitive dust (TSP) emissions from vehicle travel is based on the most recent EPA AP-42 update (i.e. May 1983), and current estimates of employee traffic loads of 388 (620 ÷ 1.6) vehicles per day (i.e. 388 x 5 = 1940 miles/day).

Access Road

Emission Factors and Source: AP-42, Table 11.2.5-1

TSP-EF = 0.012 lb/veh-mile

Process Rate: 1940 miles/day for employee vehicles
(i.e. 388 vehicles x 5 miles/round trip)
100 miles/day for off-site delivery vehicles
(i.e. 20 vehicles x 5 miles/round trip)
Total miles traveled/day on access road =
2040 veh-miles/day

Duration: 230 dry days/yr

Control Method and Efficiency: Paving

Example Calculation:

TSP - 2040 veh-miles/day x 230 dry days/yr x 0.012 lbs/veh-mile x st/2000 lb = 2.8 st/yr

Tailpipes

Emission Factor and Source: AP-42, Appendix D, Table D.1-19 (1987)

Process Rate: Employee vehicles - 2040 mi/day (LDV)

Duration: 350 days/yr

Control Method and Efficiency: As per EPA vehicle emission controls.

Example Calculation: Process Rate x Emission Factor = Emission Rate

TSP: 2040 mi/day x 0.05 g/mi x 0.002 lbs/g x 350 days/yr x st/2000 lbs = 0.04 st/yr

SO_x: 2040 x 0.13 (Table D.1-21) x 0.002 x 350 ÷ 2000 = 0.09 st/yr

NO_x: 2040 x 0.40 x 0.002 x 350 ÷2000 = 0.3 st/yr

CO : 2040 x 3.6 x 0.002 x 350 ÷ 2000 = 2.6 st/yr

HC : 2040 x 0.43 x 0.002 x 350 ÷ 2000 = 0.3 st/yr

Emitting Device: Tailpipes of vehicles.

e. Railroad Spur Clearing and Grading - The following calculations estimate the air emissions if burning instead of mulching occurs for the tree stumps and brush accumulated from the railroad spur construction (see also Kulibert, 1984). Burning will be on the surface in an open area.

Emission Factors and Source: AP-42, Table 2.4-2; Forest residues - unspecified

Particulate (TSP)	NO_x	CO	HC
lb/st	lb/st	lb/st	lb/st
17	4	140	24.7

Process Rate: Total burn

Duration: 12 months

Control Method and Efficiency: None

Example Calculations: 497 st of Forest residues for 45 acres

TSP: st of brush/yr x TSP lbs/st x st/2000 lbs
497 st/yr x 17 lbs/st x st/2000 lbs = 4.2 st/yr

NO_x: 497 x 4 ÷ 2000 = 1.0 st/yr

CO : 497 x 140 ÷ 2000 = 34.8 st/yr

HC : 497 x 24.7 ÷ 2000 = 6.1 st/yr

Diesel Locomotive - Used for on-site location and switching of railroad cars.

Emission Factors and Source: EPA - NEDS specific codes, emission factor file report, 7/23/82.

TSP - 25 lb/10^3 gal

SO_x - 57 lb/10^3 gal

NO_x - 370 lb/10^3 gal

CO - 130 lb/10^3 gal

HC - 90 lb/10^3 gal

Process Rate: 5 gal/hr, 30 gal/day, 10,800 gal/yr

Duration: 2 hrs/shift, 3 shifts/day, 360 days/yr (included in process rate).

Control Method and Efficiency: None

Example Calculation:

TSP - 10,800 gal/yr x 25.0 lb/10^3 gal x st/2000 lbs = 0.14 st/yr

Emission rates for the diesel locomotive are estimated to be as follows:

	st/yr
TSP:	0.14
SO_x:	0.3
NO_x:	2.0
CO :	0.7
HC :	0.5

f. Haul Road - Estimated air emissions for the haul road construction activities include excavation, grading and hauling.

Emission Factors and Source: AP-42, Section 11.2.4

TSP-EF = 1.2 st/acre/month

Process Rate: 10 acres of road from mine/mill site to MWDF area

Area disturbed/month = 10 acres/10 months = 1.0 acre/month

Duration: Construction Phase - Year 1

Emissions (uncontrolled) = 1.2 st/acre/month x 1.0 acre/month x 10 months
= 12.0 st/yr

Emissions (controlled) = 12.0 st x 0.5* = 6.0 st/yr

g. Water Discharge Pipeline - Emissions are primarily generated from general excavation, and stripping and hauling of sand and gravel.

Process Rate:

Assume:

Total construction area	= 15 acres
Pipeline distance	= 6.1 miles
Total disturbed width	= 20 ft
Sand and gravel backfill	= 3,500 yd^3
Average haul distance	= 3 miles
Pipeline construction period	= 6 months

General Construction

Emission Factor and Source: AP-42, Section 11.2.4

TSP-EF = 1.2 st/acre/month

Process Rate:

Area disturbed/month = 15 acres/6 months = 2.5 acres/month

Emissions (uncontrolled) = 1.2 st/acre/month x 2.5 acres/month x 6 months
= 18.0 st

Emissions (controlled) = 18.0 st x 0.5* = 9.0 st

* 50% control with watering.

Hauling

Emission Factor and Source: AP-42, Section 11.2.1 - Unpaved roads

$$TSP\text{-}EF = (0.8)5.9(15/12)(10/30)^2(10/3)^{0.7}(6/4)^{0.5}(230/365) = 1.2 \text{ lb/veh-mile}$$

Process Rate:

3,500 yd^3 sand and gravel ÷ 5 yd^3/haul = 700 hauls
700 hauls at 6 miles round trip/haul = 4,200 veh-miles

Emissions (uncontrolled) = 1.2 x 4,200 veh-miles x st/2000 lb = 2.5 st/yr

Emissions (controlled) = 2.5 st/yr x 0.5* = 1.3 st/yr

* 50% control with watering

Total construction phase TSP emissions for the wastewater discharge pipeline are conservatively estimated to be 10.3 st/yr.

h. In-Plant Roads - Vehicle traffic on roads within and adjacent to the main portion of the Project facilities.

Fugitive dust

Emissions of fugitive dust (TSP) from using existing gravel roads will be primarily from delivery of bentonite before the railroad spur is completed. Emission estimates are based on the following assumptions:

1) The access road and railroad will be constructed during the first 12 months of Project development;

2) Most traffic prior to construction of the new access road will use Sand Lake road to a 1/2 mile gravel access road to the mine/mill site;

3) Construction personnel traffic during the first 12 months is estimated to be: 413 vehicles/day (i.e. 1.6 persons/vehicle and 1 mile round trip per vehicle);

4) Bentonite hauled during the first year would be 2,000 tons in 25 ton tractor trailers at 15 miles/hr along the 6 mile distance from Sand Lake Road to the MWDF; and

5) An additional 12 service trucks and 3 equipment delivery trucks would come on-site per day (i.e. 1 mile round trip).

Fugitive dust (TSP) emissions on gravel roads (Construction Phase - Year 1) are based on the following factor:

$$TSP\text{-}EF = (0.8)5.9(s/12)(S/30)^2(W/3)^{0.7}(w/4)^{0.5}(d/365) = lb/veh\text{-}mile$$

Personnel traffic

Assume average vehicle weighs 1.7 tons with 4 wheels.

$$TSP\text{-}EF = (0.8)5.9(12/12)(15/30)^2(1.7/3)^{0.7}(4/4)^{0.5}(230/365)$$
$$= 0.5 \text{ lb/veh-mile}$$

Total miles traveled = 413 veh-miles/day x 5 days/week x 50 weeks/yr = 103,250 veh-miles/yr

Emissions (uncontrolled) = 103,250 veh-miles/yr x 0.5 lbs/veh-mile x st/2000 lbs = 25.8 st/yr

Emissions (controlled) = 25.8 st/yr x 0.15* = 3.9 st/yr

Equipment truck traffic

Assume average weight of heavy equipment trucks = 10 st
and service trucks = 5 st.

Heavy equipment truck traffic

6 truck miles/day x 5 days/week x 50 weeks/yr = 1500 veh-miles/yr

$$TSP\text{-}EF = (0.8)5.9(12/12)(15/30)^2(10/3)^{0.7}(18/4)^{0.5}(230/365) = lb/veh\text{-}mile$$
$$= 3.7 \text{ lb/veh-mile}$$

Emissions (uncontrolled) = 3.7 lb/veh-mile x 1500 veh-mile/yr x st/2000 lbs
= 2.8 st/yr

Emissions (controlled) = 2.8 x 0.15* = 0.4 st/yr

Service truck traffic

12 truck miles/day x 5 days/week x 50 weeks/yr = 3,000 veh-miles/yr

$$TSP\text{-}EF = (0.8)5.9(1)(0.25)(5/3)^{0.7}(10/4)^{0.5}(0.6) = lb/veh\text{-}mile$$
$$= 1.7 \text{ lb/veh-mile}$$

Emissions (uncontrolled) = 1.7 lb/veh-mile x 3,000 veh-mile/yr
x st/2000 lbs = 2.6 st/yr

Emissions (controlled) = 2.6 st/yr x 0.15* = 0.4 st/yr

* 85% control with chemical stabilization.

Total estimated TSP emissions for Construction Phase - Year 1 traffic = 4.7 st/yr.

Mine/Mill Site-Paved Roads

Emission Factors and Source: AP-42 (i.e. May 1983), Section 11.2.6 - Industrial Paved Roads

$$TSP\text{-}EF = k(0.09)\ I\ (4/n)(s/10)(L/1000)(W/3)^{0.7} = \text{lb/veh-mile}$$

where:

k = particle size multiplier	= 0.86
I = industrial augmentation factor	= 3.5 for LDGV = 7.0 for HDGV and HDDV
n = number of traffic lanes	= 2
s = surface material silt content (%)	= 20%
L = surface dust loading (lb/mile)	= 1000
W = average vehicle weight (tons)	= 2 st (i.e. 4000 lbs) - for light duty gasoline vehicles (LDGV) = 5 st avg. - heavy-duty gasoline vehicle (HDGV) = 15 st avg. - heavy-duty diesel vehicle (HDDV)

Process Rate:

Light Duty Gas Vehicle (LDGV)

(Pick-up Trucks)
Assume: 20 miles/hr
4 wheels
W = 2 st
230 dry days per year

Duty	miles/day
Environmental	25
Inspections	45
Security	50
Maintenance	10
Warehouse	2.5
Total	132.5

Heavy Duty Gas Vehicle (HDGV)

Assume: 15 miles/hr
6 wheels
W = 5 st (average)
230 dry days per year

Duty	miles/day
Water Truck	20
Trucks	6.5
Total	26.5

Heavy Duty Diesel Vehicle (HDDV)

Assume: 10 miles/hr
6 wheels
W = 15 st (average)
230 dry days per year

Duty	miles/day
Grader	5
Backhoe	0.5
60 st Crane	0.5
10 st Crane	0.5
Tractor/Trailer	0.5
Forklifts	20
Total	27.0

Control Method and Efficiency: Paving - asphalt.

Example Calculation:

LDGV TSP-EF = $k(0.09)\ I\ (4/n)(s/10)(L/1000)(W/3)^{0.7}$ = lb/veh-mile
= $0.86\ (0.09)\ 3.5\ (4/2)(20/10)(1000/1000)(2/3)^{0.7}$
= 0.8 lb/veh-mile
LDGV TSP - 0.8 lb/veh-mile x 132.5 miles/day x 230 dry days/yr x st/2000 lbs = 12.2 st/yr

HDGV TSP-EF = $0.08 \times 7.0 \times 2 \times 2 \times 1 \times (5/3)^{0.7}$ = 3.2 lb/veh-mile
HDGV TSP - 3.2 x 26.5 x 230 ÷ 2000 = 9.8 st/yr

HDDV TSP-EF = $0.08 \times 7.0 \times 2 \times 2 \times 1 \times (15/3)^{0.7}$ = 6.9 veh-mile
HDDV TSP - 6.9 x 27 x 230 ÷ 2000 = 21.4 st/yr

Total estimated TSP emissions = 43.4 st/yr

Gravel Roads

Emission Factors and Source: AP-42, Section 11.2.1.3

TSP-EF = $k\ 5.9\ (s/12)(S/30)^2(W/3)^{0.7}(w/4)^{0.5}(d/365)$ = lb/veh-mile

k = 0.8
s = silt content, %
S = vehicle speed, mph
W = vehicle weight, st
w = number of tires
d = number of dry days

LDGV = 132.5 miles/day
HDGV = 26.5 miles/day
HDDV = 27.0 miles/day
s = 6%

Duration: 230 dry days/yr

Control Method and Efficiency: Watering as necessary.

Example Calculations:

LDGV TSP-EF = $k\ 5.9\ (s/12)(S/30)^2(W/3)^{0.7}(w/4)^{0.5}(d/365)$ lb/veh-mile
= $(0.8)\ 5.9\ (6/12)(20/30)^2(2/3)^{0.7}(1)^{0.5}(230/365)$
= 0.5 lb/veh-mile
LDGV TSP - 0.5 lb/veh-mile x 132.5 mi/day x 230 days/yr x st/2000 lbs
= 7.6 st/yr

HDGV TSP-EF = $0.8\ (5.9)(6/12)(15/30)^2(5/3)^{0.7}(6/4)^{0.5}(0.6)$
= 0.6 lb/veh-mile
HDGV TSP - 0.6 x 26.5 x 230 ÷ 2000 = 1.8 st/yr

HDDV TSP-EF = $0.8\ (5.9)(6/12)(10/30)^2(15/3)^{0.7}(6/4)^{0.5}(0.6)$
= 0.6 lb/veh-mile
HDDV TSP - 0.6 x 27.0 x 230 ÷ 2000 = 1.9 st/yr

Total estimated TSP emissions (uncontrolled) = 11.3 st/yr

Total estimated TSP emissions (controlled) = 11.3 st/yr x 0.5* = 5.7 st/yr

*50% control with watering

Total estimated TSP emissions for employee and plant operation traffic = 49.1 st/yr

3. Construct Major Surface Facilities

a. Waste Rock Handling - Loading and dumping

Emission Factor and Source: AP-42, Section 11.2.3

$$\text{TSP-EF} = (k)(0.0018)\frac{(s/5)(U/5)(H/5)}{(M/2)^2(Y/6)^{0.33}} = \text{lb/st}$$

TSP-EF = emission factor - lb/st
k = particle size multiplier (dimensionless) - 0.73
s = silt content - %
U = wind speed (mph) - 7.2 mph (Crandon Project EIR, p. 2.1-17)
H = drop height - ft
M = material moisture content - %
Y = capacity of dumping device (yd^3)

Process Rate: See below.

Duration: See below.

Control Method and Efficiency: None

Example Calculation:

$$\text{TSP-EF(Loading)} = (0.73)(0.0018)\frac{(1.6/5)(7.2/5)(4/5)}{(4/2)^2(7/6)^{0.33}} = 0.00012 \text{ lb/st}$$

$$\text{TSP-EF(Dumping)} = (0.73)(0.0018)\frac{(1.6/5)(7.2/5)(4/5)}{(4/2)^2(28/6)^{0.33}} = 0.000073 \text{ lb/st}$$

Combined TSP-EF = 0.000193 lb/st for loading and dumping

530,000 st/yr x 0.000193 lb/st x st/2000 lbs = 0.05 st/yr

Project Year	Waste Rock (k-st)	Emissions (st/yr)**
1	2	-
2	130	0.01
3	530	0.05
4-20	115	0.01
21-32	125	0.01

b. Hauling

Emission Factor and Source: AP-42, Section 11.2.1

$$TSP\text{-}EF = (0.8)(5.9)(s/12)(S/30)^2(W/3)^{0.7}(w/4)^{0.5}(d/365)$$
$$= \text{lb/veh-mile}$$

TSP-EF = suspended particulates - lb/veh-mile
s = silt content of road material - %
S = vehicle speed (mph)
W = average vehicle weight - st
w = number of wheels on vehicle
d = dry days/year - 230

Process Rate: See below.

Duration: See below.

Control Method and Efficiency: Watering and chemical stabilization.

Example Calculation:

$$TSP\text{-}EF = (0.8)(5.9)(6/12)(15/30)^2(51/3)^{0.7}(6/4)^{0.5}(0.63)$$
$$= 3.3 \text{ lb/veh-mile}$$

Emissions (controlled) = 3.3 lb/veh-mile x 400 veh-miles x st/2000 lbs x 0.15*
= 0.1 st/yr

Project Year	Waste Rock Hauled (k-st)	Miles Traveled (k)	Controlled Emissions (st/yr)*
1	2	0.4	0.1
2	70	9.8	2.4
3	65	9.1	2.3
6-7	50 (100)	7.0	1.7
13-14	33 (66)	4.6	1.1
20-21	45 (90)	6.3	1.6

* 85% control with watering and chemical stabilization.

c. Fuel Transfer and Storage - Diesel fuel and gasoline will be transferred from a tank wagon to temporary storage tanks until dispensed to equipment and vehicles.

Emission Factors and Source: AP-42, Tables 4.3 and 4.4

HC/VOC	1.08000	kg/10^3 l	Gasoline Dispensing Loss
HC/VOC	0.00259	kg/10^3 l	Diesel Fuel Dispensing Loss
HC/VOC	0.98000	kg/10^3 l	Gasoline Tank Loading Loss
HC/VOC	0.00236	kg/10^3 l	Diesel Tank Loading Loss
HC/VOC	0.08400	kg/10^3 l	Gasoline Spillage Loss
HC/VOC	0.00020	kg/10^3 l	Diesel Spillage Loss
HC/VOC	0.01200	kg/10^3 l	Gasoline Breathing Loss
HC/VOC	0.00029	kg/10^3 l	Diesel Breathing Loss

Process Rate:

Peak construction use

	Diesel	Gasoline
Winter	22,450 l/d	530 l/d
Summer	32,850 l/d	660 l/d

Duration: Winter - 5 months (4.3 wk/month, 5 day/wk);
Summer - 7 months (4.3 wk/month, 5 day/wk)

Control Method and Efficiency: None

Example Calculation: Summation of processes

Process Rate x Emission Factor x Duration = Emission Rate

HC/VOC:

(Gasoline - Summer)

0.66×10^3 l/d x 1.080 kg/10^3 l = 0.713 kg/d
0.66×10^3 l/d x 0.980 kg/10^3 l = 0.647 kg/d
0.66×10^3 l/d x 0.084 kg/10^3 l = 0.055 kg/d
0.66×10^3 l/d x 0.012 kg/10^3 l = 0.008 kg/d

(Diesel - Summer)

32.85×10^3 l/d x 0.00259 kg/10^3 l = 0.085 kg/d
32.85×10^3 l/d x 0.00236 kg/10^3 l = 0.078 kg/d
32.85×10^3 l/d x 0.00020 kg/10^3 l = 0.007 kg/d
32.85×10^3 l/d x 0.00029 kg/10^3 l = 0.010 kg/d

Total 1.603 kg/d

Emitting Device: Temporary fuel storage tanks and filling hoses.

d. Reclaim Pond - Cells A and B

Reclaim Pond - Cell A including the construction support area and the initial landfill (mine refuse disposal facility) cell are estimated to have development activities with clearing and excavation over approximately 30 acres. Using the TSP emission factor of 1.2 st/acre from EPA AP-42 results in calculated total TSP emissions of approximately 36 st during Construction Phase - Year 1. Reclaim Pond - Cell B would be constructed during the first year of the Operation Phase. Construction activities for Cell B would occur on approximately 30 acres and result in estimated TSP emissions of 36 st/yr.

e. Tailpipe Emissions - Use of diesel fuel to power off-road equipment during construction of the mine/mill site. Diesel fuel will contain no more than 0.3 weight percent sulfur maximum.

Emission Factors and Source: EPA NEDS-National Air Data Branch (MD-14) (Off-road construction equipment).

	Diesel
TSP	39.35 lb/10^3 gal burned
SO_2	31.0 lb/10^3 gal burned
NO_x	376.2 lb/10^3 gal burned
CO	112.3 lb/10^3 gal burned
HC/VOC	56.4 lb/10^3 gal burned

Process Rate: 230 gal/day

Duration: 13.5 hr/day, 5 day/wk, 4.3 wk/month, 7 month/yr

Control Method and Efficiency: None - Values are best estimate of tailpipe exit components.

Example Calculation:

Process Rate x Emission Factor = Emission Rate

TSP - 230 gal/day x 39.35 lb/10^3 gal = 9.1 lb/day

- 9.1 lb/day x 5 day/wk x 4.3 wk/month x 7 months/yr x st/2000 lbs = 0.7 st/yr

Total Estimated Tailpipe Emissions, Diesel Vehicles

	st/yr
TSP:	0.7
SO_2:	0.5
NO_x:	6.5
CO :	1.9
HC/VOC:	1.0

IV. MILL/CONCENTRATOR OPERATIONS

1. Mine/Mill Surface Facilities Operation

a. Coarse Ore Transport - During the construction and operation phases, preproduction ore will be utilized or stored on the following schedule.

Project Year	Ore to Pad (k-st)*	Ore to Crusher (k-st)
1	-	-
2	-	-
3	350	-
4	-	238
5	-	112

* (k = thousand)

Estimates of fugitive dust (TSP) generated from various activities associated with the preproduction ore handling and storage are presented below.

Transportation emissions:

Emission Factor and Source: AP-42, Section 11.2.1.3

$$TSP\text{-}EF = k\ 5.9\ (s/12)(S/30)^{2**}(W/3)^{0.7}(w/4)^{0.5}(d/365) = lb/veh\text{-}mile$$

- k = particle size multiplier (AP-42)
- s = silt content (%)
- S = vehicle speed (mph)
- W = vehicle weight (st)
- w = number of vehicle tires
- d = number of dry days per year

** For speeds less than 30 mph, the square of the ratio of $(S/30)^2$ [i.e. $(5/30)^2$] is used as recommended by the Wyoming Deparment of Environmental Quality (Fugitive dust emission factors. WDEQ, Division of Air Quality. January 24, Memorandum from Charles A. Collins, 1979).

Ore transport (Hauling)

- k = 0.8
- s = 6%
- S = 15 mph
- W = 51 st average (35 st truck empty)
- w = 6 tires
- d = 230 dry days

Maximum transport year = Construction Year 3
Tons hauled in Year 3 = 350,000 st
At 35 st/haul = 10,000 hauls
Average haul distance = 1.0 mile/round trip.
Total mile haulage in Year 3 = 10,000 hauls x 1.0 veh-mile/haul = 10,000 veh-miles.

Hauling from main shaft to storage pad in 35 st dump truck.

Haul distance = to storage - 1.2 mile round trip
from storage - 1.0 mile round trip

$$TSP\text{-}EF = (0.8)(5.9)(s/12)(S/30)^2(W/3)^{0.7}(w/4)^{0.5}(d/365) = \text{lb/veh-mile}$$
$$= (4.72)(6/12)(15/30)^2(51/3)^{0.7}(6/4)^{0.5}(230/365)$$
$$= 3.3 \text{ lb/veh-mile (uncontrolled)}$$

Process Rate:

Project Year	Volume Hauled (k-st) To Storage	Volume Hauled (k-st) From Storage	No. of Hauls	Miles Traveled	Emission (tons)
1	-	-	-	-	-
2	-	-	-	-	-
3	350	-	10,000	12,000	3.0
4	-	238	6,800	6,800	1.7
5	-	112	3,200	3,200	0.8

Example Calculations:

Emissions (uncontrolled) = 12,000 miles x 3.3 lb/veh-mile x st/2000 lbs
= 19.8 st

Emissions (controlled) = 19.8 st x 0.15** = 3.0 st/yr

Emissions (controlled) = 3.3 lb veh-mile x 6,800 veh-miles/yr
x st/2000 lbs x 0.15**
= 1.7 st/yr

** 85% control with watering and chemical stabilization.

Loading and dumping (L&D):

Loading: Cat 988B - 7 yd^3 bucket

$$TSP\text{-}EF = (0.73)(0.0018)\frac{(1.6/5)(7.2/5)(4/5)}{(4/2)^2(7/6)^{0.33}} = 0.00012 \text{ lb/ton}$$

Dumping: 35 st dump truck - 35 st ÷ 2,500 lb/yd^3 x 2,000 lb/st = 28 yd^3

$$TSP\text{-}EF = (0.73)(0.0018)\frac{(1.6/5)(7.2/5)(4/5)}{(4/2)^2(28/6)^{0.33}} = 0.000073 \text{ lb/st}$$

Combined (loading and dumping) emission rate = 0.000193 lb/st

Example Calculation:

Emissions (uncontrolled) = 0.000193 lb/st x 350,000 st/yr x st/2000 lbs
= 0.03 st/yr.

