AIR SCIENCES INC.

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Grassy Mountain Mine Standard Air Contaminant Discharge Permit Application

PREPARED FOR:
CALICO RESOURCES, INC.

PROJECT NO. 343-1
AUGUST 2, 2019

TABLE OF CONTENTS

Attachments

1.0 APPLICATION FORMS

The Oregon Department of Environmental Quality application forms are provided here for the Standard Air Contaminant Discharge Permit (ACDP) application for the Calico Resources, Inc. Grassy Mountain Mine project.

1.1 AQ100 Series Forms

The following forms provide administrative information for the project, including location, process flows, emission points, and fee calculations.

State of Oregon Department of Environmental Quality

Cleaner Air Oregon Pre-Application Fee Form

Form AQ100CAO

For DEQ Use Only		
Permit Number:	Type of Application:	
Application Number:		
Date Received:		
Regional Office HQ-14 AQ I CAO	Check No.:	Amount:

1. Company Information	2. Facility Location Information
Legal Name: Calico Resources USA Corp	Name: Grassy Mountain Mine
Mailing Address: 665 Anderson Street	Street Address: (T21S, R44E)
City, State, ZIP Code Winnemuca, NV 89445	City, County, ZIP Code: Malheur County
3. Site Contact Person	**4. Industrial Classification Code(s)**
Name: Nancy Wolverson	Primary SIC and NAICS: 1041 10410103
Title: Authorized Field Representative	Secondary SIC and NAICS: 10410202
Telephone number: (775) 625-3600	**5. Other DEQ Permits** N/A
Fax number: N/A	
Email address: nancy@paramountnevada.com	

6. Permit Action:

		√	Title V or Standard ACDP	√	Simple ACDP	√	General or Basic ACDP
1	Existing Source Call-In Fee		$10,000		$1,000		$500
2	New Source Consulting Fee *In conjunction, a new source must also submit an Emissions Inventory (AQ405CAO) form to the appropriate regional office.	✓	$12,000		$1,900		$1,000

Please attach a check payable to Oregon Dept. of Environmental Quality, and mail to:

Oregon Dept. of Environmental Quality
Financial Services - Revenue Section
700 NE Multnomah St., Suite 600
Portland, Oregon 97232-4100

If you don't know which permit type applies to your facility, please contact DEQ. Contact information can be found here: www.oregon.gov/deq/aq/aqPermits/Pages/Contacts.aspx

Administrative Information

FORM AQ101
ANSWER SHEET

FOR DEQ USE ONLY	
Permit Number:	Type of Application:
Application No:	**RNW**☐ **MOD**☐ **NEW**☐ **EXT**☐
Date Received :	
Regional Office:	**Check No.** **Amount $**

1. Company	**2. Facility Location**
Legal Name: Calico Resources USA Corp	Name: Grassy Mountain Mine
Mailing Address: 665 Anderson Street	Street Address: (T21S, R44E)
City, State, Zip Code: Winnemuca, NV 89445	City, County, Zip Code: Malheur County
Number of employees (corporate):	Number of employees (facility):
3. Facilty Contact Person	**4. Industrial Classification Code(s)**
Name: Nancy Wolverson	Primary SIC and NAICS: 1041 10410103
Title: Authorized Field Representative	Secondary SIC and NAICS: 10410202
Telephone number: (775) 625-3600	**5. Other DEQ Permits** N/A
Fax. number: N/A	
e-mail address: nancy@paramountnevada.com	

6. Permit Action:

- ☐ Short Term Activity ACDP
- ☐ New Simple ACDP
- ☐ New Construction ACDP
- ☒ New Standard ACDP
- ☐ New Standard ACDP (PSD/NSR)
- ☐ Renewal of an existing permit without changes (include form AQ403 for Standard ACDPs)
- ☐ Renewal of an existing permit with changes (include form AQ403 for Standard ACDPs)
- ☐ Revision (or Modification) to an existing permit application

7. Signature

I hereby apply for permission to discharge air contaminants in the State of Oregon, as stated or described in this application, and certify that the information contained in this application and the schedules and exhibits appended hereto, are true and correct to the best of my knowledge and belief.

CARLO BUFFONE
Name of official (Printed or Typed)

TREASURER 775-625-3600
Title of official and phone number

[signature]
Signature of official

AUGUST 30, 2019
Date

FEE INFORMATION

(Make the check payable to DEQ)

Note: The initial application fees and annual fees specified below (OAR 340-216-8020, Table 2, Parts 1 and 2) are only required for initial permit applications. These fees are not required for an application to renew or modify an existing permit. The appropriate specific activity fee(s) specified below (OAR 340-216-8020, Table 2, Part 3) applies to permit modifications or may be in addition to initial permit application fees.

OAR 340-216-8020, Table 2, Part 1 – INITIAL PERMITTING APPLICATION FEES:		
Short Term Activity ACDP	☐	$3,600.00
Basic ACDP	☐	$144.00
Assignment to General ACDP	☐	$1,440.00
Simple ACDP	☐	$7,200.00
Construction ACDP	☐	$11,520.00
Standard ACDP	☒	$14,400.00
Standard ACDP (Major NSR or Type A State NSR)	☐	$50,400.00
OAR 340-216-8020, TABLE 2, PART 2 - ANNUAL FEES:		
Simple ACDP – Low Fee Class	☐	$2,304.00
Simple ACDP – High Fee Class	☐	$4,608.00
Standard ACDP	☐	$9,216.00
OAR 340-216-8020, TABLE 2, PART 3 - SPECIFIC ACTIVITY FEES:		
Non-Technical Permit Modification	☐	$432.00
Basic Technical Permit Modification	☐	$432.00
Simple Technical Permit Modification	☐	$1,440.00
Moderate Technical Permit Modification	☐	$7,200.00
Complex Technical Permit Modification	☐	$14,400.00
Major NSR or type A State NSR Permit Modification	☐	$50,400.00
Modeling review (outside Major NSR or Type A State NSR)	☐	$7,200.00
Public Hearing at Source's Request	☐	$2,880.00
State MACT Determination	☐	$7,200.00
TOTAL FEES		0

Submit two copies of the completed application to:

New or Modified Permits (include fees):	Permit Renewals (no fees):
Oregon Department of Environmental Quality Financial Services - Revenue Section 700 NE Multnomah St., Suite 600 Portland, OR 97232-4100	Oregon Department of Environmental Quality Air Quality Program, Eastern Region Office 475 NE Bellevue Drive, Suite 110 Bend, OR 97701-7415

Administrative Information

FORM AQ101
ANSWER SHEET

CONTACT LIST

1. **Company Information:**

Legal Name:	Other company name (if different than legal name):
Calico Resources USA Corp	N/A

2. **Site Contact Person**: *(A person who deals with DEQ staff about equipment problems.)*

Name:	Telephone number:
Nancy Wolverson	(775) 625-3600
Title: Authorized Field Representative	Email address: nancy@paramountnevada.com

3. **Facility Contact Person:** *(If other than the site contact person, a person involved with all environmental issues at the facility although they may be housed at a different site.)*

Name:	Telephone number:
See Site Contact Person	
Title:	Email address:

4. **Mailing Contact Person:** *(If other than the site contact person, a person to whom the company would like all agency communications directed.)*

Name:	Telephone number:
See Site Contact Person	
Title:	Email address:

5. **Invoice Contact Person**: *(If other than the site contact person, a valid contact information to which invoices and communications related to resolving invoice questions can be directed.)*

Name:	Telephone number:
See Site Contact Person	
Title:	Email address:

State of Oregon Department of Environmental Quality

FACILITY DESCRIPTION

Facility Name: Grassy Mountain Mine

Permit Number: N/A

1. Description of facility and processes:

See attached description.

2. Attach plot plan.

3. Attach process flow diagram.

4. Attach a city map or drawing showing the facility location.

Description of Facility and Processes:

The Project consists of an underground gold and silver ore mine using the Drift and Fill method, and a process facility to mill, refine, and melt gold and silver ore into doré bars for further processing off-site.

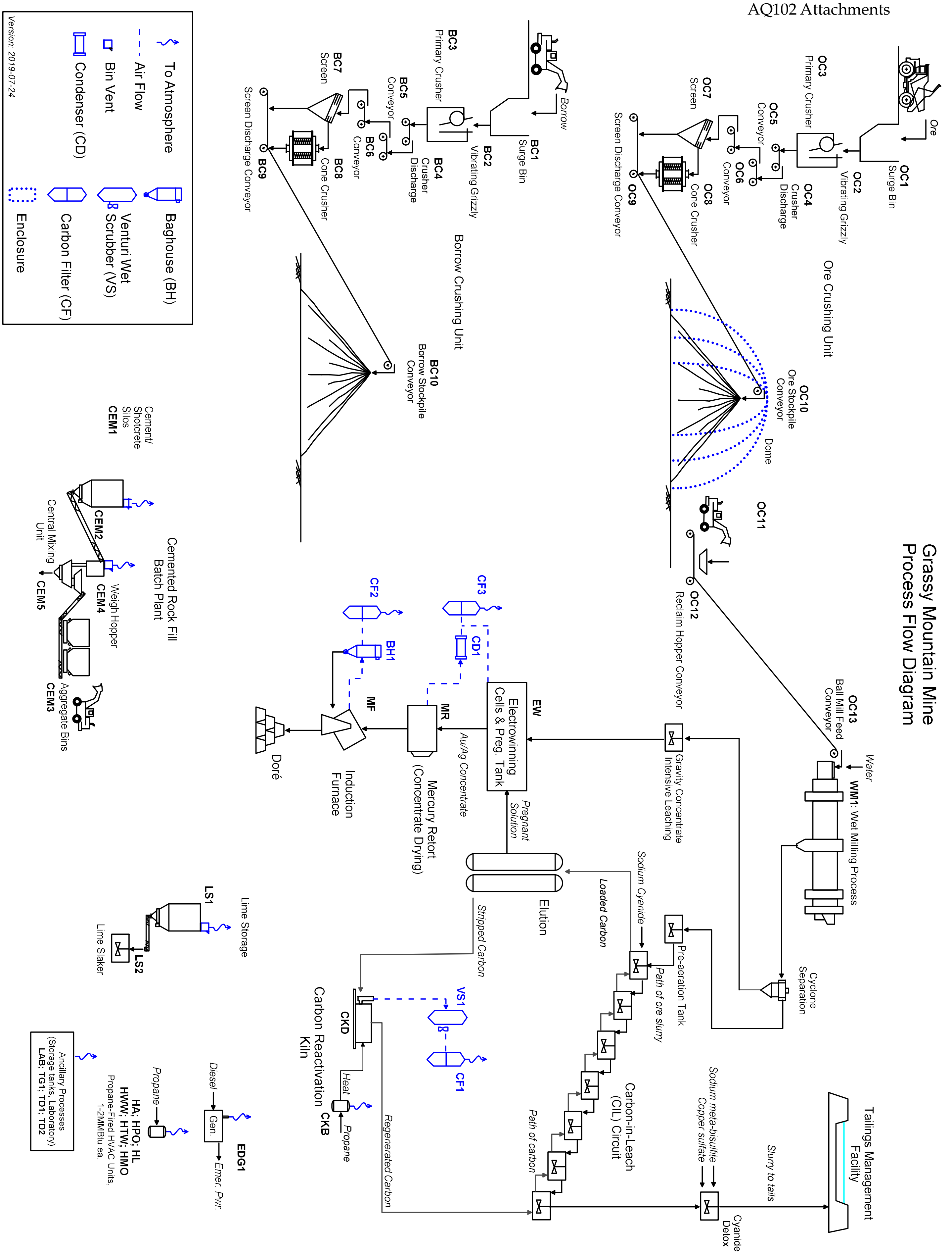
The underground mine will be developed by blasting, using emulsion, a level access tunnel and then mining drifts off of the main tunnel. As ore is removed, backfill from a nearby borrow pit will be hauled in to fill the drifts. Cemented rock fill (CRF) will be used for a portion of the backfill, requiring a batch cement plant at the surface. A mobile crushing unit will crush borrow material in the borrow pit, and material will be loaded and hauled to the waste rock storage facility, the CRF plant, or directly underground.

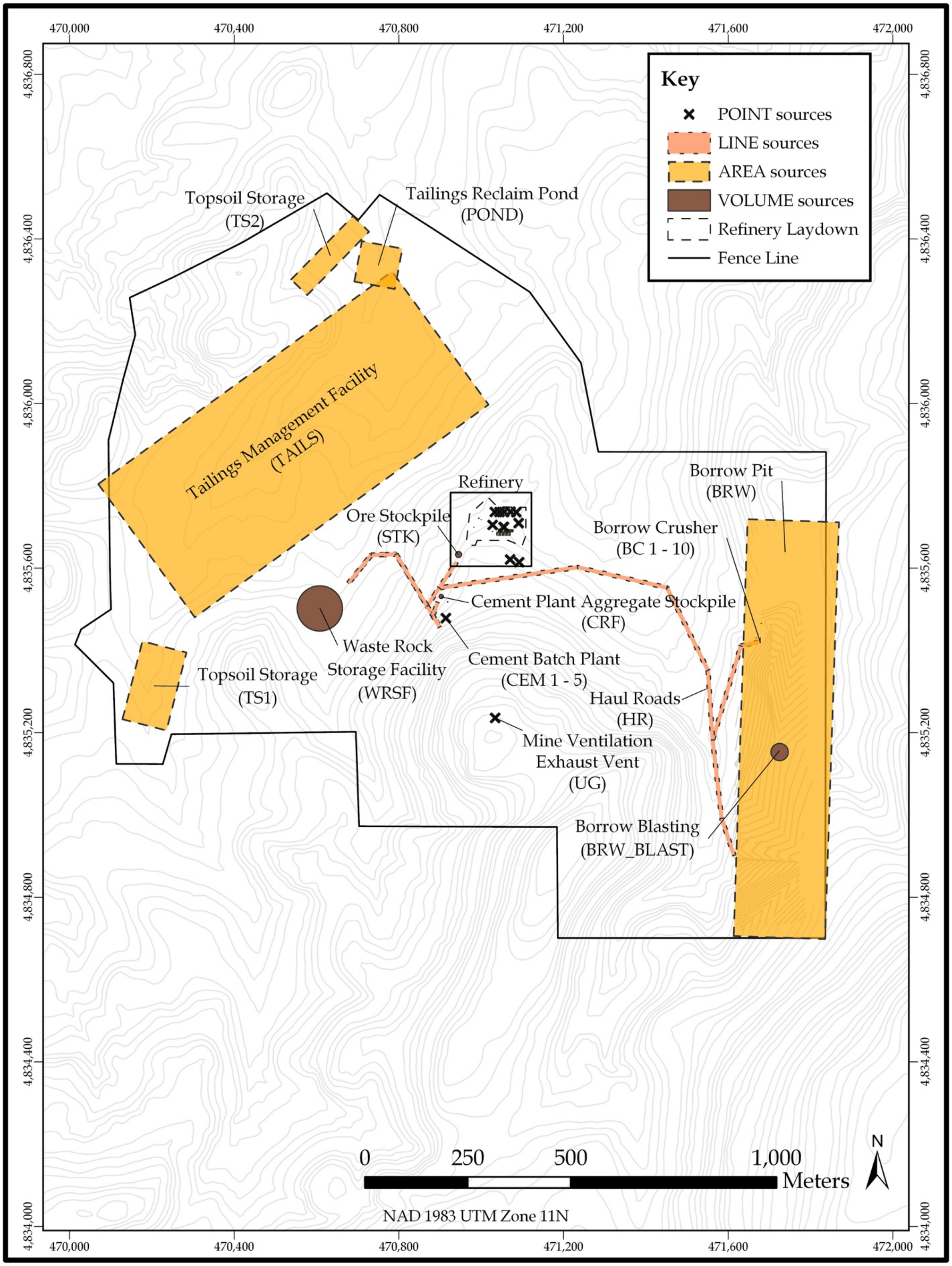
Ore removed from the mine is dumped by haul trucks directly into a mobile crushing unit that consists of a primary jaw crusher and a secondary screening/cone crusher unit. Crushed ore is then conveyed to a covered ore stockpile. A front-end loader transfers stockpiled ore to the mill via a feed conveyor; from here, the process is a closed, wet process. Milled ore is cycloned to separate free gold in coarse ore that will be extracted in a gravity concentrate intensive leaching process; the remaining ore slurry is sent directly to the carbon-in-leach (CIL) process.

The CIL circuit consists of a pre-aeration tank and a series of 7 CIL tanks. Lime is added during pre-aeration to control pH, and cyanide is added to the first CIL tank. Leached gold and silver will be adsorbed onto granular carbon, which is present in all tanks. Slurry advances through each of the 7 tanks, once per day. Barren carbon is added to the last tank and flows through the circuit in the opposite direction: loaded carbon extracted for the elution process is removed from tank 1. The elution process strips gold and silver from the carbon into solution. Pregnant solution (solution loaded with gold and silver) is transferred to the gold room, and stripped carbon is regenerated in the propane-fired carbon regeneration kiln before being recycled for the leach process. Some carbon loss occurs during heating in the kiln, and new carbon is added along with regenerated carbon to CIL tank 7.

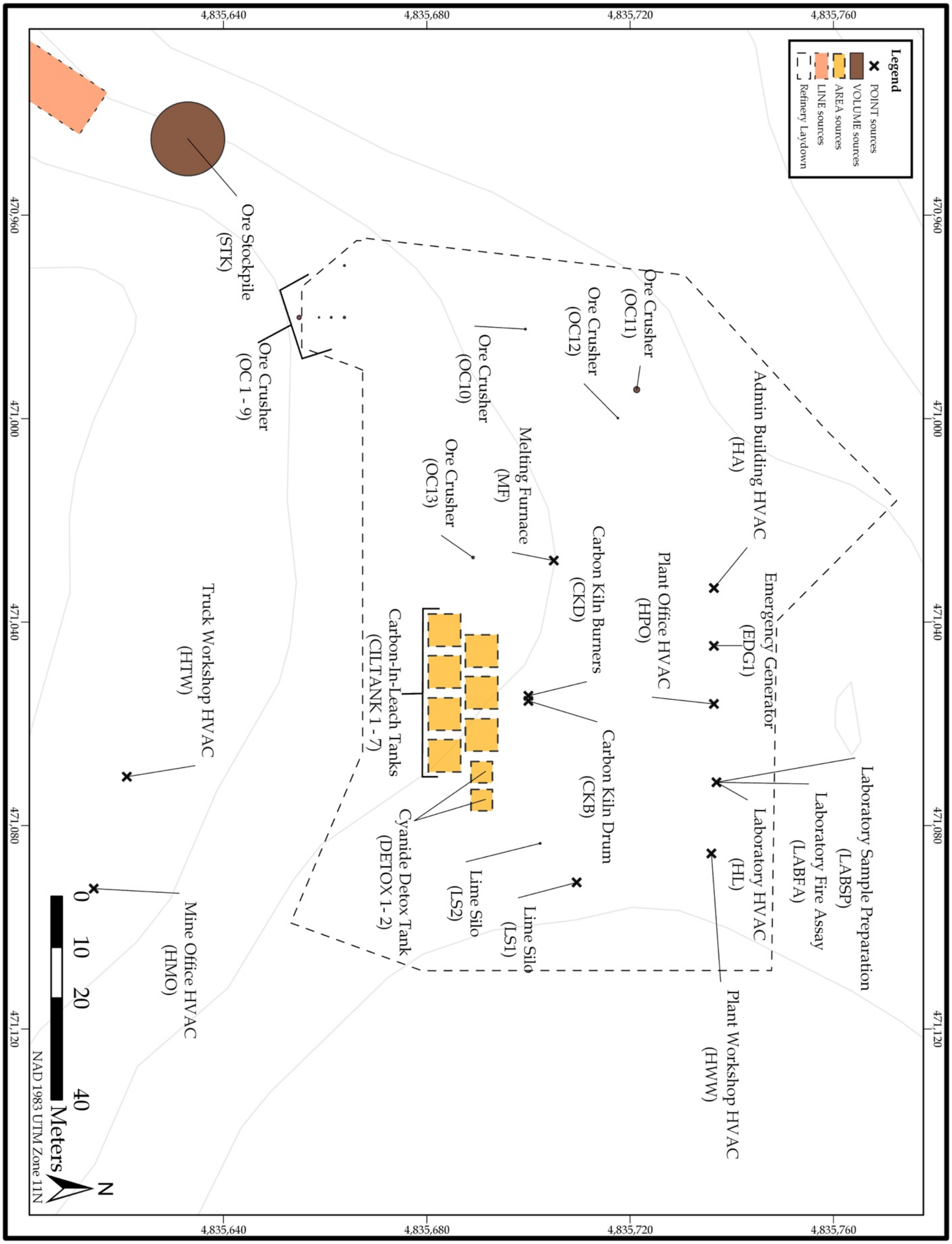
The gold room will house the electrowinning cells, retort, induction furnace, and associated support equipment. In the electrowinning cells, gold and silver are plated onto cathodes using electrolysis. Periodically, the electrowinning cells will be opened and the sludge cleaned out manually with a high-pressure spray gun. Sludge from the cells will flow by gravity to the electrowinning-sludge-filter feed tank and into manually operated pressure canister filters to be dewatered. Dewatered sludge is to be collected in trays and placed in the mercury retort to dry the sludge and remove mercury. Dried sludge will be removed from the retort and combined with fluxes in a flux mixer before being charged into the melting furnace, where the sludge is melted and poured into doré bars.