Project Year	Volume Loaded and Dumped (k-st)	Emissions (st/yr)
3	350	0.03
4	238	0.02
5	112	0.01

Wind-blown emissions:

Emission Factors and Source: Evaluation of Fugitive Dust Emissions from Mining. Task 1 Report. Identification of Fugitive Dust Sources Associated with Mining. PEDCO - Environmental Specialists, Inc., 1976. Cincinnati, Ohio.

TSP-EF = a I K C L V*

a = Portion of total wind erosion losses measured as suspended particles (a = 0.025 for waste rock and preproduction ore)

I = Soil erodibility, tons(st)/acre/year = 38 for waste rock and preproduction ore

K = Accounts for resistance to wind erosion provided by ridges and furrows or large soil clumps in the field. Ranges from 0.5 for a field with optimum ratio of ridge height to ridge spacing, to 1.0 (no reduction) for field with smooth surface.

Assume 0.75 for preproduction ore storage pad.

C = Climatic factor = 0.05 in site area

L = Unsheltered field width = 0.7

V = Vegetation cover factor. Assume unvegetated. V = 1.0

* Universal soil loss equation

Ore wind-blown emissions

Total disturbed area in Construction Phase - Year 3 = 8 acres

TSP-EF = a I K C L V

a = 0.025
I = 38
K = 0.75
C = 0.05
L = 0.7
V = 1.0

TSP-EF = 0.02494 st/acre/yr

Example Calculation:

Emissions (uncontrolled) = 0.02494 st/acre/yr x 8 acres = 0.2 st/yr.

Preproduction Ore Crushing and Handling:

Emission Factors and Source: AP-42, Table 8.23-1

TSP-EF = 0.5 lb/st - Primary Crushing
= 0.12 lb/st - Materials Handling

Process Rate: 440 st/hr, 5,510 st/day, 238,000 st/yr

Duration: 18 months (maximum in Operation Phase - Year 1)

Control Method and Efficiency: Baghouse collector, 99% efficiency

Example Calculation:

TSP - 238,000 st/yr x 0.5 lb/st x (1-0.99) x st/2000 lbs = 0.6 st/yr
238,000 x 0.12 x 2 x (1-0.99) x st/2000 lbs = 0.3 st/yr
Total = 0.9 st/yr

Activity	TSP Emissions (st/yr)
Hauling of preproduction ore	1.7
Loading and dumping of preproduction ore	0.02
Ore wind-blown emissions	0.2
Preproduction ore crushing and handling	0.9
	2.8

Total Preproduction Ore Handling (Coarse Ore Transport) Emissions

Project Year	Hauling	L&D	Crushing	Wind-Blown	Total (TSP - st/yr)
1	-	-	-	-	-
2	-	-	-	0.2	0.2
3	3.0	0.03	-	0.2	3.2
4	1.7	0.02	0.9	0.2	2.8
5	0.8	0.01	0.4	0.2	1.4

b. Concrete Batch Plant - Typical batching of concrete for miscellaneous mine/mill site applications.

Emission Factor and Source: AP-42, Table 8.10-2

		kg/mt
TSP -	Transfer of sand and aggregate to elevated bins	= 0.02
	Cement unloading to elevated storage silos	= 0.118
	Weight hopper loading of cement, sand, and aggregate	= 0.118
	Mixer loading of cement, sand, and aggregate	= 0.01
	Loading of dry-batch truck	= 0.02

Process Rate: 38.3 m^3/shift, 1 shift/day, 5 days/wk, 52 wks/yr

Sand and Aggregate	75.2 t/d	19,558 t/y
Cement	16.7 t/d	4,342 t/y
Total	91.9 t/d	23,900 t/y

Control Method and Efficiency: Baghouse with ducting and insertable collector - 99% control efficiency, AP-42, Table 8.10-1; Other - 90% control efficiency

Example Calculation:

TSP (annual):

19,558 t/yr x 0.02 kg/t x (1-0.90) ÷ 1,000 kg/t = 0.04 t/yr
4,342 t/yr x 0.118 kg/t x (1-0.99) ÷ 1,000 kg/t = 0.005 t/yr
23,900 t/yr x 0.118 kg/t x (1-0.90) ÷ 1,000 kg/t = 0.282 t/yr
23,900 t/yr x 0.01 kg/t x (1-0.90) ÷ 1,000 kg/t = 0.024 t/yr
23,900 t/yr x 0.02 kg/t x (1-0.90) ÷ 1,000 kg/t = 0.048 t/yr
0.399 t/yr
(0.44 st/yr)

Total Annual Estimated Emissions = 0.40 t/yr x 1.1 st/t = 0.44 st/yr

c. Concentrate Handling and Shipping - Includes transfer of zinc, copper, and lead concentrates from pressure filters to railroad cars.

Emission Factors and Source:

TSP - EF = 0.06 kg/t - Handling of low moisture content material, AP-42, Table 8.23-1.
Pb - EF = 0.15 kg/t - Handling of lead ore only, AP-42, Table 7.18-1.

Process Rate:
Zn - 1025 t/d
Cu - 450 t/d
Pb - 70 t/d

Duration: 24 hr/day, 350 days/yr

Control Method and Efficiency: 4 Insertable Dust Collectors, similar to DCE Vokes Model No. DLMV 45/15 F1 - 99% control efficiency.

Example Calculations:

Process Rate x Emission Factor x (1 - Efficiency Factor) x Transfer Points = Emission Rate

TSP - 1025 t/d x 0.06 kg/t x (1-.99) x 4 x 350 d/yr x t/1000 kg = 0.86 t/y (0.95 st/yr)
- 43 t/h x 0.06 kg/t x (1-.99) x 4 = 0.1 kg/h (0.23 lb/hr)

Pb - 70 t/d x 0.15 kg/t x (1-.99) x 4 x 350 d/yr x t/1000 kg = 0.15 t/y (0.17 st/yr)
- 3 t/h x 0.15 kg/t x (1-.99) x 4 = 0.02 kg/h (0.04 lb/hr)

d. Facility Heating - Natural gas is used for three purposes in the surface facilities. They are: 1) heating the buildings, 2) water heating, and 3) water treatment (brine crystallizer). Each of these processes is described further under its respective heading.

Heating Buildings - Use of natural gas unit heaters. Heat content is 1000 BTU/SCF for natural gas.

Emission Factors and Source: EPA-NEDS, Appendix C, p. C-3, December 1975 - <10 M BTU/hr.

TSP-EF = 10.0 lb/10^6 SCF of natural gas

SO_x-EF = 0.6 lb/10^6 SCF of natural gas

NO_x-EF = 120.0 lb/10^6 SCF of natural gas

CO-EF = 17.0 lb/10^6 SCF of natural gas

HC-EF = 3.0 lb/10^6 SCF of natural gas

Process Rate: 15,240 SCF/hr, 366,000 SCF/day, and 38,940,000 SCF/yr of natural gas

Duration: As required by weather conditions

Control Method and Efficiency: Use of natural gas

Example Calculation:

TSP - (38,940,000)(10.0/1,000,000)/2000 = 0.2 st/yr

Water Heating - Heating of water in the concentrator building for the process using a 42,000 BTU/hr boiler. Also, heating water in the plant services building for washrooms and showers using a 1,005,000 BTU/hr water heater.

Emission Factors and Source: Same as building heating.

Process Rate: 1,047 SCF/hr, 25,128 SCF/day, and 9,172,000 SCF/yr of natural gas.

Duration: 24 hrs/day, 365 days/yr

Control Method and Efficiency: Use of natural gas

Example Calculation:

TSP - (9,172,000)(10.0/1,000,000)/2000 = 0.05 st/yr

Water Treatment - Use of a boiler for VCE (i.e. initial) and brine crystallization operations in the vapor compression evaporator process. Boiler will consume 14,600,000 BTU/hr of natural gas.

Emission Factors and Source: Same as for heating buildings.

Process Rate: 15,000 SCF/hr, 120,000 SCF/day, and 43,800,000 SCF/yr of natural gas

Duration: 24 hrs/day, 365 days/yr

Control Method and Efficiency: Use of natural gas

Example Calculation:

TSP - (43,800,000)(10.0/1,000,000)/2000 = 0.2 st/yr

Total Estimated Facility Heating TSP Emissions

	TSP (st/yr)
Heating Buildings	0.2
Water Heating	0.05
Water Treatment	0.2
Total	0.45 (0.5)

e. Fuel Transfer and Storage (Bulk Storage Facility and Service Station) - Transfer and storage of gasoline and diesel fuel (2 - 30,000 gal tanks).

Emission Factors and Source: AP-42, Table 4.3-5

$$HC - 2 \times lb\ (lb/yr) = 2.26 \times 10^{-2} M \left[\frac{P}{14.7-P}\right]^{0.68} D^{1.7} H^{0.51} T^{0.5} F_p C K_c$$

M = 130 (Molecular Weight of Vapor), AP-42, Table 4.3-1

P = 0.0064 psia (vapor pressure @ 60%F), AP-42, Table 4.3-1

D = 26 ft (tank diameter)

H = 6.3 ft (vapor space at 1/2 tank height)

T = 15°F (temperature variation from day to night)

F_P = 1 (paint factor), AP-42, Table 4.3-2

C = 1 (adjustment factor), AP-42, Figure 4.3-10

K_C = 1 AP-42, Table 4.3-6

Adjustment for fixed roof working loss

$LW = 2.4 \times 10^{-2} MPK_h K_c$, AP-42, Table 4.3-8

Gasoline - Tank emissions, AP-42, Table 4.4-4

1) 0.88 kg/10^3 l (filling buried tank) x 1892.5 l/d for 350 days/yr

2) 0.12 kg/10^3 l (breathing loss) x 1892.5 l/d for 350 days/yr

3) 1.08 kg/10^3 l (dispensing loss) x 1892.5 l/d for 350 days/yr

Diesel - Tank emissions, AP-42, Tables 4.3-1 and 4.4-4.
A direct proportion of gasoline to diesel use exists for fixed roof tank working loss and is shown below.

$$\frac{(0.0064\ v.p.)\ (130\ mw)\ Diesel}{(5.2\ v.p.)\ (66\ mw)\ Gasoline} = 0.0024$$ multiplier for 1), 2), and 3) above

Process Rate: 6000 gal/day

Control Method and Efficiency: Vapor balance system for fuel loading at the storage facility and service station - 95% efficiency

Example Calculations:

(Process Rate) x (Emission Factor) x (1-Efficiency) = Emission Rate

HC: 6000 gal/day x 34.1 lbs/gal/yr x st/2000 lbs x .05 = 5.1 st/yr

f. Emergency Diesel Generators - The use of 3 emergency (i.e. backup) diesel generators is required to supply electrical power in the event transmission line service is interrupted to the Project facilities. For this purpose two 2500- and one 1000-kw units will supply emergency power for the mine and for the mill facilities, respectively. These units are intended for use only in emergencies. However, to assure their ability to

perform, weekly operation of each unit is necessary for a maximum of 1 hour. Also, emergency operation was estimated to be 2.5 hours per year. Total diesel fuel usage will be 192 gallons per hour per 2500-kw unit, 461 gallons per day (i.e. weekly test), and 25,125 gallons per year including the weekly and emergency operation of each unit.

Use of two 2500-kw for the mine and one 1000-kw generator for the mill for emergencies.

Emission Factors and Source: EPA, AP-42, Appendix-C, Internal combustion-electric generation-diesel, p.C-6.

TSP - 13.0 lbs/10^3 gal
SO_x - 140.0 lbs/10^3 gal
NO_x - 370.0 lbs/10^3 gal
CO - 225.0 lbs/10^3 gal
HC 37.0 lbs/10^3 gal

Process Rate: 192 gal/hr, 461 gal/day, 25,125 gal/yr

Duration: Each unit will be operated a maximum of 1 hr/wk, and estimated emergency purposes are 2.5 hr/yr.

Control Method and Efficiency: None

Example Calculation:

TSP - 25,125 gal/yr x 13.0 lbs/10^3 gal x st/2000 lbs = 0.2 st/yr

Total estimated emissions are as follows:

	st/yr
TSP:	0.2
SO_x:	1.8
NO_x:	4.7
CO :	2.8
HC :	0.5

g. Vehicular Travel, Plant Vehicles Exhaust - The current estimated mine/mill plant operation traffic load is 186 miles/day. A conservative assumption was used in that the estimated plant operation miles traveled of 186 miles/day was equally on paved and gravel roads. The calculations, therefore, overestimate the potential TSP emissions since only portions of the miles traveled will be on either road surface.

Mine/Mill Site

Emission Factors and Source: AP-42, Appendix D, Tables D.2-10 and D.2-16 (LDGV-1990); Tables D.4-10 and D.4-15 (HDGV-1990); Tables D.5-1 and D.5-4 (HDDV-1990).

LDGV (g/mi)		HDGV (g/mi)		HDDV (g/mi)	
TSP-EF	0.05	TSP-EF	0.91	TSP-EF	1.3
SO_2-EF	0.18	SO_2-EF	0.36	SO_2-EF	2.8
NO_x-EF	2.3	NO_x-EF	11.4	NO_x-EF	18.1
CO -EF	9.8	CO -EF	117.0	CO -EF	28.7
HC -EF	1.0	HC -EF	6.0	HC -EF	4.6

Process Rate:

Light Duty Gasoline Vehicle (LDGV)

(Pick-up Trucks)
Assume: 20 miles/hr
4 wheels

Duty	miles/day
Environmental	25
Inspections	45
Security	50
Maintenance	10
Warehouse	2.5
Total	132.5

Heavy Duty Gasoline Vehicle (HDGV)

Assume: 15 miles/hr
6 wheels

Duty	miles/day
Water Truck	20
Trucks	6.5
Total	26.5

Heavy Duty Diesel Vehicle (HDDV)

Assume: 10 miles/hr
6 wheels

Duty	miles/day
Grader	5
Backhoe	0.5
60 st Crane	0.5
10 st Crane	0.5
Tractor/Trailer	0.5
Forklifts	20
Total	27.0

Control Method and Efficiency: As per EPA vehicle emission controls.

Example Calculation: Process Rate x Emission Factor = Emission Rate.

LDGV TSP - 132.5 mi/d x 350 d/yr x 0.05 g/mi x 0.002 lbs/g x st/2000 lbs
= 0.002 st/yr
SO_x - 132.5 x 350 x 0.18 x 0.002 x 0.0005 = 0.008 st/yr
NO_x - 132.5 x 350 x 2.3 x 0.002 x 0.0005 = 0.11 st/yr
CO - 132.5 x 350 x 9.8 x 0.002 x 0.0005 = 0.46 st/yr
HC - 132.5 x 350 x 1.0 x 0.002 x 0.0005 = 0.05 st/yr

HDGV TSP - 26.5 mi/d x 350 d/yr x 0.91 g/mi x 0.002 lbs/g x st/2000 lbs
= 0.008 st/yr
SO_x - 26.5 x 350 x 0.36 x 0.002 x 0.0005 = 0.003 st/yr
NO_x - 26.5 x 350 x 11.4 x 0.002 x 0.0005 = 0.11 st/yr
CO - 26.5 x 350 x 117.0 x 0.002 x 0.0005 = 1.09 st/yr
HC - 26.5 x 350 x 6.0 x 0.002 x 0.0005 = 0.06 st/yr

HDDV TSP - 27.0 mi/d x 350 d/yr x 1.3 g/mi x 0.002 lbs/g x st/2000 lbs
= 0.01 st/yr

SO_x - 27 x 350 x 2.8 x 0.002 x 0.0005 = 0.03 st/yr
NO_x - 27 x 350 x 18.1 x 0.002 x 0.0005 = 0.17 st/yr
CO - 27 x 350 x 28.7 x 0.002 x 0.0005 = 0.27 st/yr
HC - 27 x 350 x 4.6 x 0.002 x 0.0005 = 0.04 st/yr

Total estimated plant vehicle exhaust emissions

TSP: 0.02 st/yr
SO_x: 0.04 st/yr
NO_x: 0.39 st/yr
CO : 1.82 st/yr
HC : 0.15 st/yr

h. Vehicular Travel, Employee Vehicles Exhaust - Current estimates indicate that approximately 620 operation phase personnel will be employed by the Crandon Project. It is also assumed that there will be 1.6 employees/vehicle traveling 2.5 miles (one way) of access road to the mine/mill site. Therefore, at this rate (2 trips/day x 2.5 miles/trip x 620/1.6 employees per vehicle), approximately 1,950 vehicle miles would be traveled per day.

Emission Factor and Source: AP-42, Appendix D, Table D.1-19 (1987)

Process Rate: Employee vehicles - 1950 mi/day (LDV).

Duration: 350 days/yr

Control Method and Efficiency: As per EPA vehicle emission controls.

Example Calculation: Process Rate x Emission Factor = Emission Rate.

TSP: 1950 mi/day x 0.05 g/mi x 0.002 lbs/g x 350 days/yr x st/2000 lbs
= 0.03 st/yr
SO_x: 1950 x 0.13 (Table D.1-21) x 0.002 x 350 ÷ 2000 = 0.09 st/yr
NO_x: 1950 x 0.40 x 0.002 x 350 ÷ 2000 = 0.3 st/yr
CO : 1950 x 3.6 x 0.002 x 350 ÷ 2000 = 2.5 st/yr
HC : 1950 x 0.43 x 0.002 x 350 ÷ 2000 = 0.3 st/yr

Emitting Device: Tailpipes of vehicles

V. MWDF CONSTRUCTION AND OPERATIONS

1. Site Preparation

MWDF Area - The surface area of construction disturbance for tailing pond T1 is estimated to be approximately 60 acres. Within this area, site preparation includes clearing the land and surface earthwork for stump removal and soil storage for reclamation (i.e. excavation to approximately 10 ft). This estimate uses the primary emission factor from AP-42 for construction activities for project facilities. However, where deep excavation (greater than 10 ft) and major hauling of soil material within the excavated area is involved, the estimated TSP emissions from hauling, and loading and dumping of the soil material were calculated separately (i.e. in addition to the surface area construction estimate).

Emission Factor and Source: AP-42, Section 11.2.4

TSP-EF = 1.2 st/acre/month.

Process Rate: Based on surface area disturbed in one year - Tailing Pond T1 - 30 acres.

Each of the additional tailing ponds were estimated separately (see Table 4.1).

Duration: 12 months (30 ÷ 12 = 2.5 acres/month)

Control Method and Efficiency: Watering, if necessary.

Example Calculation:

TSP = 1.2 st/acre/month x 2.5 acres/month x 12 months/yr = 36.0 st/yr

2. Construct MWDF Facilities

a. Construct Tailing Pipeline - The estimated acreage disturbed for construction of the tailings pipeline including excavation is approximately 10 acres.

Emission Factor and Source: AP-42, Section 11.2.4

TSP-EF = 1.2 st/acre/month

Process Rate: The tailing pipeline is constructed over 2 years. Therefore, approximately 5 acres per year is the estimated acreage disturbed during construction.

Duration: 2 years

Control Method and Efficiency: Watering, if necessary.

Example Calculation:

TSP = 1.2 st/acre/month x 5 acres/yr = 6.0 st/yr

b. Construction Support Area - The surface area for clearing, grading and excavation for the liner and filter preparation will be completed during the first year of the Construction Phase and is approximately 25 acres. This estimate uses the primary emission factor from AP-42 for construction activities for project facilities (1.2 st/acre/month).

Example Calculation:

TSP = 1.2 st/acre/month x 5 acres/month x 5 months/yr = 30.0 st/yr

3. Construct Tailing Pond T1 - Till excavation is assumed to occur equally over two years for each pond. Other activities such as loading and dumping, and hauling of other construction soil materials (i.e. drain layer, liner) were conservatively assumed to be completed in the second year of each pond development.

a. Hauling - TSP emissions generated by hauling excavated till within the pond construction area, within the MWDF boundary, and between the construction support area and the MWDF.

Emission Factor and Source: EPA AP-42, Section 11.2.1

$$TSP\text{-}EF = (0.8)(5.9)(s/12)(S/30)^2(W/3)^{0.7}(w/4)^{0.5}(d/365) = lb/veh\text{-}mile$$

TSP-EF = suspended particulate - lb/veh-mile

s = silt content of road material - %
S = vehicle speed (mph)
W = average vehicle weight - st
w = number of wheels on vehicle
d = dry days/year - 230

Assume: Pond with initial quantity of soil material (till) excavation - Tailing Pond T1 (i.e. average excavation is 40 ft - upper 10 ft included in emissions from site preparation) is used as an example of the air emissions estimating procedures. Therefore, approximately 80% of excavated till haulage is within the pond area. Also for Tailing Pond T1 calculations, the activities for development of the Reclaim Pond and Mine Refuse Disposal Facility have been included in the soil material moved estimates.

Process Rate:

Source	s	S	W	w	d	Emission Factor lbs/veh-mile	Control Efficiency	Soil Material Moved k-yd^3	Miles Traveled
1. Hauling excavated till within pond	15	15	63	4	230	7.8	50%[a]	2,535[b]	45,630
2. Bentonite/soil to pond	6	15	30	6	230	2.3	85%[c]	67[d]	3,732
3. Underdrain to pond	6	15	30	6	230	2.3	85%	59[d]	2,766
4. Filter mat'l to pond	6	15	16	6	230	1.5	85%	71[d]	3,861
5. Rip-rap to pond	6	15	16	6	230	1.5	85%	100[d]	4,688

a. 50% control with watering.
b. Each of the two years of construction.
c. 85% control with watering and chemical stabilization.
d. All in second year of T1 construction.

Duration: Two years of construction for each pond with the development of the new storage capacity phased to coincide with disposal needs.

Control Method and Efficiency: See above - Process Rate

Example Calculation:

$$TSP = (0.8)(5.9)(15/12)(15/30)^2(63/3)^{0.7}(4/4)^{0.5}(230/365) = \text{lb/veh-mile}$$
$$= (4.72)(1.25)(0.25)(8.42)(1)(0.63) = 7.8 \text{ lb/veh-mile}$$

Emissions (controlled) = 7.8 lb/veh-mile x 45,630 miles x st/2000 lb
x 0.5*
= 89.0 st

* 50% control with watering.

Total Estimated Emissions from Hauling	TSP (st/yr)
1. Hauling excavated till within pond	89.0
2. Bentonite/soil to pond	0.6
3. Underdrain to pond	0.5
4. Filter material to pond	0.4
5. Rip-rap to pond	0.5
	91.0

b. Loading and Dumping

Emission Factor and Source: AP-42, Section 11.2.3

$$TSP\text{-}EF = (k)(0.0018)\frac{(s/5)(U/5)(H/5)}{(M/2)^2(Y/6)^{0.33}} = \text{lb/st}$$

TSP-EF = emission factor - lb/st
k = particle size multiplier (dimensionless) - 0.73
s = silt content - %
U = wind speed (mph) - 7.2 mph (Crandon Project EIR, p. 2.1-17)
H = drop height - ft
M = material moisture content - %
Y = capacity of dumping device (yd^3)

Assume: Construction of any Tailing Pond (includes Reclaim Pond and Mine Refuse Disposal Facility with Tailing Pond T1) is less than these quantities.

Process Rate:

Source	s	U	H		M	Y		Soil Material (k-st)	Emission Factor (lb/st)	
			Loading	Dumping		Loading	Dumping		Loading	Dumping
1. Till at batch plant	15	7.2	3	3	2	4.5	8	122	0.0037	0.0031
2. Underdrain	1.6	7.2	3	3	4	4.5	9.6	330	0.0001	0.00008
3. Filter	15	7.2	3	3	2	4.5	8	569	0.0037	0.0031
4. Rip-rap	1.6	7.2	3	3	4	4.5	9.6	296	0.0001	0.00008

Duration: Two years of construction for each pond, but most likely in last year only.

Control Method and Efficiency: None

Example Calculation:

$$\text{TSP-EF(Loading Till)} = (0.73)(0.0018)\frac{(15/5)(7.2/5)(3/5)}{(2/2)^2(4.5/6)^{0.33}} = 0.0037 \text{ lb/st}$$

Emissions (uncontrolled) = 0.0037 lb/st x 82,800 yd^3 x 2970 lb/yd^3 x st/2000 lb x st/2000 lb = 0.23 st

Total Estimated Emissions from Loading and Dumping	TSP (st/yr)	
	Loading	Dumping
1. Till at batch plant	0.23	0.19
2. Underdrain	0.017	0.013
3. Filter	1.05	0.88
4. Rip-rap	0.015	0.012

c. Wind-blown

Emission Factor and Source: Guide for Wind Erosion Control on Cropland in Great Plains States, Craig and Turelle, USDA-SCS, July 1964, in: Evaluation of fugitive dust emissions (PEDCo, 1976).

TSP-EF = aIKCLV

TSP-EF = st/acre/yr
- a = total of wind erosion losses measured as suspended particulates (0.01 for ponds and storage area and 0.025 for haul roads)
- I = soil erodibility factor (st/acre/yr) (134 for ponds and storage areas and 38 for haul road)
- K = surface roughness factor - 1.0
- C = climate factor; 0.05 for Crandon Project site area
- L = unsheltered field width; 0.7 to 1.0 for Crandon Project site area
- V = vegetative cover factor - 1.0

Process Rate:

Source	Acreage	Control*	Emission Factor
Haul Road	16	0.85	0.03325 st/acre
Storage Area	20	0.85	0.0469 st/acre
Ponds	119	--	0.0469 st/acre

Duration: Two years of construction for each pond, but most likely in last year only.

Control Method and Efficiency: See above - Process Rate

Example Calculation:

TSP = aIKCLV = st/acre
= (0.025)(38)(1)(0.05)(0.7)(1) = 0.03325 st/acre
= 0.03325 st/acre x 16 acres/yr x 0.15* = 0.08 st/yr

* 85% control with watering and chemical stabilization

Total Estimated Wind-blown Emissions	TSP (st/yr)
Haul Road	0.08
Storage area	0.14
Ponds	5.58
	5.80

d. Summary of Estimated MWDF Construction Emissions

Process Rate:

Activity	Vehicle Size	Mat'l Bulk Density	Round Trip Distance/ Haul	Volume of Material Moved by Area (k-yd^3) T1	T2	T3	T4
Excavation	25 yd^3	2970 lb/yd^3	0.45 mi	5,070	2,810	2,440	5,170
Soil/Bentonite Mixture	12 st	2970 lb/yd^3	0.45 mi	67	77	55	117
Underdrain	12 st	2500 lb/yd^3	0.45 mi	59	67	46	104
Filter Mat'l	12 st	2900 lb/yd^3	0.45 mi	71	116	82	176
Rip-rap	12 st	2500 lb/yd^3	0.45 mi	100	93	53	94

Total Estimated MWDF Construction Emissions		TSP (st/yr) Year 1	Year 2
Tailing Pond T1 (Construction Years 2-3)	Hauling	91.0	91.0
	Loading and Dumping	--	2.4
	Wind-Blown	5.8	5.8
		96.8	99.2
Tailing Pond T2 (Operation Years 4-5)	Hauling	98.6	98.6
	Loading and Dumping	--	2.4
	Wind-Blown	5.8	5.8
		104.4	106.8
Tailing Pond T3 (Operation Years 11-12)	Hauling	85.6	85.6
	Loading and Dumping	--	2.4
	Wind-Blown	5.8	5.8
		91.4	93.8
Tailing Pond T4 (Operation Years 17-18)	Hauling	145.2	145.2
	Loading and Dumping	--	2.4
	Wind-Blown	5.8	5.8
		151.0	153.4

4. Tailpipe Emissions

a. Diesel Vehicles - Assumes all excavation and scraper equipment will use diesel fuel. Therefore, estimated miles for construction are for heavy duty diesel vehicles (HDDV).

Emission Factor and Source: AP-42, Appendix D, Tables D.5-1 and D.5-4 (HDDV-1990).

HDDV	(g/mi)
TSP-EF =	1.3
SO_x-EF =	2.8
NO_x-EF =	18.1
CO -EF =	28.7
HC -EF =	4.6

Process Rate: 93,060 miles for each year of the two years of construction for each pond.

Duration: Two years of construction for each pond with the development of the new storage capacity phased to coincide with disposal needs.

Control Method and Efficiency: As per EPA vehicle emission controls.

Example Calculation:

Process Rate x Emission Factor = Emission Rate.

TSP = 93,060 mi/yr x 1.3 g/mi x t/10^6g x st/1.1 t = 0.1 st/yr

Total Estimated Emissions for Diesel Vehicle Tailpipe Emissions	st/yr
TSP	0.1
SO_x	0.3
NO_x	1.9
CO	3.0
HC	0.4

b. Gasoline Vehicles - Assumes all of this activity occurs in the second year of construction.

Emission Factor and Source: AP-42, Appendix D, Tables D.2-10 and D.2-16 (LDGV-1990); Tables D.4-10 and D.4-15 (HDGV-1990).

LDGV	(g/mi)
TSP-EF =	0.05
SO_x-EF =	0.18
NO_x-EF =	2.3
CO -EF =	9.8
HC -EF =	1.0

Process Rate: LDGV - 49,322 miles per year

Duration: Mainly during second year of construction of each pond.

Control Method and Efficiency: As per EPA vehicle emission controls.

Example Calculation:

Process Rate x Emission Factor = Emission Rate

TSP = 49322 mi/yr x 0.05 g/mi x t/10^6 g x st/1.1 t = 0.002 st/yr

Total Estimated Emissions for Gasoline Vehicles	st/yr
TSP	0.002
SO_x	0.008
NO_x	0.103
CO	0.439
HC	0.045

5. Install Liner - Soil processing and liner batch plants

a. Batch Plant

Emission Factors and Source: AP-42, Section 8.10, Concrete Batching

TSP-EF = 0.21 lb/yd^3 processed

Process Rate: 117,000 yd^3/yr

Duration: Not applicable

Control Method and Efficiency: Enclosed facility with air vented to filters - 90%

Example Calculation:

Emission Factor x Process Rate x Unit Conversion x Control Factor = Annual Emission Rate

TSP = 0.2 lb/yd^3 x 117,000 yd^3/yr x st/2000 lb x 0.10 = 1.2 st/yr

b. Processing Plant

Emission Factors and Sources: AP-42, Section 8.19, Sand and Gravel Processing

TSP-EF = 0.1 lb/st processed

Process Rate: 406,000 st/yr

Duration: Not applicable

Control Method and Efficiency: Facility enclosed, air passed through baghouse - 99.6%

Example Calculation:

Emission Factor x Process Rate x Unit Conversion x Control Factor = Annual Emission Rate

TSP = 0.1 lb/st x 406,000 st/yr x st/2000 lb x 0.004 = 0.08 st/yr

c. Hauling of Bentonite From Mill To Batch Plant Area

Emission Factor and Source: AP-42, Section 11.2.1

Assume 12 st tractor/trailer
Vehicle weight empty = 10 st
Vehicle weight loaded = 22 st
s = 6%
S = 15 mi/hr
W = 16 st avg.
w = 18
d = 230 days

$TSP\text{-}EF = (0.8)(5.9)(6/12)(15/30)^2(16/3)^{0.7}(18/4)^{0.5}(0.6) = 2.4$ lb/veh-mile

Process Rate: 4,995 miles travelled/yr of liner material production.

Duration: Mainly during second year of construction of each pond.

Control Method and Efficiency: Watering and chemical stabilization.

Example Calculations:

Total annual TSP emissions (uncontrolled) = 4,995 miles/yr x 2.4 lb/veh-mile x st/2000 = 6.0 st/yr

Total annual TSP emissions (controlled) = 6.0 st/yr x 0.15* = 0.9 st/yr

* 85% control with chemical stabilization of haul road.

VI. Closure

Reclamation - The following calculations estimate the reclamation phase TSP air emissions. The general emission factor for TSP of 1.2 st/acre/month provided in U.S. EPA AP-42, Section 11.2.4 represents an emission rate for heavy construction activities.

a. Reclaim Tailing Pond T1 - Earthmoving, regrading, and replanting activities will occur to develop final grades, surface water drainage patterns, and final use compatibility with the Reclamation Plan.

Emission Factors and Source: AP-42, Section 11.2.4

TSP-EF = 1.2 short tons/acre/month.

Process Rate: 24 months for 60 acres or approximately 2.5 acres/month

Duration: 24 months (Operation Years 5-6)

Control Method and Efficiency: Watering of disturbed area, if necessary

Example Calculation:

Process Rate x Emission Factor x Duration = Emission Rate

TSP = 2.5 acres/month x 1.2 st/acre/month x 12 months/yr = 36.0 st/yr

b. Reclaim Tailing Pond T2 (partial)

Process Rate: 12 months for 20 and 45 acres or approximately 1.7 and 3.8 acres/month

Duration: 12 months (Operation Years 4 and 12)

Example Calculation:

TSP = 1.7 acres/month x 1.2 st/acre/month x 12 months/yr = 24.5 st/yr
= 3.8 acres/month x 1.2 st/acre/month x 12 months/yr = 54.7 st/yr

c. Reclaim Tailing Pond T2 (remainder)

Process Rate: 12 months for 30 acres or approximately 2.5 acres/month.

Duration: 24 months (Closure (Reclamation) Year 4)

Example Calculation:

TSP = 2.5 acres/month x 1.2 st/acre/month x 12 months/yr = 36.0 st/yr

d. Reclaim Tailing Pond T3

Process Rate: 24 months for 55 acres or approximately 2.3 acres/month

Duration: 24 months (Operation Years 19-20)

Example Calculation:

TSP = 2.3 acres/month x 1.2 st/acre/month x 12 months/yr = 33.1 st/yr

e. Reclaim Mine/Mill Site

Process Rate: 36 months for 104 acres or approximately 2.9 acres/month

Duration: 36 months (Closure (Reclamation) Years 2-4)

Example Calculation:

TSP = 2.9 acres/month x 1.2 st/acre/month x 12 months/yr = 41.8 st/yr

f. Reclaim Tailing Pond T4

Process Rate: 24 months for 110 acres or approximately 4.6 acres/month.

Duration: 24 months (Closure (Reclamation) Years 3-4)

Example Calculation:

TSP = 4.6 acres/month x 1.2 st/acre/month x 12 months/yr = 66.2 st/yr

g. Reclaim Reclaim Pond - Cells A and B

Process Rate: 12 months for 35 acres or approximately 2.9 acres/month

Duration: 12 months (Closure (Reclamation) Year 1)

Example Calculation:

TSP = 2.9 acres/month x 1.2 st/acre/month x 12 months/yr = 41.8 st/yr

h. Reclaim Construction Support Area

Process Rate: 12 months for 25 acres or approximately 2.08 acres/month

Duration: 12 months (Closure (Reclamation) Year 3)

Example Calculation:

TSP = 2.08 acres/month x 1.2 st/acre/month x 12 months/yr = 30.0 st/yr

i. Reclaim Railroad Spur

Process Rate: 12 months for 35 acres or approximately 2.9 acres/month

Duration: 12 months (Closure Year 3)

Example Calculation:

TSP = 2.9 acres/month x 1.2 st/acre/month x 12 months/yr = 41.8 st/yr

j. Reclaim Access Road

Process Rate: 12 months for 25 acres or approximately 2.1 acres/month.

Duration: 12 months (Closure Year 4)

Example Calculation:

TSP = 2.1 acres/month x 1.2 st/acre/month x 12 months/yr = 30.2 st/yr

k. Develop and Reclaim Borrow Area

Process Rate: 12 months for 40 acres or approximately 3.33 acres/month

Duration: 12 months (Closure Years 2 and 4)

Example Calculation:

TSP = 2.1 acres/month x 1.2 st/acre/month x 12 months/yr = 48 st/yr

l. Reclamation Activities Tailpipe Emissions

Diesel Vehicles - Assumes all excavation and scraper equipment will use diesel fuel. Therefore, estimated miles for reclamation activities are for heavy duty diesel vehicles (HDDV).

Emission Factor and Source: AP-42, Appendix D, Tables D.5-1 and D.5-4 (HDDV-1990).

HDDV	(g/mi)
TSP-EF =	1.3
SO_x-EF =	2.8
NO_x-EF =	18.1
CO -FE =	28.1
HC -FE =	4.6

Process Rate: 93,060 miles for each year of the two years for reclamation of each pond.

Duration: Two years of reclamation filling, grading and cap development for each pond.

Control Method and Efficiency: As per EPA vehicle emission controls.

Example Calculation: Process Rate x Emission Factor = Emission Rate.

TSP = 93,060 mi/yr x 1.3 g/mi x t/10^6g x st/1.1 t = 0.13 st/yr

Total Estimated Emissions for Diesel Vehicle Tailpipe Emissions

	st/yr
TSP:	0.13
SO_x:	0.29
NO_x:	1.9
CO :	2.9
HC :	0.47

Gasoline Vehicles - Assumes all of this activity occurs each year of pond reclamation.

Emission Factor and Source: AP-42, Appendix D, Tables D.2-10 and D.2-16 (LDGV-1990); Tables D.4-10 and D.4-15 (HDGV-1990).

LDGV	(g/mi)
TSP-EF =	0.05
SO_x-EF =	0.18
NO_x-EF =	2.3
CO -EF =	9.8
HC -EF =	1.0

Process Rate: LDGV - 49,322 miles per year

Duration: Mainly during second year of reclamation of each pond.

Control Method and Efficiency: As per EPA vehicle emission controls.

Example Calculation:

Process Rate x Emission Factor = Emission Rate

$TSp = 49322 \text{ mi/yr} \times 0.05 \text{ g/mi} \times t/10^6 \times st/1.1 \text{ t} = 0.002 \text{ st/yr}$

Total Estimated Emissions for Gasoline Vehicles Tailpipe Emissions

	st/yr
TSP:	0.002
SO_x:	0.008
NO_x:	0.103
CO :	0.439
HC :	0.045

APPENDIX B: References Cited

American Mining Congress. 1983. Fugitive Dust Emission Factors for the Mining Industry. Appendix D, p. D-3, Colorado Fugitive Emissions. July 1983. American Mining Congress. Washington, D.C.

Environmental Protection Agency. 1978. Survey of Fugitive Dust from Coal Mines. February. Office of Energy Activities. United States Environmental Protection Agency. Denver, Colorado. EPA-908/1-78-003.

_____. 1982. National Emission Data System (NEDS). MD-14. July. National Air Data Branch. United States Environmental Protection Agency. Research Triangle Park, North Carolina.

_____. 1983. Compilation of Air Pollutant Emission Factors, Third Edition (including Supplements 1-7). AP-42. Supplements 8-14. May. Volumes I and II, Sections 1 through 7, Appendices A, B, C, D, and E. Office of Air Quality Planning and Standards. United States Environmental Protection Agency. Research Triangle Park, North Carolina.

Kulibert, G. 1984. Personal Communication. Exxon Minerals Company Letter dated November 9, 1984. Exxon Minerals Company. Rhinelander, WI.

PEDCo - Environmental Specialists, Inc. 1976. Evaluation of Fugitive Dust Emissions from Mining. Task 1 Report. Identification of Fugitive Dust Sources Associated with Mining. Cincinnati, Ohio.

APPENDIX C

AIR EMISSION MODELING INPUT AND OUTPUT

DECEMBER 1985

TABLE C-1. ISC MODEL INPUTS - ANNUAL EMISSION RATES

```
    ISCST  (VERSION 80339)
    AN AIR QUALITY DISPERSION MODEL IN
    SECTION 3. MODELS PROPOSED SEP80 FOR 81 GUIDELINES.
    IN UNAMAP (VERSION 4) DEC 80
    SOURCE: FILE 16 ON UNAMAP MAGNETIC TAPE FROM NTIS.


          *** *FILE:ISCFINAA-CRANDON TSP WITH ANNUAL EMISSION RATES*       ***

CALCULATE (CONCENTRATION=1,DEPOSITION=2)                                ISW(1) =    1
RECEPTOR GRID SYSTEM (RECTANGULAR=1 OR 3, POLAR=2 OR 4)                 ISW(2) =    1
DISCRETE RECEPTOR SYSTEM (RECTANGULAR=1,POLAR=2)                        ISW(3) =    1
TERRAIN ELEVATIONS ARE READ (YES=1,NO=0)                                ISW(4) =    0
CALCULATIONS ARE WRITTEN TO TAPE (YES=1,NO=0)                           ISW(5) =    0
LIST ALL INPUT DATA (NO=0,YES=1,MET DATA ALSO=2)                        ISW(6) =    2

COMPUTE AVERAGE CONCENTRATION (OR TOTAL DEPOSITION)
WITH THE FOLLOWING TIME PERIODS:
  HOURLY (YES=1,NO=0)                                                   ISW(7) =    0
  2-HOUR (YES=1,NO=0)                                                   ISW(8) =    0
  3-HOUR (YES=1,NO=0)                                                   ISW(9) =    0
  4-HOUR (YES=1,NO=0)                                                  ISW(10) =    0
  6-HOUR (YES=1,NO=0)                                                  ISW(11) =    0
  8-HOUR (YES=1,NO=0)                                                  ISW(12) =    0
  12-HOUR (YES=1,NO=0)                                                 ISW(13) =    0
  24-HOUR (YES=1,NO=0)                                                 ISW(14) =    1
PRINT 'N'-DAY TABLE(S) (YES=1,NO=0)                                    ISW(15) =    1

PRINT THE FOLLOWING TYPES OF TABLES WHOSE TIME PERIODS ARE
SPECIFIED BY ISW(7) THROUGH ISW(14):
  DAILY TABLES (YES=1,NO=0)                                            ISW(16) =    0
  HIGHEST & SECOND HIGHEST TABLES (YES=1,NO=0)                         ISW(17) =    1
  MAXIMUM 50 TABLES (YES=1,NO=0)                                       ISW(18) =    1
METEOROLOGICAL DATA INPUT METHOD (PRE-PROCESSED=1,CARD=2)              ISW(19) =    1
RURAL-URBAN OPTION (RURAL=0,URBAN MODE 1=1,URBAN MODE 2=2)             ISW(20) =    0
WIND PROFILE EXPONENT VALUES (DEFAULTS=1,USER ENTERS=2,3)              ISW(21) =    1
VERTICAL POT. TEMP. GRADIENT VALUES (DEFAULTS=1,USER ENTERS=2,3)       ISW(22) =    1
SCALE EMISSION RATES FOR ALL SOURCES (NO=0,YES>0)                      ISW(23) =    0
PROGRAM CALCULATES FINAL PLUME RISE ONLY (YES=1,NO=2)                  ISW(24) =    1
PROGRAM ADJUSTS ALL STACK HEIGHTS FOR DOWNWASH (YES=2,NO=1)            ISW(25) =    1

NUMBER OF INPUT SOURCES                                                NSOURC =   32
NUMBER OF SOURCE GROUPS (=0,ALL SOURCES)                               NGROUP =   11
TIME PERIOD INTERVAL TO BE PRINTED (=0,ALL INTERVALS)                   IPERD =    0
NUMBER OF X (RANGE) GRID VALUES                                        NXPNTS =    0
NUMBER OF Y (THETA) GRID VALUES                                        NYPNTS =    0
NUMBER OF DISCRETE RECEPTORS                                           NXWYPT = 123
SOURCE EMISSION RATE UNITS CONVERSION FACTOR                               TK =.10000E 07
ENTRAINMENT COEFFICIENT FOR UNSTABLE ATMOSPHERE                         BETA1 =0.600
ENTRAINMENT COEFFICIENT FOR STABLE ATMOSPHERE                           BETA2 =0.600
HEIGHT ABOVE GROUND AT WHICH WIND SPEED WAS MEASURED                       ZR =   10.00  METERS
LOGICAL UNIT NUMBER OF METEOROLOGICAL DATA                              IMET =    1
DECAY COEFFICIENT FOR PHYSICAL OR CHEMICAL DEPLETION                   DECAY =0.0
SURFACE STATION NO.                                                       ISS = 14991
YEAR OF SURFACE DATA                                                      ISY = 77
UPPER AIR STATION NO.                                                     IUS = 14926
YEAR OF UPPER AIR DATA                                                    IUY = 77
ALLOCATED DATA STORAGE                                                 LIMIT = 43500 WORDS
```

REQUIRED DATA STORAGE FOR THIS PROBLEM RUN   MIMIT = 17701 WORDS

*** *FILE:ISCFINAA-CRANDON TSP WITH ANNUAL EMISSION RATES*   ***

*** METEOROLOGICAL DAYS TO BE PROCESSED ***
(IF=1)

```
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 0
```

*** NUMBER OF SOURCE NUMBERS REQUIRED TO DEFINE SOURCE GROUPS ***
(NSOGRP)

1, 1, 1, 1, 1, 2, 2, 2, 2, 1, 2,

*** SOURCE NUMBERS DEFINING SOURCE GROUPS ***
(IDSOR)

1, 2, 3, 4, 5, 6, -8, 9, -19, 20, -24, 25, -31, 32,
1, -32,

*** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
(METERS/SEC)

1.54, 3.09, 5.14, 8.23, 10.80,

*** WIND PROFILE EXPONENTS ***

STABILITY CATEGORY	WIND SPEED CATEGORY 1	2	3	4	5	6
A	.10000E 00	.10000E 00	.10000E 00	.10000E 00	.10000E 00	.10000E 00
B	.15000E 00	.15000E 00	.15000E 00	.15000E 00	.15000E 00	.15000E 00
C	.20000E 00	.20000E 00	.20000E 00	.20000E 00	.20000E 00	.20000E 00
D	.25000E 00	.25000E 00	.25000E 00	.25000E 00	.25000E 00	.25000E 00
E	.30000E 00	.30000E 00	.30000E 00	.30000E 00	.30000E 00	.30000E 00
F	.30000E 00	.30000E 00	.30000E 00	.30000E 00	.30000E 00	.30000E 00

*** *FILE:ISCFINAA-CRANDON TSP WITH ANNUAL EMISSION RATES*   ***

*** VERTICAL POTENTIAL TEMPERATURE GRADIENTS ***
(DEGREES KELVIN PER METER)

STABILITY   WIND SPEED CATEGORY

TABLE C-1. (continued)

CATEGORY	1	2	3	4	5	6
A	.0	.0	.0	.0	.0	.0
B	.0	.0	.0	.0	.0	.0
C	.0	.0	.0	.0	.0	.0
D	.0	.0	.0	.0	.0	.0
E	.20000E-01	.20000E-01	.20000E-01	.20000E-01	.20000E-01	.20000E-01
F	.35000E-01	.35000E-01	.35000E-01	.35000E-01	.35000E-01	.35000E-01