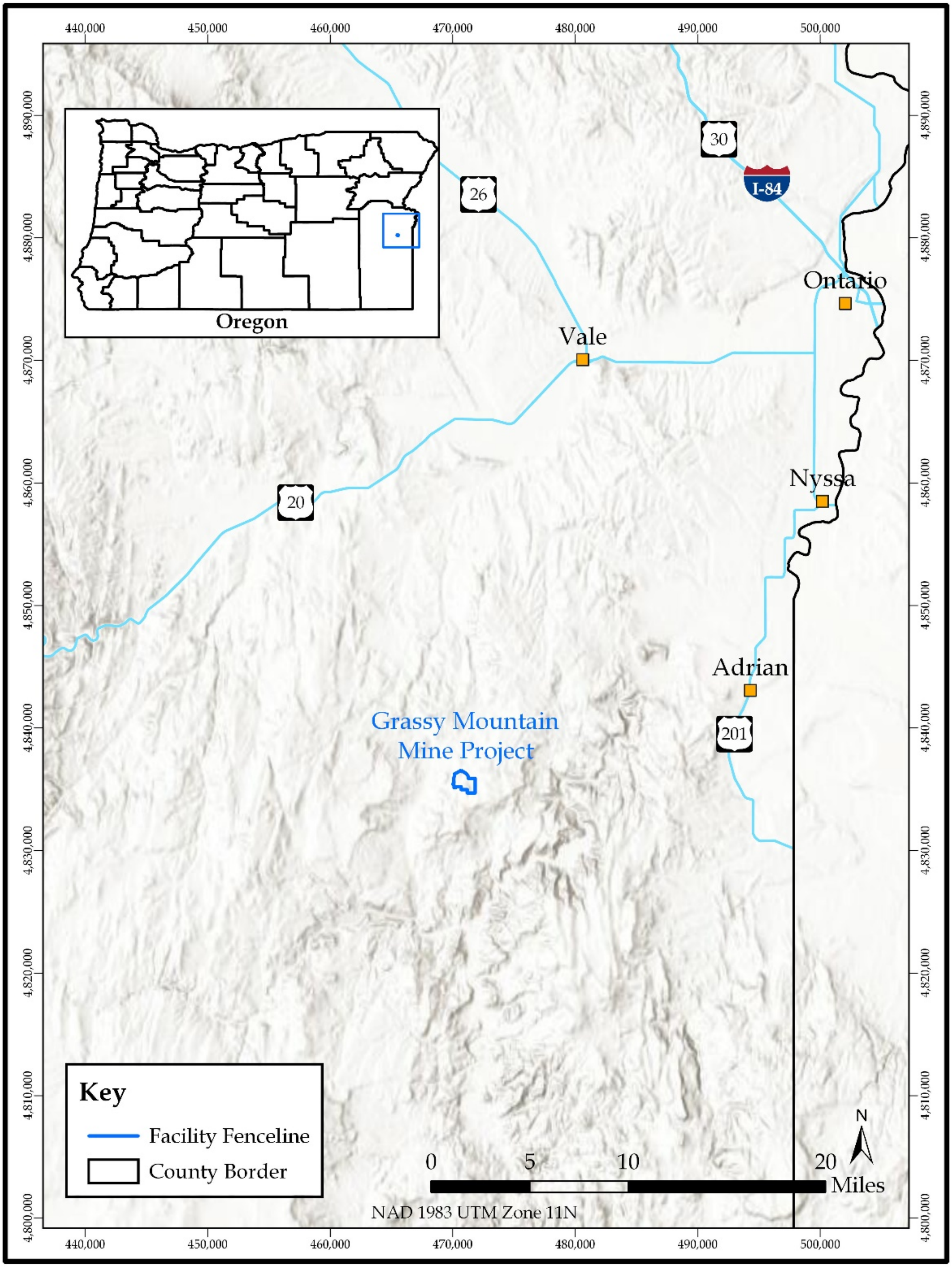
The CIL tailings will be pumped to the 2-stage agitated cyanide-detoxification tanks, where lime will be added to buffer pH, copper sulfate will be added as a reaction catalyst, and sodium meta-bisulfite will be added. Detoxified slurry will overflow the second detoxification tank to the final tailings pump box where it will be pumped to the tailings management facility by the final tailings pumps.


Grassy Mountain Mine
Process Flow Diagram
Ore Crushing Unit
Ore
OC1 Surge Bin
OC2 Vibrating Grizzly
OC3 Primary Crusher
OC4 Crusher Discharge
OC5 Conveyor
OC6 Conveyor
OC7 Screen
OC8 Cone Crusher
OC9 Screen Discharge Conveyor
OC10 Ore Stockpile Conveyor
Dome
OC11
OC12 Reclaim Hopper Conveyor
OC13 Ball Mill Feed Conveyor
Borrow Crushing Unit
Borrow
BC1 Surge Bin
BC2 Vibrating Grizzly
BC3 Primary Crusher
BC4 Crusher Discharge
BC5 Conveyor
BC6 Conveyor
BC7 Screen
BC8 Cone Crusher
BC9 Screen Discharge Conveyor
BC10 Borrow Stockpile Conveyor
Water
WM1: Wet Milling Process
Cyclone Separation
Gravity Concentrate Intensive Leaching
Pre-aeration Tank
Path of ore slurry
Sodium Cyanide
Loaded Carbon
Elution
Pregnant Solution
EW Electrowinning Cells & Preg. Tank
Au/Ag Concentrate
MR Mercury Retort (Concentrate Drying)
MF Induction Furnace
Doré
CF3
CD1
CF2
BH1
Stripped Carbon
VS1
CF1
CKD
Carbon Reactivation Kiln
Heat
CKB
Propane
Regenerated Carbon
Path of carbon
Carbon-in-Leach (CIL) Circuit
Sodium meta-bisulfite
Copper sulfate
Slurry to tails
Cyanide Detox
Tailings Management Facility
Cemented Rock Fill Batch Plant
Cement/ Shotcrete Silos CEM1
CEM2
Central Mixing Unit
CEM5
CEM4
Weigh Hopper
CEM3
Aggregate Bins
Lime Storage
LS1
LS2
Lime Slaker
Diesel
Gen.
EDG1
Emer. Pwr.
Propane
HA; HPO; HL
HWW; HTW; HMO
Propane-Fired HVAC Units, 1-2MMBtu ea.
Ancillary Processes (Storage tanks, Laboratory)
LAB; TG1; TD1; TD2
To Atmosphere
Air Flow
Bin Vent
Condenser (CD)
Baghouse (BH)
Venturi Wet Scrubber (VS)
Carbon Filter (CF)
Enclosure
Version: 2019-07-24



470,000
470,400
470,800
471,200
471,600
472,000
4,836,800
4,836,400
4,836,000
4,835,600
4,835,200
4,834,800
4,834,400
4,834,000
Key
POINT sources
LINE sources
AREA sources
VOLUME sources
Refinery Laydown
Fence Line
Topsoil Storage (TS2)
Tailings Reclaim Pond (POND)
Tailings Management Facility (TAILS)
Refinery
Ore Stockpile (STK)
Borrow Pit (BRW)
Borrow Crusher (BC 1 - 10)
Cement Plant Aggregate Stockpile (CRF)
Waste Rock Storage Facility (WRSF)
Topsoil Storage (TS1)
Cement Batch Plant (CEM 1 - 5)
Haul Roads (HR)
Mine Ventilation Exhaust Vent (UG)
Borrow Blasting (BRW_BLAST)
0
250
500
1,000
Meters
N
NAD 1983 UTM Zone 11N


Legend
POINT sources
VOLUME sources
AREA sources
LINE sources
Refinery Laydown
Ore Stockpile (STK)
Ore Crusher (OC 1 - 9)
Ore Crusher (OC10)
Ore Crusher (OC11)
Ore Crusher (OC12)
Ore Crusher (OC13)
Admin Building HVAC (HA)
Melting Furnace (MF)
Carbon Kiln Burners (CKD)
Plant Office HVAC (HPO)
Emergency Generator (EDG1)
Carbon-In-Leach Tanks (CILTANK 1 - 7)
Carbon Kiln Drum (CKB)
Cyanide Detox Tank (DETOX 1 - 2)
Truck Workshop HVAC (HTW)
Laboratory Sample Preparation (LABSP)
Laboratory Fire Assay (LABFA)
Laboratory HVAC (HL)
Lime Silo (LS1)
Lime Silo (LS2)
Plant Workshop HVAC (HWW)
Mine Office HVAC (HMO)
4,835,640
4,835,680
4,835,720
4,835,760
470,960
471,000
471,040
471,080
471,120
0 10 20 40
Meters
N
NAD 1983 UTM Zone 11N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4,850,000
4,840,000
4,830,000
4,820,000
4,810,000
4,800,000
Oregon
30
I-84
26
Ontario
Vale
20
Nyssa
Adrian
201
Grassy Mountain
Mine Project
Key
Facility Fenceline
County Border
0
5
10
20
Miles
N
NAD 1983 UTM Zone 11N

1.2 AQ200 and AQ300 Series Forms

The following forms provide process and control device information for the project.

ROCK CRUSHER

FORM AQ203
ANSWER SHEET

Facility Name: Grassy Mountain Mine

Permit Number: N/A

Plant Information

Device ID: BC

1.	Portable plant? (yes/no)	YES
2.	Date installed at current location	TBD
3.	Manufacturer and date manufactured	TBD

4. Crusher heads: (number of each)

Jaws	1	Roll	0
Cones	1	Other (specify)	N/A

5.	Plant electrical power supply (e.g., on-site generator or electric service company). If generators are used, complete form AQ213.	Electric Service Company

Projected Operating Schedule

6. Hours of operation:	Hours/day	Days/week	Weeks/year	**Total** hours/year
Primary schedule	12	7	37	3120
Secondary schedule	N/A	N/A	N/A	

Production Information

7.	Design Capacity (tons/hour)	93
8.	Projected maximum (tons/hour)	93
9.	Projected maximum (tons/year)	289800

Dust Control Information

10. You will be required to control dust at the plant site, including dust from product manufacture, receipt, movement, and loading of materials, and dust from interior and access roads. Describe how you will accomplish this.

Emissions calculations assume no dust control, however, dust will be controlled by best management practices, including periodic wetting of borrow stockpile.

Waste Process Water

11.	A permit to discharge and/or store process wastewater may be required. Do you have, or have you applied for such a permit from DEQ? (yes/no)	NO
	If "no", have you contacted your Region's water quality section? (yes/no)	NO

Facility Name: Grassy Mountain Mine Device ID: OC

Permit Number: N/A

Plant Information

Device ID: OC

1. Portable plant? (yes/no)			NO
2. Date installed at current location			TBD
3. Manufacturer and date manufactured			TBD
4. Crusher heads: (number of each)			
Jaws	1	Roll	0
Cones	1	Other (specify)	N/A
5. Plant electrical power supply (e.g., on-site generator or electric service company). If generators are used, complete form AQ213.			Electric Service Company

Projected Operating Schedule

6. Hours of operation:	Hours/day	Days/week	Weeks/year	**Total** hours/year
Primary schedule	24	7	52	8760
Secondary schedule	N/A	N/A	N/A	

Production Information

7. Design Capacity (tons/hour)	33
8. Projected maximum (tons/hour)	33
9. Projected maximum (tons/year)	289700

Dust Control Information

10. You will be required to control dust at the plant site, including dust from product manufacture, receipt, movement, and loading of materials, and dust from interior and access roads. Describe how you will accomplish this.

Wet ore from underground mine will be fed to crusher. Moisture inherent in ore will control dust.

Waste Process Water

11. A permit to discharge and/or store process wastewater may be required. Do you have, or have you applied for such a permit from DEQ? (yes/no)	NO
If "no", have you contacted your Region's water quality section? (yes/no)	NO

Facility Name: Grassy Mountain Mine

Permit Number: N/A

Plant Information

Device ID: CEM

1. Portable plant? (yes/no)	No
2. Date installed at current location	TBD
3. Manufacturer and date manufactured	Simem Eagle 7000
4. Truck mixed, central mixed, or dry batch?	Central Mix
5. Plant electrical power supply (e.g., on-site generator or electric service company). If generators are used, complete form AQ213.	Electric Service Company

Projected Operating Schedule

6. Hours of operation:	Hours/day	Days/week	Weeks/year	**Total** hours/year
Primary schedule	24	7	52	8760
Secondary schedule	N/A	N/A	N/A	

Production Information

7. Design Capacity (cubic yards/hour)	236
8. Projected maximum (cubic yards/hour)	236
9. Projected maximum (cubic yards/year)	70,106

Dust Control Information

10. You will be required to control dust at the plant site, including dust from product manufacture, receipt, movement, and loading of materials, and dust from interior and access roads. Describe how you will accomplish this.

Types of controls used may include water sprays, enclosures, hoods, curtains, shrouds, movable and telescoping chutes, and the like.

Waste Process Water

11. A permit to discharge and/or store process wastewater may be required. Do you have, or have you applied for such a permit from DEQ? (yes/no)	NO
If "no", have you contacted your Region's water quality section? (yes/no)	NO

State of Oregon Department of Environmental Quality

Facility Name: Grassy Mountain Mine   Permit Number: N/A

Tank Information:

	Tank Identification Number			
	TG1			
1. Existing or future?	Future			
2. Manufacturer	TBD			
3. Date construction commenced (month/year)	TBD			
4. Date installed (month/year)	TBD			
5. Rated capacity (gallons)	1,000			
6. Height (feet)	9			
7. Diameter (feet)	4.4			
8. Submerged fill pipe? (yes or no)	No			
9. Type of tank	Horizontal			
10. Underground? (yes or no)	NO			
Underground tank fill type	N/A			
11. Above ground? (yes or no)	Yes			
a. Pipe material	TBD			
b. Pipe size	TBD			
c. Piping continuously drains downward? (yes or no)	Yes			
d. Description of condensate collection tank.	TBD			
e. Isolation valves? (yes or no)	No			
12. Pressure/vacuum relief valves				
a. vent pressure settings (psia)	-0.03			
b. months	N/A			
13. Pressure conservation vent? (yes or no)	Yes			
If yes, enter psia.	0.03			
14. Fixed roof tank? (yes or no)	Yes			
a. roof color	White			

	Tank Identification Number			
	TG1			
b. shell color	White			
c. vapor space height (feet)	2.2			
d. shell condition	Good			
15. Floating roof tank? (yes or no)	No			
a. type of construction	N/A			
b. condition	N/A			
c. tank color	N/A			
d. deck type	N/A			
16. External floating roof tank seal type	N/A			
17. Internal floating roof tanks				
a. seal type	N/A			
b. number of columns	N/A			
c. effective column diameter (feet)	N/A			
d. total deck seam length (feet)	N/A			
e.i deck fitting types – access hatch				
(1) bolted cover, gasketed	N/A			
(2) unbolted cover, gasketed	N/A			
(3) unbolted cover, ungasketed	N/A			
e.ii deck fitting types – automatic gauge float well				
(1) bolted cover, gasketed	N/A			
(2) unbolted cover, gasketed	N/A			
(3) unbolted cover, ungasketed	N/A			
e.iii deck fitting types – column well				
(1) built-up column, sliding cover, gasketed	N/A			

	Tank Identification Number			
	TG1			
(2) built up column, sliding cover, ungasketed	N/A			
(3) pipe column, flexible fabric sleeve seal	N/A			
(4) pipe column, sliding cover, gasketed	N/A			
(5) pipe column, sliding cover, ungasketed	N/A			
e.iv deck fitting types – ladder well				
(1) sliding cover, gasketed	N/A			
(2) sliding cover, ungasketed	N/A			
e.v deck fitting types – sample well or pipe				
(1) slotted pipe, sliding cover, gasket	N/A			
(2) slotted pipe, sliding cover, ungasketed	N/A			
(3) sample well, slit fabric seal, 10% open area	N/A			
(4) stub drain, 1-inch diameter	N/A			
e.vi deck fitting types – roof leg or hanger well				
(1) adjustable	N/A			
(2) fix	N/A			
e.vii deck fitting types – vacuum breaker				
(1) weighted mechanical actuation, gasketed	N/A			
(2) weighted mechanical actuation, ungasketed	N/A			
18. Maximum liquid loading rate (gallons/hour)	TBD			
19. Description of submerged fill out-loading	TBD			
20. Vapor recovery system? (yes or no)	No			

Material Stored:

21. Name/type of material stored in the tank	Gasoline			
22. Maximum projected throughput (gallons/year)	52,000			
23. Maximum projected turnovers per year	52			

	Tank Identification Number			
	TG1			
24. Density (pounds/gallon)	6.17			
25. Molecular weight	92			
26. Average storage temperature (°F)	50.94			
27. Vapor pressure (psia)	3.995			

Facility Name: Grassy Mountain Mine Permit Number: N/A

1. Boiler Information:

Boiler identification	HA	HPO	HL	HWW
Manufacturer	TBD	TBD	TBD	TBD
Date manufactured (month/year)	TBD	TBD	TBD	TBD
Date construction commenced (month/year)	TBD	TBD	TBD	TBD
Date installed (month/year)	TBD	TBD	TBD	TBD
Rated design heat input capacity (million Btu per hour)	1.0	1.0	1.0	1.0
Rated steam production capacity (pounds per hour)	N/A	N/A	N/A	N/A
Primary fuel type	Propane	Propane	Propane	Propane
Max. fuel quantity used per hour (include units)	11.0 gal	11.0 gal	11.0 gal	11.0 gal
Max. fuel quantity used per year (include units)	96,800 gal	96,800 gal	96,800 gal	96,800 gal
If oil is used, sulfur content (% by wt.)	N/A	N/A	N/A	N/A
Secondary fuel type	N/A	N/A	N/A	N/A
Max. fuel quantity used per hour (include units)	N/A	N/A	N/A	N/A
Max. fuel quantity used per year (include units)	N/A	N/A	N/A	N/A
If oil is used, sulfur content (% by wt.)	N/A	N/A	N/A	N/A
Stack identification	HVAC1	HVAC2	HVAC3	HVAC4
Stack height (feet)	27.3	27.3	27.0	27.3
Stack gas flow rate at maximum load (dscf/minute)	169	169	169	169
Control device(s) identification from AQ300	N/A	N/A	N/A	N/A
Continuous monitoring systems	N/A	N/A	N/A	N/A

2. Describe how the boilers(s) is operated. (Refer to instructions for guidance)

Propane-fired HVAC units for conditioning buildings at the facility. Units will be used primarily during summer and winter, but maximum usage assumes year-round operation.

Facility Name: Grassy Mountain Mine

Permit Number: N/A

1. Boiler Information:

Boiler identification	HTW	HMO		
Manufacturer	TBD	TBD		
Date manufactured (month/year)	TBD	TBD		
Date construction commenced (month/year)	TBD	TBD		
Date installed (month/year)	TBD	TBD		
Rated design heat input capacity (million Btu per hour)	2.0	1.0		
Rated steam production capacity (pounds per hour)	N/A	N/A		
Primary fuel type	Propane	Propane		
Max. fuel quantity used per hour (include units)	22.1 gal	11.0 gal		
Max. fuel quantity used per year (include units)	193,600 gal	96,800 gal		
If oil is used, sulfur content (% by wt.)	N/A	N/A		
Secondary fuel type	N/A	N/A		
Max. fuel quantity used per hour (include units)	N/A	N/A		
Max. fuel quantity used per year (include units)	N/A	N/A		
If oil is used, sulfur content (% by wt.)	N/A	N/A		
Stack identification	HVAC5	HVAC6		
Stack height (feet)	53.3	27.6		
Stack gas flow rate at maximum load (dscf/minute)	339	169		
Control device(s) identification from AQ300	N/A	N/A		
Continuous monitoring systems	N/A	N/A		

2. Describe how the boilers(s) is operated. (Refer to instructions for guidance)

Propane-fired HVAC units for conditioning buildings at the facility. Units will be used primarily during summer and winter, but maximum usage assumes year-round operation.

Internal Combustion Engines and Turbines

Facility Name: Grassy Mountain | Permit Number: N/A

Engine Information

1.	Device ID Number	CKB
2.	Existing or future?	Future
3.	Date construction/installation commenced	TBD
4.	Date construction/installation completed	TBD
5.	Manufacturer	TBD
6.	Date manufactured	TBD
7.	Maximum rating (MMbtu/hr for turbines, Hp for others)	1.7 MMbtu/hr
8.	Control device(s) (yes/no)	No
	If yes, enter the identification number(s)	N/A
9.	Description of device:	

Propane burners for carbon regeneration kiln ducted through a dedicated burner stack.

Operating Schedule

10.	Projected maximum hours/day	24
11.	Projected maximum hours/year	8760

Fuel Information

12. Fuel usage:	a. Type	b. Hourly usage	c. Annual usage
Primary	Propane	1.7 MMbtu	14,892 MMbtu
Back-up	N/A	N/A	N/A
Other	N/A	N/A	N/A

Stack Information

13.	Exit height (ft)	18
14.	Exit diameter (ft)	0.48
15.	Design flowrate (dscf/min)	80

Monitoring Information

16. Monitoring equipment			
fuel flow (y/n)	No	recorder? (y/n)	NO
engine load (y/n)	NO	recorder? (y/n)	NO
other (specify)	NO	recorder? (y/n)	NO

Internal Combustion Engines and Turbines

Facility Name: Grassy Mountain   Permit Number: N/A

Engine Information

1.	Device ID Number	EDG1
2.	Existing or future?	Future
3.	Date construction/installation commenced	TBD
4.	Date construction/installation completed	TBD
5.	Manufacturer	TBD
6.	Date manufactured	2007 or newer
7.	Maximum rating (MMbtu/hr for turbines, Hp for others)	536 HP
8.	Control device(s) (yes/no)	NO
	If yes, enter the identification number(s)	N/A
9.	Description of device:	

Emergency Diesel Generator

Operating Schedule

10.	Projected maximum hours/day	24
11.	Projected maximum hours/year	100 (for maintenance and testing)

Fuel Information

12. Fuel usage:	a. Type	b. Hourly usage	c. Annual usage
Primary	ULSD	3.75 MMBtu	375.5 MMBtu
Back-up	N/A	N/A	N/A
Other	N/A	N/A	N/A

Stack Information

13.	Exit height (ft)	10
14.	Exit diameter (ft)	0.67
15.	Design flowrate (dscf/min)	1,500

Monitoring Information

16. Monitoring equipment			
fuel flow (y/n)	NO	recorder? (y/n)	NO
engine load (y/n)	NO	recorder? (y/n)	NO
other (specify)	Hour meter	recorder? (y/n)	Yes

Facility Name: Grassy Mountain Mine   Permit Number: N/A

Engine Information

1.	Device ID Number	EQP1
2.	Existing or future?	Future
3.	Date construction/installation commenced	TBD
4.	Date construction/installation completed	TBD
5.	Manufacturer	Sandvik DD21-40
6.	Date manufactured	2018 or newer
7.	Maximum rating (MMbtu/hr for turbines, Hp for others)	83 HP
8.	Control device(s) (yes/no)	NO
	If yes, enter the identification number(s)	N/A
9.	Description of device:	

Drilling Development Jumbo. Unit has a small engine for tramming. Operates on line power when drilling. Exhaust will be released to atmosphere via mine vent. Annual schedule and fuel usage is for 2 units combined.

Operating Schedule

10.	Projected maximum hours/day	24
11.	Projected maximum hours/year	731

Fuel Information

12. Fuel usage:	a. Type	b. Hourly usage	c. Annual usage
Primary	ULSD	4 gal	2,905 gal
Back-up	N/A	N/A	N/A
Other	N/A	N/A	N/A

Stack Information

13.	Exit height (ft)	N/A
14.	Exit diameter (ft)	N/A
15.	Design flowrate (dscf/min)	N/A

Monitoring Information

16. Monitoring equipment

fuel flow (y/n)	NO	recorder? (y/n)	NO
engine load (y/n)	NO	recorder? (y/n)	NO
other (specify)	NO	recorder? (y/n)	NO

Internal Combustion Engines and Turbines

Facility Name: Grassy Mountain Mine   Permit Number: N/A

Engine Information

1.	Device ID Number	EQP2
2.	Existing or future?	Future
3.	Date construction/installation commenced	TBD
4.	Date construction/installation completed	TBD
5.	Manufacturer	Sandvik DS311
6.	Date manufactured	2018 or newer
7.	Maximum rating (MMbtu/hr for turbines, Hp for others)	83
8.	Control device(s) (yes/no)	NO
	If yes, enter the identification number(s)	N/A
9.	Description of device:	

Bolter unit. Small engine for tramming, otherwise operates on line power. Exhaust will be released to atmosphere via mine vent.

Operating Schedule

10.	Projected maximum hours/day	24
11.	Projected maximum hours/year	466

Fuel Information

12. Fuel usage:	a. Type	b. Hourly usage	c. Annual usage
Primary	ULSD	4 gal	1,853 gal
Back-up	N/A	N/A	N/A
Other	N/A	N/A	N/A

Stack Information

13.	Exit height (ft)	N/A
14.	Exit diameter (ft)	N/A
15.	Design flowrate (dscf/min)	N/A

Monitoring Information

16. Monitoring equipment

fuel flow (y/n)	NO	recorder? (y/n)	NO
engine load (y/n)	NO	recorder? (y/n)	NO
other (specify)	NO	recorder? (y/n)	NO

Internal Combustion Engines and Turbines

Facility Name: Grassy Mountain Mine | Permit Number: N/A

Engine Information

1.	Device ID Number	EQP3
2.	Existing or future?	Future
3.	Date construction/installation commenced	TBD
4.	Date construction/installation completed	TBD
5.	Manufacturer	Sandvik LH410
6.	Date manufactured	2018 or newer
7.	Maximum rating (MMbtu/hr for turbines, Hp for others)	315 HP
8.	Control device(s) (yes/no)	NO
	If yes, enter the identification number(s)	N/A
9.	Description of device:	

Load-Haul-Dump mobile equipment for underground mining. Exhaust will be released to atmosphere via mine vent. Annual schedule and fuel usage is for 4 trucks combined.

Operating Schedule

10.	Projected maximum hours/day	24
11.	Projected maximum hours/year	4,428

Fuel Information

12. Fuel usage:	a. Type	b. Hourly usage	c. Annual usage
Primary	ULSD	8.45 gal	37,432 gal
Back-up	N/A	N/A	N/A
Other	N/A	N/A	N/A

Stack Information

13.	Exit height (ft)	N/A
14.	Exit diameter (ft)	N/A
15.	Design flowrate (dscf/min)	N/A

Monitoring Information

16. Monitoring equipment			
fuel flow (y/n)	NO	recorder? (y/n)	NO
engine load (y/n)	NO	recorder? (y/n)	NO
other (specify)	NO	recorder? (y/n)	NO

Internal Combustion Engines and Turbines

Facility Name: Grassy Mountain Mine   Permit Number: N/A

Engine Information

1.	Device ID Number	EQP4
2.	Existing or future?	Future
3.	Date construction/installation commenced	TBD
4.	Date construction/installation completed	TBD
5.	Manufacturer	Cat 926M
6.	Date manufactured	2018 or newer
7.	Maximum rating (MMbtu/hr for turbines, Hp for others)	153 HP
8.	Control device(s) (yes/no)	NO
	If yes, enter the identification number(s)	N/A
9.	Description of device:	

Front-end wheel loader for underground mining activities. Exhaust will be released to atmosphere via mine vent.

Operating Schedule

10.	Projected maximum hours/day	24
11.	Projected maximum hours/year	2,220

Fuel Information

12. Fuel usage:	a. Type	b. Hourly usage	c. Annual usage
Primary	ULSD	2.7 gal	5,994 gal
Back-up	N/A	N/A	N/A
Other	N/A	N/A	N/A

Stack Information

13.	Exit height (ft)	N/A
14.	Exit diameter (ft)	N/A
15.	Design flowrate (dscf/min)	N/A

Monitoring Information

16. Monitoring equipment

fuel flow (y/n)	NO	recorder? (y/n)	NO
engine load (y/n)	NO	recorder? (y/n)	NO
other (specify)	NO	recorder? (y/n)	NO

Internal Combustion Engines and Turbines

Facility Name: Grassy Mountain Mine Permit Number: N/A

Engine Information

1.	Device ID Number	EQP5
2.	Existing or future?	Future
3.	Date construction/installation commenced	TBD
4.	Date construction/installation completed	TBD
5.	Manufacturer	Cat AD30
6.	Date manufactured	2018 or newer
7.	Maximum rating (MMbtu/hr for turbines, Hp for others)	409 HP
8.	Control device(s) (yes/no)	NO
	If yes, enter the identification number(s)	N/A
9.	Description of device:	

Articulated low-profile haul truck for underground mining. Annual schedule and fuel usage is for 3 trucks combined. Exhaust will be released to atmosphere via mine vent.

Operating Schedule

10.	Projected maximum hours/day	24
11.	Projected maximum hours/year	13,980

Fuel Information

12. Fuel usage:	a. Type	b. Hourly usage	c. Annual usage
Primary	ULSD	11 gal	153,081 gal
Back-up	N/A	N/A	N/A
Other	N/A	N/A	N/A

Stack Information

13.	Exit height (ft)	N/A
14.	Exit diameter (ft)	N/A
15.	Design flowrate (dscf/min)	N/A

Monitoring Information

16. Monitoring equipment

fuel flow (y/n)	NO	recorder? (y/n)	NO
engine load (y/n)	NO	recorder? (y/n)	NO
other (specify)	NO	recorder? (y/n)	NO

Internal Combustion Engines and Turbines

Facility Name: Grassy Mountain Mine Permit Number: N/A

Engine Information

1.	Device ID Number	EQP6
2.	Existing or future?	Future
3.	Date construction/installation commenced	TBD
4.	Date construction/installation completed	TBD
5.	Manufacturer	Paus Universa 50
6.	Date manufactured	2018 or newer
7.	Maximum rating (MMbtu/hr for turbines, Hp for others)	101 HP
8.	Control device(s) (yes/no)	NO
	If yes, enter the identification number(s)	N/A
9.	Description of device:	

Emulsion loader. Unit will run on line power unless tramming. Exhaust will be released to atmosphere via mine vent.

Operating Schedule

10.	Projected maximum hours/day	24
11.	Projected maximum hours/year	731

Fuel Information

12. Fuel usage:	a. Type	b. Hourly usage	c. Annual usage
Primary	ULSD	4.9 gal	3,565 gal
Back-up	N/A	N/A	N/A
Other	N/A	N/A	N/A

Stack Information

13.	Exit height (ft)	N/A
14.	Exit diameter (ft)	N/A
15.	Design flowrate (dscf/min)	N/A

Monitoring Information

16. Monitoring equipment

fuel flow (y/n)	NO	recorder? (y/n)	NO
engine load (y/n)	NO	recorder? (y/n)	NO
other (specify)	NO	recorder? (y/n)	NO

Internal Combustion Engines and Turbines

Facility Name: Grassy Mountain Mine
Permit Number: N/A

Engine Information

1.	Device ID Number	EQP7
2.	Existing or future?	Future
3.	Date construction/installation commenced	TBD
4.	Date construction/installation completed	TBD
5.	Manufacturer	Cat TL943D
6.	Date manufactured	2018 or newer
7.	Maximum rating (MMbtu/hr for turbines, Hp for others)	111 HP
8.	Control device(s) (yes/no)	NO
	If yes, enter the identification number(s)	N/A
9.	Description of device:	

Telehandler to support underground mining activities. Annual schedule and fuel usage is for 2 units combined. Exhaust will be released to atmosphere via mine vent.

Operating Schedule

10.	Projected maximum hours/day	24
11.	Projected maximum hours/year	8,232

Fuel Information

12. Fuel usage:	a. Type	b. Hourly usage	c. Annual usage
Primary	ULSD	3 gal	24,696 gal
Back-up	N/A	N/A	N/A
Other	N/A	N/A	N/A

Stack Information

13.	Exit height (ft)	N/A
14.	Exit diameter (ft)	N/A
15.	Design flowrate (dscf/min)	N/A

Monitoring Information

16. Monitoring equipment

fuel flow (y/n)	NO	recorder? (y/n)	NO
engine load (y/n)	NO	recorder? (y/n)	NO
other (specify)	NO	recorder? (y/n)	NO

Internal Combustion Engines and Turbines

Facility Name: Grassy Mountain Mine   Permit Number: N/A

Engine Information

1.	Device ID Number	EQP8
2.	Existing or future?	Future
3.	Date construction/installation commenced	TBD
4.	Date construction/installation completed	TBD
5.	Manufacturer	Cat D6T
6.	Date manufactured	2018 or newer
7.	Maximum rating (MMbtu/hr for turbines, Hp for others)	200 HP
8.	Control device(s) (yes/no)	NO
	If yes, enter the identification number(s)	N/A
9.	Description of device:	

Bulldozer to support underground mining activities. Exhaust will be released to atmosphere via mine vent.

Operating Schedule

10.	Projected maximum hours/day	24
11.	Projected maximum hours/year	2,760

Fuel Information

12. Fuel usage:	a. Type	b. Hourly usage	c. Annual usage
Primary	ULSD	6.5	17,802
Back-up	N/A	N/A	N/A
Other	N/A	N/A	N/A

Stack Information

13.	Exit height (ft)	N/A
14.	Exit diameter (ft)	N/A
15.	Design flowrate (dscf/min)	N/A

Monitoring Information

16. Monitoring equipment

fuel flow (y/n)	NO	recorder? (y/n)	NO
engine load (y/n)	NO	recorder? (y/n)	NO
other (specify)	NO	recorder? (y/n)	NO

Internal Combustion Engines and Turbines

Facility Name: Grassy Mountain Mine   Permit Number: N/A

Engine Information

1.	Device ID Number	EQP9
2.	Existing or future?	Future
3.	Date construction/installation commenced	TBD
4.	Date construction/installation completed	TBD
5.	Manufacturer	Paus PG5HA
6.	Date manufactured	2018 or newer
7.	Maximum rating (MMbtu/hr for turbines, Hp for others)	101 HP
8.	Control device(s) (yes/no)	NO
	If yes, enter the identification number(s)	N/A
9.	Description of device:	

Low-profile motor grader to support underground mining activities. Exhaust will be released to atmosphere via mine vent.

Operating Schedule

10.	Projected maximum hours/day	24
11.	Projected maximum hours/year	2,796

Fuel Information

12. Fuel usage:	a. Type	b. Hourly usage	c. Annual usage
Primary	ULSD	4.9 gal	13,640 gal
Back-up	N/A	N/A	N/A
Other	N/A	N/A	N/A

Stack Information

13.	Exit height (ft)	N/A
14.	Exit diameter (ft)	N/A
15.	Design flowrate (dscf/min)	N/A

Monitoring Information

16. Monitoring equipment			
fuel flow (y/n)	NO	recorder? (y/n)	NO
engine load (y/n)	NO	recorder? (y/n)	NO
other (specify)	NO	recorder? (y/n)	NO

Facility Name: Grassy Mountain Mine   Permit Number: N/A

Process Information

1. ID Number	LAB
2. Descriptive name	Analytical Laboratory
3. Existing or future?	Future
4. Date commenced	TBD
5. Date installed/completed	TBD
6. Description of process:	

An analytical laboratory will be maintained on site. Ore samples will first be prepared by crushing, grinding, and screening, and then a sub-sample will undergo a fire assay to measure precious metal concentrations in the sample. Exhaust from the sample preparation and fire assay sources is ducted through a fume hood with a potential to emit particulates.

Operating Schedule

7. Seasonal or year-round?	Year-round
8. Batch or continuous operation?	BATCH
9. Projected maximum hours/day	24
10. Projected maximum hours/year	2,920

11. Process/device capacity:	Short term capacity		Annual usage	
Raw materials	Amount	Units	Amount	Units
ore sample	6	tons/day	2,190	tons
Fire assay sample	.025	tons/day	9	tons
Products				
Precious metal from assay	N/A	N/A	N/A	N/A

12. Control devices(s) (yes/no)	NO

If yes, provide the ID number and complete and attached the applicable series AQ300 form(s).

N/A

Form AQ230 Process Flow Attachment

See form AQ102, page 8, for process flow diagrams for all AQ230 Answer Sheets.

State of Oregon Department of Environmental Quality

Facility Name: Grassy Mountain Mine   Permit Number: N/A

Process Information

1. ID Number	LS
2. Descriptive name	Lime Silo
3. Existing or future?	Future
4. Date commenced	TBD
5. Date installed/completed	TBD

6. Description of process:

55-ton silo holding dry lime for input to the lime slaker

Operating Schedule

7. Seasonal or year-round?	Year-round
8. Batch or continuous operation?	Continuous
9. Projected maximum hours/day	24
10. Projected maximum hours/year	8760

11. Process/device capacity:	Short term capacity		Annual usage	
Raw materials	Amount	Units	Amount	Units
Lime loading to silo	55	ton/hr	292	tons
Lime unloading to slaker	0.8	ton/hr	292	tons
Products				
N/A	N/A	N/A	N/A	N/A

12. Control devices(s) (yes/no) NO

If yes, provide the ID number and complete and attached the applicable series AQ300 form(s).

Passive silo vent filter to control product losses during silo loading.

State of Oregon Department of Environmental Quality

MISCELLANEOUS PROCESS OR DEVICE

Facility Name: Grassy Mountain Mine   Permit Number: N/A

Process Information

1. ID Number	CKD
2. Descriptive name	Carbon Regeneration Kiln Drum
3. Existing or future?	Future
4. Date commenced	TBD
5. Date installed/completed	TBD

6. Description of process:

Device regenerates carbon used in carbon-in-leach (CIL) process. Stripped carbon is loaded into a drum and indirectly heated with propane burners (See AQ210_CKB) to burn off contaminants and re-activate the carbon for re-use in the CIL process. Emissions from the carbon kiln drum are controlled by a wet scrubber (control device VS1) and carbon filter (control device CF1). It is expected that the kiln drum has the potential to emit particulates, CO, and mercury emissions.

Operating Schedule

7. Seasonal or year-round?	Year-round
8. Batch or continuous operation?	CONTINUOUS
9. Projected maximum hours/day	24
10. Projected maximum hours/year	8,760

11. Process/device capacity:	Short term capacity		Annual usage	
Raw materials	Amount	Units	Amount	Units
Stripped carbon	0.2	tons/hr	1,752	tons
Products				
Activated carbon	0.2	tons/hr	1,752	tons

12. Control devices(s) (yes/no)

If yes, provide the ID number and complete and attached the applicable series AQ300 form(s).

VS1, CF1

State of Oregon Department of Environmental Quality

MISCELLANEOUS CONTROL DEVICE INFORMATION

FORM AQ307 ANSWER SHEET

Facility Name: Grassy Mountain Mine

Permit Number: N/A

1.	Control Device ID	CF1
2.	Process/Device(s) Controlled	Carbon Kiln Drum (ID CKD)
3.	Year installed	TBD
4.	Manufacturer/Model No.	TBD
5.	Control Efficiency (%)	Not specified
6.	Design inlet gas flow rate (acfm)	TBD by vendor
7.	Design parameter(s)	Carbon bed inlet temperature (F) and carbon bed loading (percent mercury loading by weight). Maximum values TBD by vendor.
8.	Inlet gas pretreatment? (yes/no) If yes, list control device ID and complete a separate control device form	VS1
9.	Describe the control device	
	Sulfur impregnated (or halogenated) activated carbon adsorption bed designed for the removal of mercury	

State of Oregon Department of Environmental Quality

WET SCRUBBER
CONTROL DEVICE INFORMATION

FORM AQ303
ANSWER SHEET

Facility Name: Grassy Mountain Mine

Permit Number: N/A

1.	Control Device ID	VS1		
2.	Process/Device(s) Controlled	Carbon Kiln Drum (ID CKD)		
3.	Year installed	TBD		
4.	Manufacturer/Model No.	TBD		
5.	Control Efficiency (%)	Vendor guarantee requirement of 0.06 lbs PM/hr		
6.	Type of scrubber	Venturi		
7.	Is water re-circulated?	yes		
8.	Design water flow rate (gpm)	TBD by vendor		
9.	Design water pressure (psig)	TBD by vendor		
10.	Design inlet gas flow rate (acfm)	TBD by vendor		
11.	Design pressure drop (inches of water)	TBD by vendor		
12.	Inlet gas pretreatment? (yes/no) If yes, list control device ID and complete a separate control device form	No		
13.	Describe any water treatment systems*	TBD by vendor		

* Attach additional pages, if necessary.

State of Oregon Department of Environmental Quality

Facility Name: Grassy Mountain Mine

Permit Number: N/A

Process Information

1. ID Number	EW
2. Descriptive name	Electrowinning Cells/Pregnant Solution Tank
3. Existing or future?	Future
4. Date commenced	TBD
5. Date installed/completed	TBD

6. Description of process:

Solution is fed to the electrowinning (EW) cells from a Pregnant Solution Tank (PST). Current is supplied to an inert anode through the solution and metal is plated onto a cathode. Periodically, the "cells" are opened and the plated metal is cleaned from the cathodes. Emissions from the EW Cells and PST are combined with the retort exhaust downstream of the retort condenser and are controlled by a carbon filter (control device CF3). It is expected that the EW cells and PST have the potential to emit Hg and HCN.

Operating Schedule

7. Seasonal or year-round?	Year-round
8. Batch or continuous operation?	batch
9. Projected maximum hours/day	24
10. Projected maximum hours/year	8760

11. Process/device capacity:

	Short term capacity		Annual usage	
Raw materials	Amount	Units	Amount	Units
Pregnant eluate solution	N/A	N/A	N/A	N/A
No data are available on the amount of solution entering the cells, only the end product.				
Products				
Wet Au Concentrate	N/A	N/A	8	ton

12. Control devices(s) (yes/no)

If yes, provide the ID number and complete and attached the applicable series AQ300 form(s).

CF3 (shared with mercury retort)

State of Oregon Department of Environmental Quality

Facility Name: Grassy Mountain Mine   Permit Number: N/A

Process Information

1. ID Number	MR
2. Descriptive name	Mercury Retort
3. Existing or future?	Future
4. Date commenced	TBD
5. Date installed/completed	TBD
6. Description of process:	

Au/Ag concentrate is heated in an oven to evacuate mercury as a gas from the concentrate. The mercury vapor is then cooled, condensed, and collected as a liquid in the retort condenser (control device CD1). The exhaust exiting the retort condenser is combined with Electrowinning Cells and Pregnant Solution Tank (ID EW) exhaust and ducted through a carbon bed (control device CF3) to remove any residual mercury. It is expected that the retort has the potential to emit mercury emissions.

Operating Schedule

7. Seasonal or year-round?	Year-round
8. Batch or continuous operation?	Continuous
9. Projected maximum hours/day	24
10. Projected maximum hours/year	8760

11. Process/device capacity:	Short term capacity		Annual usage	
Raw materials	Amount	Units	Amount	Units
Au/Ag Concentrate	TBD		8	tons
Products				
Au/Ag Concentrate	N/A		8	tons

12. Control devices(s) (yes/no) Yes

If yes, provide the ID number and complete and attached the applicable series AQ300 form(s).

CF3 (shared with Electrowinning Cells and Pregnant Solution Tank); CD1

DEQ State of Oregon Department of Environmental Quality

MISCELLANEOUS
CONTROL DEVICE INFORMATION

FORM AQ307
ANSWER SHEET

Facility Name: Grassy Mountain Mine

Permit Number: N/A

1.	Control Device ID	CD1
2.	Process/Device(s) Controlled	Mercury Retort (ID MR)
3.	Year installed	TBD
4.	Manufacturer/Model No.	TBD
5.	Control Efficiency (%)	Not specified
6.	Design inlet gas flow rate (acfm)	TBD by vendor
7.	Design parameter(s)	Outlet exhaust temperature (F). Minimum value TBD by vendor.
8.	Inlet gas pretreatment? (yes/no) If yes, list control device ID and complete a separate control device form	No
9.	Describe the control device	
	Condenser designed to cool, condense, and collect mercury from the retort exhaust.	

MISCELLANEOUS
CONTROL DEVICE INFORMATION

FORM AQ307
ANSWER SHEET

State of Oregon Department of Environmental Quality

Facility Name: Grassy Mountain Mine

Permit Number: N/A

1.	Control Device ID	CF3
2.	Process/Device(s) Controlled	Mercury Retort (ID MR) and Electrowinning Cells / Pregnant Solution Tank (EW)
3.	Year installed	TBD
4.	Manufacturer/Model No.	TBD
5.	Control Efficiency (%)	Not specified
6.	Design inlet gas flow rate (acfm)	TBD by vendor
7.	Design parameter(s)	Carbon bed inlet temperature (F) and carbon bed loading (percent mercury loading by weight). Maximum values TBD by vendor.
8.	Inlet gas pretreatment? (yes/no) If yes, list control device ID and complete a separate control device form	CD1 (Mercury retort exhaust only)
9.	Describe the control device	
	Sulfur impregnated (or halogenated) activated carbon adsorption bed designed for the removal of mercury	

Facility Name: Grassy Mountain Mine   Permit Number: N/A

Process Information

1. ID Number	MF
2. Descriptive name	Induction Melting Furnace
3. Existing or future?	Future
4. Date commenced	TBD
5. Date installed/completed	TBD
6. Description of process:	

Induction (electric) furnace for melting Au/Ag concentrate to produce dore bars. It is expected that the melting furnace has the potential to emit particulates and mercury emissions. Emissions from the melting furnace are controlled by a baghouse (control device BH1) and carbon bed (control device CF2).

Operating Schedule

7. Seasonal or year-round?	Year-round
8. Batch or continuous operation?	Batch
9. Projected maximum hours/day	12
10. Projected maximum hours/year	960

11. Process/device capacity:	Short term capacity		Annual usage	
Raw materials	Amount	Units	Amount	Units
Dried metal concentrate	0.1	ton/batch	8	tons
Flux	N/A	N/A	N/A	N/A
Products				
gold and silver doré bars	0.1	ton/batch	8	ton

12. Control devices(s) (yes/no) Yes

If yes, provide the ID number and complete and attached the applicable series AQ300 form(s).