*** X,Y COORDINATES OF DISCRETE RECEPTORS ***
(METERS)

(691000.0, 39000.0),	(691000.0, 34500.0),	(691000.0, 37500.0),	(691500.0, 39000.0),	(691500.0, 38000.0),			
(692000.0, 39500.0),	(692000.0, 39000.0),	(692000.0, 38000.0),	(692500.0, 37500.0),	(692000.0, 36500.0),			
(692000.0, 35500.0),	(692000.0, 34500.0),	(692000.0, 33500.0),	(692500.0, 39000.0),	(692500.0, 38000.0),			
(693000.0, 39500.0),	(693000.0, 39000.0),	(693000.0, 38000.0),	(693000.0, 37500.0),	(693000.0, 36500.0),			
(693020.0, 36120.0),	(693020.0, 35720.0),	(693020.0, 35320.0),	(693100.0, 34960.0),	(693050.0, 34500.0),			
(693000.0, 33500.0),	(693500.0, 39000.0),	(693500.0, 38000.0),	(693500.0, 37500.0),	(693360.0, 36940.0),			
(693355.0, 36500.0),	(693350.0, 36120.0),	(694000.0, 39500.0),	(694000.0, 39000.0),	(694000.0, 38500.0),			
(693340.0, 35960.0),	(694000.0, 34860.0),	(693700.0, 34500.0),	(694000.0, 33500.0),	(694000.0, 32500.0),			
(694000.0, 31500.0),	(694500.0, 38500.0),	(694500.0, 38000.0),	(694500.0, 37500.0),	(694340.0, 36980.0),			
(694420.0, 35160.0),	(695000.0, 39500.0),	(695000.0, 38500.0),	(695000.0, 37500.0),	(694840.0, 37000.0),			
(694860.0, 35020.0),	(694840.0, 34380.0),	(694340.0, 33740.0),	(695000.0, 33000.0),	(695000.0, 32500.0),			
(695000.0, 32000.0),	(695000.0, 31500.0),	(695340.0, 32240.0),	(695340.0, 37020.0),	(695500.0, 33760.0),			
(695560.0, 33200.0),	(695500.0, 32760.0),	(695420.0, 32240.0),	(695500.0, 31500.0),	(696000.0, 39500.0),			
(696000.0, 38500.0),	(696000.0, 37500.0),	(695820.0, 37000.0),	(696000.0, 32250.0),	(696000.0, 31500.0),			
(696500.0, 37500.0),	(696500.0, 37000.0),	(696500.0, 32260.0),	(696500.0, 31500.0),	(697000.0, 39500.0),			
(697000.0, 38500.0),	(697000.0, 37500.0),	(696960.0, 37000.0),	(696960.0, 36250.0),	(696960.0, 35820.0),			
(697080.0, 33020.0),	(697080.0, 32640.0),	(697080.0, 32250.0),	(697000.0, 31500.0),	(697500.0, 37500.0),			
(697500.0, 37000.0),	(697500.0, 36500.0),	(697360.0, 35860.0),	(697400.0, 35300.0),	(697420.0, 34780.0),			
(697460.0, 34240.0),	(697440.0, 33020.0),	(697500.0, 32500.0),	(697500.0, 32000.0),	(698000.0, 39500.0),			
(698000.0, 38500.0),	(698000.0, 37500.0),	(698000.0, 37000.0),	(698000.0, 36500.0),	(698000.0, 36000.0),			
(698000.0, 35500.0),	(698000.0, 35000.0),	(698000.0, 34500.0),	(697840.0, 34220.0),	(697880.0, 33600.0),			
(697920.0, 33120.0),	(698000.0, 32500.0),	(698500.0, 31500.0),	(698500.0, 37000.0),	(698500.0, 36000.0),			
(698500.0, 34500.0),	(698500.0, 34000.0),	(698500.0, 33500.0),	(698500.0, 33000.0),	(699000.0, 39500.0),			
(699000.0, 38500.0),	(699000.0, 37500.0),	(699000.0, 36500.0),	(699000.0, 35500.0),	(699000.0, 34500.0),			
(699000.0, 33500.0),	(699000.0, 32500.0),	(699000.0, 31500.0),	(				

*** *FILE:ISCFINAA-CRANDON TSP WITH ANNUAL EMISSION RATES* ***

*** SOURCE DATA ***

SOURCE NUMBER	TYPE	WAKE	NUMBER PART. CATS.	EMISSION RATE TYPE=0,1 GRAMS/SECOND TYPE=2 GRAMS/SECOND *PER METER**2	X (METERS)	Y (METERS)	BASE ELEV. (METERS)	HEIGHT (METERS)	TEMP. TYPE=0 (DEG.K); VERT.DIM TYPE=1 (METERS)	EXIT VEL. TYPE=0 (M/SEC); HORZ.DIM TYPE=1,2 (METERS)	DIAMETER TYPE=0 (METERS)	BLDG. HEIGHT TYPE=0 (METERS)	BLDG. LENGTH TYPE=0 (METERS)	BLDG. WIDTH TYPE=0 (METERS)
1	))		0	0.)	694215.0	35770.0	0.0	26.00	294.30	0.01	1.00	35.00	21.00	22.00
2	))		0	0.)	694140.0	35770.0	0.0	38.00	294.30	20.40	0.84	35.00	15.00	30.00
3	))		0	0.160000E-01	694470.0	35550.0	0.0	8.00	294.30	0.01	0.43	20.00	50.00	25.00
4	))		0	0.477000E 00	693285.0	35590.0	0.0	3.70	294.30	8.33	6.71	0.0	0.0	0.0
5	))		0	0.477000E 00	694625.0	35460.0	0.0	3.70	294.30	8.33	6.71	0.0	0.0	0.0
6	))		0	0.231000E-02	694155.0	35710.0	0.0	13.00	623.00	0.01	0.60	10.00	23.50	30.00
7	))		0	0.231000E-02	694160.0	35710.0	0.0	13.00	623.00	0.01	0.60	10.00	23.50	30.00

TABLE C-1. (continued)

8	2	0	0	0.13800E-02	694165.0	35710.0	0.0	13.00	623.00	0.01	0.50	10.00	23.50	30.00
9	2	0	3	0.77600E-06	691500.0	38500.0	0.0	1.00	0.0	100.00	0.0	0.0	0.0	0.0
10	2	0	3	0.77600E-06	691900.0	38450.0	0.0	1.00	0.0	100.00	0.0	0.0	0.0	0.0
11	2	0	3	0.77600E-06	692300.0	38400.0	0.0	1.00	0.0	100.00	0.0	0.0	0.0	0.0
12	2	0	3	0.77600E-06	692700.0	38350.0	0.0	1.00	0.0	100.00	0.0	0.0	0.0	0.0
13	2	0	3	0.77600E-06	693100.0	38300.0	0.0	1.00	0.0	100.00	0.0	0.0	0.0	0.0
14	2	0	3	0.77600E-06	693500.0	38250.0	0.0	1.00	0.0	100.00	0.0	0.0	0.0	0.0
15	2	0	3	0.77600E-06	693800.0	38000.0	0.0	1.00	0.0	100.00	0.0	0.0	0.0	0.0
16	2	0	3	0.77600E-06	693850.0	37600.0	0.0	1.00	0.0	100.00	0.0	0.0	0.0	0.0
17	2	0	3	0.77600E-06	693850.0	37200.0	0.0	1.00	0.0	100.00	0.0	0.0	0.0	0.0
18	2	0	3	0.77600E-06	693850.0	36800.0	0.0	1.00	0.0	100.00	0.0	0.0	0.0	0.0
19	2	0	3	0.77600E-06	693850.0	36400.0	0.0	1.00	0.0	100.00	0.0	0.0	0.0	0.0
20	2	0	3	0.42300E-05	693900.0	35700.0	0.0	1.00	0.0	300.00	0.0	0.0	0.0	0.0
21	2	0	3	0.41600E-05	694100.0	35600.0	0.0	1.00	0.0	100.00	0.0	0.0	0.0	0.0
22	2	0	3	0.42300E-05	694200.0	35500.0	0.0	1.00	0.0	400.00	0.0	0.0	0.0	0.0
23	2	0	3	0.41600E-05	694200.0	35400.0	0.0	1.00	0.0	200.00	0.0	0.0	0.0	0.0
24	2	0	3	0.41700E-05	694600.0	35800.0	0.0	1.00	0.0	200.00	0.0	0.0	0.0	0.0
25	2	0	3	0.10300E-05	694700.0	35650.0	0.0	1.00	0.0	100.00	0.0	0.0	0.0	0.0
26	2	0	3	0.10300E-05	694700.0	35450.0	0.0	1.00	0.0	100.00	0.0	0.0	0.0	0.0
27	2	0	3	0.10300E-05	694900.0	35250.0	0.0	1.00	0.0	100.00	0.0	0.0	0.0	0.0
28	2	0	3	0.10300E-05	695100.0	35150.0	0.0	1.00	0.0	100.00	0.0	0.0	0.0	0.0
29	2	0	3	0.10300E-05	695300.0	35100.0	0.0	1.00	0.0	100.00	0.0	0.0	0.0	0.0
30	2	0	3	0.10300E-05	695500.0	35100.0	0.0	1.00	0.0	100.00	0.0	0.0	0.0	0.0
31	2	0	3	0.10300E-05	695700.0	35100.0	0.0	1.00	0.0	100.00	0.0	0.0	0.0	0.0
32	2	0	13	0.16500E-04	695900.0	34700.0	0.0	1.00	0.0	600.00	0.0	0.0	0.0	0.0

*** *FILE:ISCFINAA-CRANDON TSP WITH ANNUAL EMISSION RATES* ***

*** SOURCE PARTICULATE DATA ***

*** SOURCE NUMBER = 9 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

*** SOURCE NUMBER = 10 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

*** SOURCE NUMBER = 11 ***

MASS FRACTION =

TABLE C-1 (CONTINUED)

```
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

                    *** *FILE:ISCFINAA-CRANDON TSP WITH ANNUAL EMISSION RATES*       ***

                                  *** SOURCE PARTICULATE DATA ***

*** SOURCE NUMBER =    12 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

*** SOURCE NUMBER =    13 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

*** SOURCE NUMBER =    14 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

                    *** *FILE:ISCFINAA-CRANDON TSP WITH ANNUAL EMISSION RATES*       ***

                                  *** SOURCE PARTICULATE DATA ***

*** SOURCE NUMBER =    15 ***
```

TABLE C-1. (continued)

```
MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

*** SOURCE NUMBER =    16 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

*** SOURCE NUMBER =    17 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

*** *FILE:ISCFINAA-CRANDON TSP WITH ANNUAL EMISSION RATES*        ***

                    *** SOURCE PARTICULATE DATA ***

*** SOURCE NUMBER =    18 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

*** SOURCE NUMBER =    19 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0200, 0.0480,
```

TABLE C-1. (continued)

```
SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

*** SOURCE NUMBER =     20 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,


                *** *FILE:ISCFINAA-CRANDON TSP WITH ANNUAL EMISSION RATES*        ***

                              *** SOURCE PARTICULATE DATA ***


*** SOURCE NUMBER =     21 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

*** SOURCE NUMBER =     22 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

*** SOURCE NUMBER =     23 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,


                *** *FILE:ISCFINAA-CRANDON TSP WITH ANNUAL EMISSION RATES*        ***
```

TABLE C-1. (continued)

*** SOURCE PARTICULATE DATA ***

*** SOURCE NUMBER = 24 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

*** SOURCE NUMBER = 25 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

*** SOURCE NUMBER = 26 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

*** *FILE:ISCFINAA-CRANDON TSP WITH ANNUAL EMISSION RATES* ***

*** SOURCE PARTICULATE DATA ***

*** SOURCE NUMBER = 27 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

*** SOURCE NUMBER = 28 ***

TABLE C-1. (continued)

```
MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

*** SOURCE NUMBER =     29 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

                    *** *FILE:ISCFINAA-CRANDON TSP WITH ANNUAL EMISSION RATES*        ***

                                  *** SOURCE PARTICULATE DATA ***

*** SOURCE NUMBER =     30 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

*** SOURCE NUMBER =     31 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

*** SOURCE NUMBER =     32 ***

MASS FRACTION =
0.03800,0.08600,0.14800,0.16800,0.08400,0.07300,0.08100,0.07700,0.06700,0.07300,
0.07200,0.02000,0.01000,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0200, 0.0480, 0.0960, 0.1550, 0.2300, 0.3220, 0.4300, 0.5500, 0.6900,
 0.8300, 1.0100, 1.2300,
```

TABLE C-1. (continued)

```
SURFACE REFLECTION COEFFICIENT =
1.00000,0.71000,0.63000,0.51000,0.36000,0.17000,0.0     ,0.0     ,0.0     ,0.0     ,
0.0     ,0.0     ,0.0     ,
                    *** *FILE:ISCFINAA-CRANDON TSP WITH ANNUAL EMISSION RATES*        ***

                  * SOURCE-RECEPTOR COMBINATIONS LESS THAN 100 METERS OR THREE BUILDING
                    HEIGHTS IN DISTANCE.  NO AVERAGE CONCENTRATION    IS CALCULATED *

                                  - - RECEPTOR LOCATION - -
                                        X                Y (METERS)              DISTANCE
                  SOURCE          OR RANGE          OR DIRECTION              BETWEEN
                  NUMBER          (METERS)           (DEGREES)                (METERS)
                - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

                    18             693840.0           36960.0                  68.88
```

TABLE C-2. ISC MODEL OUTPUT - ANNUAL EMISSION RATES

N-DAY
365 DAYS
SGROUP# 11

*** *FILE:ISCFINAA-CRANDON TSP WITH ANNUAL EMISSION RATES* ***

* 365-DAY AVERAGE CONCENTRATION MICROGRAMS/CUBIC METER *

* FROM SOURCES: 1, -32,
* FOR THE DISCRETE RECEPTOR POINTS *

- X -	- Y -	CON.	- X -	- Y -	CON.	- X -	- Y -	CON.
691000.0	39000.0	0.28623	691000.0	38500.0	0.30179	691000.0	37500.0	0.34088
691500.0	39000.0	0.36233	691500.0	38000.0	0.41745	692000.0	39500.0	0.30459
692000.0	39000.0	0.41752	692000.0	38000.0	0.50131	692000.0	37500.0	0.52329
692000.0	36500.0	0.51698	692000.0	35500.0	0.41017	692000.0	34500.0	0.50298
692000.0	33500.0	0.38177	692500.0	39000.0	0.44547	692500.0	38000.0	0.58544
693000.0	39500.0	0.35584	693000.0	39000.0	0.47124	693000.0	38000.0	0.67011
693000.0	37500.0	0.80145	693000.0	36500.0	1.22813	693020.0	36120.0	1.13745
693020.0	35720.0	0.97038	693020.0	35320.0	1.14442	693100.0	34960.0	1.22379
693350.0	34600.0	0.85730	693000.0	33500.0	0.46646	693500.0	39000.0	0.52756
693500.0	38000.0	0.85012	693500.0	37500.0	0.98252	693360.0	36940.0	1.33493
693350.0	36500.0	1.83519	693350.0	36120.0	1.96919	694000.0	39500.0	0.42094
694000.0	38000.0	0.53935	694000.0	38500.0	0.77179	693840.0	36960.0	1.71480
694000.0	34860.0	1.72522	693780.0	34500.0	0.97780	694000.0	33500.0	0.83646
694000.0	32500.0	0.44384	694000.0	31500.0	0.23978	694500.0	38500.0	0.67007
694500.0	38000.0	0.90717	694500.0	37500.0	1.25522	694340.0	36980.0	2.07438
694420.0	35160.0	4.28016	695000.0	39500.0	0.41541	695000.0	38500.0	0.59102
695000.0	37500.0	1.05117	694840.0	37000.0	1.76699	694860.0	35020.0	3.00826
694840.0	34380.0	1.96425	694840.0	33740.0	1.29258	695000.0	33000.0	0.56490
695000.0	32500.0	0.37268	695000.0	32000.0	0.28735	695000.0	31500.0	0.24351
695500.0	37500.0	1.12279	695340.0	37020.0	1.69134	695500.0	33760.0	1.22593
695560.0	33200.0	0.72303	695500.0	32760.0	0.54698	695490.0	32240.0	0.42682
695500.0	31500.0	0.31268	696000.0	39500.0	0.39554	696000.0	38500.0	0.61925
696000.0	37500.0	1.24291	695820.0	37000.0	1.96263	696000.0	32250.0	0.44830
696000.0	31500.0	0.30594	696500.0	37500.0	1.12417	696500.0	37000.0	1.75705
695500.0	32260.0	0.39911	696500.0	31500.0	0.26713	697000.0	39500.0	0.33732
697000.0	38500.0	0.52100	697000.0	37500.0	1.00404	696960.0	37000.0	1.33607
696860.0	36250.0	2.07229	696760.0	35320.0	4.28348	697080.0	33020.0	0.62789
697030.0	32640.0	0.51370	697050.0	32250.0	0.42056	697000.0	31500.0	0.27215
697500.0	37500.0	0.93129	697500.0	37000.0	1.07542	697500.0	36500.0	1.41579
697360.0	35860.0	3.36181	697400.0	35300.0	3.86155	697420.0	34780.0	2.31799
697450.0	34240.0	1.28963	697440.0	33020.0	0.56482	697500.0	32500.0	0.40572
697500.0	32000.0	0.33858	698000.0	39500.0	0.31566	698000.0	38500.0	0.47431
698000.0	37500.0	0.80667	698000.0	37000.0	0.96437	698000.0	36500.0	1.26449
698000.0	36000.0	1.94413	698000.0	35500.0	1.75081	698000.0	35000.0	1.39130
698000.0	34500.0	0.96625	697840.0	34220.0	0.88063	697880.0	33600.0	0.65463
697720.0	33020.0	0.53066	698000.0	32500.0	0.39049	698000.0	31500.0	0.24292
698500.0	37000.0	0.81655	698500.0	36000.0	1.35397	698500.0	34500.0	0.67831
698500.0	34000.0	0.53886	698500.0	33500.0	0.42002	698500.0	33000.0	0.38207

TABLE C-2. (continued)

N-DAY
365 DAYS
SGROUP# 11

*** *FILE:ISCFINAA-CRANDON TSP WITH ANNUAL EMISSION RATES* ***

* 365-DAY AVERAGE CONCENTRATION MICROGRAMS/CUBIC METER *

* FROM SOURCES: 1, -32,
* FOR THE DISCRETE RECEPTOR POINTS *

- X -	- Y -	CON.	- X -	- Y -	CON.	- X -	- Y -	CON.
699000.0	37500.0	0.27503	699000.0	38500.0	0.51008	699000.0	37500.0	0.60249
699000.0	36500.0	0.96997	699000.0	35500.0	0.74941	699000.0	34500.0	0.52066
699000.0	33500.0	0.35326	699000.0	32500.0	0.27632	699000.0	31500.0	0.23542

TABLE C-3. ISC MODEL OUTPUT - ANNUAL EMISSION RATES 50 MAXIMUM (MAX) CONCENTRATIONS

MAX 50
24-HR
SGROUP# 11

*** *FILE:ISCFINAA-CRANDON TSP WITH ANNUAL EMISSION RATES* ***

* 50 MAXIMUM 24-HOUR AVERAGE CONCENTRATION MICROGRAMS/CUBIC METER *

* FROM SOURCES: 1, -32,

RANK	CON.	PER.	DAY	X OR RANGE (METERS)	Y(METERS) OR DIRECTION (DEGREES)	RANK	CON.	PER.	DAY	X OR RANGE (METERS)	Y(METERS) OR DIRECTION (DEGREES)
1	80.75496	1	248	694420.0	35160.0	26	20.46065	1	276	696960.0	35820.0
2	41.60956	1	300	694420.0	35160.0	27	20.45015	1	115	694420.0	35160.0
3	39.92993	1	46	694420.0	35160.0	28	19.92494	1	9	694420.0	35160.0
4	38.75285	1	275	694420.0	35160.0	29	19.88026	1	38	696960.0	35820.0
5	35.06233	1	176	694420.0	35160.0	30	19.58505	1	40	697360.0	35860.0
6	32.20644	1	129	694420.0	35160.0	31	19.48643	1	65	696960.0	35820.0
7	31.78852	1	214	694420.0	35160.0	32	19.30190	1	21	697400.0	35300.0
8	30.31563	1	40	696960.0	35820.0	33	18.95730	1	230	696960.0	35820.0
9	29.19097	1	130	694420.0	35160.0	34	18.89404	1	236	694420.0	35160.0
10	28.35788	1	308	694420.0	35160.0	35	18.56825	1	118	694420.0	35160.0
11	26.53325	1	344	697400.0	35300.0	36	18.44328	1	75	697420.0	34780.0
12	26.50104	1	14	697400.0	35300.0	37	18.21718	1	176	694860.0	35020.0
13	25.31513	1	248	694360.0	35020.0	38	18.12810	1	15	697400.0	35300.0
14	25.24348	1	316	694420.0	35160.0	39	18.01601	1	66	696960.0	36250.0
15	24.53869	1	256	694420.0	35160.0	40	17.77913	1	337	697360.0	35860.0
16	23.93431	1	41	696960.0	35820.0	41	17.75355	1	259	697420.0	34780.0
17	22.11293	1	153	694420.0	35160.0	42	17.52113	1	158	693350.0	36120.0
18	21.74181	1	311	693350.0	36120.0	43	17.49956	1	59	697420.0	34780.0
19	21.43199	1	257	696960.0	35820.0	44	17.49236	1	17	697400.0	35300.0
20	21.33060	1	364	694340.0	34380.0	45	17.46103	1	363	694000.0	34860.0
21	21.32360	1	5	696960.0	35820.0	46	17.45421	1	50	697400.0	35300.0
22	21.03633	1	111	694420.0	35160.0	47	17.31194	1	37	697400.0	35300.0
23	21.01854	1	232	696960.0	35820.0	48	17.22322	1	57	694420.0	35160.0
24	20.77716	1	66	696960.0	35820.0	49	17.20576	1	230	697360.0	35860.0
25	20.74812	1	248	694340.0	34380.0	50	17.04726	1	231	696960.0	35820.0

TABLE C-4. ISC - CALMPRO MODEL INPUTS - ANNUAL EMISSION RATES

```
    ISCST  (VERSION 80339)
    AN AIR QUALITY DISPERSION MODEL IN
    SECTION 3. MODELS PROPOSED SEP80 FOR 81 GUIDELINES.
    IN UNAMAP (VERSION 4) DEC 80
    SOURCE: FILE 16 ON UNAMAP MAGNETIC TAPE FROM NTIS.


          *** *FILE:ISCFINAA-CRANDON TSP WITH ANNUAL EMISSION RATES*       ***

CALCULATE (CONCENTRATION=1,DEPOSITION=2)                          ISW(1) =   1
RECEPTOR GRID SYSTEM (RECTANGULAR=1 OR 3, POLAR=2 OR 4)           ISW(2) =   1
DISCRETE RECEPTOR SYSTEM (RECTANGULAR=1,POLAR=2)                  ISW(3) =   1
TERRAIN ELEVATIONS ARE READ (YES=1,NO=0)                          ISW(4) =   0
CALCULATIONS ARE WRITTEN TO TAPE (YES=1,NO=0)                     ISW(5) =   0
LIST ALL INPUT DATA (NO=0,YES=1,MET DATA ALSO=2)                  ISW(6) =   2

COMPUTE AVERAGE CONCENTRATION (OR TOTAL DEPOSITION)
WITH THE FOLLOWING TIME PERIODS:
  HOURLY (YES=1,NO=0)                                             ISW(7) =   0
  2-HOUR (YES=1,NO=0)                                             ISW(8) =   0
  3-HOUR (YES=1,NO=0)                                             ISW(9) =   0
  4-HOUR (YES=1,NO=0)                                            ISW(10) =   0
  6-HOUR (YES=1,NO=0)                                            ISW(11) =   0
  8-HOUR (YES=1,NO=0)                                            ISW(12) =   0
  12-HOUR (YES=1,NO=0)                                           ISW(13) =   0
  24-HOUR (YES=1,NO=0)                                           ISW(14) =   1
PRINT *N*-DAY TABLE(S) (YES=1,NO=0)                              ISW(15) =   0

PRINT THE FOLLOWING TYPES OF TABLES WHOSE TIME PERIODS ARE
SPECIFIED BY ISW(7) THROUGH ISW(14):
  DAILY TABLES (YES=1,NO=0)                                      ISW(16) =   0
  HIGHEST & SECOND HIGHEST TABLES (YES=1,NO=0)                   ISW(17) =   1
  MAXIMUM 50 TABLES (YES=1,NO=0)                                 ISW(18) =   1
METEOROLOGICAL DATA INPUT METHOD (PRE-PROCESSED=1,CARD=2)        ISW(19) =   1
RURAL-URBAN OPTION (RURAL=0,URBAN MODE 1=1,URBAN MODE 2=2)       ISW(20) =   0
WIND PROFILE EXPONENT VALUES (DEFAULTS=1,USER ENTERS=2,3)        ISW(21) =   1
VERTICAL POT. TEMP. GRADIENT VALUES (DEFAULTS=1,USER ENTERS=2,3) ISW(22) =   1
SCALE EMISSION RATES FOR ALL SOURCES (NO=0,YES>0)                ISW(23) =   0
PROGRAM CALCULATES FINAL PLUME RISE ONLY (YES=1,NO=2)            ISW(24) =   1
PROGRAM ADJUSTS ALL STACK HEIGHTS FOR DOWNWASH (YES=2,NO=1)      ISW(25) =   1

NUMBER OF INPUT SOURCES                                          NSOURC =  32
NUMBER OF SOURCE GROUPS (=0,ALL SOURCES)                         NGROUP =  11
TIME PERIOD INTERVAL TO BE PRINTED (=0,ALL INTERVALS)              IPRD =   0
NUMBER OF X (RANGE) GRID VALUES                                  NXPNTS =   0
NUMBER OF Y (THETA) GRID VALUES                                  NYPNTS =   0
NUMBER OF DISCRETE RECEPTORS                                     NXWYPT = 123
SOURCE EMISSION RATE UNITS CONVERSION FACTOR                        TK =.100000E 07
ENTRAINMENT COEFFICIENT FOR UNSTABLE ATMOSPHERE                  BETA1 =0.600
ENTRAINMENT COEFFICIENT FOR STABLE ATMOSPHERE                    BETA2 =0.600
HEIGHT ABOVE GROUND AT WHICH WIND SPEED WAS MEASURED                ZR =  10.00  METERS
LOGICAL UNIT NUMBER OF METEOROLOGICAL DATA                        IMET =   1
DECAY COEFFICIENT FOR PHYSICAL OR CHEMICAL DEPLETION             DECAY =0.0
SURFACE STATION NO.                                                ISS = 14991
YEAR OF SURFACE DATA                                               ISY = 77
UPPER AIR STATION NO.                                              IUS = 14926
YEAR OF UPPER AIR DATA                                             IUY = 77
ALLOCATED DATA STORAGE                                           LIMIT = 43500 WORDS
```