BH1, CF2

BAGHOUSE
CONTROL DEVICE INFORMATION

FORM AQ304
ANSWER SHEET

State of Oregon Department of Environmental Quality

Facility Name: Grassy Mountain Mine

Permit Number: N/A

1.	Control Device ID	BH1		
2.	Process/Device(s) Controlled	Induction Melting Furnace (ID MF)		
3.	Year installed	TBD		
4.	Manufacturer/Model No.	TBD		
5.	Control Efficiency (%)	Vendor guarantee requirement of 0.004 grains per dscf		
6.	Type of cleaning mechanism and frequency	TBD by vendor		
7.	Design inlet gas flow rate (acfm)	TBD by vendor		
8.	Number of bags	TBD by vendor		
9.	Design air-to-cloth ratio	TBD by vendor		
10.	Design pressure drop (inches of water)	TBD by vendor		
11.	Inlet gas pretreatment? (yes/no) If yes, list control device ID and complete a separate control device form	No		

State of Oregon Department of Environmental Quality

MISCELLANEOUS CONTROL DEVICE INFORMATION

FORM AQ307 ANSWER SHEET

Facility Name: Grassy Mountain Mine

Permit Number: N/A

1.	Control Device ID	CF2
2.	Process/Device(s) Controlled	Induction Melting Furnace (ID MF)
3.	Year installed	TBD
4.	Manufacturer/Model No.	TBD
5.	Control Efficiency (%)	Not specified
6.	Design inlet gas flow rate (acfm)	TBD by vendor
7.	Design parameter(s)	Carbon bed inlet temperature (F) and carbon bed loading (percent mercury loading by weight). Maximum values TBD by vendor.
8.	Inlet gas pretreatment? (yes/no) If yes, list control device ID and complete a separate control device form	BH1
9.	Describe the control device	
	Sulfur impregnated (or halogenated) activated carbon adsorption bed designed for the removal of mercury	

1.3 AQ400 Series Forms

The following forms provide summary emissions information for all emissions points, including criteria pollutants and hazardous air pollutants. Form AQ403 emissions are included instead in form AQ405.

References for emission factors refer to the emissions inventory worksheets in Attachment A, which in turn refer to the reference list in Section 2.0.

Electronic versions of all AQ400 Series forms, as well as the worksheets presented in Attachment A, are available upon request.

PLANT SITE EMISSIONS DETAIL SHEET **FORM AQ402**
CURRENT/FUTURE OPERATIONS **ANSWER SHEET**

Facility Name: Grassy Mountain Mine Permit Number: N/A

Table 1

1. Emissions Point	Production Rates		4. Pollutant	Emissions Factors			Emissions	
	2. Short-term (Specify units)	3. Annual (Specify units)		5. Short-term	6. Long-term	7. Reference(s)	8. Short-term (Specify units)	9. Annual (tons/year)
See attached Table								
Example	200 tons of rock/hr	400,000 tons	PM	0.04 lb/ton	0.04 lb/ton	DEQ	8.0 lb/hr	8.0

1. Emissions Point	Production Rates		4. Pollutant	Emissions Factors			Emissions	
	2. Short-term (Specify units)	3. Annual (Specify Units)		5. Short-term	6. Long-term	7. Reference(s)	8. Short-term (Specify units)	9. Annual (tons/year)
OC1	794 ton Ore/day	289,700 ton Ore/yr	PM	0.00014	0.00014	See Process Sheet	0.111 lbs/day	0.020
OC2	794 ton Ore/day	289,700 ton Ore/yr	PM	0.00014	0.00014	See Process Sheet	0.111 lbs/day	0.020
OC3	794 ton Ore/day	289,700 ton Ore/yr	PM	0.0012	0.0012	See Process Sheet	0.952 lbs/day	0.174
OC4	794 ton Ore/day	289,700 ton Ore/yr	PM	0.00014	0.00014	See Process Sheet	0.111 lbs/day	0.020
OC5	794 ton Ore/day	289,700 ton Ore/yr	PM	0.00014	0.00014	See Process Sheet	0.111 lbs/day	0.020
OC6	794 ton Ore/day	289,700 ton Ore/yr	PM	0.00014	0.00014	See Process Sheet	0.111 lbs/day	0.020
OC7	794 ton Ore/day	289,700 ton Ore/yr	PM	0.0022	0.0022	See Process Sheet	1.75 lbs/day	0.319
OC8	794 ton Ore/day	289,700 ton Ore/yr	PM	0.0012	0.0012	See Process Sheet	0.952 lbs/day	0.174
OC9	794 ton Ore/day	289,700 ton Ore/yr	PM	0.00014	0.00014	See Process Sheet	0.111 lbs/day	0.020
OC10	794 ton Ore/day	289,700 ton Ore/yr	PM	0.00014	0.00014	See Process Sheet	0.111 lbs/day	0.020
OC11	794 ton Ore/day	289,700 ton Ore/yr	PM	0.00014	0.00014	See Process Sheet	0.111 lbs/day	0.020
OC12	794 ton Ore/day	289,700 ton Ore/yr	PM	0.00014	0.00014	See Process Sheet	0.111 lbs/day	0.020
OC13	794 ton Ore/day	289,700 ton Ore/yr	PM	0.00014	0.00014	See Process Sheet	0.111 lbs/day	0.020
BC1	1,115 ton Borrow/day	289,800 ton Borrow/yr	PM	0.003	0.003	See Process Sheet	3.344 lbs/day	0.435
BC2	1,115 ton Borrow/day	289,800 ton Borrow/yr	PM	0.003	0.003	See Process Sheet	3.344 lbs/day	0.435
BC3	1,115 ton Borrow/day	289,800 ton Borrow/yr	PM	0.0054	0.0054	See Process Sheet	6.02 lbs/day	0.782
BC4	1,115 ton Borrow/day	289,800 ton Borrow/yr	PM	0.003	0.003	See Process Sheet	3.344 lbs/day	0.435
BC5	1,115 ton Borrow/day	289,800 ton Borrow/yr	PM	0.003	0.003	See Process Sheet	3.344 lbs/day	0.435
BC6	1,115 ton Borrow/day	289,800 ton Borrow/yr	PM	0.003	0.003	See Process Sheet	3.344 lbs/day	0.435
BC7	1,115 ton Borrow/day	289,800 ton Borrow/yr	PM	0.025	0.025	See Process Sheet	27.87 lbs/day	3.623
BC8	1,115 ton Borrow/day	289,800 ton Borrow/yr	PM	0.0054	0.0054	See Process Sheet	6.02 lbs/day	0.782
BC9	1,115 ton Borrow/day	289,800 ton Borrow/yr	PM	0.003	0.003	See Process Sheet	3.344 lbs/day	0.435
BC10	1,115 ton Borrow/day	289,800 ton Borrow/yr	PM	0.003	0.003	See Process Sheet	3.344 lbs/day	0.435
LS1	55 ton Lime/day	292 ton Lime/yr	PM	0.00099	0.00099	See Process Sheet	0.054 lbs/day	0.0001
LS2	1 ton Lime/day	292 ton Lime/yr	PM	0.0048	0.0048	See Process Sheet	0.004 lbs/day	0.001
CKD	5 ton Carbon/day	1,752 ton Carbon/yr	PM	0.3	0.3	See Process Sheet	1.44 lbs/day	0.263
CKB	41 MMBtu Propane/day	14,892 MMBtu Propane/yr	PM	0.00765	0.00765	See Process Sheet	0.312 lbs/day	0.057
MF	24 hours per day	960 hours per year	PM	0.12	0.12	See Process Sheet	2.88 lbs/day	0.058
LABSP	6 ton Samples/day	2,190 ton Samples/yr	PM	0.02	0.02	See Process Sheet	0.120 lbs/day	0.022
LABFA	0 ton Samples/day	9 ton Samples/yr	PM	20	20	See Process Sheet	0.500 lbs/day	0.091
EDG1	110 kW Diesel/day	40,000 kW Diesel/yr	PM	0.00044	0.00044	See Process Sheet	0.049 lbs/day	0.009
HA	24 MMBtu Propane/day	8,760 MMBtu Propane/yr	PM	0.00765	0.00765	See Process Sheet	0.184 lbs/day	0.034
HPO	24 MMBtu Propane/day	8,760 MMBtu Propane/yr	PM	0.00765	0.00765	See Process Sheet	0.184 lbs/day	0.034
HL	24 MMBtu Propane/day	8,760 MMBtu Propane/yr	PM	0.00765	0.00765	See Process Sheet	0.184 lbs/day	0.034
HWW	24 MMBtu Propane/day	8,760 MMBtu Propane/yr	PM	0.00765	0.00765	See Process Sheet	0.184 lbs/day	0.034
HTW	48 MMBtu Propane/day	17,520 MMBtu Propane/yr	PM	0.00765	0.00765	See Process Sheet	0.367 lbs/day	0.067
HMO	24 MMBtu Propane/day	8,760 MMBtu Propane/yr	PM	0.00765	0.00765	See Process Sheet	0.184 lbs/day	0.034
CEM1	80 ton Cement/day	7,053 ton Cement/yr	PM	0.00099	0.00099	See Process Sheet	0.079 lbs/day	0.003
CEM2	80 ton Cement/day	7,053 ton Cement/yr	PM	0.00099	0.00099	See Process Sheet	0.079 lbs/day	0.003
CEM3	1,125 ton Aggregate/day	134,000 ton Aggregate/yr	PM	0.0069	0.0069	See Process Sheet	7.76 lbs/day	0.462
CEM4	1,125 ton Aggregate/day	134,000 ton Aggregate/yr	PM	0.0048	0.0048	See Process Sheet	5.40 lbs/day	0.322
CEM5	59 ton Cemented Rock Fill/day	7,053 ton Cemented Rock Fill/yr	PM	0.0184	0.0184	See Process Sheet	1.09 lbs/day	0.065
Underground Drilling	1,400 ton ore/day	291,200 ton Ore/yr	PM	0.00017	0.00017	See Mine Sheet, p. 3	0.237 lbs/day	0.025
Borrow Drilling	1,115 ton Borrow/day	289,800 ton Borrow/yr	PM	0.0058	0.0058	See Mine Sheet, p. 3	6.50 lbs/day	0.845
Underground Blasting	1,400 ton ore/day	291,200 ton Ore/yr	PM	0.00034	0.00034	See Mine Sheet, p. 4	0.470 lbs/day	0.049
Borrow Blasting	1,115 ton Borrow/day	289,800 ton Borrow/yr	PM	0.00444	0.00444	See Mine Sheet, p. 4	4.950 lbs/day	0.064
Underground Hauling	385 VMT/day	80,073 VMT/yr	PM	0.565	0.565	See Mine Sheet, pp. 5–7	217 lbs/day	22.6
Borrow Pit Hauling	63 VMT/day	13,072 VMT/yr	PM	0.851	0.851	See Mine Sheet, pp. 5–7	53.5 lbs/day	5.56
Process Area Hauling	34 VMT/day	7,143 VMT/yr	PM	0.851	0.851	See Mine Sheet, pp. 5–7	29.2 lbs/day	3.04
Underground Load/Unload	2,800 Ton material transferred/day	582,400 Ton material transferred/yr	PM	0.00012	0.00012	See Mine Sheet, p. 8	0.343 lbs/day	0.036
Material Load / Unload	6,875 Ton material transferred/day	1,430,096 Ton material transferred/yr	PM	0.00016	0.00016	See Mine Sheet, p. 8	1.09 lbs/day	0.113
Underground Mobile Tailpipe	308 VMT/day	80,073 VMT/yr	PM	0.010	0.010	See Mine Sheet, pp. 10–14	3.00 lbs/day	0.390
Dozing	24 hr/day	2,760 hr/yr	PM	2.18	3.94	See Mine Sheet, p. 16	52.3 lbs/day	5.44
Grading	87 VMT/day	18,174 VMT/yr	PM	0.60	0.60	See Mine Sheet, p. 16	52.4 lbs/day	5.45
Water Truck Travel	33 VMT/day	8,701 VMT/yr	PM	1.21	1.21	See Mine Sheet, p. 17	41 lbs/day	5.3
Wind Erosion	2 Erodible Area (acre/day)	194 Erodible Area (acre/yr)	PM	1.97	4.84	See Mine Sheet, pp. 18–26	3.62 lbs/day	0.470
TOTAL			**PM**				**555 lbs/day**	**60.04**

1. Emissions Point	Production Rates: 2. Short-term (Specify units)	Production Rates: 3. Annual (Specify Units)	4. Pollutant	Emissions Factors: 5. Short-term	Emissions Factors: 6. Long-term	Emissions Factors: 7. Reference(s)	Emissions: 8. Short-term (Specify units)	Emissions: 9. Annual (tons/year)
OC1	794 ton Ore/day	289,700 ton Ore/yr	PM10	0.000046	0.000046	See Process Sheet	0.037 lbs/day	0.007
OC2	794 ton Ore/day	289,700 ton Ore/yr	PM10	0.000046	0.000046	See Process Sheet	0.037 lbs/day	0.007
OC3	794 ton Ore/day	289,700 ton Ore/yr	PM10	0.00054	0.00054	See Process Sheet	0.429 lbs/day	0.078
OC4	794 ton Ore/day	289,700 ton Ore/yr	PM10	0.000046	0.000046	See Process Sheet	0.037 lbs/day	0.007
OC5	794 ton Ore/day	289,700 ton Ore/yr	PM10	0.000046	0.000046	See Process Sheet	0.037 lbs/day	0.007
OC6	794 ton Ore/day	289,700 ton Ore/yr	PM10	0.000046	0.000046	See Process Sheet	0.037 lbs/day	0.007
OC7	794 ton Ore/day	289,700 ton Ore/yr	PM10	0.00074	0.00074	See Process Sheet	0.59 lbs/day	0.107
OC8	794 ton Ore/day	289,700 ton Ore/yr	PM10	0.00054	0.00054	See Process Sheet	0.429 lbs/day	0.078
OC9	794 ton Ore/day	289,700 ton Ore/yr	PM10	0.000046	0.000046	See Process Sheet	0.037 lbs/day	0.007
OC10	794 ton Ore/day	289,700 ton Ore/yr	PM10	0.000046	0.000046	See Process Sheet	0.037 lbs/day	0.007
OC11	794 ton Ore/day	289,700 ton Ore/yr	PM10	0.000046	0.000046	See Process Sheet	0.037 lbs/day	0.007
OC12	794 ton Ore/day	289,700 ton Ore/yr	PM10	0.000046	0.000046	See Process Sheet	0.037 lbs/day	0.007
OC13	794 ton Ore/day	289,700 ton Ore/yr	PM10	0.000046	0.000046	See Process Sheet	0.037 lbs/day	0.007
BC1	1,115 ton Borrow/day	289,800 ton Borrow/yr	PM10	0.0011	0.0011	See Process Sheet	1.226 lbs/day	0.159
BC2	1,115 ton Borrow/day	289,800 ton Borrow/yr	PM10	0.0011	0.0011	See Process Sheet	1.226 lbs/day	0.159
BC3	1,115 ton Borrow/day	289,800 ton Borrow/yr	PM10	0.0024	0.0024	See Process Sheet	2.68 lbs/day	0.348
BC4	1,115 ton Borrow/day	289,800 ton Borrow/yr	PM10	0.0011	0.0011	See Process Sheet	1.226 lbs/day	0.159
BC5	1,115 ton Borrow/day	289,800 ton Borrow/yr	PM10	0.0011	0.0011	See Process Sheet	1.226 lbs/day	0.159
BC6	1,115 ton Borrow/day	289,800 ton Borrow/yr	PM10	0.0011	0.0011	See Process Sheet	1.226 lbs/day	0.159
BC7	1,115 ton Borrow/day	289,800 ton Borrow/yr	PM10	0.0087	0.0087	See Process Sheet	9.70 lbs/day	1.261
BC8	1,115 ton Borrow/day	289,800 ton Borrow/yr	PM10	0.0024	0.0024	See Process Sheet	2.68 lbs/day	0.348
BC9	1,115 ton Borrow/day	289,800 ton Borrow/yr	PM10	0.0011	0.0011	See Process Sheet	1.226 lbs/day	0.159
BC10	1,115 ton Borrow/day	289,800 ton Borrow/yr	PM10	0.0011	0.0011	See Process Sheet	1.226 lbs/day	0.159
LS1	55.0 ton Lime/day	292 ton Lime/yr	PM10	0.00034	0.00034	See Process Sheet	0.019 lbs/day	0.0000
LS2	0.8 ton Lime/day	292 ton Lime/yr	PM10	0.0028	0.0028	See Process Sheet	0.002 lbs/day	0.000
CKD	4.8 ton Carbon/day	1,752 ton Carbon/yr	PM10	0.3	0.3	See Process Sheet	1.44 lbs/day	0.263
CKB	40.8 MMBtu Propane/day	14,892 MMBtu Propane/yr	PM10	0.00765	0.00765	See Process Sheet	0.312 lbs/day	0.057
MF	24 hours per day	960 hours per year	PM10	0.12	0.12	See Process Sheet	2.88 lbs/day	0.058
LABSP	6.0 ton Samples/day	2,190 ton Samples/yr	PM10	0.01	0.01	See Process Sheet	0.046 lbs/day	0.008
LABFA	0.025 ton Samples/day	9 ton Samples/yr	PM10	20	20	See Process Sheet	0.500 lbs/day	0.091
EDG1	110 kW Diesel/day	40,000 kW Diesel/yr	PM10	0.00044	0.00044	See Process Sheet	0.049 lbs/day	0.009
HA	24 MMBtu Propane/day	8,760 MMBtu Propane/yr	PM10	0.00765	0.00765	See Process Sheet	0.184 lbs/day	0.034
HPO	24 MMBtu Propane/day	8,760 MMBtu Propane/yr	PM10	0.00765	0.00765	See Process Sheet	0.184 lbs/day	0.034
HL	24 MMBtu Propane/day	8,760 MMBtu Propane/yr	PM10	0.00765	0.00765	See Process Sheet	0.184 lbs/day	0.034
HWW	24 MMBtu Propane/day	8,760 MMBtu Propane/yr	PM10	0.00765	0.00765	See Process Sheet	0.184 lbs/day	0.034
HTW	48 MMBtu Propane/day	17,520 MMBtu Propane/yr	PM10	0.00765	0.00765	See Process Sheet	0.367 lbs/day	0.067
HMO	24 MMBtu Propane/day	8,760 MMBtu Propane/yr	PM10	0.00765	0.00765	See Process Sheet	0.184 lbs/day	0.034
CEM1	80 ton Cement/day	7,053 ton Cement/yr	PM10	0.00034	0.00034	See Process Sheet	0.027 lbs/day	0.001
CEM2	80 ton Cement/day	7,053 ton Cement/yr	PM10	0.00034	0.00034	See Process Sheet	0.027 lbs/day	0.001
CEM3	1,125 ton Aggregate/day	134,000 ton Aggregate/yr	PM10	0.0033	0.0033	See Process Sheet	3.71 lbs/day	0.221
CEM4	1,125 ton Aggregate/day	134,000 ton Aggregate/yr	PM10	0.0028	0.0028	See Process Sheet	3.15 lbs/day	0.188
CEM5	59 ton Cemented Rock Fill/day	7,053 ton Cemented Rock Fill/yr	PM10	0.0055	0.0055	See Process Sheet	0.33 lbs/day	0.019
Underground Drilling	1,400 ton ore/day	291,200 ton Ore/yr	PM10	0.00008	0.00008	See Mine Sheet, p. 3	0.112 lbs/day	0.012
Borrow Drilling	1,115 ton Borrow/day	289,800 ton Borrow/yr	PM10	0.0030	0.0030	See Mine Sheet, p. 3	3.38 lbs/day	0.439
Underground Blasting	1,400 ton ore/day	291,200 ton Ore/yr	PM10	0.00017	0.00017	See Mine Sheet, p. 4	0.244 lbs/day	0.025
Borrow Blasting	1,115 ton Borrow/day	289,800 ton Borrow/yr	PM10	0.00231	0.00023	See Mine Sheet, p. 4	2.574 lbs/day	0.033
Underground Hauling	385 VMT/day	80,073 VMT/yr	PM10	0.149	0.149	See Mine Sheet, pp. 5–7	58 lbs/day	6.0
Borrow Pit Hauling	63 VMT/day	13,072 VMT/yr	PM10	0.225	0.225	See Mine Sheet, pp. 5–7	14.2 lbs/day	1.47
Process Area Hauling	34 VMT/day	7,143 VMT/yr	PM10	0.225	0.225	See Mine Sheet, pp. 5–7	7.7 lbs/day	0.80
Underground Load/Unload	2,800 Ton material transferred/da	582,400 Ton material transferred/yr	PM10	0.00006	0.00006	See Mine Sheet, p. 8	0.162 lbs/day	0.017
Material Load / Unload	6,875 Ton material transferred/da	1,430,096 Ton material transferred/yr	PM10	0.00008	0.00008	See Mine Sheet, p. 8	0.52 lbs/day	0.054
Underground Mobile Tailpipe	385 VMT/day	80,073 VMT/yr	PM10	0.010	0.010	See Mine Sheet, pp. 10–1	3.75 lbs/day	0.390
Dozing	24 hr/day	2,760 hr/yr	PM10	0.42	0.75	See Mine Sheet, p. 16	10.0 lbs/day	1.04
Grading	87 VMT/day	18,174 VMT/yr	PM10	0.18	0.18	See Mine Sheet, p. 16	15.7 lbs/day	1.64
Water Truck Travel	33 VMT/day	8,701 VMT/yr	PM10	0.32	0.32	See Mine Sheet, p. 17	11 lbs/day	1.4
Wind Erosion	2 Erodible Area (acre/day)	194 Erodible Area (acre/yr)	PM10	0.99	2.42	See Mine Sheet, pp. 18–2	1.81 lbs/day	0.235
TOTAL			**PM10**				**168 lbs/day**	**18.1**

1. Emissions Point	Production Rates: 2. Short-term (Specify units)	3. Annual (Specify Units)	4. Pollutant	Emissions Factors: 5. Short-term	6. Long-term	7. Reference(s)	Emissions: 8. Short-term (Specify units)	9. Annual (tons/year)
OC1	794 ton Ore/day	289,700 ton Ore/yr	PM2.5	0.000013	0.000013	See Process Sheet	0.010 lbs/day	0.002
OC2	794 ton Ore/day	289,700 ton Ore/yr	PM2.5	0.000013	0.000013	See Process Sheet	0.010 lbs/day	0.002
OC3	794 ton Ore/day	289,700 ton Ore/yr	PM2.5	0.0001	0.0001	See Process Sheet	0.079 lbs/day	0.014
OC4	794 ton Ore/day	289,700 ton Ore/yr	PM2.5	0.000013	0.000013	See Process Sheet	0.010 lbs/day	0.002
OC5	794 ton Ore/day	289,700 ton Ore/yr	PM2.5	0.000013	0.000013	See Process Sheet	0.010 lbs/day	0.002
OC6	794 ton Ore/day	289,700 ton Ore/yr	PM2.5	0.000013	0.000013	See Process Sheet	0.010 lbs/day	0.002
OC7	794 ton Ore/day	289,700 ton Ore/yr	PM2.5	0.00005	0.00005	See Process Sheet	0.04 lbs/day	0.007
OC8	794 ton Ore/day	289,700 ton Ore/yr	PM2.5	0.0001	0.0001	See Process Sheet	0.079 lbs/day	0.014
OC9	794 ton Ore/day	289,700 ton Ore/yr	PM2.5	0.000013	0.000013	See Process Sheet	0.010 lbs/day	0.002
OC10	794 ton Ore/day	289,700 ton Ore/yr	PM2.5	0.000013	0.000013	See Process Sheet	0.010 lbs/day	0.002
OC11	794 ton Ore/day	289,700 ton Ore/yr	PM2.5	0.000013	0.000013	See Process Sheet	0.010 lbs/day	0.002
OC12	794 ton Ore/day	289,700 ton Ore/yr	PM2.5	0.000013	0.000013	See Process Sheet	0.010 lbs/day	0.002
OC13	794 ton Ore/day	289,700 ton Ore/yr	PM2.5	0.000013	0.000013	See Process Sheet	0.010 lbs/day	0.002
BC1	1,115 ton Borrow/day	289,800 ton Borrow/yr	PM2.5	0.00017	0.00017	See Process Sheet	0.189 lbs/day	0.025
BC2	1,115 ton Borrow/day	289,800 ton Borrow/yr	PM2.5	0.00017	0.00017	See Process Sheet	0.189 lbs/day	0.025
BC3	1,115 ton Borrow/day	289,800 ton Borrow/yr	PM2.5	0.00036	0.00036	See Process Sheet	0.40 lbs/day	0.052
BC4	1,115 ton Borrow/day	289,800 ton Borrow/yr	PM2.5	0.00017	0.00017	See Process Sheet	0.189 lbs/day	0.025
BC5	1,115 ton Borrow/day	289,800 ton Borrow/yr	PM2.5	0.00017	0.00017	See Process Sheet	0.189 lbs/day	0.025
BC6	1,115 ton Borrow/day	289,800 ton Borrow/yr	PM2.5	0.00017	0.00017	See Process Sheet	0.189 lbs/day	0.025
BC7	1,115 ton Borrow/day	289,800 ton Borrow/yr	PM2.5	0.00132	0.00132	See Process Sheet	1.47 lbs/day	0.191
BC8	1,115 ton Borrow/day	289,800 ton Borrow/yr	PM2.5	0.00036	0.00036	See Process Sheet	0.40 lbs/day	0.052
BC9	1,115 ton Borrow/day	289,800 ton Borrow/yr	PM2.5	0.00017	0.00017	See Process Sheet	0.189 lbs/day	0.025
BC10	1,115 ton Borrow/day	289,800 ton Borrow/yr	PM2.5	0.00017	0.00017	See Process Sheet	0.189 lbs/day	0.025
LS1	55 ton Lime/day	292 ton Lime/yr	PM2.5	0.00005	0.00005	See Process Sheet	0.003 lbs/day	7.3E-06
LS2	0.8 ton Lime/day	292 ton Lime/yr	PM2.5	0.0004	0.0004	See Process Sheet	0.000 lbs/day	5.8E-05
CKD	4.8 ton Carbon/day	1,752 ton Carbon/yr	PM2.5	0.3	0.3	See Process Sheet	1.44 lbs/day	0.263
CKB	40.8 MMBtu Propane/day	14,892 MMBtu Propane/yr	PM2.5	0.00765	0.00765	See Process Sheet	0.312 lbs/day	0.057
MF	24 hours per day	960 hours per year	PM2.5	0.12	0.12	See Process Sheet	2.88 lbs/day	0.058
LABSP	6 ton Samples/day	2,190 ton Samples/yr	PM2.5	0.00	0.00	See Process Sheet	0.004 lbs/day	0.001
LABFA	0.025 ton Samples/day	9 ton Samples/yr	PM2.5	20	20	See Process Sheet	0.500 lbs/day	0.091
EDG1	110 kW Diesel/day	40,000 kW Diesel/yr	PM2.5	0.00044	0.00044	See Process Sheet	0.049 lbs/day	0.009
HA	24 MMBtu Propane/day	8,760 MMBtu Propane/yr	PM2.5	0.00765	0.00765	See Process Sheet	0.184 lbs/day	0.034
HPO	24 MMBtu Propane/day	8,760 MMBtu Propane/yr	PM2.5	0.00765	0.00765	See Process Sheet	0.184 lbs/day	0.034
HL	24 MMBtu Propane/day	8,760 MMBtu Propane/yr	PM2.5	0.00765	0.00765	See Process Sheet	0.184 lbs/day	0.034
HWW	24 MMBtu Propane/day	8,760 MMBtu Propane/yr	PM2.5	0.00765	0.00765	See Process Sheet	0.184 lbs/day	0.034
HTW	48 MMBtu Propane/day	17,520 MMBtu Propane/yr	PM2.5	0.00765	0.00765	See Process Sheet	0.367 lbs/day	0.067
HMO	24 MMBtu Propane/day	8,760 MMBtu Propane/yr	PM2.5	0.00765	0.00765	See Process Sheet	0.184 lbs/day	0.034
CEM1	80 ton Cement/day	7,053 ton Cement/yr	PM2.5	0.00005	0.00005	See Process Sheet	0.004 lbs/day	0.000
CEM2	80 ton Cement/day	7,053 ton Cement/yr	PM2.5	0.00005	0.00005	See Process Sheet	0.004 lbs/day	0.000
CEM3	1,125 ton Aggregate/day	134,000 ton Aggregate/yr	PM2.5	0.0005	0.0005	See Process Sheet	0.56 lbs/day	0.034
CEM4	1,125 ton Aggregate/day	134,000 ton Aggregate/yr	PM2.5	0.0004	0.0004	See Process Sheet	0.45 lbs/day	0.027
CEM5	59.4 ton Cemented Rock Fill/day	7,053 ton Cemented Rock Fill/yr	PM2.5	0.0008	0.0008	See Process Sheet	0.05 lbs/day	0.003
Underground Drilling	1,400 ton ore/day	291,200 ton Ore/yr	PM2.5	0.00001	0.00001	See Mine Sheet, p. 3	0.017 lbs/day	0.002
Borrow Drilling	1,115 ton Borrow/day	289,800 ton Borrow/yr	PM2.5	0.0002	0.0002	See Mine Sheet, p. 3	0.195 lbs/day	0.025
Underground Blasting	1,400 ton ore/day	291,200 ton Ore/yr	PM2.5	0.00001	0.00001	See Mine Sheet, p. 4	0.014 lbs/day	0.001
Borrow Blasting	1,115 ton Borrow/day	289,800 ton Borrow/yr	PM2.5	0.00013	0.00001	See Mine Sheet, p. 4	0.148 lbs/day	0.002
Underground Hauling	385 VMT/day	80,073 VMT/yr	PM2.5	0.015	0.015	See Mine Sheet, pp. 5–7	6 lbs/day	0.6
Borrow Pit Hauling	63 VMT/day	13,072 VMT/yr	PM2.5	0.023	0.023	See Mine Sheet, pp. 5–7	1.4 lbs/day	0.15
Process Area Hauling	34 VMT/day	7,143 VMT/yr	PM2.5	0.023	0.023	See Mine Sheet, pp. 5–7	0.8 lbs/day	0.08
Underground Load/Unload	2,800 Ton material transferred/day	582,400 Ton material transferred/yr	PM2.5	0.00001	0.00001	See Mine Sheet, p. 8	0.025 lbs/day	0.003
Material Load / Unload	6,875 Ton material transferred/day	1,430,096 Ton material transferred/yr	PM2.5	0.00001	0.00001	See Mine Sheet, p. 8	0.08 lbs/day	0.008
Underground Mobile Tailpipes	385 VMT/day	80,073 VMT/yr	PM2.5	0.006	0.006	See Mine Sheet, pp. 10–14	2.40 lbs/day	0.249
Dozing	24 hr/day	2,760 hr/yr	PM2.5	0.23	0.41	See Mine Sheet, p. 16	5.5 lbs/day	0.57
Grading	87 VMT/day	18,174 VMT/yr	PM2.5	0.02	0.02	See Mine Sheet, p. 16	1.6 lbs/day	0.17
Water Truck Travel	33 VMT/day	8,701 VMT/yr	PM2.5	0.03	0.03	See Mine Sheet, p. 17	1.07 lbs/day	0.139
Wind Erosion	2 Erodible Area (acre/day)	194 Erodible Area (acre/yr)	PM2.5	0.15	0.36	See Mine Sheet, pp. 18–26	0.271 lbs/day	0.035
TOTAL			**PM2.5**				**31 lbs/day**	**3.3**

1. Emissions Point	Production Rates		4. Pollutant	Emissions Factors			Emissions	
	2. Short-term (Specify units)	3. Annual (Specify Units)		5. Short-term	6. Long-term	7. Reference(s)	8. Short-term (Specify units)	9. Annual (tons/year)
CKD	0.2 ton Carbon/hr	1,752 ton Carbon/yr	CO	5.25	5.25	See Process Sheet	1.05 lbs/hr	4.599
CKB	1.7 MMBtu Propane/hr	14,892 MMBtu Propane/yr	CO	0.08197	0.08197	See Process Sheet	0.14 lbs/hr	0.610
EDG1	400.0 kW Diesel/hr	40,000 kW Diesel/yr	CO	0.00772	0.00772	See Process Sheet	3.09 lbs/hr	0.154
HA	1.0 MMBtu Propane/hr	8,760 MMBtu Propane/yr	CO	0.08197	0.08197	See Process Sheet	0.08 lbs/hr	0.359
HPO	1.0 MMBtu Propane/hr	8,760 MMBtu Propane/yr	CO	0.08197	0.08197	See Process Sheet	0.08 lbs/hr	0.359
HL	1.0 MMBtu Propane/hr	8,760 MMBtu Propane/yr	CO	0.08197	0.08197	See Process Sheet	0.08 lbs/hr	0.359
HWW	1.0 MMBtu Propane/hr	8,760 MMBtu Propane/yr	CO	0.08197	0.08197	See Process Sheet	0.08 lbs/hr	0.359
HTW	2.0 MMBtu Propane/hr	17,520 MMBtu Propane/yr	CO	0.08197	0.08197	See Process Sheet	0.16 lbs/hr	0.718
HMO	1.0 MMBtu Propane/hr	8,760 MMBtu Propane/yr	CO	0.08197	0.08197	See Process Sheet	0.08 lbs/hr	0.359
Underground Blasting	58 ton ore/hr	291,200 ton Ore/yr	CO	1.41831	0.05910	See Mine Sheet, p. 4	82.7 lbs/hr	8.604
Borrow Blasting	93 ton Borrow/hr	289,800 ton Borrow/yr	CO	1.89348	0.01578	See Mine Sheet, p. 4	176 lbs/hr	2.286
Underground Mobile Tailpipe	13 VMT/hr	80,073 VMT/yr	CO	0.499	0.399	See Mine Sheet, pp. 10–14	6.41 lbs/hr	15.987
TOTAL			**CO**				**270 lbs/hr**	**34.8**
CKB	1.7 MMBtu Propane/hr	14,892 MMBtu Propane/yr	NOX	0.142	0.142	See Process Sheet	0.242 lbs/hr	1.058
EDG1	400 kW Diesel/hr	40,000 kW Diesel/yr	NOX	0.0141	0.0141	See Process Sheet	5.644 lbs/hr	0.282
HA	1 MMBtu Propane/hr	8,760 MMBtu Propane/yr	NOX	0.142	0.142	See Process Sheet	0.142 lbs/hr	0.622
HPO	1 MMBtu Propane/hr	8,760 MMBtu Propane/yr	NOX	0.142	0.142	See Process Sheet	0.142 lbs/hr	0.622
HL	1 MMBtu Propane/hr	8,760 MMBtu Propane/yr	NOX	0.142	0.142	See Process Sheet	0.142 lbs/hr	0.622
HWW	1 MMBtu Propane/hr	8,760 MMBtu Propane/yr	NOX	0.142	0.142	See Process Sheet	0.142 lbs/hr	0.622
HTW	2 MMBtu Propane/hr	17,520 MMBtu Propane/yr	NOX	0.142	0.142	See Process Sheet	0.284 lbs/hr	1.245
HMO	1 MMBtu Propane/hr	8,760 MMBtu Propane/yr	NOX	0.142	0.142	See Process Sheet	0.142 lbs/hr	0.622
Underground Blasting	58 ton ore/hr	291,200 ton Ore/yr	NOX	0.26858	0.01119	See Mine Sheet, p. 4	15.7 lbs/hr	1.629
Borrow Blasting	93 ton Borrow/hr	289,800 ton Borrow/yr	NOX	0.05087	0.00042	See Mine Sheet, p. 4	4.73 lbs/hr	0.061
Underground Mobile Tailpipe	16 VMT/hr	80,073 VMT/yr	NOX	0.106	0.106	See Mine Sheet, pp. 10–14	1.70 lbs/hr	4.231
TOTAL			**NOX**				**29 lbs/hr**	**11.6**
CKB	1.7 MMBtu Propane/hr	14,892 MMBtu Propane/yr	SO2	0.01738	0.01738	See Process Sheet	0.030 lbs/hr	0.129
EDG1	400.0 kW Diesel/hr	40,000 kW Diesel/yr	SO2	0.00001	0.00001	See Process Sheet	0.006 lbs/hr	0.000
HA	1.0 MMBtu Propane/hr	8,760 MMBtu Propane/yr	SO2	0.01738	0.01738	See Process Sheet	0.017 lbs/hr	0.076
HPO	1.0 MMBtu Propane/hr	8,760 MMBtu Propane/yr	SO2	0.01738	0.01738	See Process Sheet	0.017 lbs/hr	0.076
HL	1.0 MMBtu Propane/hr	8,760 MMBtu Propane/yr	SO2	0.01738	0.01738	See Process Sheet	0.017 lbs/hr	0.076
HWW	1.0 MMBtu Propane/hr	8,760 MMBtu Propane/yr	SO2	0.01738	0.01738	See Process Sheet	0.017 lbs/hr	0.076
HTW	2.0 MMBtu Propane/hr	17,520 MMBtu Propane/yr	SO2	0.01738	0.01738	See Process Sheet	0.035 lbs/hr	0.152
HMO	1.0 MMBtu Propane/hr	8,760 MMBtu Propane/yr	SO2	0.01738	0.01738	See Process Sheet	0.017 lbs/hr	0.076
Underground Blasting	58 ton ore/hr	291,200 ton Ore/yr	SO2	0.00E+00	0.00E+00	See Mine Sheet, p. 4	0.00E+00 lbs/hr	0.00E+00
Borrow Blasting	93 ton Borrow/hr	289,800 ton Borrow/yr	SO2	1.02E-04	8.48E-07	See Mine Sheet, p. 4	9.45E-03 lbs/hr	1.23E-04
Underground Mobile Tailpipe	16 VMT/hr	80,073 VMT/yr	SO2	0.001	0.001	See Mine Sheet, pp. 10–14	0.01 lbs/hr	0.030
TOTAL			**SO2**				**0.18 lbs/hr**	**0.7**
CKB	40.8 MMBtu Propane/day	14,892 MMBtu Propane/yr	VOC	0.0087	0.0087	See Process Sheet	0.357 lbs/day	0.065
EDG1	110 kW Diesel/day	40,000 kW Diesel/yr	VOC	0.0029	0.0029	See Process Sheet	0.315 lbs/day	0.057
HA	24 MMBtu Propane/day	8,760 MMBtu Propane/yr	VOC	0.0087	0.0087	See Process Sheet	0.210 lbs/day	0.038
HPO	24 MMBtu Propane/day	8,760 MMBtu Propane/yr	VOC	0.0087	0.0087	See Process Sheet	0.210 lbs/day	0.038
HL	24 MMBtu Propane/day	8,760 MMBtu Propane/yr	VOC	0.0087	0.0087	See Process Sheet	0.210 lbs/day	0.038
HWW	24 MMBtu Propane/day	8,760 MMBtu Propane/yr	VOC	0.0087	0.0087	See Process Sheet	0.210 lbs/day	0.038
HTW	48 MMBtu Propane/day	17,520 MMBtu Propane/yr	VOC	0.0087	0.0087	See Process Sheet	0.420 lbs/day	0.077
HMO	24 MMBtu Propane/day	8,760 MMBtu Propane/yr	VOC	0.0087	0.0087	See Process Sheet	0.210 lbs/day	0.038
TG1	24 hours/day	8,760 hours/year	VOC	0.0454	0.0454	See Process Sheet	1.09 lbs/day	0.199
TD1	24 hours/day	8,760 hours/year	VOC	4.30E-04	4.30E-04	See Process Sheet	0.01 lbs/day	0.002
TD2	24 hours/day	8,760 hours/year	VOC	5.05E-05	5.05E-05	See Process Sheet	1.2E-03 lbs/day	2.2E-04
Underground Mobile Tailpipe	385 VMT/day	80,073 VMT/yr	VOC	0.028	0.028	See Mine Sheet, pp. 10–14	10.95 lbs/day	1.139
TOTAL			**VOC**				**14 lbs/day**	**1.7**

PLANT SITE EMISSIONS DETAIL SHEET **FORM AQ402**

CURRENT/FUTURE OPERATIONS **ANSWER SHEET**

Facility Name: Grassy Mountain Mine Permit Number: N/A

Table 2

1. Device/process ID	2. PM_{10} PSEL (tons/year)	3. $PM_{2.5}$ fraction (f)	4. Reference	5. $PM_{2.5}$ PSEL (tons/yr)
See attached Table				
TOTAL	0			0

1. Device/process ID	2. PM_{10} PSEL (tons/year)	3. $PM_{2.5}$ fraction (f)	4. Reference	5. $PM_{2.5}$ PSEL (tons/yr)
BC - Borrow Crusher	3.07	0.152	*See Process Sheet*	0.468
All Other Process Sources	1.48	0.561	*See Process Sheet*	0.831
UG - Underground Activity	8.05	0.184	*See Mining Activity Emissions Sheet*	1.48
HR - Aboveground Haul Road	4.23	0.159	*See Mining Activity Emissions Sheet*	0.674
All Other Mine Activities	1.81	0.220	*See Mining Activity Emissions Sheet*	0.400
TOTAL	**19**			**4**

State of Oregon Department of Environmental Quality

HAZARDOUS AIR POLLUTANT (HAP) **FORM AQ403**

EMISSIONS DETAIL SHEET **ANSWER SHEET**

Facility Name: Grassy Mountain Mine Permit Number: N/A

Emissions Data

1. Emissions Point	2. Annual Production Rate (specify units)	3. Pollutant	4. Emission Factor	5. EF reference	6. Annual Emissions (tons/yr)
See Form AQ405 for complete HAPs inventory.					

Applications for Standard ACDPs must also include the most recent Toxics Release Inventory report, if applicable (see instructions).

State of Oregon Department of Environmental Quality

Facility name: Grassy Mountain Mine Permit Number: N/A

Indicate which of the following categorically insignificant activities are present at the facility by placing an "X" in the "Yes" or "No" column.

Yes	No	Type of activity **Categorically Insignificant Activities**
		Constituents of a chemical mixture present at less than 1 percent by weight of any chemical or compound regulated under divisions 200 through 268 excluding divisions 248 and 262 of this chapter, or less than 0.1 percent by weight of any carcinogen listed in the U.S. Department of Health and Human Service's Annual Report on Carcinogens when usage of the chemical mixture is less than 100,000 pounds/year
✓		Evaporative and tail pipe emissions from on-site motor vehicle operation
✓		Distillate oil, kerosene, gasoline, natural gas or propane burning equipment, provided the aggregate expected actual emissions of the equipment identified as categorically insignificant do not exceed the de minimis level for any regulated pollutant, based on the expected maximum annual operation of the equipment. If a source's expected emissions from all such equipment exceed the de minimis levels, then the source may identify a subgroup of such equipment as categorically insignificant with the remainder not categorically insignificant. The following equipment may never be included as categorically insignificant: A. Any individual distillate oil, kerosene or gasoline burning equipment with a rating greater than 0.4 million Btu/hour; B. Any individual natural gas or propane burning equipment with a rating greater than 2.0 million Btu/hour
		Distillate oil, kerosene, gasoline, natural gas or propane burning equipment brought on site for six months or less for maintenance, construction or similar purposes, such as but not limited to generators, pumps, hot water pressure washers and space heaters, provided that any such equipment that performs the same function as the permanent equipment, must be operated within the source's existing PSEL
		Office activities
		Food service activities
		Janitorial activities
		Personal care activities
		Grounds keeping activities, including, but not limited to building painting and road and parking lot maintenance
		On-site laundry activities
		On-site recreation facilities
		Instrument calibration
✓		Maintenance and repair shop
		Automotive repair shops or storage garages;
✓		Air cooling or ventilating equipment not designed to remove air contaminants generated by or released from associated equipment
		Refrigeration systems with less than 50 pounds of charge of ozone depleting substances regulated under Title VI, including pressure tanks used in refrigeration systems but excluding any combustion equipment associated with such systems
✓		Bench scale laboratory equipment and laboratory equipment used exclusively for chemical and physical analysis, including associated vacuum producing devices but excluding research and development facilities

Yes	No	Type of activity
		Temporary construction activities
✓		Warehouse activities
		Accidental fires
		Air vents from air compressors
		Air purification systems
		Continuous emissions monitoring vent lines
		Demineralized water tanks
		Pre-treatment of municipal water, including use of deionized water purification systems
		Electrical charging stations
		Fire brigade training
		Instrument air dryers and distribution
		Process raw water filtration systems
		Pharmaceutical packaging
		Fire suppression
		Blueprint making
✓		Routine maintenance, repair, and replacement such as anticipated activities most often associated with and performed during regularly scheduled equipment outages to maintain a plant and its equipment in good operating condition, including but not limited to steam cleaning, abrasive use, and woodworking
		Electric motors
		Storage tanks, reservoirs, transfer and lubricating equipment used for ASTM grade distillate or residual fuels, lubricants, and hydraulic fluids
✓		On-site storage tanks not subject to any New Source Performance Standard (NSPS), including underground storage tanks (UST), storing gasoline or diesel used exclusively for fueling of the facility's fleet of vehicles
✓		Natural gas, propane, and liquefied petroleum gas (LPG) storage tanks and transfer equipment
		Pressurized tanks containing gaseous compounds
		Vacuum sheet stacker vents
		Emissions from wastewater discharges to publicly owned treatment works (POTW) provided the source is authorized to discharge to the POTW, not including on-site wastewater treatment and/or holding facilities
		Log ponds
		Storm water settling basins
		Fire suppression and training
		Paved roads and paved parking lots within an urban growth boundary
✓		Hazardous air pollutant emissions in fugitive dust from paved and unpaved roads except for those sources that have processes or activities that contribute to the deposition and entrainment of hazardous air pollutants from surface soils
✓		Health, safety, and emergency response activities

Yes	No	Type of activity
✓		Emergency generators and pumps used only during loss of primary equipment or utility service due to circumstances beyond the reasonable control of the owner or operator, or to address a power emergency, provided that the aggregate horsepower rating of all stationary emergency generator and pump engines is not more than 3,000 horsepower. If the aggregate horsepower rating of all stationary emergency generator and pump engines is more than 3,000 horsepower, then no emergency generators and pumps at the source may be considered categorically insignificant
		Non-contact steam vents and leaks and safety and relief valves for boiler steam distribution systems
		Non-contact steam condensate flash tanks
		Non-contact steam vents on condensate receivers, deaerators and similar equipment
		Boiler blow down tanks
		Industrial cooling towers that do not use chromium-based water treatment chemicals
		Ash piles maintained in a wetted condition and associated handling systems and activities
		Uncontrolled oil/water separators in effluent treatment systems, excluding systems with a throughput of more than 400,000 gallons per year of effluent located at the following sources: A. Petroleum refineries; B. Sources that perform petroleum refining and re-refining of lubricating oils and greases including asphalt production by distillation and the reprocessing of oils and/or solvents for fuels; or C. Bulk gasoline plants, bulk gasoline terminals, and pipeline facilities
		Combustion source flame safety purging on startup
		Broke beaters, pulp and repulping tanks, stock chests and pulp handling equipment, excluding thickening equipment and repulpers
		Stock cleaning and pressurized pulp washing, excluding open stock washing systems
		White water storage tanks