REQUIRED DATA STORAGE FOR THIS PROBLEM RUN MIMIT = 16349 WORDS

*** *FILE:ISCFINAA-CRANDON TSP WITH ANNUAL EMISSION RATES* ***

*** METEOROLOGICAL DAYS TO BE PROCESSED ***
(IF=1)

```
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 0
```

*** NUMBER OF SOURCE NUMBERS REQUIRED TO DEFINE SOURCE GROUPS ***
(NSOGRP)

1, 1, 1, 1, 1, 2, 2, 2, 2, 1, 2,

*** SOURCE NUMBERS DEFINING SOURCE GROUPS ***
(IDSOR)

1, 2, 3, 4, 5, 6, -8, 9, -19, 20, -24, 25, -31, 32,
1, -32,

*** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
(METERS/SEC)

1.54, 3.09, 5.14, 8.23, 10.80,

*** WIND PROFILE EXPONENTS ***

STABILITY CATEGORY	WIND SPEED CATEGORY 1	2	3	4	5	6
A	.10000E 00	.10000E 00	.10000E 00	.10000E 00	.10000E 00	.10000E 00
B	.15000E 00	.15000E 00	.15000E 00	.15000E 00	.15000E 00	.15000E 00
C	.20000E 00	.20000E 00	.20000E 00	.20000E 00	.20000E 00	.20000E 00
D	.25000E 00	.25000E 00	.25000E 00	.25000E 00	.25000E 00	.25000E 00
E	.30000E 00	.30000E 00	.30000E 00	.30000E 00	.30000E 00	.30000E 00
F	.30000E 00	.30000E 00	.30000E 00	.30000E 00	.30000E 00	.30000E 00

*** *FILE:ISCFINAA-CRANDON TSP WITH ANNUAL EMISSION RATES* ***

*** VERTICAL POTENTIAL TEMPERATURE GRADIENTS ***
(DEGREES KELVIN PER METER)

STABILITY WIND SPEED CATEGORY

TABLE C-4. (continued)

CATEGORY	1	2	3	4	5	6
A	.0	.0	.0	.0	.0	.0
B	.0	.0	.0	.0	.0	.0
C	.0	.0	.0	.0	.0	.0
D	.0	.0	.0	.0	.0	.0
E	.200000E-01	.200000E-01	.200000E-01	.200000E-01	.200000E-01	.200000E-01
F	.350000E-01	.350000E-01	.350000E-01	.350000E-01	.350000E-01	.350000E-01

*** X,Y COORDINATES OF DISCRETE RECEPTORS ***
(METERS)

(691000.0,	39000.0),	(691000.0,	38500.0),	(691000.0,	37500.0),	(691500.0,	39000.0),	(691500.0,	38000.0),
(692000.0,	39500.0),	(692000.0,	38000.0),	(692000.0,	34000.0),	(692000.0,	37500.0),	(692000.0,	36500.0),
(692000.0,	35000.0),	(692000.0,	34500.0),	(692000.0,	33500.0),	(692500.0,	39000.0),	(692500.0,	38000.0),
(693000.0,	39500.0),	(693000.0,	39000.0),	(693000.0,	33000.0),	(693000.0,	37500.0),	(693000.0,	35500.0),
(693020.0,	36120.0),	(693020.0,	35720.0),	(693020.0,	35320.0),	(693100.0,	34960.0),	(693050.0,	34500.0),
(693000.0,	33500.0),	(693500.0,	39000.0),	(693500.0,	38000.0),	(693500.0,	37500.0),	(693360.0,	36940.0),
(693350.0,	36500.0),	(693350.0,	36120.0),	(694000.0,	39500.0),	(694000.0,	39000.0),	(694000.0,	38500.0),
(693340.0,	36960.0),	(694000.0,	34850.0),	(693700.0,	34500.0),	(694000.0,	33500.0),	(694000.0,	32500.0),
(694000.0,	31000.0),	(694500.0,	32500.0),	(694500.0,	38000.0),	(694500.0,	37500.0),	(694340.0,	36980.0),
(694420.0,	35160.0),	(695000.0,	39500.0),	(695000.0,	39500.0),	(695000.0,	37500.0),	(694940.0,	37000.0),
(694960.0,	35020.0),	(694340.0,	34340.0),	(694340.0,	33740.0),	(695000.0,	33000.0),	(695000.0,	32500.0),
(695000.0,	32000.0),	(695000.0,	31500.0),	(695500.0,	37520.0),	(695340.0,	37020.0),	(695500.0,	33760.0),
(695560.0,	33200.0),	(695500.0,	32750.0),	(695340.0,	32240.0),	(695500.0,	31500.0),	(696000.0,	39500.0),
(696000.0,	38500.0),	(696000.0,	37500.0),	(695820.0,	37000.0),	(696000.0,	32250.0),	(696000.0,	31500.0),
(696500.0,	37500.0),	(696500.0,	37000.0),	(696500.0,	32260.0),	(696500.0,	31500.0),	(697000.0,	39500.0),
(697000.0,	38500.0),	(697000.0,	37500.0),	(696960.0,	37000.0),	(696950.0,	36250.0),	(696960.0,	35820.0),
(697080.0,	33020.0),	(697080.0,	32640.0),	(697080.0,	32250.0),	(697000.0,	31500.0),	(697500.0,	37500.0),
(697500.0,	37000.0),	(697500.0,	36590.0),	(697360.0,	35960.0),	(697400.0,	35300.0),	(697420.0,	34780.0),
(697460.0,	34240.0),	(697440.0,	33020.0),	(697500.0,	32500.0),	(697500.0,	32000.0),	(698000.0,	39500.0),
(698000.0,	38500.0),	(698000.0,	37500.0),	(698000.0,	37000.0),	(698000.0,	36500.0),	(698000.0,	36000.0),
(698000.0,	35500.0),	(698000.0,	35000.0),	(698000.0,	34500.0),	(697840.0,	34220.0),	(697880.0,	33660.0),
(697820.0,	33120.0),	(698000.0,	32500.0),	(698000.0,	31500.0),	(698500.0,	37000.0),	(698500.0,	36000.0),
(698500.0,	34500.0),	(698500.0,	34000.0),	(698500.0,	33500.0),	(698500.0,	33000.0),	(699000.0,	39500.0),
(699000.0,	38500.0),	(699000.0,	37500.0),	(699000.0,	37500.0),	(699000.0,	35500.0),	(699000.0,	34500.0),
(699000.0,	33500.0),	(699000.0,	32500.0),	(699000.0,	31500.0),	(			

*** *FILE:ISCFINAA-CRANDON TSP WITH ANNUAL EMISSION RATES* ***

*** SOURCE DATA ***

SOURCE NUMBER	TYPE	WAKE	NUMBER PART. CATS.	EMISSION RATE TYPE=0,1 GRAMS/SECOND TYPE=2 GRAMS/SECOND *PER METER**2	X (METERS)	Y (METERS)	BASE ELEV. (METERS)	HEIGHT (METERS)	TEMP. TYPE=0 (DEG.K); VERT.DIM TYPE=1 (METERS)	EXIT VEL. TYPE=0 (M/SEC); HORZ.DIM TYPE=1,2 (METERS)	DIAMETER TYPE=0 (METERS)	BLDG. HEIGHT TYPE=0 (METERS)	BLDG. LENGTH TYPE=0 (METERS)	BLDG. WIDTH TYPE=0 (METERS)
1	0	0	0	0.)	694215.0	35770.0	0.0	26.00	294.30	0.01	1.00	35.00	21.00	22.00
2	0	0	0	0.)	694140.0	35770.0	0.0	38.00	294.30	20.40	0.84	35.00	15.00	30.00
3	0	0	0	0.160000E-01	694470.0	35550.0	0.0	8.00	294.30	0.01	0.43	21.00	50.00	25.00
4	0	0	0	0.477000E 00	693285.0	35590.0	0.0	3.70	294.30	8.33	6.71	0.0	0.0	0.0
5	0	0	0	0.477000E 00	694625.0	35460.0	0.0	3.70	294.30	8.33	6.71	0.0	0.0	0.0
6	0	0	0	0.231000E-02	694155.0	35710.0	0.0	13.00	623.00	0.01	0.60	10.00	23.50	30.00
7	0	0	0	0.231000E-02	694160.0	35710.0	0.0	13.00	623.00	0.01	0.60	10.00	23.50	30.00

TABLE C-4. (continued)

8	1	0	3	0.13500E-02	694165.0	35710.0	0.0	13.00	623.00	0.51	0.50	10.00	23.50	30.00
9	2	0	3	0.77600E-06	691500.0	35500.0	0.0	1.00	0.00	100.00	0.00	0.00	0.00	0.00
10	2	0	3	0.77600E-06	691900.0	38450.0	0.0	1.00	0.00	100.00	0.00	0.00	0.00	0.00
11	2	0	3	0.77600E-06	692300.0	38400.0	0.0	1.00	0.00	100.00	0.00	0.00	0.00	0.00
12	2	0	3	0.77600E-06	692700.0	38350.0	0.0	1.00	0.00	100.00	0.00	0.00	0.00	0.00
13	2	0	3	0.77600E-06	693100.0	38300.0	0.0	1.00	0.00	100.00	0.00	0.00	0.00	0.00
14	2	0	3	0.77600E-06	693500.0	38250.0	0.0	1.00	0.00	100.00	0.00	0.00	0.00	0.00
15	2	0	3	0.77600E-06	693800.0	38000.0	0.0	1.00	0.00	100.00	0.00	0.00	0.00	0.00
16	2	0	3	0.77600E-06	693850.0	37600.0	0.0	1.00	0.00	100.00	0.00	0.00	0.00	0.00
17	2	0	3	0.77600E-06	693650.0	37200.0	0.0	1.00	0.00	100.00	0.00	0.00	0.00	0.00
18	2	0	3	0.77600E-06	693850.0	36800.0	0.0	1.00	0.00	100.00	0.00	0.00	0.00	0.00
19	2	0	3	0.77600E-06	693850.0	36400.0	0.0	1.00	0.00	100.00	0.00	0.00	0.00	0.00
20	2	0	3	0.42300E-05	693900.0	35700.0	0.0	1.00	0.00	300.00	0.00	0.00	0.00	0.00
21	2	0	3	0.41600E-05	694100.0	35600.0	0.0	1.00	0.00	100.00	0.00	0.00	0.00	0.00
22	2	0	3	0.42300E-05	694200.0	35600.0	0.0	1.00	0.00	400.00	0.00	0.00	0.00	0.00
23	2	0	3	0.41600E-05	694200.0	35400.0	0.0	1.00	0.00	200.00	0.00	0.00	0.00	0.00
24	2	0	3	0.41700E-05	694600.0	35800.0	0.0	1.00	0.00	200.00	0.00	0.00	0.00	0.00
25	2	0	3	0.10300E-05	694700.0	35650.0	0.0	1.00	0.00	100.00	0.00	0.00	0.00	0.00
26	2	0	3	0.10300E-05	694700.0	35450.0	0.0	1.00	0.00	100.00	0.00	0.00	0.00	0.00
27	2	0	3	0.10300E-05	694900.0	35250.0	0.0	1.00	0.00	100.00	0.00	0.00	0.00	0.00
28	2	0	3	0.10300E-05	695100.0	35150.0	0.0	1.00	0.00	100.00	0.00	0.00	0.00	0.00
29	2	0	3	0.10300E-05	695300.0	35100.0	0.0	1.00	0.00	100.00	0.00	0.00	0.00	0.00
30	2	0	3	0.10300E-05	695500.0	35100.0	0.0	1.00	0.00	100.00	0.00	0.00	0.00	0.00
31	2	0	3	0.10300E-05	695700.0	35100.0	0.0	1.00	0.00	100.00	0.00	0.00	0.00	0.00
32	2	0	13	0.16500E-04	695900.0	34700.0	0.0	1.00	0.00	600.00	0.00	0.00	0.00	0.00

*** *FILE:ISCFINAA-CRANDON TSP WITH ANNUAL EMISSION RATES* ***

*** SOURCE PARTICULATE DATA ***

*** SOURCE NUMBER = 9 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.97000,0.71000,0.63000,

*** SOURCE NUMBER = 10 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.97000,0.71000,0.63000,

*** SOURCE NUMBER = 11 ***

MASS FRACTION =

TABLE C-4. (continued)

```
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,


                    *** *FILE:ISCFINAA-CRANDON TSP WITH ANNUAL EMISSION RATES*        ***

                                    *** SOURCE PARTICULATE DATA ***


*** SOURCE NUMBER =    12 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

*** SOURCE NUMBER =    13 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

*** SOURCE NUMBER =    14 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,


                    *** *FILE:ISCFINAA-CRANDON TSP WITH ANNUAL EMISSION RATES*        ***

                                    *** SOURCE PARTICULATE DATA ***


*** SOURCE NUMBER =    15 ***
```

TABLE C-4. (continued)

```
MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

*** SOURCE NUMBER =    16 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

*** SOURCE NUMBER =    17 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

                *** *FILE:ISCFINAA-CRANDON TSP WITH ANNUAL EMISSION RATES*       ***

                              *** SOURCE PARTICULATE DATA ***

*** SOURCE NUMBER =    18 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

*** SOURCE NUMBER =    19 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0200, 0.0480,
```

TABLE C-4. (continued)

```
SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

*** SOURCE NUMBER =    20 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,


                *** *FILE:ISCFINAA-CRANDON TSP WITH ANNUAL EMISSION RATES*        ***

                                *** SOURCE PARTICULATE DATA ***


*** SOURCE NUMBER =    21 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

*** SOURCE NUMBER =    22 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

*** SOURCE NUMBER =    23 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,


                *** *FILE:ISCFINAA-CRANDON TSP WITH ANNUAL EMISSION RATES*        ***
```

TABLE C-4. (continued)

*** SOURCE PARTICULATE DATA ***

*** SOURCE NUMBER = 24 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

*** SOURCE NUMBER = 25 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

*** SOURCE NUMBER = 26 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

*** *FILE:ISCFINAA-CRANDON TSP WITH ANNUAL EMISSION RATES* ***

*** SOURCE PARTICULATE DATA ***

*** SOURCE NUMBER = 27 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

*** SOURCE NUMBER = 28 ***

TABLE C-4. (continued)

```
MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

*** SOURCE NUMBER =    29 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

                    *** *FILE:ISCFINAA-CRANDON TSP WITH ANNUAL EMISSION RATES*       ***

                                    *** SOURCE PARTICULATE DATA ***

*** SOURCE NUMBER =    30 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

*** SOURCE NUMBER =    31 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

*** SOURCE NUMBER =    32 ***

MASS FRACTION =
0.03800,0.08600,0.14800,0.16800,0.08400,0.07300,0.05100,0.07700,0.06700,0.07300,
0.07200,0.02000,0.01000,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0200, 0.0480, 0.0960, 0.1550, 0.2300, 0.3220, 0.4300, 0.5500, 0.6900,
 0.8300, 1.0100, 1.2300,
```

TABLE C-4. (continued)

```
SURFACE REFLECTION COEFFICIENT =
1.00000,0.71000,0.63000,0.51000,0.36000,0.17000,0.0     ,0.0     ,0.0     ,0.0     ,
0.0     ,0.0     ,0.0     ,
```

*** *FILE:ISCFINAA-CRANDON TSP WITH ANNUAL EMISSION RATES* ***

* SOURCE-RECEPTOR COMBINATIONS LESS THAN 100 METERS OR THREE BUILDING HEIGHTS IN DISTANCE. NO AVERAGE CONCENTRATION IS CALCULATED *

SOURCE NUMBER	- - RECEPTOR LOCATION - - X OR RANGE (METERS)	Y (METERS) OR DIRECTION (DEGREES)	DISTANCE BETWEEN (METERS)
18	693840.0	35960.0	68.88

TABLE C-4. (continued)

CALMPRO ADJUSTMENT - TSP ANNUAL AVERAGE CONCENTRATIONS - ANNUAL EMISSION RATES

RECEPTOR	RECEPTORS IDENTIFICATION	EAST COORD (USER UNITS)	NORTH COORD (USER UNITS)	RECEPTOR HT ABV LOCAL GRD LVL (METERS)	RECEPTOR GROUND LEVEL ELEVATION (USER HT UNITS)	DAY	AVG CONC FOR PERIOD 1.HR 1. TO DAY365.HR24. (MICROGRAMS/M**3)	
1		0.00	0.00			*	-0.00	C
2		0.00	0.00				-0.00	C
3		0.00	0.00				-0.00	C
4		0.00	0.00				-0.00	C
5		0.00	0.00				-0.00	C
6		0.00	0.00				-0.00	C
7		0.00	0.00				-0.00	C
8		0.00	0.00				-0.00	C
9		0.00	0.00				-0.00	C
10		0.00	0.00				-0.00	C
11		0.00	0.00				-0.00	C
12		0.00	0.00				-0.00	C
13		0.00	0.00				-0.00	C
14		0.00	0.00				-0.00	C
15		0.00	0.00				-0.00	C
16		0.00	0.00				-0.00	C
17		0.00	0.00				-0.00	C
18		0.00	0.00				-0.00	C
19		0.00	0.00				-0.00	C
20		0.00	0.00				-0.00	C
21		0.00	0.00				-0.00	C
22		0.00	0.00				-0.00	C
23		0.00	0.00				-0.00	C
24		0.00	0.00				-0.00	C
25		0.00	0.00				-0.00	C
26		0.00	0.00				-0.00	C
27		0.00	0.00				-0.00	C
28		0.00	0.00				-0.00	C
29		0.00	0.00				-0.00	C
30		0.00	0.00				-0.00	C
31		0.00	0.00				-0.00	C
32		0.00	0.00				-0.00	C
33		0.00	0.00				-0.00	C

TABLE C-4. (continued)

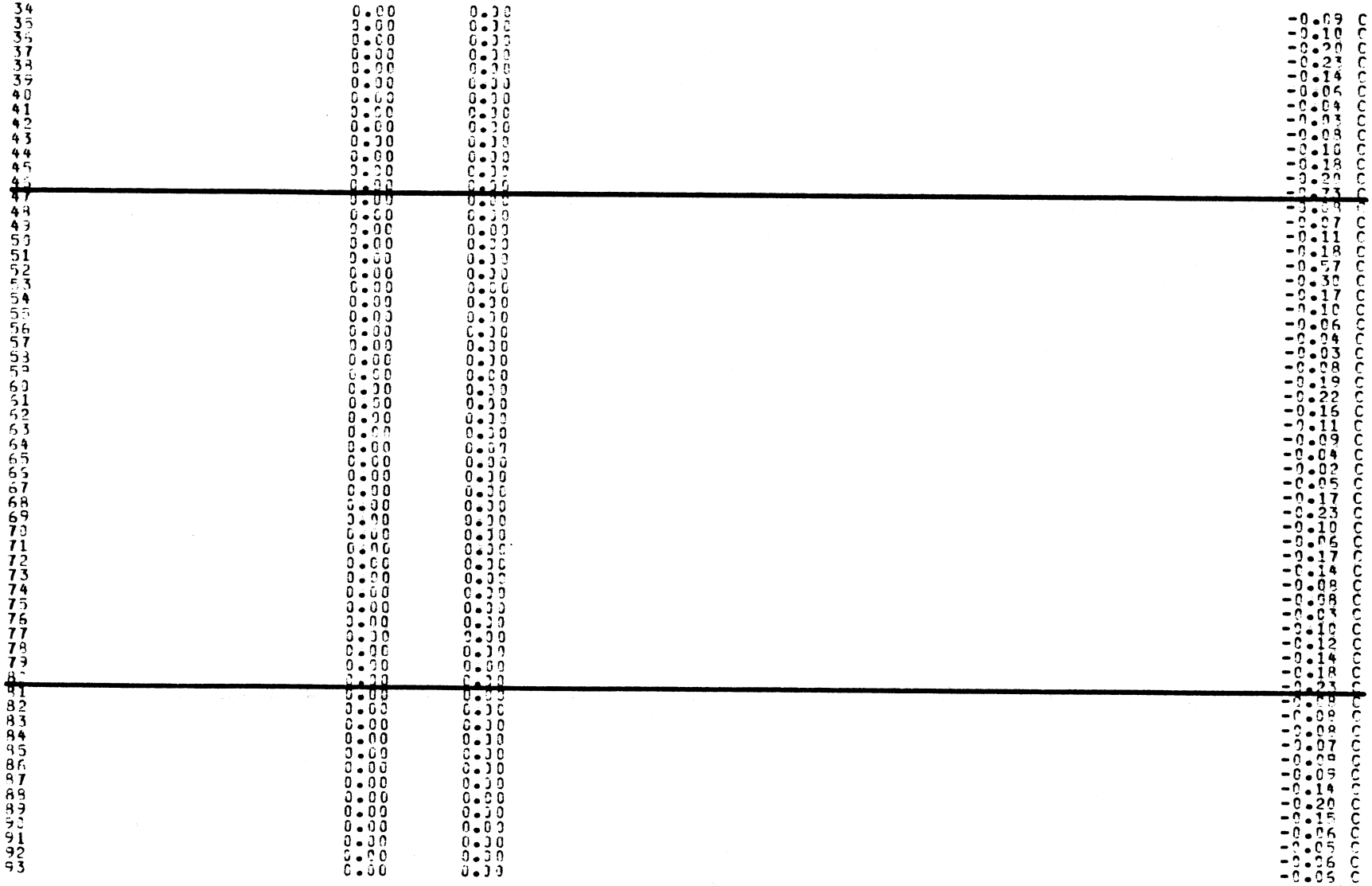

TABLE C-4. (continued)

TABLE C-5. EAU CLAIRE, WISCONSIN METEOROLOGICAL DATA-CALM PERIODS

DAY	# CALMS	CALMPRO P1	P2	P3	P4	P5	P6	P7	P8
1	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0
4	11	0	0	0	3	3	0	2	3
5	12	3	2	0	2	3	0	0	0
6	1	0	0	0	0	0	0	0	0
7	2	2	0	0	0	2	0	0	0
8	3	1	0	0	0	1	0	0	1
9	13	2	1	0	1	1	0	2	2
10	3	1	2	0	0	1	0	0	0
11	3	2	0	0	1	1	0	0	0
12	5	2	0	1	1	3	0	0	0
13	13	3	3	1	2	2	0	0	0
14	1	0	0	1	0	0	0	0	0
15	1	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0
19	10	2	3	2	0	1	0	2	0
20	1	0	0	0	1	0	0	0	0
21	1	0	0	2	0	0	0	0	1
22	3	2	0	0	2	0	0	0	0
23	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0
25	2	0	0	0	0	1	0	0	1
26	0	0	0	0	0	0	0	0	0
27	2	0	0	0	0	0	1	0	0
28	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0	0
32	6	0	0	0	0	0	0	3	3
33	4	3	1	0	0	0	0	0	0
34	4	2	0	0	0	0	0	1	1
35	2	1	0	0	0	0	0	0	0
36	1	3	0	0	0	0	0	0	1
37	3	3	2	0	1	0	0	0	0
38	3	3	2	0	3	0	0	2	3
39	2	3	0	0	3	0	0	0	0
40	15	3	3	3	3	2	0	3	0
41	3	3	0	0	0	0	0	0	0
42	4	0	0	0	1	0	0	0	0
43	0	0	0	0	0	0	0	0	0
44	0	0	0	0	0	0	0	0	0
45	0	0	0	0	0	0	0	0	0
46	10	0	2	3	3	2	0	1	0
47	3	3	2	2	1	3	0	0	0
48	0	0	0	0	0	0	0	0	0
49	2	0	0	0	0	0	0	0	0
50	2	0	0	0	1	0	0	0	0
51	3	1	3	3	0	0	0	0	0
52	3	3	0	0	0	0	0	0	0
53	3	3	0	0	0	0	0	0	0
54	0	0	0	0	0	0	0	0	0
55	1	0	0	0	1	0	0	0	0
56	0	0	0	0	0	0	0	0	0
57	3	0	0	0	0	0	0	3	0

TABLE C-5. (continued)

TABLE C-5. (continued)

```
358          0    0    0    0    0    0    0    0    0
359          0    0    0    0    0    0    0    0    0
360          0    0    0    0    0    0    0    0    0
361          0    0    0    0    0    0    0    0    0
362          0    0    0    0    0    0    0    0    0
363         13    1    3    2    0    0    1    3    3
364         12    1    3    2    0    0    2    3    1
365          1    1    0    0    0    0    0    0    0
TOTAL NUMBER OF CALM HOURS
         1243

 NUMBER OF 3-HR PERIODS WITH
    1    2    3 CALM HRS
  251  184  208

 NUMBER OF 24-HR PERIODS WITH
    1    2    3    4    5    6    7    8    9   10   11   12   13   14   15   16   17   18   19   20   21   22   23   24 CALM HRS
   43   34   25   21   28   17   13   15   16    8    9    5    3    2    2    0    1    0    0    0    0    0    1    0

        123 STATIONS WILL BE PROCESSED IN THIS RUN OF CALMPRO.
```

TABLE C-6. HIGHEST PREDICTED 24-HOUR TSP CONCENTRATIONS USING ANNUAL EMISSION RATES AND CALMPRO.

FIVE HIGHEST 24-HOUR PART CONCENTRATIONS((ENDING ON JULIAN DAY, HOUR)
(MICROGRAMS/M**3)

RECEPTOR			1	2	3	4	5
1(	0.00,	0.00)	0.920 (158,24)	0.100 (363,24)	0.00 (0, 0)	0.00 (0, 0)	0.00 (0, 0)
2(	0.00,	0.00)	1.820 (67,24)	0.540 (158,24)	0.000 (363,24)	0.00 (0, 0)	0.00 (0, 0)
3(	0.00,	0.00)	2.860 (158,24)	0.420 (67,24)	0.050 (363,24)	0.000 (46,24)	0.000 (176,24)
4(	0.00,	0.00)	5.850 (158,24)	2.440 (67,24)	0.000 (363,24)	0.000 (176,24)	0.00 (0, 0)
5(	0.00,	0.00)	1.570 (67,24)	0.700 (158,24)	0.070 (363,24)	0.010 (46,24)	0.000 (176,24)
6(	0.00,	0.00)	1.780 (158,24)	1.440 (67,24)	0.000 (176,24)	0.000 (363,24)	0.000 (46,24)
7(	0.00,	0.01)	2.010 (158,24)	1.890 (67,24)	0.100 (46,24)	0.090 (363,24)	0.020 (176,24)
8(	0.00,	0.00)	4.230 (67,24)	2.530 (158,24)	0.140 (363,24)	0.090 (46,24)	0.040 (176,24)
9(	0.00,	0.00)	1.270 (158,24)	1.270 (67,24)	0.090 (46,24)	0.040 (363,24)	0.000 (176,24)
10(	0.00,	0.00)	5.460 (158,24)	0.030 (363,24)	0.020 (67,24)	0.010 (46,24)	0.000 (176,24)
11(	0.00,	0.00)	8.610 (158,24)	0.120 (363,24)	0.010 (67,24)	0.010 (46,24)	0.000 (176,24)
12(	0.00,	0.00)	2.160 (363,24)	0.100 (158,24)	0.010 (67,24)	0.000 (46,24)	0.000 (176,24)
13(	0.00,	0.00)	1.880 (363,24)	0.090 (67,24)	0.000 (46,24)	0.000 (158,24)	0.000 (176,24)
14(	0.00,	0.01)	3.040 (158,24)	1.590 (67,24)	0.140 (46,24)	0.110 (363,24)	0.020 (176,24)
15(	0.00,	0.01)	3.810 (158,24)	3.350 (67,24)	0.290 (46,24)	0.230 (363,24)	0.040 (176,24)
16(	0.00,	0.00)	2.250 (158,24)	1.440 (67,24)	0.060 (46,24)	0.050 (363,24)	0.000 (176,24)
17(	0.00,	0.00)	3.170 (158,24)	1.750 (67,24)	0.090 (46,24)	0.020 (363,24)	0.010 (176,24)
18(	0.00,	0.00)	4.340 (158,24)	2.240 (67,24)	0.280 (46,24)	0.170 (363,24)	0.050 (176,24)
19(	0.00,	0.00)	4.610 (158,24)	3.350 (67,24)	0.080 (46,24)	0.080 (363,24)	0.020 (176,24)
20(	0.00,	0.00)	4.120 (158,24)	1.830 (67,24)	0.060 (46,24)	0.060 (363,24)	0.000 (176,24)
21(	0.00,	0.00)	12.380 (158,24)	0.590 (67,24)	0.060 (363,24)	0.040 (46,24)	0.000 (176,24)
22(	0.00,	0.00)	14.660 (158,24)	0.260 (363,24)	0.040 (46,24)	0.020 (67,24)	0.000 (176,24)
23(	0.00,	0.00)	4.490 (158,24)	2.060 (363,24)	0.020 (46,24)	0.020 (67,24)	0.000 (176,24)
24(	0.00,	0.00)	3.040 (363,24)	0.380 (158,24)	0.040 (67,24)	0.020 (46,24)	0.000 (176,24)
25(	0.00,	0.00)	3.320 (363,24)	0.440 (67,24)	0.090 (158,24)	0.020 (46,24)	0.000 (176,24)
26(	0.00,	0.00)	3.810 (363,24)	1.280 (67,24)	0.030 (46,24)	0.000 (176,24)	0.000 (158,24)
27(	0.00,	0.00)	4.790 (158,24)	1.370 (67,24)	0.060 (46,24)	0.020 (363,24)	0.010 (176,24)
28(	0.00,	0.00)	4.840 (158,24)	2.710 (67,24)	0.060 (363,24)	0.060 (46,24)	0.040 (176,24)
29(	0.00,	0.00)	5.590 (158,24)	3.220 (67,24)	0.200 (363,24)	0.130 (46,24)	0.020 (176,24)
30(	0.00,	0.00)	8.440 (158,24)	5.130 (67,24)	0.100 (363,24)	0.070 (46,24)	0.010 (176,24)
31(	0.00,	0.00)	7.890 (158,24)	2.770 (67,24)	0.100 (363,24)	0.060 (46,24)	0.010 (176,24)
32(	0.00,	0.00)	16.270 (158,24)	0.190 (363,24)	0.080 (67,24)	0.040 (46,24)	0.010 (176,24)
33(	0.00,	0.00)	4.970 (158,24)	0.650 (67,24)	0.050 (46,24)	0.050 (363,24)	0.010 (176,24)
34(	0.00,	0.00)	4.910 (158,24)	0.770 (67,24)	0.110 (363,24)	0.050 (46,24)	0.010 (176,24)
35(	0.00,	0.00)	4.870 (158,24)	1.320 (67,24)	0.150 (46,24)	0.150 (363,24)	0.040 (176,24)
36(	0.00,	0.00)	7.190 (158,24)	4.260 (67,24)	0.070 (46,24)	0.060 (176,24)	0.040 (363,24)
37(	0.00,	0.00)	9.590 (363,24)	3.130 (67,24)	1.080 (158,24)	0.480 (46,24)	0.340 (176,24)
38(	0.00,	0.00)	6.390 (363,24)	2.220 (67,24)	0.080 (158,24)	0.030 (176,24)	0.030 (46,24)
39(	0.00,	0.00)	2.400 (363,24)	1.140 (67,24)	0.250 (46,24)	0.000 (176,24)	0.000 (158,24)
40(	0.00,	0.00)	1.290 (363,24)	0.900 (67,24)	0.210 (46,24)	0.000 (176,24)	0.00 (0, 0)
41(	0.00,	0.00)	0.940 (363,24)	0.770 (67,24)	0.350 (46,24)	0.000 (176,24)	0.00 (0, 0)
42(	0.00,	0.00)	3.730 (158,24)	0.560 (67,24)	0.360 (363,24)	0.070 (46,24)	0.040 (176,24)
43(	0.00,	0.00)	4.450 (158,24)	0.880 (363,24)	0.680 (67,24)	0.130 (46,24)	0.100 (176,24)
44(	0.00,	0.00)	5.950 (158,24)	3.690 (363,24)	1.070 (67,24)	0.170 (176,24)	0.160 (46,24)
45(	0.00,	0.00)	7.360 (158,24)	2.720 (67,24)	1.740 (363,24)	0.520 (176,24)	0.270 (46,24)
46(	0.00,	0.00)	* 26.850 (46,24)	* 9.160 (363,24)	2.890 (158,24)	2.380 (67,24)	2.140 (176,24)
47(	0.00,	0.00)	2.500 (363,24)	2.140 (158,24)	0.250 (67,24)	0.040 (46,24)	0.010 (176,24)
48(	0.00,	0.00)	2.340 (158,24)	1.510 (363,24)	0.420 (67,24)	0.070 (176,24)	0.020 (46,24)
49(	0.00,	0.00)	4.530 (158,24)	1.400 (363,24)	0.620 (67,24)	0.480 (176,24)	0.090 (46,24)
50(	0.00,	0.00)	5.890 (158,24)	2.830 (363,24)	1.350 (67,24)	1.050 (176,24)	0.280 (46,24)
51(	0.00,	0.00)	17.110 (46,24)	7.630 (363,24)	6.070 (176,24)	2.870 (158,24)	1.740 (67,24)
52(	0.00,	0.00)	12.950 (46,24)	4.750 (363,24)	1.060 (67,24)	0.160 (176,24)	0.000 (158,24)
53(	0.00,	0.00)	5.480 (46,24)	1.990 (363,24)	1.000 (176,24)	0.880 (67,24)	0.000 (158,24)
54(	0.00,	0.00)	3.660 (46,24)	1.560 (363,24)	0.900 (67,24)	0.480 (176,24)	0.00 (0, 0)
55(	0.00,	0.00)	2.080 (46,24)	1.030 (363,24)	0.770 (67,24)	0.050 (176,24)	0.00 (0, 0)

TABLE C-6. (continued)

TABLE C-6. (continued)

116(0.00, 0.00)	1.860 (46,24)	1.510 (158,24)	0.280 (176,24)	0.000 (363,24)	0.000 (67,24)
117(0.00, 0.00)	2.050 (46,24)	1.270 (158,24)	0.290 (176,24)	0.080 (363,24)	0.000 (0, 0)
118(0.00, 0.00)	1.040 (46,24)	0.360 (363,24)	0.240 (176,24)	0.070 (158,24)	0.000 (0, 0)
119(0.00, 0.00)	1.740 (176,24)	0.460 (363,24)	0.000 (46,24)	0.000 (158,24)	0.000 (0, 0)
120(0.00, 0.00)	0.770 (176,24)	0.070 (46,24)	0.000 (363,24)	0.00 (0, 0)	0.000 (0, 0)
121(0.00, 0.00)	0.310 (46,24)	0.160 (176,24)	0.000 (0, 0)	0.00 (0, 0)	0.000 (0, 0)
122(0.00, 0.00)	0.480 (46,24)	0.140 (176,24)	0.000 (0, 0)	0.00 (0, 0)	0.000 (0, 0)
123(0.00, 0.00)	0.440 (46,24)	0.390 (176,24)	0.00 (0, 0)	0.00 (0, 0)	0.00 (0, 0)

MESSAGE SUMMARY: MESSAGE NUMBER - COUNT

208 1

TABLE C-7. ISC MODEL INPUTS - 24 HOUR EMISSION RATES

```
ISCST (VERSION 88359)
AN AIR QUALITY DISPERSION MODEL IN
SECTION 3. MODELS PROPOSED SEP80 FOR 81 GUIDELINES.
IN UNAMAP (VERSION 4) DEC 80
SOURCE: FILE 16 ON UNAMAP MAGNETIC TAPE FROM NTIS.


          *** *24HR EMISSION RATES-W/*HI 13 DAYS FROM ANNUAL 50 MAX.*       ***

CALCULATE (CONCENTRATION=1,DEPOSITION=2)                          ISW(1) =    1
RECEPTOR GRID SYSTEM (RECTANGULAR=1 OR 3, POLAR=2 OR 4)           ISW(2) =    1
DISCRETE RECEPTOR SYSTEM (RECTANGULAR=1,POLAR=2)                  ISW(3) =    1
TERRAIN ELEVATIONS ARE READ (YES=1,NO=0)                          ISW(4) =    0
CALCULATIONS ARE WRITTEN TO TAPE (YES=1,NO=0)                     ISW(5) =    1
LIST ALL INPUT DATA (NO=0,YES=1,MET DATA ALSO=2)                  ISW(6) =    2

COMPUTE AVERAGE CONCENTRATION (OR TOTAL DEPOSITION)
WITH THE FOLLOWING TIME PERIODS:
  HOURLY (YES=1,NO=0)                                             ISW(7) =    1
  2-HOUR (YES=1,NO=0)                                             ISW(8) =    0
  3-HOUR (YES=1,NO=0)                                             ISW(9) =    0
  4-HOUR (YES=1,NO=0)                                            ISW(10) =    0
  6-HOUR (YES=1,NO=0)                                            ISW(11) =    0
  8-HOUR (YES=1,NO=0)                                            ISW(12) =    0
  12-HOUR (YES=1,NO=0)                                           ISW(13) =    0
  24-HOUR (YES=1,NO=0)                                           ISW(14) =    0
PRINT *N*-DAY TABLE(S) (YES=1,NO=0)                              ISW(15) =    0

PRINT THE FOLLOWING TYPES OF TABLES WHOSE TIME PERIODS ARE
SPECIFIED BY ISW(7) THROUGH ISW(14):
  DAILY TABLES (YES=1,NO=0)                                      ISW(16) =    0
  HIGHEST & SECOND HIGHEST TABLES (YES=1,NO=0)                   ISW(17) =    0
  MAXIMUM 50 TABLES (YES=1,NO=0)                                 ISW(18) =    0
METEOROLOGICAL DATA INPUT METHOD (PRE-PROCESSED=1,CARD=2)        ISW(19) =    1
RURAL-URBAN OPTION (RURAL=0,URBAN MODE 1=1,URBAN MODE 2=2)       ISW(20) =    0
WIND PROFILE EXPONENT VALUES (DEFAULTS=1,USER ENTERS=2,3)        ISW(21) =    1
VERTICAL POT. TEMP. GRADIENT VALUES (DEFAULTS=1,USER ENTERS=2,3) ISW(22) =    1
SCALE EMISSION RATES FOR ALL SOURCES (NO=0,YES>0)                ISW(23) =    0
PROGRAM CALCULATES FINAL PLUME RISE ONLY (YES=1,NO=2)            ISW(24) =    1
PROGRAM ADJUSTS ALL STACK HEIGHTS FOR DOWNWASH (YES=2,NO=1)      ISW(25) =    1

NUMBER OF INPUT SOURCES                                          NSOURC =   32
NUMBER OF SOURCE GROUPS (=0,ALL SOURCES)                         NGROUP =    1
TIME PERIOD INTERVAL TO BE PRINTED (=0,ALL INTERVALS)             IPERD =    0
NUMBER OF X (RANGE) GRID VALUES                                  NXPNTS =    0
NUMBER OF Y (THETA) GRID VALUES                                  NYPNTS =    0
NUMBER OF DISCRETE RECEPTORS                                     NXYPT  =  123
SOURCE EMISSION RATE UNITS CONVERSION FACTOR                        TK  =.10000E 07
ENTRAINMENT COEFFICIENT FOR UNSTABLE ATMOSPHERE                  BETA1 =0.600
ENTRAINMENT COEFFICIENT FOR STABLE ATMOSPHERE                    BETA2 =0.600
HEIGHT ABOVE GROUND AT WHICH WIND SPEED WAS MEASURED                ZR  =   10.00  METERS
LOGICAL UNIT NUMBER OF METEOROLOGICAL DATA                        IMET =    1
DECAY COEFFICIENT FOR PHYSICAL OR CHEMICAL DEPLETION             DECAY =0.0
SURFACE STATION NO.                                                ISS  =  14991
YEAR OF SURFACE DATA                                               ISY  =  77
UPPER AIR STATION NO.                                              IUS  =  14926
YEAR OF UPPER AIR DATA                                             IUY  =  77
LOGICAL UNIT OF CALCULATION *SAVE* TAPE                          ITAP   =  12
```

```
ALLOCATED DATA STORAGE                                              LIMIT = 43500 WORDS
REQUIRED DATA STORAGE FOR THIS PROBLEM RUN                          MIMIT =  7495 WORDS
```

*** *24HR EMISSION RATES-W/*HI 13 DAYS FROM ANNUAL 50 MAX.* ***

*** METEOROLOGICAL DAYS TO BE PROCESSED ***
(IF=1)

```
0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 1   0 0 0 0 0 1 0 0 0 0
0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 1 0 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 1 1   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 1 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 1 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0   0 0 0 1 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 1 0 0
0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 1 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 1
0 0 0 0 0 0 0 1 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0   0 0 1 0 0 0
```

*** NUMBER OF SOURCE NUMBERS REQUIRED TO DEFINE SOURCE GROUPS ***
(NSOGRP)

2,

*** SOURCE NUMBERS DEFINING SOURCE GROUPS ***
(IDSOR)

1, -32,

*** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
(METERS/SEC)

1.54, 3.09, 5.14, 8.23, 10.80,

*** WIND PROFILE EXPONENTS ***

STABILITY CATEGORY	WIND SPEED CATEGORY 1	2	3	4	5	6
A	.10000E 00	.10000E 00	.10000E 00	.10000E 00	.10000E 00	.10000E 00
B	.15000E 00	.15000E 00	.15000E 00	.15000E 00	.15000E 00	.15000E 00
C	.20000E 00	.20000E 00	.20000E 00	.20000E 00	.20000E 00	.20000E 00
D	.25000E 00	.25000E 00	.25000E 00	.25000E 00	.25000E 00	.25000E 00
E	.30000E 00	.30000E 00	.30000E 00	.30000E 00	.30000E 00	.30000E 00
F	.30000E 00	.30000E 00	.30000E 00	.30000E 00	.30000E 00	.30000E 00

*** *24HR EMISSION RATES-W/*HI 13 DAYS FROM ANNUAL 50 MAX.* ***

*** VERTICAL POTENTIAL TEMPERATURE GRADIENTS ***
(DEGREES KELVIN PER METER)

STABILITY WIND SPEED CATEGORY

TABLE C-7. (continued)

CATEGORY	1	2	3	4	5	6
A	.0	.0	.0	.0	.0	.0
B	.0	.0	.0	.0	.0	.0
C	.0	.0	.0	.0	.0	.0
D	.0	.0	.0	.0	.0	.0
E	.20000E-01	.20000E-01	.20000E-01	.20000E-01	.20000E-01	.20000E-01
F	.35000E-01	.35000E-01	.35000E-01	.35000E-01	.35000E-01	.35000E-01

*** X,Y COORDINATES OF DISCRETE RECEPTORS ***
(METERS)

(691000.0,	33300.0),	(691000.0,	34500.0),	(691000.0,	37500.0),	(691500.0,	39000.0),	(691500.0,	38000.0),
(692000.0,	39500.0),	(692000.0,	33000.0),	(692000.0,	33000.0),	(692000.0,	37500.0),	(692500.0,	36500.0),
(692000.0,	33500.0),	(692000.0,	34500.0),	(692000.0,	33500.0),	(692500.0,	39000.0),	(692500.0,	39000.0),
(693000.0,	39500.0),	(693000.0,	35000.0),	(693000.0,	38000.0),	(693000.0,	37500.0),	(693000.0,	36500.0),
(693000.0,	36120.0),	(693020.0,	35720.0),	(693020.0,	35320.0),	(693100.0,	34960.0),	(693050.0,	34500.0),
(693000.0,	33500.0),	(693500.0,	35000.0),	(693500.0,	38000.0),	(693500.0,	37500.0),	(693360.0,	36940.0),
(693355.0,	35500.0),	(693350.0,	35120.0),	(694000.0,	38500.0),	(694000.0,	39000.0),	(694000.0,	38500.0),
(693940.0,	36960.0),	(694000.0,	34860.0),	(693700.0,	34500.0),	(694000.0,	33500.0),	(694000.0,	32500.0),
(694000.0,	31500.0),	(694500.0,	38500.0),	(694500.0,	38000.0),	(694500.0,	37500.0),	(694340.0,	36960.0),
(694420.0,	35160.0),	(695000.0,	39500.0),	(695000.0,	39500.0),	(695000.0,	37500.0),	(694940.0,	37000.0),
(694360.0,	34720.0),	(694540.0,	34330.0),	(694140.0,	33740.0),	(695000.0,	33000.0),	(695000.0,	32500.0),
(695000.0,	32000.0),	(695000.0,	31500.0),	(695500.0,	37500.0),	(695340.0,	37020.0),	(695500.0,	33760.0),
(695560.0,	33200.0),	(695500.0,	32750.0),	(695480.0,	32240.0),	(695510.0,	31500.0),	(696000.0,	39500.0),
(696000.0,	38500.0),	(696000.0,	37500.0),	(695820.0,	37000.0),	(696000.0,	32250.0),	(696000.0,	31500.0),
(695500.0,	37500.0),	(696500.0,	37000.0),	(696500.0,	32250.0),	(696500.0,	31500.0),	(697000.0,	39500.0),
(697000.0,	38500.0),	(697000.0,	37500.0),	(696960.0,	37000.0),	(696950.0,	36250.0),	(696960.0,	35820.0),
(697040.0,	33020.0),	(697080.0,	32440.0),	(697080.0,	32250.0),	(697000.0,	31500.0),	(697500.0,	37500.0),
(697500.0,	37500.0),	(697500.0,	35500.0),	(697360.0,	35850.0),	(697400.0,	35300.0),	(697420.0,	34780.0),
(697440.0,	34240.0),	(697440.0,	33020.0),	(697500.0,	32500.0),	(697500.0,	32000.0),	(698000.0,	39500.0),
(698000.0,	38500.0),	(698000.0,	37500.0),	(698000.0,	37000.0),	(698000.0,	36500.0),	(698000.0,	36000.0),
(698000.0,	35000.0),	(698000.0,	35000.0),	(698000.0,	34500.0),	(697840.0,	34220.0),	(697880.0,	33600.0),
(697820.0,	33020.0),	(698000.0,	32500.0),	(698000.0,	31500.0),	(698500.0,	37000.0),	(698500.0,	36000.0),
(698500.0,	34500.0),	(698500.0,	34000.0),	(698500.0,	33500.0),	(698500.0,	33000.0),	(699000.0,	39500.0),
(699000.0,	38500.0),	(699000.0,	37500.0),	(699000.0,	36500.0),	(699000.0,	35500.0),	(699000.0,	34500.0),
(699000.0,	33500.0),	(699000.0,	32500.0),	(699000.0,	31500.0),	(			