AQ405CAO Form - Version 1.53

4/5/2019

Facility Information	
Facility Name	Grassy Mountain Mine
Facility Address	(T21S, R44E)
City	Malheur County
Zip Code	
Source Number (for existing sources)	
Facility Contact	Nancy Wolverson
Phone Number	(775) 625-3600

Emissions Unit Information			Stack/Fugitive Information		Activity Information								
Toxics Emissions Unit ID	Unit Description	Control Device[s]	Emission Type (e.g. Point or Fugitive)	Stack or Fugitive ID	Units (e.g. hours operation, tons material, gallons)	Description/Type	Annual - Chronic [units/year]			Max Daily - Acute [units/day]		
							Actual	Requested PTE	Capacity	Actual	Requested PTE	Capacity
OC	Ore crusher		Fugitive	OCF	tons PM from ore crushing		0.869		0.869	0.00238		0.00238
BC	Borrow crusher		Fugitive	BCF	tons PM from borrow crushing		8.23		8.23	0.0317		0.0317
CKB	Carbon Regeneration Kiln (Burners)		Point	RFS1	MMBtu		14,892		14,892	40.8		40.8
HA	Administration HVAC		Point	HVAC1	MMBtu		8,760		8,760	24		24
HPO	Plant Office and Dry HVAC		Point	HVAC2	MMBtu		8,760		8,760	24		24
HL	Laboratory HVAC		Point	HVAC3	MMBtu		8,760		8,760	24		24
HWW	Plant Workshop and Warehouse HVAC		Point	HVAC4	MMBtu		8,760		8,760	24		24
HTW	Truck Workshop and Warehouse HVAC		Point	HVAC5	MMBtu		17,520		17,520	48		48
HMO	Mine Office and Changehouse HVAC		Point	HVAC6	MMBtu		8,760		8,760	24		24
EDG1	Emergency Generator (Mfr. Yr. >2007; diesel)		Point	EDGS1	MMBtu		375		375	90.1		90.1
MR	Mercury Retort	CF2, CF3, BH1	Point	RFS2	tons material	Au concentrate	8		8	0.022		0.022
UFD	Underground Fugitive Dust - Ore handling		Point	MINE	tons PM from ore		0.109		0	0.00052		0.001
AFD	Fugitive Dust - Ore and backfill handling		Fugitive	FD	tons PM from ore		1.49		1	0.00574		0.006
TAILS	Tailings Storage Facility		Fugitive	TAIL1	Hours of operation		8,760		8,760	24		24
POND	Tailings Pipeline Reclaim Pond		Fugitive	TAIL2	Hours of operation		8,760		8,760	24		24
DETOX1	CN Detoxification Tank 1		Fugitive	DET1	Hours of operation		8,760		8,760	24		24
DETOX2	CN Detoxification Tank 2		Fugitive	DET2	Hours of operation		8,760		8,760	24		24
CILTANK1	CIL Tank 1		Fugitive	CIL1	Hours of operation		8,760		8,760	24		24
CILTANK2	CIL Tank 2		Fugitive	CIL2	Hours of operation		8,760		8,760	24		24
CILTANK3	CIL Tank 3		Fugitive	CIL3	Hours of operation		8,760		8,760	24		24
CILTANK4	CIL Tank 4		Fugitive	CIL4	Hours of operation		8,760		8,760	24		24
CILTANK5	CIL Tank 5		Fugitive	CIL5	Hours of operation		8,760		8,760	24		24
CILTANK6	CIL Tank 6		Fugitive	CIL6	Hours of operation		8,760		8,760	24		24
CILTANK7	CIL Tank 7		Fugitive	CIL7	Hours of operation		8,760		8,760	24		24

								Calculated Emissions					
Toxic Emissions Unit ID	Pollutant Information		Control Efficiency	Emission Factor Information				Annual - Chronic [lb/yr]			Max Daily - Acute [lb/day]		
				EF Values		Units	Reference/Notes						
	CAS	Chemical Name		Annual Chronic	Max Daily - Acute			Actual	Requested PTE	Capacity	Actual	Requested PTE	Capacity
OC	106-99-0	1,3-Butadiene				lb/ton	See Process HAP and GHG Emissions Sheet, p. 5						
OC	75-07-0	Acetaldehyde				lb/ton	See Process HAP and GHG Emissions Sheet, p. 5						
OC	107-02-8	Acrolein				lb/ton	See Process HAP and GHG Emissions Sheet, p. 5						
OC	7440-36-0	Antimony and compounds		7.40E-02	7.40E-02	lb/ton	See Process HAP and GHG Emissions Sheet, p. 5	6.43E-02		6.43E-02	1.76E-04		1.76E-04
OC	7440-38-2	Arsenic and compounds		3.04E-01	3.04E-01	lb/ton	See Process HAP and GHG Emissions Sheet, p. 5	2.64E-01		2.64E-01	7.24E-04		7.24E-04
OC	7440-39-3	Barium and compounds				lb/ton	See Process HAP and GHG Emissions Sheet, p. 5						
OC	71-43-2	Benzene				lb/ton	See Process HAP and GHG Emissions Sheet, p. 5						
OC	7440-41-7	Beryllium and compounds		2.20E-03	2.20E-03	lb/ton	See Process HAP and GHG Emissions Sheet, p. 5	1.91E-03		1.91E-03	5.24E-06		5.24E-06
OC	7440-43-9	Cadmium and compounds		4.00E-04	4.00E-04	lb/ton	See Process HAP and GHG Emissions Sheet, p. 5	3.48E-04		3.48E-04	9.52E-07		9.52E-07
OC	18540-29-9	Chromium VI, chromate, and dichromate particulate		5.40E-02	5.40E-02	lb/ton	See Process HAP and GHG Emissions Sheet, p. 5	4.69E-02		4.69E-02	1.29E-04		1.29E-04
OC	7440-48-4	Cobalt and compounds		3.00E-03	3.00E-03	lb/ton	See Process HAP and GHG Emissions Sheet, p. 5	2.61E-03		2.61E-03	7.14E-06		7.14E-06
OC	7440-50-8	Copper and compounds				lb/ton	See Process HAP and GHG Emissions Sheet, p. 5						
OC	74-90-8	Cyanide, Hydrogen				lb/ton	See Process HAP and GHG Emissions Sheet, p. 5						
OC	106-46-7	p-Dichlorobenzene				lb/ton	See Process HAP and GHG Emissions Sheet, p. 5						
OC		Diesel Particulate Matter				lb/ton	See Process HAP and GHG Emissions Sheet, p. 5						
OC	100-41-4	Ethyl benzene				lb/ton	See Process HAP and GHG Emissions Sheet, p. 5						
OC	50-00-0	Formaldehyde				lb/ton	See Process HAP and GHG Emissions Sheet, p. 5						
OC	110-54-3	Hexane				lb/ton	See Process HAP and GHG Emissions Sheet, p. 5						
OC	7439-92-1	Lead and compounds		1.40E-02	1.40E-02	lb/ton	See Process HAP and GHG Emissions Sheet, p. 5	1.22E-02		1.22E-02	3.33E-05		3.33E-05
OC	7439-96-5	Manganese and compounds		1.62E-01	1.62E-01	lb/ton	See Process HAP and GHG Emissions Sheet, p. 5	1.41E-01		1.41E-01	3.86E-04		3.86E-04
OC	7439-97-6	Mercury and compounds		4.40E-03	4.40E-03	lb/ton	See Process HAP and GHG Emissions Sheet, p. 5	3.82E-03		3.82E-03	1.05E-05		1.05E-05
OC	91-20-3	Naphthalene				lb/ton	See Process HAP and GHG Emissions Sheet, p. 5						
OC	7440-02-0	Nickel and compounds		9.60E-03	9.60E-03	lb/ton	See Process HAP and GHG Emissions Sheet, p. 5	8.34E-03		8.34E-03	2.29E-05		2.29E-05
OC		PAHs				lb/ton	See Process HAP and GHG Emissions Sheet, p. 5						
OC	115-07-1	Propylene				lb/ton	See Process HAP and GHG Emissions Sheet, p. 5						
OC	7782-49-2	Selenium and compounds				lb/ton	See Process HAP and GHG Emissions Sheet, p. 5						
OC	108-88-3	Toluene				lb/ton	See Process HAP and GHG Emissions Sheet, p. 5						
OC	7440-62-2	Vanadium (fume or dust)				lb/ton	See Process HAP and GHG Emissions Sheet, p. 5						
OC	1330-20-7	Xylene (mixture)				lb/ton	See Process HAP and GHG Emissions Sheet, p. 5						
OC	7440-66-6	Zinc and compounds				lb/ton	See Process HAP and GHG Emissions Sheet, p. 5						
BC	106-99-0	1,3-Butadiene				lb/ton	See Process HAP and GHG Emissions Sheet, p. 5						
BC	75-07-0	Acetaldehyde				lb/ton	See Process HAP and GHG Emissions Sheet, p. 5						
BC	107-02-8	Acrolein				lb/ton	See Process HAP and GHG Emissions Sheet, p. 5						
BC	7440-36-0	Antimony and compounds		3.20E-02	3.20E-02	lb/ton	See Process HAP and GHG Emissions Sheet, p. 5	2.63E-01		2.63E-01	1.01E-03		1.01E-03
BC	7440-38-2	Arsenic and compounds		3.08E-01	3.08E-01	lb/ton	See Process HAP and GHG Emissions Sheet, p. 5	2.53E+00		2.53E+00	9.75E-03		9.75E-03
BC	7440-39-3	Barium and compounds				lb/ton	See Process HAP and GHG Emissions Sheet, p. 5						
BC	71-43-2	Benzene				lb/ton	See Process HAP and GHG Emissions Sheet, p. 5						
BC	7440-41-7	Beryllium and compounds		6.20E-04	6.20E-04	lb/ton	See Process HAP and GHG Emissions Sheet, p. 5	5.10E-03		5.10E-03	1.96E-05		1.96E-05
BC	7440-43-9	Cadmium and compounds		4.80E-04	4.80E-04	lb/ton	See Process HAP and GHG Emissions Sheet, p. 5	3.95E-03		3.95E-03	1.52E-05		1.52E-05
BC	18540-29-9	Chromium VI, chromate, and dichromate particulate		2.40E-02	2.40E-02	lb/ton	See Process HAP and GHG Emissions Sheet, p. 5	1.98E-01		1.98E-01	7.60E-04		7.60E-04
BC	7440-48-4	Cobalt and compounds		4.00E-03	4.00E-03	lb/ton	See Process HAP and GHG Emissions Sheet, p. 5	3.29E-02		3.29E-02	1.27E-04		1.27E-04
BC	7440-50-8	Copper and compounds				lb/ton	See Process HAP and GHG Emissions Sheet, p. 5						
BC	74-90-8	Cyanide, Hydrogen				lb/ton	See Process HAP and GHG Emissions Sheet, p. 5						
BC	106-46-7	p-Dichlorobenzene				lb/ton	See Process HAP and GHG Emissions Sheet, p. 5						
BC		Diesel Particulate Matter				lb/ton	See Process HAP and GHG Emissions Sheet, p. 5						
BC	100-41-4	Ethyl benzene				lb/ton	See Process HAP and GHG Emissions Sheet, p. 5						
BC	50-00-0	Formaldehyde				lb/ton	See Process HAP and GHG Emissions Sheet, p. 5						
BC	110-54-3	Hexane				lb/ton	See Process HAP and GHG Emissions Sheet, p. 5						
BC	7439-92-1	Lead and compounds		1.00E-02	1.00E-02	lb/ton	See Process HAP and GHG Emissions Sheet, p. 5	8.23E-02		8.23E-02	3.17E-04		3.17E-04
BC	7439-96-5	Manganese and compounds		1.08E-01	1.08E-01	lb/ton	See Process HAP and GHG Emissions Sheet, p. 5	8.89E-01		8.89E-01	3.42E-03		3.42E-03
BC	7439-97-6	Mercury and compounds		5.00E-03	5.00E-03	lb/ton	See Process HAP and GHG Emissions Sheet, p. 5	4.12E-02		4.12E-02	1.58E-04		1.58E-04
BC	91-20-3	Naphthalene				lb/ton	See Process HAP and GHG Emissions Sheet, p. 5						
BC	7440-02-0	Nickel and compounds		6.00E-03	6.00E-03	lb/ton	See Process HAP and GHG Emissions Sheet, p. 5	4.94E-02		4.94E-02	1.90E-04		1.90E-04
BC		Polycyclic aromatic hydrocarbons (PAHs)				lb/ton	See Process HAP and GHG Emissions Sheet, p. 5						
BC	115-07-1	Propylene				lb/ton	See Process HAP and GHG Emissions Sheet, p. 5						
BC	7782-49-2	Selenium and compounds				lb/ton	See Process HAP and GHG Emissions Sheet, p. 5						
BC	108-88-3	Toluene				lb/ton	See Process HAP and GHG Emissions Sheet, p. 5						
BC	7440-62-2	Vanadium (fume or dust)				lb/ton	See Process HAP and GHG Emissions Sheet, p. 5						
BC	1330-20-7	Xylene (mixture)				lb/ton	See Process HAP and GHG Emissions Sheet, p. 5						
BC	7440-66-6	Zinc and compounds				lb/ton	See Process HAP and GHG Emissions Sheet, p. 5						
CKB	106-99-0	1,3-Butadiene				lb/MMBtu	See Process HAP and GHG Emissions Sheet, p. 2						
CKB	75-07-0	Acetaldehyde		7.26E-06	7.26E-06	lb/MMBtu	See Process HAP and GHG Emissions Sheet, p. 2	1.08E-01		1.08E-01	2.96E-04		2.96E-04
CKB	107-02-8	Acrolein		4.35E-06	4.35E-06	lb/MMBtu	See Process HAP and GHG Emissions Sheet, p. 2	6.48E-02		6.48E-02	1.78E-04		1.78E-04
CKB	7440-36-0	Antimony and compounds				lb/MMBtu	See Process HAP and GHG Emissions Sheet, p. 2						
CKB	7440-38-2	Arsenic and compounds		1.96E-07	1.96E-07	lb/MMBtu	See Process HAP and GHG Emissions Sheet, p. 2	2.92E-03		2.92E-03	8.00E-06		8.00E-06
CKB	7440-39-3	Barium and compounds		4.31E-06	4.31E-06	lb/MMBtu	See Process HAP and GHG Emissions Sheet, p. 2	6.42E-02		6.42E-02	1.76E-04		1.76E-04
CKB	71-43-2	Benzene		2.06E-06	2.06E-06	lb/MMBtu	See Process HAP and GHG Emissions Sheet, p. 2	3.07E-02		3.07E-02	8.40E-05		8.40E-05
CKB	7440-41-7	Beryllium and compounds		1.18E-08	1.18E-08	lb/MMBtu	See Process HAP and GHG Emissions Sheet, p. 2	1.75E-04		1.75E-04	4.80E-07		4.80E-07
CKB	7440-43-9	Cadmium and compounds		1.08E-06	1.08E-06	lb/MMBtu	See Process HAP and GHG Emissions Sheet, p. 2	1.61E-02		1.61E-02	4.40E-05		4.40E-05
CKB	18540-29-9	Chromium VI, chromate, and dichromate particulate		1.37E-06	1.37E-06	lb/MMBtu	See Process HAP and GHG Emissions Sheet, p. 2	2.04E-02		2.04E-02	5.60E-05		5.60E-05
CKB	7440-48-4	Cobalt and compounds		8.24E-08	8.24E-08	lb/MMBtu	See Process HAP and GHG Emissions Sheet, p. 2	1.23E-03		1.23E-03	3.36E-06		3.36E-06
CKB	7440-50-8	Copper and compounds		8.33E-07	8.33E-07	lb/MMBtu	See Process HAP and GHG Emissions Sheet, p. 2	1.24E-02		1.24E-02	3.40E-05		3.40E-05
CKB	74-90-8	Cyanide, Hydrogen				lb/MMBtu	See Process HAP and GHG Emissions Sheet, p. 2						
CKB	106-46-7	p-Dichlorobenzene		1.18E-06	1.18E-06	lb/MMBtu	See Process HAP and GHG Emissions Sheet, p. 2	1.75E-02		1.75E-02	4.80E-05		4.80E-05
CKB		Diesel Particulate Matter				lb/MMBtu	See Process HAP and GHG Emissions Sheet, p. 2						
CKB	100-41-4	Ethyl benzene		2.21E-06	2.21E-06	lb/MMBtu	See Process HAP and GHG Emissions Sheet, p. 2	3.29E-02		3.29E-02	9.00E-05		9.00E-05
CKB	50-00-0	Formaldehyde		7.35E-05	7.35E-05	lb/MMBtu	See Process HAP and GHG Emissions Sheet, p. 2	1.10E+00		1.10E+00	3.00E-03		3.00E-03
CKB	110-54-3	Hexane		1.76E-03	1.76E-03	lb/MMBtu	See Process HAP and GHG Emissions Sheet, p. 2	2.63E+01		2.63E+01	7.20E-02		7.20E-02
CKB	7439-92-1	Lead and compounds				lb/MMBtu	See Process HAP and GHG Emissions Sheet, p. 2						
CKB	7439-96-5	Manganese and compounds		3.73E-07	3.73E-07	lb/MMBtu	See Process HAP and GHG Emissions Sheet, p. 2	5.55E-03		5.55E-03	1.52E-05		1.52E-05
CKB	7439-97-6	Mercury and compounds		2.55E-07	2.55E-07	lb/MMBtu	See Process HAP and GHG Emissions Sheet, p. 2	3.80E-03		3.80E-03	1.04E-05		1.04E-05
CKB	91-20-3	Naphthalene		5.98E-07	5.98E-07	lb/MMBtu	See Process HAP and GHG Emissions Sheet, p. 2	8.91E-03		8.91E-03	2.44E-05		2.44E-05
CKB	7440-02-0	Nickel and compounds		2.06E-06	2.06E-06	lb/MMBtu	See Process HAP and GHG Emissions Sheet, p. 2	3.07E-02		3.07E-02	8.40E-05		8.40E-05
CKB		Polycyclic aromatic hydrocarbons (PAHs)		8.65E-08	8.65E-08	lb/MMBtu	See Process HAP and GHG Emissions Sheet, p. 2	1.29E-03		1.29E-03	3.53E-06		3.53E-06
CKB	115-07-1	Propylene		1.60E-04	1.60E-04	lb/MMBtu	See Process HAP and GHG Emissions Sheet, p. 2	2.38E+00		2.38E+00	6.52E-03		6.52E-03
CKB	7782-49-2	Selenium and compounds		2.35E-08	2.35E-08	lb/MMBtu	See Process HAP and GHG Emissions Sheet, p. 2	3.50E-04		3.50E-04	9.60E-07		9.60E-07
CKB	108-88-3	Toluene		3.33E-06	3.33E-06	lb/MMBtu	See Process HAP and GHG Emissions Sheet, p. 2	4.96E-02		4.96E-02	1.36E-04		1.36E-04
CKB	7440-62-2	Vanadium (fume or dust)		2.25E-06	2.25E-06	lb/MMBtu	See Process HAP and GHG Emissions Sheet, p. 2	3.36E-02		3.36E-02	9.20E-05		9.20E-05
CKB	1330-20-7	Xylene (mixture)		9.80E-06	9.80E-06	lb/MMBtu	See Process HAP and GHG Emissions Sheet, p. 2	1.46E-01		1.46E-01	4.00E-04		4.00E-04
CKB	7440-66-6	Zinc and compounds		2.84E-05	2.84E-05	lb/MMBtu	See Process HAP and GHG Emissions Sheet, p. 2	4.23E-01		4.23E-01	1.16E-03		1.16E-03