*** *24HR EMISSION RATES-W/*HI 13 DAYS FROM ANNUAL 50 MAX.* ***

*** SOURCE DATA ***

SOURCE NUMBER	TYPE	WAKE	NUMBER PART. CATS.	EMISSION RATE TYPE=0,1 GRAMS/SECOND TYPE=2 GRAMS/SECOND *PER METER**2	X (METERS)	Y (METERS)	BASE ELEV. (METERS)	HEIGHT (METERS)	TEMP. TYPE=0 (DEG.K); VERT.DIM TYPE=1 (METERS)	EXIT VEL. TYPE=0 (M/SEC); HORZ.DIM TYPE=1,2 (METERS)	DIAMETER TYPE=0 (METERS)	BLDG. HEIGHT TYPE=0 (METERS)	BLDG. LENGTH TYPE=0 (METERS)	BLDG. WIDTH TYPE=0 (METERS)
1				0.0	694215.0	35770.0	0.0	26.00	294.30	0.01	1.00	35.00	21.00	22.00
2				0.0	694140.0	35770.0	0.0	38.00	294.30	20.40	0.84	35.00	15.00	30.00
3				0.34100E 00	694470.0	35550.0	0.0	8.00	294.30	0.01	0.43	21.00	50.00	25.00
4				0.40000E 01	693285.0	35590.0	0.0	3.70	294.30	8.33	6.71	0.0	0.0	0.0
5				0.40100E 01	694625.0	35460.0	0.0	3.70	294.30	8.33	6.71	0.0	0.0	0.0
6				0.11700E 00	694155.0	35710.0	0.0	13.00	623.00	0.01	0.60	10.00	23.50	30.00
7				0.11800E 00	694160.0	35710.0	0.0	13.00	623.00	0.01	0.60	10.00	23.50	30.00

TABLE C-7. (continued)

8	2	0		0.597300E-01	694165.0	3[illegible]710.0	0.0	13.00	623.00	0.01	0.50	10.00	23.50	30.00
9	2	0	5	0.776000E-06	691500.0	34500.0	0.0	1.00	0.0	100.00	0.0	0.0	0.0	0.0
10	2	0	5	0.776000E-06	691900.0	34400.0	0.0	1.00	0.0	100.00	0.0	0.0	0.0	0.0
11	2	0	5	0.776000E-06	692300.0	34400.0	0.0	1.00	0.0	100.00	0.0	0.0	0.0	0.0
12	2	0	5	0.776000E-06	692700.0	34350.0	0.0	1.00	0.0	100.00	0.0	0.0	0.0	0.0
13	2	0	5	0.776000E-06	693100.0	34300.0	0.0	1.00	0.0	100.00	0.0	0.0	0.0	0.0
14	2	0	5	0.776000E-06	693500.0	34250.0	0.0	1.00	0.0	100.00	0.0	0.0	0.0	0.0
15	2	0	5	0.776000E-06	693800.0	38000.0	0.0	1.00	0.0	100.00	0.0	0.0	0.0	0.0
16	2	0	5	0.776000E-06	693950.0	37600.0	0.0	1.00	0.0	100.00	0.0	0.0	0.0	0.0
17	2	0	5	0.776000E-06	693850.0	37200.0	0.0	1.00	0.0	100.00	0.0	0.0	0.0	0.0
18	2	0	5	0.776000E-06	693350.0	36800.0	0.0	1.00	0.0	100.00	0.0	0.0	0.0	0.0
19	2	0	5	0.776000E-06	693850.0	36400.0	0.0	1.00	0.0	100.00	0.0	0.0	0.0	0.0
20	2	0	5	0.432000E-05	693900.0	35700.0	0.0	1.00	0.0	300.00	0.0	0.0	0.0	0.0
21	2	0	5	0.414000E-05	694100.0	35600.0	0.0	1.00	0.0	100.00	0.0	0.0	0.0	0.0
22	2	0	5	0.432000E-05	694200.0	35600.0	0.0	1.00	0.0	400.00	0.0	0.0	0.0	0.0
23	2	0	5	0.414000E-05	694200.0	35400.0	0.0	1.00	0.0	200.00	0.0	0.0	0.0	0.0
24	2	0	5	0.417000E-05	694600.0	35500.0	0.0	1.00	0.0	200.00	0.0	0.0	0.0	0.0
25	2	0	5	0.396000E-05	694700.0	35650.0	0.0	1.00	0.0	100.00	0.0	0.0	0.0	0.0
26	2	0	5	0.39[illegible]000E-05	694700.0	35450.0	0.0	1.00	0.0	100.00	0.0	0.0	0.0	0.0
27	2	0	5	0.396000E-05	694800.0	35250.0	0.0	1.00	0.0	100.00	0.0	0.0	0.0	0.0
28	2	0	5	0.396000E-05	695100.0	35150.0	0.0	1.00	0.0	100.00	0.0	0.0	0.0	0.0
29	2	0	5	0.396000E-05	695300.0	35100.0	0.0	1.00	0.0	100.00	0.0	0.0	0.0	0.0
30	2	0	5	0.396000E-05	695500.0	35100.0	0.0	1.00	0.0	100.00	0.0	0.0	0.0	0.0
31	2	0	5	0.396000E-05	695700.0	35100.0	0.0	1.00	0.0	100.00	0.0	0.0	0.0	0.0
32	2	0	16	0.248000E-04	695900.0	34700.0	0.0	1.00	0.0	800.00	0.0	0.0	0.0	0.0

*** *24HR EMISSION RATES-W/*HI 13 DAYS FROM ANNUAL 50 MAX.* ***

*** SOURCE PARTICULATE DATA ***

*** SOURCE NUMBER = 9 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.53000,

*** SOURCE NUMBER = 10 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.53000,

*** SOURCE NUMBER = 11 ***

MASS FRACTION =

TABLE C-7. (continued)

```
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.43000,


                    *** *24HR EMISSION RATES-W/*HI 13 DAYS FROM ANNUAL 50 MAX.*      ***

                                  *** SOURCE PARTICULATE DATA ***


*** SOURCE NUMBER =    12 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

*** SOURCE NUMBER =    13 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.43000,

*** SOURCE NUMBER =    14 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,


                    *** *24HR EMISSION RATES-W/*HI 13 DAYS FROM ANNUAL 50 MAX.*      ***

                                  *** SOURCE PARTICULATE DATA ***


*** SOURCE NUMBER =    15 ***
```

TABLE C-7. (continued)

```
MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

*** SOURCE NUMBER =    16 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

*** SOURCE NUMBER =    17 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

                *** *24HR EMISSION RATES-W/*HI 13 DAYS FROM ANNUAL 50 MAX.*      ***

                        *** SOURCE PARTICULATE DATA ***

*** SOURCE NUMBER =    18 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

*** SOURCE NUMBER =    19 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0200, 0.0480,
```

TABLE C-7. (continued)

```
SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

*** SOURCE NUMBER =    20 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0210, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,


*** *24HR EMISSION RATES-W/*HI 13 DAYS FROM ANNUAL 50 MAX.*      ***

*** SOURCE PARTICULATE DATA ***


*** SOURCE NUMBER =    21 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0210, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

*** SOURCE NUMBER =    22 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0210, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

*** SOURCE NUMBER =    23 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0210, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,


*** *24HR EMISSION RATES-W/*HI 13 DAYS FROM ANNUAL 50 MAX.*      ***
```

TABLE C-7. (continued)

*** SOURCE PARTICULATE DATA ***

*** SOURCE NUMBER = 24 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

*** SOURCE NUMBER = 25 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

*** SOURCE NUMBER = 26 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

*** *24HR EMISSION RATES-W/*HI 13 DAYS FROM ANNUAL 50 MAX.* ***

*** SOURCE PARTICULATE DATA ***

*** SOURCE NUMBER = 27 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

*** SOURCE NUMBER = 28 ***

TABLE C-7. (continued)

```
MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

*** SOURCE NUMBER =    29 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,
```

*** *24HR EMISSION RATES-W/*HI 13 DAYS FROM ANNUAL 50 MAX.* ***

*** SOURCE PARTICULATE DATA ***

```
*** SOURCE NUMBER =    30 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

*** SOURCE NUMBER =    31 ***

MASS FRACTION =
0.12700,0.32100,0.55200,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0200, 0.0480,

SURFACE REFLECTION COEFFICIENT =
0.87000,0.71000,0.63000,

*** SOURCE NUMBER =    32 ***

MASS FRACTION =
0.03800,0.03600,0.14800,0.16800,0.08400,0.07300,0.08100,0.07700,0.06700,0.07300,
0.07200,0.02000,0.01000,

SETTLING VELOCITY(METERS/SEC) =
 0.0030, 0.0200, 0.0460, 0.0960, 0.1560, 0.2300, 0.3220, 0.4300, 0.5500, 0.6900,
 0.8300, 1.0100, 1.2300,
```

SURFACE REFLECTION COEFFICIENT =
1.00000,0.71000,0.63000,0.51000,0.36000,0.17000,0.0 ,0.0 ,0.0 ,0.0 ,
0.0 ,0.0 ,0.0 ,

*** *24HR EMISSION RATES-W/*HI 13 DAYS FROM ANNUAL 50 MAX.* ***

* SOURCE-RECEPTOR COMBINATIONS LESS THAN 100 METERS OR THREE BUILDING HEIGHTS IN DISTANCE. NO AVERAGE CONCENTRATION IS CALCULATED *

SOURCE NUMBER	- - RECEPTOR LOCATION - - X OR RANGE (METERS)	Y (METERS) OR DIRECTION (DEGREES)	DISTANCE BETWEEN (METERS)
18	693840.0	35960.0	68.89

TABLE C-7. (continued)

FIVE HIGHEST 24-HOUR PART CONCENTRATIONS((ENDING ON JULIAN DAY, HOUR)
(MICROGRAMS/M**3)

RECEPTOR			1	2	3	4	5
1(	0.00,	0.00)	0.000 (158,24)	0.000 (308,24)	0.000 (129,24)	0.000 (363,24)	0.000 (130,24)
2(	0.00,	0.00)	2.600 (308,24)	1.780 (130,24)	1.670 (214,24)	1.030 (67,24)	1.470 (129,24)
3(	0.00,	0.00)	7.080 (130,24)	4.600 (308,24)	3.310 (158,24)	1.490 (129,24)	0.730 (214,24)
4(	0.00,	0.00)	5.080 (158,24)	2.240 (67,24)	1.330 (308,24)	0.910 (130,24)	0.900 (214,24)
5(	0.00,	0.00)	3.420 (308,24)	2.840 (130,24)	2.340 (214,24)	1.790 (129,24)	1.310 (67,24)
6(	0.00,	0.00)	1.980 (67,24)	1.740 (158,24)	1.240 (130,24)	0.710 (129,24)	0.540 (308,24)
7(	0.00,	0.00)	2.230 (67,24)	1.710 (130,24)	1.540 (158,24)	0.880 (308,24)	0.860 (214,24)
8(	0.00,	0.00)	3.410 (67,24)	2.700 (308,24)	2.560 (158,24)	2.520 (130,24)	1.590 (129,24)
9(	0.00,	0.00)	4.720 (130,24)	4.330 (308,24)	2.810 (214,24)	2.460 (129,24)	2.170 (158,24)
10(	0.00,	0.00)	8.280 (308,24)	7.360 (129,24)	5.080 (158,24)	4.010 (130,24)	3.410 (214,24)
11(	0.00,	0.00)	9.920 (158,24)	6.000 (308,24)	2.120 (129,24)	0.100 (363,24)	0.070 (308,24)
12(	0.00,	0.00)	2.940 (308,24)	1.950 (308,24)	1.530 (363,24)	0.850 (129,24)	0.350 (158,24)
13(	0.00,	0.00)	2.270 (363,24)	2.100 (308,24)	1.870 (129,24)	0.430 (214,24)	0.350 (275,24)
14(	0.00,	0.00)	3.020 (158,24)	2.280 (67,24)	1.150 (130,24)	0.830 (129,24)	0.630 (308,24)
15(	0.00,	0.00)	3.300 (158,24)	2.980 (67,24)	2.460 (130,24)	2.330 (308,24)	1.930 (129,24)
16(	0.00,	0.00)	2.700 (158,24)	2.180 (130,24)	1.600 (67,24)	0.630 (129,24)	0.320 (214,24)
17(	0.00,	0.00)	3.730 (158,24)	2.160 (130,24)	2.160 (67,24)	0.810 (129,24)	0.510 (308,24)
18(	0.00,	0.00)	3.590 (158,24)	2.490 (67,24)	1.960 (130,24)	1.550 (214,24)	1.390 (308,24)
19(	0.00,	0.00)	4.040 (158,24)	3.420 (130,24)	3.280 (308,24)	2.690 (67,24)	2.570 (129,24)
20(	0.00,	0.00)	17.190 (130,24)	10.810 (308,24)	9.290 (129,24)	4.840 (158,24)	2.150 (67,24)
21(	0.00,	0.00)	13.710 (129,24)	12.870 (158,24)	12.480 (308,24)	5.490 (130,24)	0.800 (67,24)
22(	0.00,	0.00)	13.960 (158,24)	10.370 (308,24)	8.460 (129,24)	0.710 (130,24)	0.250 (363,24)
23(	0.00,	0.00)	6.610 (308,24)	6.430 (158,24)	4.980 (129,24)	2.200 (308,24)	2.040 (363,24)
24(	0.00,	0.00)	9.600 (308,24)	5.160 (308,24)	4.970 (129,24)	3.840 (275,24)	2.960 (158,24)
25(	0.00,	0.00)	8.470 (308,24)	5.170 (275,24)	3.460 (129,24)	3.460 (308,24)	2.690 (363,24)
26(	0.00,	0.00)	5.590 (308,24)	4.060 (363,24)	2.990 (214,24)	2.170 (275,24)	0.790 (67,24)
27(	0.00,	0.00)	4.440 (158,24)	2.020 (130,24)	1.570 (67,24)	0.700 (129,24)	0.370 (214,24)
28(	0.00,	0.00)	5.150 (158,24)	3.590 (67,24)	3.370 (130,24)	1.300 (308,24)	1.190 (214,24)
29(	0.00,	0.00)	5.180 (158,24)	4.480 (130,24)	3.350 (67,24)	2.100 (308,24)	1.690 (214,24)
30(	0.00,	0.00)	9.010 (158,24)	6.830 (130,24)	5.890 (308,24)	3.430 (129,24)	3.290 (67,24)
31(	0.00,	0.00)	12.530 (130,24)	10.040 (308,24)	9.920 (158,24)	6.670 (129,24)	4.960 (67,24)
32(	0.00,	0.00)	19.780 (130,24)	17.950 (308,24)	15.310 (158,24)	14.300 (129,24)	0.610 (214,24)
33(	0.00,	0.00)	4.590 (158,24)	1.410 (130,24)	1.030 (67,24)	0.350 (129,24)	0.090 (214,24)
34(	0.00,	0.00)	5.310 (158,24)	1.590 (130,24)	1.040 (67,24)	0.500 (129,24)	0.230 (214,24)
35(	0.00,	0.00)	5.210 (158,24)	1.930 (130,24)	1.340 (67,24)	0.730 (129,24)	0.430 (214,24)
36(	0.00,	0.00)	7.490 (130,24)	5.930 (158,24)	4.470 (67,24)	3.670 (308,24)	2.760 (129,24)
37(	0.00,	0.00)	9.630 (308,24)	9.400 (300,24)	8.490 (275,24)	8.190 (214,24)	7.810 (363,24)
38(	0.00,	0.00)	5.880 (363,24)	4.560 (275,24)	4.370 (308,24)	4.130 (300,24)	3.720 (214,24)
39(	0.00,	0.00)	12.080 (300,24)	9.030 (275,24)	5.390 (129,24)	5.240 (214,24)	2.790 (363,24)
40(	0.00,	0.00)	7.240 (300,24)	5.900 (275,24)	3.980 (214,24)	1.920 (363,24)	1.320 (129,24)
41(	0.00,	0.00)	6.540 (300,24)	2.770 (363,24)	2.290 (214,24)	2.210 (275,24)	1.550 (308,24)
42(	0.00,	0.00)	4.190 (158,24)	2.090 (130,24)	1.100 (67,24)	0.450 (129,24)	0.340 (363,24)
43(	0.00,	0.00)	4.970 (158,24)	2.260 (130,24)	1.220 (67,24)	0.820 (129,24)	0.670 (363,24)
44(	0.00,	0.00)	6.700 (158,24)	2.920 (130,24)	2.340 (363,24)	2.170 (67,24)	1.660 (129,24)
45(	0.00,	0.00)	7.020 (158,24)	5.050 (130,24)	4.180 (67,24)	2.990 (129,24)	2.550 (308,24)
46(	0.00,	0.00)	28.050 (300,24)	* 22.650 (43,24)	21.180 (308,24)	20.170 (275,24)	18.250 (214,24)
47(	0.00,	0.00)	2.430 (158,24)	1.920 (130,24)	1.220 (363,24)	0.820 (67,24)	0.250 (40,24)
48(	0.00,	0.00)	2.670 (158,24)	2.560 (130,24)	1.340 (363,24)	1.310 (67,24)	0.970 (40,24)
49(	0.00,	0.00)	5.750 (158,24)	4.170 (130,24)	2.500 (40,24)	1.630 (67,24)	1.580 (214,24)
50(	0.00,	0.00)	7.170 (158,24)	4.360 (130,24)	3.560 (67,24)	3.360 (40,24)	2.790 (363,24)
51(	0.00,	0.00)	20.550 (308,24)	17.570 (308,24)	15.050 (129,24)	14.980 (275,24)	11.240 (46,24)
52(	0.00,	0.00)	10.810 (300,24)	10.420 (129,24)	9.500 (46,24)	7.940 (275,24)	6.590 (363,24)
53(	0.00,	0.00)	10.910 (275,24)	7.370 (300,24)	5.980 (129,24)	4.550 (46,24)	4.230 (363,24)
54(	0.00,	0.00)	6.950 (275,24)	5.060 (363,24)	4.280 (300,24)	2.490 (46,24)	2.430 (214,24)
55(	0.00,	0.00)	4.240 (275,24)	3.980 (300,24)	3.790 (363,24)	2.520 (214,24)	2.210 (67,24)

TABLE C-7. (continued)

56(	0.00, 0.00)	0.00)	3.87C (300,24)	3.73C (270,24)	3.10C (214,24)	1.71C (67,24)	1.60C (363,24)
57(	0.00, 0.00)	0.00)	3.59C (300,24)	3.45C (270,24)	2.96C (214,24)	1.42C (67,24)	1.40C (129,24)
58(	0.00, 0.00)	0.00)	2.63C (158,24)	3.58C (130,24)	2.68C (40,24)	1.97C (67,24)	0.94C (214,24)
59(	0.00, 0.00)	0.00)	7.11C (158,24)	5.50C (40,24)	4.98C (130,24)	2.49C (67,24)	1.63C (214,24)
60(	0.00, 0.00)	0.00)	11.31C (214,24)	9.06C (363,24)	8.79C (300,24)	8.18C (275,24)	5.26C (46,24)
61(	0.00, 0.00)	0.00)	8.29C (270,24)	7.54C (300,24)	7.06C (214,24)	5.01C (363,24)	4.64C (46,24)
62(	0.00, 0.00)	0.00)	9.25C (275,24)	5.86C (300,24)	4.69C (214,24)	4.41C (129,24)	3.52C (46,24)
63(	0.00, 0.00)	0.00)	7.97C (275,24)	5.51C (300,24)	4.10C (214,24)	3.23C (129,24)	3.10C (248,24)
64(	0.00, 0.00)	0.00)	6.65C (275,24)	5.79C (300,24)	4.06C (214,24)	1.81C (248,24)	1.69C (308,24)
65(	0.00, 0.00)	0.00)	2.30C (158,24)	1.23C (40,24)	1.00C (130,24)	0.27C (129,24)	0.14C (67,24)
66(	0.00, 0.00)	0.00)	5.34C (158,24)	2.19C (40,24)	1.19C (130,24)	0.87C (214,24)	0.51C (129,24)
67(	0.00, 0.00)	0.00)	5.63C (158,24)	3.56C (40,24)	2.77C (130,24)	1.79C (46,24)	1.14C (129,24)
68(	0.00, 0.00)	0.00)	11.81C (158,24)	5.87C (130,24)	5.45C (40,24)	2.79C (46,24)	2.21C (67,24)
69(	0.00, 0.00)	0.00)	8.62C (300,24)	6.33C (275,24)	5.73C (214,24)	3.35C (46,24)	1.83C (129,24)
70(	0.00, 0.00)	0.00)	5.80C (300,24)	3.50C (275,24)	3.82C (214,24)	2.78C (129,24)	2.73C (46,24)
71(	0.00, 0.00)	0.00)	7.35C (158,24)	4.47C (40,24)	3.00C (130,24)	2.07C (363,24)	1.87C (46,24)
72(	0.00, 0.00)	0.00)	6.44C (40,24)	5.33C (130,24)	4.34C (158,24)	2.77C (363,24)	2.65C (46,24)
73(	0.00, 0.00)	0.00)	5.18C (300,24)	4.86C (275,24)	4.65C (214,24)	4.16C (46,24)	1.68C (308,24)
74(	0.00, 0.00)	0.00)	3.69C (46,24)	3.28C (214,24)	3.14C (275,24)	2.93C (300,24)	2.85C (176,24)
75(	0.00, 0.00)	0.00)	2.15C (40,24)	1.34C (158,24)	1.01C (363,24)	0.92C (130,24)	0.68C (214,24)
76(	0.00, 0.00)	0.00)	3.30C (158,24)	3.17C (40,24)	1.89C (130,24)	1.36C (363,24)	1.01C (46,24)
77(	0.00, 0.00)	0.00)	5.44C (40,24)	3.21C (130,24)	1.97C (363,24)	1.83C (158,24)	1.74C (46,24)
78(	0.00, 0.00)	0.00)	5.80C (40,24)	3.87C (130,24)	2.84C (46,24)	2.50C (363,24)	0.87C (158,24)
79(	0.00, 0.00)	0.00)	14.86C (40,24)	9.46C (158,24)	6.39C (363,24)	5.47C (46,24)	4.81C (130,24)
80(	0.00, 0.00)	0.00) *	33.22C (40,24)	22.42C (40,24)	15.03C (158,24)	8.50C (130,24)	5.42C (176,24)
81(	0.00, 0.00)	0.00)	10.76C (46,24)	7.72C (275,24)	4.76C (129,24)	3.27C (214,24)	3.13C (300,24)
82(	0.00, 0.00)	0.00)	8.29C (275,24)	7.81C (46,24)	3.96C (129,24)	2.70C (300,24)	1.87C (248,24)
83(	0.00, 0.00)	0.00)	7.57C (275,24)	5.81C (46,24)	3.20C (129,24)	2.00C (300,24)	1.56C (176,24)
84(	0.00, 0.00)	0.00)	5.17C (275,24)	3.76C (46,24)	1.47C (300,24)	1.42C (214,24)	1.37C (129,24)
85(	0.00, 0.00)	0.00)	5.81C (40,24)	2.16C (46,24)	1.60C (130,24)	0.60C (158,24)	0.46C (176,24)
86(	0.00, 0.00)	0.00)	6.33C (40,24)	3.70C (158,24)	1.90C (46,24)	1.29C (130,24)	1.03C (129,24)
87(	0.00, 0.00)	0.00)	9.56C (40,24)	6.28C (158,24)	3.51C (46,24)	2.08C (214,24)	1.82C (176,24)
88(	0.00, 0.00)	0.00)	19.05C (40,24)	14.67C (46,24)	12.15C (158,24)	4.49C (130,24)	4.10C (176,24)
89(	0.00, 0.00)	0.00)	12.54C (46,24)	10.47C (40,24)	10.18C (214,24)	8.94C (176,24)	5.79C (363,24)
90(	0.00, 0.00)	0.00)	14.50C (214,24)	6.93C (176,24)	3.03C (46,24)	1.82C (129,24)	0.01C (46,24)
91(	0.00, 0.00)	0.00)	8.85C (214,24)	6.77C (275,24)	4.79C (46,24)	3.43C (176,24)	2.63C (300,24)
92(	0.00, 0.00)	0.00)	9.16C (46,24)	3.49C (275,24)	3.35C (214,24)	2.93C (129,24)	1.52C (176,24)
93(	0.00, 0.00)	0.00)	7.90C (46,24)	3.35C (275,24)	2.92C (129,24)	2.35C (214,24)	1.13C (300,24)
94(	0.00, 0.00)	0.00)	5.74C (46,24)	5.18C (275,24)	2.75C (129,24)	1.51C (214,24)	1.36C (176,24)
95(	0.00, 0.00)	0.00)	2.88C (158,24)	2.42C (40,24)	0.74C (130,24)	0.74C (214,24)	0.70C (46,24)
96(	0.00, 0.00)	0.00)	3.13C (40,24)	1.75C (158,24)	0.77C (130,24)	0.71C (214,24)	0.51C (46,24)
97(	0.00, 0.00)	0.00)	5.64C (40,24)	2.89C (158,24)	2.02C (46,24)	1.08C (130,24)	0.79C (129,24)
98(	0.00, 0.00)	0.00)	6.58C (158,24)	6.46C (40,24)	0.82C (46,24)	1.52C (214,24)	1.22C (130,24)
99(	0.00, 0.00)	0.00)	8.93C (40,24)	7.92C (158,24)	5.23C (46,24)	2.27C (130,24)	1.72C (214,24)
100(	0.00, 0.00)	0.00)	7.92C (40,24)	6.25C (46,24)	3.43C (158,24)	2.42C (130,24)	2.11C (363,24)
101(	0.00, 0.00)	0.00)	4.05C (176,24)	3.79C (46,24)	3.09C (363,24)	2.63C (40,24)	1.82C (214,24)
102(	0.00, 0.00)	0.00)	6.45C (214,24)	5.27C (176,24)	0.25C (40,24)	0.05C (46,24)	0.05C (363,24)
103(	0.00, 0.00)	0.00)	8.24C (214,24)	2.00C (176,24)	1.92C (46,24)	0.47C (129,24)	0.00C (308,24)
104(	0.00, 0.00)	0.00)	7.78C (214,24)	2.51C (46,24)	1.46C (129,24)	0.84C (176,24)	0.66C (308,24)
105(	0.00, 0.00)	0.00)	4.67C (275,24)	2.85C (214,24)	2.24C (46,24)	1.92C (176,24)	1.84C (308,24)
106(	0.00, 0.00)	0.00)	4.16C (275,24)	3.61C (46,24)	2.18C (214,24)	1.80C (308,24)	1.71C (176,24)
107(	0.00, 0.00)	0.00)	3.77C (46,24)	2.83C (275,24)	2.45C (214,24)	1.33C (176,24)	1.04C (308,24)
108(	0.00, 0.00)	0.00)	4.59C (46,24)	2.55C (275,24)	1.56C (214,24)	1.23C (129,24)	1.08C (176,24)
109(	0.00, 0.00)	0.00)	5.96C (158,24)	5.56C (40,24)	3.07C (46,24)	1.39C (130,24)	1.26C (214,24)
110(	0.00, 0.00)	0.00)	4.48C (40,24)	4.38C (46,24)	2.37C (363,24)	1.20C (130,24)	1.06C (176,24)
111(	0.00, 0.00)	0.00)	6.73C (214,24)	1.83C (176,24)	0.75C (46,24)	0.02C (129,24)	0.00C (308,24)
112(	0.00, 0.00)	0.00)	4.75C (214,24)	1.74C (46,24)	0.66C (129,24)	0.53C (176,24)	0.00C (308,24)
113(	0.00, 0.00)	0.00)	2.92C (214,24)	1.53C (46,24)	1.09C (129,24)	0.70C (308,24)	0.40C (275,24)
114(	0.00, 0.00)	0.00)	2.51C (275,24)	1.67C (214,24)	1.44C (308,24)	1.32C (46,24)	0.96C (129,24)
115(	0.00, 0.00)	0.00)	2.53C (40,24)	1.65C (158,24)	0.63C (214,24)	0.48C (46,24)	0.43C (129,24)