Toxic Emissions Unit ID	Pollutant Information		Control Efficiency	Emission Factor Information				Calculated Emissions					
				EF Values		Units	Reference/Notes	Annual - Chronic [lb/yr]			Max Daily - Acute [lb/day]		
	CAS	Chemical Name		Annual Chronic	Max Daily - Acute			Actual	Requested PTE	Capacity	Actual	Requested PTE	Capacity
HA	106-99-0	1,3-Butadiene				lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*						
HA	75-07-0	Acetaldehyde		7.26E-06	7.26E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	6.36E-02		6.36E-02	1.74E-04		1.74E-04
HA	107-02-8	Acrolein		4.35E-06	4.35E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	3.81E-02		3.81E-02	1.04E-04		1.04E-04
HA	7440-36-0	Antimony and compounds				lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*						
HA	7440-38-2	Arsenic and compounds		1.96E-07	1.96E-07	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.72E-03		1.72E-03	4.71E-06		4.71E-06
HA	7440-39-3	Barium and compounds		4.31E-06	4.31E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	3.78E-02		3.78E-02	1.04E-04		1.04E-04
HA	71-43-2	Benzene		2.06E-06	2.06E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.80E-02		1.80E-02	4.94E-05		4.94E-05
HA	7440-41-7	Beryllium and compounds		1.18E-08	1.18E-08	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.03E-04		1.03E-04	2.82E-07		2.82E-07
HA	7440-43-9	Cadmium and compounds		1.08E-06	1.08E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	9.45E-03		9.45E-03	2.59E-05		2.59E-05
HA	18540-29-9	Chromium VI, chromate, and dichromate particulate		1.37E-06	1.37E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.20E-02		1.20E-02	3.29E-05		3.29E-05
HA	7440-48-4	Cobalt and compounds		8.24E-08	8.24E-08	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	7.21E-04		7.21E-04	1.98E-06		1.98E-06
HA	7440-50-8	Copper and compounds		8.33E-07	8.33E-07	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	7.30E-03		7.30E-03	2.00E-05		2.00E-05
HA	74-90-8	Cyanide, Hydrogen				lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*						
HA	106-46-7	p-Dichlorobenzene		1.18E-06	1.18E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.03E-02		1.03E-02	2.82E-05		2.82E-05
HA		Diesel Particulate Matter				lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*						
HA	100-41-4	Ethyl benzene		2.21E-06	2.21E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.93E-02		1.93E-02	5.29E-05		5.29E-05
HA	50-00-0	Formaldehyde		7.35E-05	7.35E-05	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	6.44E-01		6.44E-01	1.76E-03		1.76E-03
HA	110-54-3	Hexane		1.76E-03	1.76E-03	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.55E+01		1.55E+01	4.24E-02		4.24E-02
HA	7439-92-1	Lead and compounds				lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*						
HA	7439-96-5	Manganese and compounds		3.73E-07	3.73E-07	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	3.26E-03		3.26E-03	8.94E-06		8.94E-06
HA	7439-97-6	Mercury and compounds		2.55E-07	2.55E-07	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	2.23E-03		2.23E-03	6.12E-06		6.12E-06
HA	91-20-3	Naphthalene		5.98E-07	5.98E-07	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	5.24E-03		5.24E-03	1.44E-05		1.44E-05
HA	7440-02-0	Nickel and compounds		2.06E-06	2.06E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.80E-02		1.80E-02	4.94E-05		4.94E-05
HA		Polycyclic aromatic hydrocarbons (PAHs)		8.65E-08	8.65E-08	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	7.57E-04		7.57E-04	2.08E-06		2.08E-06
HA	115-07-1	Propylene		1.60E-04	1.60E-04	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.40E+00		1.40E+00	3.84E-03		3.84E-03
HA	7782-49-2	Selenium and compounds		2.35E-08	2.35E-08	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	2.06E-04		2.06E-04	5.65E-07		5.65E-07
HA	108-88-3	Toluene		3.33E-06	3.33E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	2.92E-02		2.92E-02	8.00E-05		8.00E-05
HA	7440-62-2	Vanadium (fume or dust)		2.25E-06	2.25E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.98E-02		1.98E-02	5.41E-05		5.41E-05
HA	1330-20-7	Xylene (mixture)		9.80E-06	9.80E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	8.59E-02		8.59E-02	2.35E-04		2.35E-04
HA	7440-66-6	Zinc and compounds		2.84E-05	2.84E-05	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	2.49E-01		2.49E-01	6.82E-04		6.82E-04
HPO	106-99-0	1,3-Butadiene				lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*						
HPO	75-07-0	Acetaldehyde		7.26E-06	7.26E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	6.36E-02		6.36E-02	1.74E-04		1.74E-04
HPO	107-02-8	Acrolein		4.35E-06	4.35E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	3.81E-02		3.81E-02	1.04E-04		1.04E-04
HPO	7440-36-0	Antimony and compounds				lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*						
HPO	7440-38-2	Arsenic and compounds		1.96E-07	1.96E-07	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.72E-03		1.72E-03	4.71E-06		4.71E-06
HPO	7440-39-3	Barium and compounds		4.31E-06	4.31E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	3.78E-02		3.78E-02	1.04E-04		1.04E-04
HPO	71-43-2	Benzene		2.06E-06	2.06E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.80E-02		1.80E-02	4.94E-05		4.94E-05
HPO	7440-41-7	Beryllium and compounds		1.18E-08	1.18E-08	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.03E-04		1.03E-04	2.82E-07		2.82E-07
HPO	7440-43-9	Cadmium and compounds		1.08E-06	1.08E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	9.45E-03		9.45E-03	2.59E-05		2.59E-05
HPO	18540-29-9	Chromium VI, chromate, and dichromate particulate		1.37E-06	1.37E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.20E-02		1.20E-02	3.29E-05		3.29E-05
HPO	7440-48-4	Cobalt and compounds		8.24E-08	8.24E-08	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	7.21E-04		7.21E-04	1.98E-06		1.98E-06
HPO	7440-50-8	Copper and compounds		8.33E-07	8.33E-07	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	7.30E-03		7.30E-03	2.00E-05		2.00E-05
HPO	74-90-8	Cyanide, Hydrogen				lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*						
HPO	106-46-7	p-Dichlorobenzene		1.18E-06	1.18E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.03E-02		1.03E-02	2.82E-05		2.82E-05
HPO		Diesel Particulate Matter				lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*						
HPO	100-41-4	Ethyl benzene		2.21E-06	2.21E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.93E-02		1.93E-02	5.29E-05		5.29E-05
HPO	50-00-0	Formaldehyde		7.35E-05	7.35E-05	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	6.44E-01		6.44E-01	1.76E-03		1.76E-03
HPO	110-54-3	Hexane		1.76E-03	1.76E-03	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.55E+01		1.55E+01	4.24E-02		4.24E-02
HPO	7439-92-1	Lead and compounds				lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*						
HPO	7439-96-5	Manganese and compounds		3.73E-07	3.73E-07	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	3.26E-03		3.26E-03	8.94E-06		8.94E-06
HPO	7439-97-6	Mercury and compounds		2.55E-07	2.55E-07	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	2.23E-03		2.23E-03	6.12E-06		6.12E-06
HPO	91-20-3	Naphthalene		5.98E-07	5.98E-07	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	5.24E-03		5.24E-03	1.44E-05		1.44E-05
HPO	7440-02-0	Nickel and compounds		2.06E-06	2.06E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.80E-02		1.80E-02	4.94E-05		4.94E-05
HPO		Polycyclic aromatic hydrocarbons (PAHs)		8.65E-08	8.65E-08	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	7.57E-04		7.57E-04	2.08E-06		2.08E-06
HPO	115-07-1	Propylene		1.60E-04	1.60E-04	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.40E+00		1.40E+00	3.84E-03		3.84E-03
HPO	7782-49-2	Selenium and compounds		2.35E-08	2.35E-08	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	2.06E-04		2.06E-04	5.65E-07		5.65E-07
HPO	108-88-3	Toluene		3.33E-06	3.33E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	2.92E-02		2.92E-02	8.00E-05		8.00E-05
HPO	7440-62-2	Vanadium (fume or dust)		2.25E-06	2.25E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.98E-02		1.98E-02	5.41E-05		5.41E-05
HPO	1330-20-7	Xylene (mixture)		9.80E-06	9.80E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	8.59E-02		8.59E-02	2.35E-04		2.35E-04
HPO	7440-66-6	Zinc and compounds		2.84E-05	2.84E-05	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	2.49E-01		2.49E-01	6.82E-04		6.82E-04
HL	106-99-0	1,3-Butadiene				lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*						
HL	75-07-0	Acetaldehyde		7.26E-06	7.26E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	6.36E-02		6.36E-02	1.74E-04		1.74E-04
HL	107-02-8	Acrolein		4.35E-06	4.35E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	3.81E-02		3.81E-02	1.04E-04		1.04E-04
HL	7440-36-0	Antimony and compounds				lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*						
HL	7440-38-2	Arsenic and compounds		1.96E-07	1.96E-07	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.72E-03		1.72E-03	4.71E-06		4.71E-06
HL	7440-39-3	Barium and compounds		4.31E-06	4.31E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	3.78E-02		3.78E-02	1.04E-04		1.04E-04
HL	71-43-2	Benzene		2.06E-06	2.06E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.80E-02		1.80E-02	4.94E-05		4.94E-05
HL	7440-41-7	Beryllium and compounds		1.18E-08	1.18E-08	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.03E-04		1.03E-04	2.82E-07		2.82E-07
HL	7440-43-9	Cadmium and compounds		1.08E-06	1.08E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	9.45E-03		9.45E-03	2.59E-05		2.59E-05
HL	18540-29-9	Chromium VI, chromate, and dichromate particulate		1.37E-06	1.37E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.20E-02		1.20E-02	3.29E-05		3.29E-05
HL	7440-48-4	Cobalt and compounds		8.24E-08	8.24E-08	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	7.21E-04		7.21E-04	1.98E-06		1.98E-06
HL	7440-50-8	Copper and compounds		8.33E-07	8.33E-07	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	7.30E-03		7.30E-03	2.00E-05		2.00E-05
HL	74-90-8	Cyanide, Hydrogen				lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*						
HL	106-46-7	p-Dichlorobenzene		1.18E-06	1.18E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.03E-02		1.03E-02	2.82E-05		2.82E-05
HL		Diesel Particulate Matter				lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*						
HL	100-41-4	Ethyl benzene		2.21E-06	2.21E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.93E-02		1.93E-02	5.29E-05		5.29E-05
HL	50-00-0	Formaldehyde		7.35E-05	7.35E-05	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	6.44E-01		6.44E-01	1.76E-03		1.76E-03
HL	110-54-3	Hexane		1.76E-03	1.76E-03	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.55E+01		1.55E+01	4.24E-02		4.24E-02
HL	7439-92-1	Lead and compounds				lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*						
HL	7439-96-5	Manganese and compounds		3.73E-07	3.73E-07	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	3.26E-03		3.26E-03	8.94E-06		8.94E-06
HL	7439-97-6	Mercury and compounds		2.55E-07	2.55E-07	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	2.23E-03		2.23E-03	6.12E-06		6.12E-06
HL	91-20-3	Naphthalene		5.98E-07	5.98E-07	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	5.24E-03		5.24E-03	1.44E-05		1.44E-05
HL	7440-02-0	Nickel and compounds		2.06E-06	2.06E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.80E-02		1.80E-02	4.94E-05		4.94E-05
HL		Polycyclic aromatic hydrocarbons (PAHs)		8.65E-08	8.65E-08	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	7.57E-04		7.57E-04	2.08E-06		2.08E-06
HL	115-07-1	Propylene		1.60E-04	1.60E-04	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.40E+00		1.40E+00	3.84E-03		3.84E-03
HL	7782-49-2	Selenium and compounds		2.35E-08	2.35E-08	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	2.06E-04		2.06E-04	5.65E-07		5.65E-07
HL	108-88-3	Toluene		3.33E-06	3.33E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	2.92E-02		2.92E-02	8.00E-05		8.00E-05
HL	7440-62-2	Vanadium (fume or dust)		2.25E-06	2.25E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.98E-02		1.98E-02	5.41E-05		5.41E-05
HL	1330-20-7	Xylene (mixture)		9.80E-06	9.80E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	8.59E-02		8.59E-02	2.35E-04		2.35E-04
HL	7440-66-6	Zinc and compounds		2.84E-05	2.84E-05	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	2.49E-01		2.49E-01	6.82E-04		6.82E-04

Toxic Emissions Unit ID	Pollutant Information		Control Efficiency	Emission Factor Information				Calculated Emissions					
				EF Values		Units	Reference/Notes	Annual - Chronic [lb/yr]			Max Daily - Acute [lb/day]		
	CAS	Chemical Name		Annual Chronic	Max Daily - Acute			Actual	Requested PTE	Capacity	Actual	Requested PTE	Capacity
HWW	106-99-0	1,3-Butadiene				lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*						
HWW	75-07-0	Acetaldehyde		7.26E-06	7.26E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	6.36E-02		6.36E-02	1.74E-04		1.74E-04
HWW	107-02-8	Acrolein		4.35E-06	4.35E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	3.81E-02		3.81E-02	1.04E-04		1.04E-04
HWW	7440-36-0	Antimony and compounds				lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*						
HWW	7440-38-2	Arsenic and compounds		1.96E-07	1.96E-07	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.72E-03		1.72E-03	4.71E-06		4.71E-06
HWW	7440-39-3	Barium and compounds		4.31E-06	4.31E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	3.78E-02		3.78E-02	1.04E-04		1.04E-04
HWW	71-43-2	Benzene		2.06E-06	2.06E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.80E-02		1.80E-02	4.94E-05		4.94E-05
HWW	7440-41-7	Beryllium and compounds		1.18E-08	1.18E-08	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.03E-04		1.03E-04	2.82E-07		2.82E-07
HWW	7440-43-9	Cadmium and compounds		1.08E-06	1.08E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	9.45E-03		9.45E-03	2.59E-05		2.59E-05
HWW	18540-29-9	Chromium VI, chromate, and dichromate particulate		1.37E-06	1.37E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.20E-02		1.20E-02	3.29E-05		3.29E-05
HWW	7440-48-4	Cobalt and compounds		8.24E-08	8.24E-08	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	7.21E-04		7.21E-04	1.98E-06		1.98E-06
HWW	7440-50-8	Copper and compounds		8.33E-07	8.33E-07	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	7.30E-03		7.30E-03	2.00E-05		2.00E-05
HWW	74-90-8	Cyanide, Hydrogen				lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*						
HWW	106-46-7	p-Dichlorobenzene		1.18E-06	1.18E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.03E-02		1.03E-02	2.82E-05		2.82E-05
HWW		Diesel Particulate Matter				lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*						
HWW	100-41-4	Ethyl benzene		2.21E-06	2.21E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.93E-02		1.93E-02	5.29E-05		5.29E-05
HWW	50-00-0	Formaldehyde		7.35E-05	7.35E-05	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	6.44E-01		6.44E-01	1.76E-03		1.76E-03
HWW	110-54-3	Hexane		1.76E-03	1.76E-03	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.55E+01		1.55E+01	4.24E-02		4.24E-02
HWW	7439-92-1	Lead and compounds				lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*						
HWW	7439-96-5	Manganese and compounds		3.73E-07	3.73E-07	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	3.26E-03		3.26E-03	8.94E-06		8.94E-06
HWW	7439-97-6	Mercury and compounds		2.55E-07	2.55E-07	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	2.23E-03		2.23E-03	6.12E-06		6.12E-06
HWW	91-20-3	Naphthalene		5.98E-07	5.98E-07	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	5.24E-03		5.24E-03	1.44E-05		1.44E-05
HWW	7440-02-0	Nickel and compounds		2.06E-06	2.06E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.80E-02		1.80E-02	4.94E-05		4.94E-05
HWW		Polycyclic aromatic hydrocarbons (PAHs)		8.65E-08	8.65E-08	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	7.57E-04		7.57E-04	2.08E-06		2.08E-06
HWW	115-07-1	Propylene		1.60E-04	1.60E-04	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.40E+00		1.40E+00	3.84E-03		3.84E-03
HWW	7782-49-2	Selenium and compounds		2.35E-08	2.35E-08	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	2.06E-04		2.06E-04	5.65E-07		5.65E-07
HWW	108-88-3	Toluene		3.33E-06	3.33E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	2.92E-02		2.92E-02	8.00E-05		8.00E-05
HWW	7440-62-2	Vanadium (fume or dust)		2.25E-06	2.25E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.98E-02		1.98E-02	5.41E-05		5.41E-05
HWW	1330-20-7	Xylene (mixture)		9.80E-06	9.80E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	8.59E-02		8.59E-02	2.35E-04		2.35E-04
HWW	7440-66-6	Zinc and compounds		2.84E-05	2.84E-05	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	2.49E-01		2.49E-01	6.82E-04		6.82E-04
HTW	106-99-0	1,3-Butadiene				lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*						
HTW	75-07-0	Acetaldehyde		7.26E-06	7.26E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.27E-01		1.27E-01	3.49E-04		3.49E-04
HTW	107-02-8	Acrolein		4.35E-06	4.35E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	7.63E-02		7.63E-02	2.09E-04		2.09E-04
HTW	7440-36-0	Antimony and compounds				lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*						
HTW	7440-38-2	Arsenic and compounds		1.96E-07	1.96E-07	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	3.44E-03		3.44E-03	9.41E-06		9.41E-06
HTW	7440-39-3	Barium and compounds		4.31E-06	4.31E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	7.56E-02		7.56E-02	2.07E-04		2.07E-04
HTW	71-43-2	Benzene		2.06E-06	2.06E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	3.61E-02		3.61E-02	9.88E-05		9.88E-05
HTW	7440-41-7	Beryllium and compounds		1.18E-08	1.18E-08	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	2.06E-04		2.06E-04	5.65E-07		5.65E-07
HTW	7440-43-9	Cadmium and compounds		1.08E-06	1.08E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.89E-02		1.89E-02	5.18E-05		5.18E-05
HTW	18540-29-9	Chromium VI, chromate, and dichromate particulate		1.37E-06	1.37E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	2.40E-02		2.40E-02	6.59E-05		6.59E-05
HTW	7440-48-4	Cobalt and compounds		8.24E-08	8.24E-08	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.44E-03		1.44E-03	3.95E-06		3.95E-06
HTW	7440-50-8	Copper and compounds		8.33E-07	8.33E-07	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.46E-02		1.46E-02	4.00E-05		4.00E-05
HTW	74-90-8	Cyanide, Hydrogen				lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*						
HTW	106-46-7	p-Dichlorobenzene		1.18E-06	1.18E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	2.06E-02		2.06E-02	5.65E-05		5.65E-05
HTW		Diesel Particulate Matter				lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*						
HTW	100-41-4	Ethyl benzene		2.21E-06	2.21E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	3.86E-02		3.86E-02	1.06E-04		1.06E-04
HTW	50-00-0	Formaldehyde		7.35E-05	7.35E-05	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.29E+00		1.29E+00	3.53E-03		3.53E-03
HTW	110-54-3	Hexane		1.76E-03	1.76E-03	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	3.09E+01		3.09E+01	8.47E-02		8.47E-02
HTW	7439-92-1	Lead and compounds				lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*						
HTW	7439-96-5	Manganese and compounds		3.73E-07	3.73E-07	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	6.53E-03		6.53E-03	1.79E-05		1.79E-05
HTW	7439-97-6	Mercury and compounds		2.55E-07	2.55E-07	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	4.47E-03		4.47E-03	1.22E-05		1.22E-05
HTW	91-20-3	Naphthalene		5.98E-07	5.98E-07	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.05E-02		1.05E-02	2.87E-05		2.87E-05
HTW	7440-02-0	Nickel and compounds		2.06E-06	2.06E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	3.61E-02		3.61E-02	9.88E-05		9.88E-05
HTW		Polycyclic aromatic hydrocarbons (PAHs)		8.65E-08	8.65E-08	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.51E-03		1.51E-03	4.15E-06		4.15E-06
HTW	115-07-1	Propylene		1.60E-04	1.60E-04	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	2.80E+00		2.80E+00	7.67E-03		7.67E-03
HTW	7782-49-2	Selenium and compounds		2.35E-08	2.35E-08	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	4.12E-04		4.12E-04	1.13E-06		1.13E-06
HTW	108-88-3	Toluene		3.33E-06	3.33E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	5.84E-02		5.84E-02	1.60E-04		1.60E-04
HTW	7440-62-2	Vanadium (fume or dust)		2.25E-06	2.25E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	3.95E-02		3.95E-02	1.08E-04		1.08E-04
HTW	1330-20-7	Xylene (mixture)		9.80E-06	9.80E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.72E-01		1.72E-01	4.71E-04		4.71E-04
HTW	7440-66-6	Zinc and compounds		2.84E-05	2.84E-05	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	4.98E-01		4.98E-01	1.36E-03		1.36E-03
HMO	106-99-0	1,3-Butadiene				lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*						
HMO	75-07-0	Acetaldehyde		7.26E-06	7.26E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	6.36E-02		6.36E-02	1.74E-04		1.74E-04
HMO	107-02-8	Acrolein		4.35E-06	4.35E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	3.81E-02		3.81E-02	1.04E-04		1.04E-04
HMO	7440-36-0	Antimony and compounds				lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*						
HMO	7440-38-2	Arsenic and compounds		1.96E-07	1.96E-07	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.72E-03		1.72E-03	4.71E-06		4.71E-06
HMO	7440-39-3	Barium and compounds		4.31E-06	4.31E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	3.78E-02		3.78E-02	1.04E-04		1.04E-04
HMO	71-43-2	Benzene		2.06E-06	2.06E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.80E-02		1.80E-02	4.94E-05		4.94E-05
HMO	7440-41-7	Beryllium and compounds		1.18E-08	1.18E-08	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.03E-04		1.03E-04	2.82E-07		2.82E-07
HMO	7440-43-9	Cadmium and compounds		1.08E-06	1.08E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	9.45E-03		9.45E-03	2.59E-05		2.59E-05
HMO	18540-29-9	Chromium VI, chromate, and dichromate particulate		1.37E-06	1.37E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.20E-02		1.20E-02	3.29E-05		3.29E-05
HMO	7440-48-4	Cobalt and compounds		8.24E-08	8.24E-08	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	7.21E-04		7.21E-04	1.98E-06		1.98E-06
HMO	7440-50-8	Copper and compounds		8.33E-07	8.33E-07	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	7.30E-03		7.30E-03	2.00E-05		2.00E-05
HMO	74-90-8	Cyanide, Hydrogen				lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*						
HMO	106-46-7	p-Dichlorobenzene		1.18E-06	1.18E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.03E-02		1.03E-02	2.82E-05		2.82E-05
HMO		Diesel Particulate Matter				lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*						
HMO	100-41-4	Ethyl benzene		2.21E-06	2.21E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.93E-02		1.93E-02	5.29E-05		5.29E-05
HMO	50-00-0	Formaldehyde		7.35E-05	7.35E-05	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	6.44E-01		6.44E-01	1.76E-03		1.76E-03
HMO	110-54-3	Hexane		1.76E-03	1.76E-03	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.55E+01		1.55E+01	4.24E-02		4.24E-02
HMO	7439-92-1	Lead and compounds				lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*						
HMO	7439-96-5	Manganese and compounds		3.73E-07	3.73E-07	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	3.26E-03		3.26E-03	8.94E-06		8.94E-06
HMO	7439-97-6	Mercury and compounds		2.55E-07	2.55E-07	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	2.23E-03		2.23E-03	6.12E-06		6.12E-06
HMO	91-20-3	Naphthalene		5.98E-07	5.98E-07	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	5.24E-03		5.24E-03	1.44E-05		1.44E-05
HMO	7440-02-0	Nickel and compounds		2.06E-06	2.06E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.80E-02		1.80E-02	4.94E-05		4.94E-05
HMO		Polycyclic aromatic hydrocarbons (PAHs)		8.65E-08	8.65E-08	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	7.57E-04		7.57E-04	2.08E-06		2.08E-06
HMO	115-07-1	Propylene		1.60E-04	1.60E-04	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.40E+00		1.40E+00	3.84E-03		3.84E-03
HMO	7782-49-2	Selenium and compounds		2.35E-08	2.35E-08	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	2.06E-04		2.06E-04	5.65E-07		5.65E-07
HMO	108-88-3	Toluene		3.33E-06	3.33E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	2.92E-02		2.92E-02	8.00E-05		8.00E-05
HMO	7440-62-2	Vanadium (fume or dust)		2.25E-06	2.25E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	1.98E-02		1.98E-02	5.41E-05		5.41E-05
HMO	1330-20-7	Xylene (mixture)		9.80E-06	9.80E-06	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	8.59E-02		8.59E-02	2.35E-04		2.35E-04
HMO	7440-66-6	Zinc and compounds		2.84E-05	2.84E-05	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 2*	2.49E-01		2.49E-01	6.82E-04		6.82E-04