TABLE C-7. (continued)

116(	0.00,	0.00)	4.52C (40,24)	2.13C (158,24)	1.45C (46,24)	0.78C (130,24)	0.50C (129,24)
117(	0.00,	0.00)	4.69C (158,24)	4.05C (40,24)	2.32C (46,24)	1.02C (130,24)	0.97C (214,24)
118(	0.00,	0.00)	4.45C (40,24)	3.61C (46,24)	1.20C (130,24)	0.46C (176,24)	0.36C (158,24)
119(	0.00,	0.00)	2.34C (176,24)	1.74C (363,24)	1.18C (214,24)	0.82C (40,24)	0.08C (46,24)
120(	0.00,	0.00)	2.32C (214,24)	1.61C (176,24)	0.19C (46,24)	0.00C (129,24)	0.00C (300,24)
121(	0.00,	0.00)	2.35C (214,24)	1.44C (46,24)	0.67C (129,24)	0.22C (176,24)	0.01C (300,24)
122(	0.00,	0.00)	1.53C (275,24)	1.26C (300,24)	1.23C (214,24)	0.91C (46,24)	0.73C (129,24)
123(	0.00,	0.00)	2.25C (275,24)	1.13C (214,24)	1.07C (46,24)	0.94C (176,24)	0.80C (300,24)

MESSAGE SUMMARY: MESSAGE NUMBER - COUNT

208 1

TABLE C-8. ISC MODEL OUTPUT - STATIONARY SOURCES ONLY

HIGH
24-HR
SGROUP# 4

*** *FILE:ISCFINAA-CRANDON TSP WITH ANNUAL EMISSION RATES* ***

* HIGHEST 24-HOUR AVERAGE CONCENTRATION MICROGRAMS/CUBIC METER *
* FROM SOURCES: 4,
* FOR THE DISCRETE RECEPTOR POINTS *

- X -	- Y -	CON.	(DAY,PER.)	- X -	- Y -	CON.	(DAY,PER.)
691000.0	39000.0	0.52199	(198, 1)	691000.0	38500.0	0.40952	(144, 1)
691000.0	37500.0	0.42396	(191, 1)	691500.0	39000.0	0.41810	(164, 1)
691500.0	38000.0	0.48272	(246, 1)	692000.0	39500.0	0.39245	(238, 1)
692000.0	39000.0	0.45252	(237, 1)	692000.0	38000.0	0.50114	(237, 1)
692000.0	37500.0	0.76539	(198, 1)	692000.0	36500.0	0.98305	(146, 1)
692000.0	35500.0	0.96399	(191, 1)	692000.0	34500.0	1.63210	(221, 1)
692000.0	33500.0	0.54739	(163, 1)	692500.0	39000.0	0.56763	(195, 1)
692500.0	38000.0	0.76063	(238, 1)	693000.0	39500.0	0.44199	(203, 1)
693000.0	39000.0	0.43723	(241, 1)	693000.0	38000.0	0.70327	(139, 1)
693000.0	37500.0	1.18544	(139, 1)	693000.0	36500.0	2.17313	(238, 1)
693020.0	36120.0	2.11092	(237, 1)	693020.0	35720.0	1.44014	(147, 1)
693020.0	35320.0	1.65928	(163, 1)	693100.0	34960.0	1.83621	(202, 1)
693050.0	34500.0	1.32095	(202, 1)	693000.0	33500.0	0.79633	(255, 1)
693500.0	39000.0	0.81906	(186, 1)	693500.0	38000.0	0.84508	(166, 1)
693500.0	37500.0	0.95595	(166, 1)	693360.0	36940.0	1.55570	(174, 1)
693555.0	36500.0	1.77511	(174, 1)	693350.0	36120.0	2.77661	(239, 1)
694000.0	39500.0	0.46485	(186, 1)	694000.0	39000.0	0.47627	(158, 1)
694000.0	38500.0	0.41028	(239, 1)	693840.0	36960.0	1.30656	(200, 1)
694000.0	34860.0	1.26752	(228, 1)	693700.0	34500.0	1.08363	(245, 1)
694000.0	33500.0	0.95113	(248, 1)	694000.0	32500.0	0.45452	(176, 1)
694000.0	31500.0	0.67917	(176, 1)	694500.0	38500.0	0.55146	(192, 1)
694500.0	38000.0	0.51263	(101, 1)	694500.0	37500.0	0.77284	(231, 1)
694340.0	36980.0	0.86933	(268, 1)	694420.0	35160.0	1.18479	(217, 1)
695000.0	39500.0	0.40353	(132, 1)	695000.0	38500.0	0.51698	(231, 1)
695000.0	37500.0	0.72536	(268, 1)	694840.0	37000.0	0.50747	(209, 1)
694860.0	35020.0	0.75405	(217, 1)	694840.0	34380.0	0.52504	(205, 1)
694840.0	33740.0	0.85422	(223, 1)	695000.0	33000.0	0.35287	(229, 1)
695000.0	32500.0	0.31547	(214, 1)	695000.0	32000.0	0.45932	(248, 1)
695000.0	31500.0	1.05591	(248, 1)	695500.0	37500.0	0.38340	(193, 1)
695340.0	37020.0	0.85522	(230, 1)	695500.0	33760.0	0.37119	(243, 1)
695560.0	33200.0	0.55724	(177, 1)	695500.0	32760.0	0.58756	(228, 1)
695490.0	32240.0	0.38107	(214, 1)	695500.0	31500.0	0.30575	(231, 1)
696000.0	39500.0	0.34753	(231, 1)	696000.0	38500.0	0.43160	(257, 1)
696000.0	37500.0	0.75544	(230, 1)	695820.0	37000.0	0.64794	(212, 1)
696000.0	32250.0	0.58145	(228, 1)	696000.0	31500.0	0.38768	(214, 1)
696500.0	37500.0	0.66650	(216, 1)	696500.0	37000.0	0.59572	(217, 1)
696500.0	32260.0	0.69728	(177, 1)	696500.0	31500.0	0.49725	(176, 1)
697000.0	39500.0	0.38783	(257, 1)	697000.0	39000.0	0.41050	(230, 1)

TABLE C-8. (continued)

HIGH
24-HR
SGROUP# 4

*** *FILE:ISCFINAA-CRANDON TSP WITH ANNUAL EMISSION RATES* ***

* HIGHEST 24-HOUR AVERAGE CONCENTRATION MICROGRAMS/CUBIC METER *
* FROM SOURCES: 4,
* FOR THE DISCRETE RECEPTOR POINTS *

- X -	- Y -	CON.	(DAY,PER.)	- X -	- Y -	CON.	(DAY,PER.)
697000.0	37500.0	0.53533	(212, 1)	696960.0	37000.0	0.40353	(234, 1)
696960.0	36250.0	0.31114	(182, 1)	696950.0	35820.0	0.44370	(240, 1)
697030.0	33020.0	0.64212	(171, 1)	697080.0	32640.0	0.42795	(244, 1)
697030.0	32250.0	0.42084	(141, 1)	697000.0	31500.0	0.61994	(177, 1)
697500.0	37500.0	0.51393	(217, 1)	697500.0	37000.0	0.56430	(219, 1)
697500.0	36500.0	0.27298	(182, 1)	697360.0	35860.0	0.42587	(240, 1)
697400.0	35300.0	0.35187	(241, 1)	697420.0	34780.0	0.47923	(133, 1)
697460.0	34240.0	0.26034	(219, 1)	697440.0	33020.0	0.41049	(171, 1)
697500.0	32500.0	0.37709	(244, 1)	697500.0	32000.0	0.54278	(141, 1)
698000.0	38500.0	0.24986	(257, 1)	698000.0	38500.0	0.62537	(216, 1)
698000.0	37500.0	0.52571	(144, 1)	698000.0	37000.0	0.57168	(219, 1)
698000.0	36500.0	0.23527	(182, 1)	698000.0	36000.0	0.26963	(240, 1)
698000.0	35000.0	0.49723	(187, 1)	698000.0	35000.0	0.35847	(226, 1)
698000.0	34500.0	0.51183	(133, 1)	697840.0	34220.0	0.20965	(219, 1)
697880.0	33600.0	0.30590	(164, 1)	697920.0	33020.0	0.18976	(172, 1)
698000.0	32500.0	0.63793	(171, 1)	698000.0	31500.0	0.49417	(141, 1)
698500.0	37000.0	0.46011	(219, 1)	698500.0	36000.0	0.32484	(240, 1)
698500.0	34500.0	0.51102	(133, 1)	698500.0	34000.0	0.18593	(219, 1)
698500.0	33500.0	0.29318	(259, 1)	698500.0	33000.0	0.24039	(168, 1)
699000.0	38500.0	0.46027	(230, 1)	699000.0	38500.0	0.56925	(193, 1)
699000.0	37500.0	0.59575	(210, 1)	699000.0	36500.0	0.24935	(169, 1)
699000.0	35500.0	0.51185	(147, 1)	699000.0	34500.0	0.46203	(133, 1)
699000.0	33500.0	0.28966	(259, 1)	699000.0	32500.0	0.18188	(172, 1)
699000.0	31500.0	0.41518	(171, 1)				

APPENDIX D

SO_2, NO_x, CO AND HC

ANNUAL TOTAL EMISSION RATE ESTIMATES

DECEMBER 1985

TABLE D - 1 Schedule Associated With Project Activities During the Construction and Operation Phases and the Estimated SO_2 Air Emissions from the Proposed Sources (st/yr).

Project Activities	CONSTRUCTION			OPERATION																						
	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23-29
Site Preparation (trees & brush)																										
1. Mine Shafts																										
2. Mine/Mill Site																										
3. M&IF Area																										
4. Access Road/Powerline	0.1	*	*																							
5. Railroad Spur		0.3	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
6. Haul Road		0.1	*																							
7. Water Discharge Pipeline																										
8. In-Plant Roads				0.14	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
9. Concrete Batch Plant																										
Construct Mine Support Facilities																										
1. Sink Main Shaft	0.03	0.39																								
2. Construct East Exhaust Shaft			0.6																							
3. Construct West Exhaust Shaft								0.6																		
4. Power Generation	20.8	0.25	*																							
Underground Mine Development																										
1. Develop Drifts and Stopes		0.15	1.1																							
2. Mine Air Heating		0.01	*																							
3. Mine Vehicles		11.6	*																							

TABLE D - 1 (continued)

Project Activities	CONSTRUCTION			OPERATION																						
	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23-29
Construct Major Surface Facilities																										
1. Construct Reclaim Pond R1																										
2. Construct Reclaim Pond R2																										
3. Mobile Sources	0.5	*	*																							
4. Construct Temporary Ore Storage Pad																										
Construct MWDF Facilities (Operations)																										
1. Waste Rock Handling																										
a. Loading and Dumping																										
b. Hauling																										
2. Construct Tailing Pipeline																										
3. Construct Tailing Pond T1																										
4. Construct Tailing Pond T2																										
5. Reclaim Tailing Pond T1																										
6. Construct Tailing Pond T3																										
7. Reclaim Tailing Pond T2																										
8. Construct Tailig Pond T4																										
9. Reclaim Tailing Pond T3																										
10. Mobile Sources	0.3	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
11. Install Liner																										
a. Hauling of Bentonite to MWDF																										

TABLE D - 1 (continued)

Project Activities	CONSTRUCTION			OPERATION																				
	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23-29
Mine Operation (Production)																										
1. Full (Total Estimated Underground Emissions)																										
a. Drilling & Blasting (Rock Handling)				2.3	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
b. Mine Air Heating				0.03	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
c. Mobile Equipment				23.7	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Mill/Concentrator Operations																										
1. Facility Heating				0.03	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
2. Emergency Diesel Generators				1.8	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

Project Activities	CLOSURE		
	1	2	3-7
Reclamation Phase			
1. Mobile Sources	0.3[a]	*	*

TOTAL	21.7	13.7	14.9	28.6	*	*	29.2	28.6	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

*Means previous annual estimate is used for this year.

[a]Total in years 1-7 only.

TABLE D - 2 Schedule Associated With Project Activities During the Construction and Operation Phases and the Estimated NO_x Air Emissions from the Proposed Sources (st/yr).

Project Activities	CONSTRUCTION			OPERATION																					
	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23-29
Site Preparation (trees & brush)																										
1. Mine Shafts	1.9																									
2. Mine/Mill Site																										
3. MADF Area																										
4. Access Road/Powerline	0.6	0.3	*																							
5. Railroad Spur	1.0	2.0	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
6. Haul Road		0.3	*																							
7. Water Discharge Pipeline																										
8. In-Plant Roads				0.7	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
9. Concrete Batch Plant																										
Construct Mine Support Facilities																										
1. Sink Main Shaft																										
2. Construct East Exhaust Shaft																										
3. Construct West Exhaust Shaft																										
4. Power Generation	54.8	0.7	*																							
Underground Mine Development																										
1. Develop Drifts and Stopes		1.2	8.9																							
2. Mine Air Heating		2.6	*																							
3. Mine Vehicles		11.8	*																							

TABLE D - 2 (continued)

Project Activities	CONSTRUCTION			OPERATION																					
	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23-29
Construct Major Surface Facilities																										
1. Construct Reclaim Pond R1																										
2. Construct Reclaim Pond R2																										
3. Mobile Sources	6.5	*	*																							
4. Construct Temporary Ore Storage Pad																										
Construct MWDF Facilities (Operations)																										
1. Waste Rock Handling																										
a. Loading and Dumping																										
b. Hauling																										
2. Construct Tailing Pipeline																										
3. Construct Tailing Pond T1																										
4. Construct Tailing Pond T2																										
5. Reclaim Tailing Pond T1																										
6. Construct Tailing Pond T3																										
7. Reclaim Tailing Pond T2																										
8. Construct Tailing Pond T4																										
9. Reclaim Tailing Pond T3																										
10. Mobile Sources	2.0	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
11. Install Liner																										
a. Hauling of Bentonite to MWDF																										

TABLE D - 2 (continued)

Project Activities	CONSTRUCTION 1	2	3	OPERATION 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23-29
Mine Operation (Production)																										
1. Full (Total Estimated Underground Emissions)																										
a. Drilling & Blasting (Rock Handling)				18.3	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
b. Mine Air Heating				5.3	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
c. Mobile Equipment				24.1	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Mill/Concentrator Operations																										
1. Facility Heating				5.5	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
2. Emergency Diesel Generators				4.7	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

Project Activities	CLOSURE 1	2	3-7
Reclamation Phase			
1. Mobile Sources	2.0[a]	*	*
TOTAL	66.8	27.4	35.1

*Means previous annual estimate is used for this year.

[a]Total in years 1-7 only.

TABLE D - 3 Schedule Associated With Project Activities During the Construction and Operation Phases and the Estimated CO Air Emissions from the Proposed Sources (st/yr).

Project Activities	CONSTRUCTION			OPERATION																						
	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23-29
Site Preparation (trees & brush)																										
1. Mine Shafts		46.2																								
2. Mine/Mill Site	67.2																									
3. MDF Area																										
4. Access Road/Powerline	22.1	2.6	*																							
5. Railroad Spur	34.8	0.7	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
6. Haul Road																										
7. Water Discharge Pipeline																										
8. In-Plant Roads				4.3	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
9. Concrete Batch Plant																										
Construct Mine Support Facilities																										
1. Sink Main Shaft	1.9	18.0																								
2. Construct East Exhaust Shaft			27.6																							
3. Construct West Exhaust Shaft								27.6																		
4. Power Generation	33.3	0.4	*																							
Underground Mine Development																										
1. Develop Drifts and Stopes		5.1	38.0																							
2. Mine Air Heating		0.4	*																							
3. Mine Vehicles		5.8	*																							

TABLE D - 3 (continued)

Project Activities	CONSTRUCTION			OPERATION																				
	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23-29
Construct Major Surface Facilities																										
1. Construct Reclaim Pond R1																										
2. Construct Reclaim Pond R2																										
3. Mobile Sources	4.3	*	*																							
4. Construct Temporary Ore Storage Pad																										
Construct M&TF Facilities (Operations)																										
1. Waste Rock Handling																										
a. Loading and Dumping																										
b. Hauling																										
2. Construct Tailing Pipeline																										
3. Construct Tailing Pond T1																										
4. Construct Tailing Pond T2																										
5. Reclaim Tailing Pond T1																										
6. Construct Tailing Pond T3																										
7. Reclaim Tailing Pond T2																										
8. Construct Tailing Pond T4																										
9. Reclaim Tailing Pond T3																										
10. Mobile Sources	3.4	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
11. Install Liner																										
a. Hauling of Bentonite to M&TF																										

TABLE D - 3 (continued)

Project Activities	CONSTRUCTION 1	2	3	OPERATION 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23-29
Mine Operation (Production)																										
1. Full (Total Estimated Underground Emissions)																										
a. Drilling & Blasting (Rock Handling)				77.8	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
b. Mine Air Heating				0.9	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
c. Mobile Equipment				11.8	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Mill/Concentrator Operations																										
1. Facility Heating				0.8	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
2. Emergency Diesel Generators				2.8	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

Project Activities	CLOSURE 1	2	3-7
Reclamation Phase			
1. Mobile Sources	3.3[a]	*	*
TOTAL	167.0	86.9	83.2

Project Activities	OPERATION 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23-29
TOTAL	102.5	*	*	*	130.1	102.5	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

*Means previous annual estimate is used for this year.

[a]Total in years 1-7 only.

TABLE D - 4 Schedule Associated With Project Activities During the Construction and Operation Phases and the Estimated HC Air Emissions from the Proposed Sources (st/yr).

Project Activities	CONSTRUCTION			OPERATION																					
	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23-29
Site Preparation (trees & brush)																										
1. Mine Shafts																										
2. Mine/Mill Site	11.9																									
3. MWDF Area																										
4. Access Road/Powerline	3.9	0.3	*																							
5. Railroad Spur	6.1	0.5	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
6. Haul Road																										
7. Water Discharge Pipeline																										
8. In-Plant Roads				0.5	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
9. Concrete Batch Plant																										
Construct Mine Support Facilities																										
1. Sink Main Shaft																										
2. Construct East Exhaust Shaft																										
3. Construct West Exhaust Shaft																										
4. Power Generation	5.5	0.07	*																							
Underground Mine Development																										
1. Develop Drifts and Stopes																										
2. Mine Air Heating		0.2	*																							
3. Mine Vehicles		0.7	*																							

TABLE D - 4 (continued)

Project Activities	CONSTRUCTION			OPERATION																					
	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23-29
Construct Major Surface Facilities																										
1. Construct Reclaim Pond R1																										
2. Construct Reclaim Pond R2																										
3. Mobile Sources	1.0	*	*																							
4. Construct Temporary Ore Storage Pad																										
Construct M&TF Facilities (Operations)																										
1. Waste Rock Handling																										
a. Loading and Dumping																										
b. Hauling																										
2. Construct Tailing Pipeline																										
3. Construct Tailing Pond T1																										
4. Construct Tailing Pond T2																										
5. Reclaim Tailing Pond T1																										
6. Construct Tailing Pond T3																										
7. Reclaim Tailing Pond T2																										
8. Construct Tailing Pond T4																										
9. Reclaim Tailing Pond T3																										
10. Mobile Sources	0.5	*	*																							
11. Install Liner																										
a. Hauling of Bentonite to M&TF																										

TABLE D - 4 (continued)

Project Activities	CONSTRUCTION			OPERATION																					
	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23-29
Mine Operation (Production)																										
1. Full (Total Estimated Underground Emissions)																										
a. Drilling & Blasting (Rock Handling)																										
b. Mine Air Heating				0.4	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
c. Mobile Equipment				1.3	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Mill/Concentrator Operations																										
1. Facility Heating				0.1	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
2. Emergency Diesel Generators				0.5	*	*.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
3. Rail Storage and Transfer	0.5	*	*	5.1	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

Project Activities	CLOSURE		
	1	2	3-7
Reclamation Phase			
1. Mobile Sources	0.5[a]	*	*
TOTAL	29.4	3.8	*[b]

[a]Means previous annual estimate is used for this year.

[b]Total in years 1-7 only.