Toxic Emissions Unit ID	Pollutant Information: CAS	Pollutant Information: Chemical Name	Control Efficiency	Emission Factor Information: EF Values: Annual Chronic	Emission Factor Information: EF Values: Max Daily - Acute	Emission Factor Information: Units	Emission Factor Information: Reference/Notes	Calculated Emissions: Annual - Chronic [lb/yr]: Actual	Calculated Emissions: Annual - Chronic [lb/yr]: Requested PTE	Calculated Emissions: Annual - Chronic [lb/yr]: Capacity	Calculated Emissions: Max Daily - Acute [lb/day]: Actual	Calculated Emissions: Max Daily - Acute [lb/day]: Requested PTE	Calculated Emissions: Max Daily - Acute [lb/day]: Capacity
EDG1	106-99-0	1,3-Butadiene		3.91E-05	3.91E-05	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 4*	1.47E-02		1.47E-02	3.52E-03		3.52E-03
EDG1	75-07-0	Acetaldehyde		7.67E-04	7.67E-04	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 4*	2.88E-01		2.88E-01	6.91E-02		6.91E-02
EDG1	107-02-8	Acrolein		9.25E-05	9.25E-05	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 4*	3.47E-02		3.47E-02	8.34E-03		8.34E-03
EDG1	7440-36-0	Antimony and compounds				lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 4*						
EDG1	7440-38-2	Arsenic and compounds				lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 4*						
EDG1	7440-39-3	Barium and compounds				lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 4*						
EDG1	71-43-2	Benzene		9.33E-04	9.33E-04	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 4*	3.50E-01		3.50E-01	8.41E-02		8.41E-02
EDG1	7440-41-7	Beryllium and compounds				lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 4*						
EDG1	7440-43-9	Cadmium and compounds				lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 4*						
EDG1	18540-29-9	Chromium VI, chromate, and dichromate particulate				lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 4*						
EDG1	7440-48-4	Cobalt and compounds				lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 4*						
EDG1	7440-50-8	Copper and compounds				lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 4*						
EDG1	74-90-8	Cyanide, Hydrogen				lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 4*						
EDG1	106-46-7	p-Dichlorobenzene				lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 4*						
EDG1		Diesel Particulate Matter		4.70E-02	4.70E-02	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 4*	1.76E+01		1.76E+01	4.23E+00		4.23E+00
EDG1	100-41-4	Ethyl benzene				lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 4*						
EDG1	50-00-0	Formaldehyde		1.18E-03	1.18E-03	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 4*	4.43E-01		4.43E-01	1.06E-01		1.06E-01
EDG1	110-54-3	Hexane				lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 4*						
EDG1	7439-92-1	Lead and compounds				lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 4*						
EDG1	7439-96-5	Manganese and compounds				lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 4*						
EDG1	7439-97-6	Mercury and compounds				lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 4*						
EDG1	91-20-3	Naphthalene				lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 4*						
EDG1	7440-02-0	Nickel and compounds				lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 4*						
EDG1		Polycyclic aromatic hydrocarbons (PAHs)		1.68E-04	1.68E-04	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 4*	6.31E-02		6.31E-02	1.51E-02		1.51E-02
EDG1	115-07-1	Propylene				lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 4*						
EDG1	7782-49-2	Selenium and compounds				lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 4*						
EDG1	108-88-3	Toluene		4.09E-04	4.09E-04	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 4*	1.54E-01		1.54E-01	3.69E-02		3.69E-02
EDG1	7440-62-2	Vanadium (fume or dust)				lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 4*						
EDG1	1330-20-7	Xylene (mixture)		2.85E-04	2.85E-04	lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 4*	1.07E-01		1.07E-01	2.57E-02		2.57E-02
EDG1	7440-66-6	Zinc and compounds				lb/MMBtu	*See Process HAP and GHG Emissions Sheet, p. 4*						
MR	7439-97-6	Mercury and compounds	50%	8.00E-01	8.00E-01	lb/ton	*See Process HAP and GHG Emissions Sheet, p. 6*	3.20E+00		3.20E+00	8.77E-03		8.77E-03
MR	74-90-8	Cyanide, Hydrogen		5.00E+00	5.00E+00	lb/ton	*See Grassy Mountain HCN Emissions Sheet*	4.00E+01		4.00E+01	1.10E-01		1.10E-01
UFD	106-99-0	1,3-Butadiene				lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*						
UFD	75-07-0	Acetaldehyde				lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*						
UFD	107-02-8	Acrolein				lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*						
UFD	7440-36-0	Antimony and compounds		6.71E-02	6.71E-02	lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*	7.33E-03		7.33E-03	3.52E-05		3.52E-05
UFD	7440-38-2	Arsenic and compounds		3.05E-01	3.05E-01	lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*	3.33E-02		3.33E-02	1.60E-04		1.60E-04
UFD	7440-39-3	Barium and compounds				lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*						
UFD	71-43-2	Benzene				lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*						
UFD	7440-41-7	Beryllium and compounds		1.94E-03	1.94E-03	lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*	2.12E-04		2.12E-04	1.02E-06		1.02E-06
UFD	7440-43-9	Cadmium and compounds		4.13E-04	4.13E-04	lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*	4.51E-05		4.51E-05	2.17E-07		2.17E-07
UFD	18540-29-9	Chromium VI, chromate, and dichromate particulate		4.91E-02	4.91E-02	lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*	5.36E-03		5.36E-03	2.58E-05		2.58E-05
UFD	7440-48-4	Cobalt and compounds		3.16E-03	3.16E-03	lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*	3.45E-04		3.45E-04	1.66E-06		1.66E-06
UFD	7440-50-8	Copper and compounds				lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*						
UFD	74-90-8	Cyanide, Hydrogen				lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*						
UFD	106-46-7	p-Dichlorobenzene				lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*						
UFD		Diesel Particulate Matter				lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*						
UFD	100-41-4	Ethyl benzene				lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*						
UFD	50-00-0	Formaldehyde				lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*						
UFD	110-54-3	Hexane				lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*						
UFD	7439-92-1	Lead and compounds		1.33E-02	1.33E-02	lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*	1.46E-03		1.46E-03	7.00E-06		7.00E-06
UFD	7439-96-5	Manganese and compounds		1.53E-01	1.53E-01	lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*	1.67E-02		1.67E-02	8.04E-05		8.04E-05
UFD	7439-97-6	Mercury and compounds		4.50E-03	4.50E-03	lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*	4.91E-04		4.91E-04	2.36E-06		2.36E-06
UFD	91-20-3	Naphthalene				lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*						
UFD	7440-02-0	Nickel and compounds		9.01E-03	9.01E-03	lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*	9.84E-04		9.84E-04	4.73E-06		4.73E-06
UFD		Polycyclic aromatic hydrocarbons (PAHs)				lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*						
UFD	115-07-1	Propylene				lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*						
UFD	7782-49-2	Selenium and compounds				lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*						
UFD	108-88-3	Toluene				lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*						
UFD	7440-62-2	Vanadium (fume or dust)				lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*						
UFD	1330-20-7	Xylene (mixture)				lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*						
UFD	7440-66-6	Zinc and compounds				lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*						
AFD	106-99-0	1,3-Butadiene				lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*						
AFD	75-07-0	Acetaldehyde				lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*						
AFD	107-02-8	Acrolein				lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*						
AFD	7440-36-0	Antimony and compounds		4.02E-02	4.02E-02	lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*	6.00E-02		6.00E-02	2.31E-04		2.31E-04
AFD	7440-38-2	Arsenic and compounds		3.07E-01	3.07E-01	lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*	4.59E-01		4.59E-01	1.76E-03		1.76E-03
AFD	7440-39-3	Barium and compounds				lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*						
AFD	71-43-2	Benzene				lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*						
AFD	7440-41-7	Beryllium and compounds		9.29E-04	9.29E-04	lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*	1.39E-03		1.39E-03	5.33E-06		5.33E-06
AFD	7440-43-9	Cadmium and compounds		4.64E-04	4.64E-04	lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*	6.93E-04		6.93E-04	2.67E-06		2.67E-06
AFD	18540-29-9	Chromium VI, chromate, and dichromate particulate		2.99E-02	2.99E-02	lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*	4.46E-02		4.46E-02	1.71E-04		1.71E-04
AFD	7440-48-4	Cobalt and compounds		3.80E-03	3.80E-03	lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*	5.68E-03		5.68E-03	2.18E-05		2.18E-05
AFD	7440-50-8	Copper and compounds				lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*						
AFD	74-90-8	Cyanide, Hydrogen				lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*						
AFD	106-46-7	p-Dichlorobenzene				lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*						
AFD		Diesel Particulate Matter				lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*						
AFD	100-41-4	Ethyl benzene				lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*						
AFD	50-00-0	Formaldehyde				lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*						
AFD	110-54-3	Hexane				lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*						
AFD	7439-92-1	Lead and compounds		1.08E-02	1.08E-02	lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*	1.61E-02		1.61E-02	6.19E-05		6.19E-05
AFD	7439-96-5	Manganese and compounds		1.19E-01	1.19E-01	lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*	1.77E-01		1.77E-01	6.81E-04		6.81E-04
AFD	7439-97-6	Mercury and compounds		4.88E-03	4.88E-03	lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*	7.29E-03		7.29E-03	2.80E-05		2.80E-05
AFD	91-20-3	Naphthalene				lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*						
AFD	7440-02-0	Nickel and compounds		6.70E-03	6.70E-03	lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*	1.00E-02		1.00E-02	3.85E-05		3.85E-05
AFD		Polycyclic aromatic hydrocarbons (PAHs)				lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*						
AFD	115-07-1	Propylene				lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*						
AFD	7782-49-2	Selenium and compounds				lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*						
AFD	108-88-3	Toluene				lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*						
AFD	7440-62-2	Vanadium (fume or dust)				lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*						
AFD	1330-20-7	Xylene (mixture)				lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*						
AFD	7440-66-6	Zinc and compounds				lb/ton	*See Mine HAP and GHG Emissions Sheet, p. 3*						
TAILS	74-90-8	Cyanide, Hydrogen		7.02E-02	7.02E-02	lb/hr	*See Grassy Mountain HCN Emissions Sheet*	6.15E+02		6.15E+02	1.68E+00		1.68E+00
POND	74-90-8	Cyanide, Hydrogen		2.93E-03	2.93E-03	lb/hr	*See Grassy Mountain HCN Emissions Sheet*	2.56E+01		2.56E+01	7.03E-02		7.03E-02
DETOX1	74-90-8	Cyanide, Hydrogen		1.16E-02	1.16E-02	lb/hr	*See Grassy Mountain HCN Emissions Sheet*	1.02E+02		1.02E+02	2.78E-01		2.78E-01
DETOX2	74-90-8	Cyanide, Hydrogen		1.16E-02	1.16E-02	lb/hr	*See Grassy Mountain HCN Emissions Sheet*	1.02E+02		1.02E+02	2.78E-01		2.78E-01
CILTANK1	74-90-8	Cyanide, Hydrogen		7.85E-02	7.85E-02	lb/hr	*See Grassy Mountain HCN Emissions Sheet*	6.88E+02		6.88E+02	1.89E+00		1.89E+00
CILTANK2	74-90-8	Cyanide, Hydrogen		7.85E-02	7.85E-02	lb/hr	*See Grassy Mountain HCN Emissions Sheet*	6.88E+02		6.88E+02	1.89E+00		1.89E+00
CILTANK3	74-90-8	Cyanide, Hydrogen		7.85E-02	7.85E-02	lb/hr	*See Grassy Mountain HCN Emissions Sheet*	6.88E+02		6.88E+02	1.89E+00		1.89E+00
CILTANK4	74-90-8	Cyanide, Hydrogen		7.85E-02	7.85E-02	lb/hr	*See Grassy Mountain HCN Emissions Sheet*	6.88E+02		6.88E+02	1.89E+00		1.89E+00
CILTANK5	74-90-8	Cyanide, Hydrogen		7.85E-02	7.85E-02	lb/hr	*See Grassy Mountain HCN Emissions Sheet*	6.88E+02		6.88E+02	1.89E+00		1.89E+00
CILTANK6	74-90-8	Cyanide, Hydrogen		7.85E-02	7.85E-02	lb/hr	*See Grassy Mountain HCN Emissions Sheet*	6.88E+02		6.88E+02	1.89E+00		1.89E+00
CILTANK7	74-90-8	Cyanide, Hydrogen		7.85E-02	7.85E-02	lb/hr	*See Grassy Mountain HCN Emissions Sheet*	6.88E+02		6.88E+02	1.89E+00		1.89E+00

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Attachment A – Emissions Inventory Worksheets

SOURCE DESCRIPTION		OPERATING LIMITS							EMISSION FACTORS								
Model ID	Source Description	Design Throughput unit/hr	unit/day	unit/yr	units	Material	hr/yr	reference	PM	PM_{10}	$PM_{2.5}$	CO	NOx	SO_2	VOC	unit	reference
OC1	Dump of Ore to Ore Surge Bin	33	794	289,700	ton	Ore	8,760	(MDA 2018) pp. 178-180	0.00014	4.6E-05	1.3E-05					lb/ton	AP-42, Table 11.19.2-2 (08/04) Conv. transfer - ctrl.
OC2	Surge Bin to Vibrating Grizzly Transfer	33	794	289,700	ton	Ore	8,760	(MDA 2018) pp. 178-180	0.00014	4.6E-05	1.3E-05					lb/ton	AP-42, Table 11.19.2-2 (08/04) Conv. transfer - ctrl.
OC3	Primary Crusher (including transfers in and out)	33	794	289,700	ton	Ore	8,760	(MDA 2018) pp. 178-180	0.0012	0.00054	0.0001					lb/ton	AP-42, Table 11.19.2-2 (08/04) Tert. Crushing - ctrl.
OC4	Crusher Discharge Conveyor Transfer Point	33	794	289,700	ton	Ore	8,760	(MDA 2018) pp. 178-180	0.00014	4.6E-05	1.3E-05					lb/ton	AP-42, Table 11.19.2-2 (08/04) Conv. transfer - ctrl.
OC5	Screen Feed Conveyor 1 Transfer Point	33	794	289,700	ton	Ore	8,760	(MDA 2018) pp. 178-180	0.00014	4.6E-05	1.3E-05					lb/ton	AP-42, Table 11.19.2-2 (08/04) Conv. transfer - ctrl.
OC6	Screen Feed Conveyor 2 Transfer Point	33	794	289,700	ton	Ore	8,760	(MDA 2018) pp. 178-180	0.00014	4.6E-05	1.3E-05					lb/ton	AP-42, Table 11.19.2-2 (08/04) Conv. transfer - ctrl.
OC7	Screen (including transfers in and out)	33	794	289,700	ton	Ore	8,760	(MDA 2018) pp. 178-180	0.0022	0.00074	0.00005					lb/ton	AP-42, Table 11.19.2-2 (08/04) Screening - ctrl.
OC8	Cone Crusher (including transfers in and out)	33	794	289,700	ton	Ore	8,760	(MDA 2018) pp. 178-180	0.0012	0.00054	0.0001					lb/ton	AP-42, Table 11.19.2-2 (08/04) Tert. Crushing - ctrl.
OC9	Screen Discharge Conveyor Transfer to Stockpile Conveyor	33	794	289,700	ton	Ore	8,760	(MDA 2018) pp. 178-180	0.00014	4.6E-05	1.3E-05					lb/ton	AP-42, Table 11.19.2-2 (08/04) Conv. transfer - ctrl.
OC10	Ore Stockpile Conveyor Transfer to Ore Stockpile	33	794	289,700	ton	Ore	8,760	(MDA 2018) pp. 178-180	0.00014	4.6E-05	1.3E-05					lb/ton	AP-42, Table 11.19.2-2 (08/04) Conv. transfer - ctrl.
OC11	Load Reclaim Hopper	33	794	289,700	ton	Ore	8,760	(MDA 2018) pp. 178-180	0.00014	4.6E-05	1.3E-05					lb/ton	AP-42, Table 11.19.2-2 (08/04) Conv. transfer - ctrl.
OC12	Reclaim Hopper to Ball Mill Feed Conveyor Tansfer	33	794	289,700	ton	Ore	8,760	(MDA 2018) pp. 178-180	0.00014	4.6E-05	1.3E-05					lb/ton	AP-42, Table 11.19.2-2 (08/04) Conv. transfer - ctrl.
OC13	Ball Mill Feed Conveyor to Ball Mill Transfer	33	794	289,700	ton	Ore	8,760	(MDA 2018) pp. 178-180	0.00014	4.6E-05	1.3E-05					lb/ton	AP-42, Table 11.19.2-2 (08/04) Conv. transfer - ctrl.
BC1	Dump of Borrow to Surge Bin	93	1,115	289,800	ton	Borrow	3,120	(MDA 2018) pp. 178-180	0.003	0.0011	0.00017					lb/ton	AP-42, Table 11.19.2-2 (08/04) Conv. Xfer - unctrl.; PM2.5 Ch. 13.2.4
BC2	Surge Bin to Vibrating Grizzly Transfer	93	1,115	289,800	ton	Borrow	3,120	(MDA 2018) pp. 178-180	0.003	0.0011	0.00017					lb/ton	AP-42, Table 11.19.2-2 (08/04) Conv. Xfer - unctrl.; PM2.5 Ch. 13.2.4
BC3	Primary Crusher (including transfers in and out)	93	1,115	289,800	ton	Borrow	3,120	(MDA 2018) pp. 178-180	0.0054	0.0024	0.00036					lb/ton	AP-42, Table 11.19.2-2 (08/04) Tert. Crushing - unctrl.; PM2.5 Ch. 13.2.4
BC4	Crusher Discharge Conveyor Transfer Point	93	1,115	289,800	ton	Borrow	3,120	(MDA 2018) pp. 178-180	0.003	0.0011	0.00017					lb/ton	AP-42, Table 11.19.2-2 (08/04) Conv. Xfer - unctrl.; PM2.5 Ch. 13.2.4
BC5	Screen Feed Conveyor 1 Transfer Point	93	1,115	289,800	ton	Borrow	3,120	(MDA 2018) pp. 178-180	0.003	0.0011	0.00017					lb/ton	AP-42, Table 11.19.2-2 (08/04) Conv. Xfer - unctrl.; PM2.5 Ch. 13.2.4
BC6	Screen Feed Conveyor 2 Transfer Point	93	1,115	289,800	ton	Borrow	3,120	(MDA 2018) pp. 178-180	0.003	0.0011	0.00017					lb/ton	AP-42, Table 11.19.2-2 (08/04) Conv. Xfer - unctrl.; PM2.5 Ch. 13.2.4
BC7	Screen (including transfers in and out)	93	1,115	289,800	ton	Borrow	3,120	(MDA 2018) pp. 178-180	0.025	0.0087	0.00132					lb/ton	AP-42, Table 11.19.2-2 (08/04) Screening - unctrl.; PM2.5 Ch. 13.2.4
BC8	Cone Crusher (including transfers in and out)	93	1,115	289,800	ton	Borrow	3,120	(MDA 2018) pp. 178-180	0.0054	0.0024	0.00036					lb/ton	AP-42, Table 11.19.2-2 (08/04) Tert. Crushing - unctrl.; PM2.5 Ch. 13.2.4
BC9	Screen Discharge Conveyor Transfer to Stockpile Conveyor	93	1,115	289,800	ton	Borrow	3,120	(MDA 2018) pp. 178-180	0.003	0.0011	0.00017					lb/ton	AP-42, Table 11.19.2-2 (08/04) Conv. Xfer - unctrl.; PM2.5 Ch. 13.2.4
BC10	Ore Stockpile Conveyor Transfer to Borrow Stockpile	93	1,115	289,800	ton	Borrow	3,120	(MDA 2018) pp. 178-180	0.003	0.0011	0.00017					lb/ton	AP-42, Table 11.19.2-2 (08/04) Conv. Xfer - unctrl.; PM2.5 Ch. 13.2.4
WM1	Wet Milling	33	794	289,700	ton	Ore	8,760	(MDA 2018) pp. 178-180									
LS1	Lime Silo Loading	55	55	292	ton	Lime	8,760	(Mills 2019.06.21)	0.00099	0.00034	0.00005					lb/ton	AP-42, Table 11.12-2 (6/06), pneumatic loading-ctrl.
LS2	Lime Silo Unloading to Lime Slaker	0.033	0.8	292	ton	Lime	8,760	(Mills 2019.03.20)	0.0048	0.0028	0.0004					lb/ton	AP-42, Table 11.12-2 (6/06), weigh hopper loading-unctrl.
CKD	Carbon Regeneration Kiln (Drum)	0.2	4.8	1,752	ton	Carbon	8,760	(Mills 2019.03.20)	0.06	0.06	0.06	1.05				lb/hr	Based on NDEP-BAPC Permit for Carbon Regeneration Kiln [Marigold (NDEP 2018)]
CKB	Carbon Regeneration Kiln (Burners)	1.7	40.8	14,892	MMBtu	Propane	8,760	(Mills 2019.03.20)	0.00765	0.00765	0.00765	0.0820	0.142	0.01738	0.00874	lb/MMBtu	AP-42, Table 1.5-1 (07/08) Com. Boilers; SO2 - 15.9 gr/100ft3 & 91,500 Btu/gal

SOURCE DESCRIPTION		EMISSION CONTROLS	HOURLY EMISSIONS							DAILY EMISSIONS							ANNUAL EMISSIONS						
Model ID	Source Description	control system	PM lb/hr	PM_{10} lb/hr	$PM_{2.5}$ lb/hr	CO lb/hr	NOx lb/hr	SO_2 lb/hr	VOC lb/hr	PM lb/day	PM_{10} lb/day	$PM_{2.5}$ lb/day	CO lb/day	NOx lb/day	SO_2 lb/day	VOC lb/day	PM ton/yr	PM_{10} ton/yr	$PM_{2.5}$ ton/yr	CO ton/yr	NOx ton/yr	SO_2 ton/yr	VOC ton/yr
OC1	Dump of Ore to Ore Surge Bin	Underground wet ore	0.0046	0.0015	4.3E-4					0.11	0.037	0.010					0.020	0.0067	0.0019				
OC2	Surge Bin to Vibrating Grizzly Transfer	Underground wet ore	0.0046	0.0015	4.3E-4					0.11	0.037	0.010					0.020	0.0067	0.0019				
OC3	Primary Crusher (including transfers in and out)	Underground wet ore	0.040	0.018	0.0033					0.95	0.43	0.079					0.17	0.078	0.014				
OC4	Crusher Discharge Conveyor Transfer Point	Underground wet ore	0.0046	0.0015	4.3E-4					0.11	0.037	0.010					0.020	0.0067	0.0019				
OC5	Screen Feed Conveyor 1 Transfer Point	Underground wet ore	0.0046	0.0015	4.3E-4					0.11	0.037	0.010					0.020	0.0067	0.0019				
OC6	Screen Feed Conveyor 2 Transfer Point	Underground wet ore	0.0046	0.0015	4.3E-4					0.11	0.037	0.010					0.020	0.0067	0.0019				
OC7	Screen (including transfers in and out)	Underground wet ore	0.073	0.024	0.0017					1.7	0.59	0.040					0.32	0.11	0.0072				
OC8	Cone Crusher (including transfers in and out)	Underground wet ore	0.040	0.018	0.0033					0.95	0.43	0.079					0.17	0.078	0.014				
OC9	Screen Discharge Conveyor Transfer to Stockpile Conveyor	Underground wet ore	0.0046	0.0015	4.3E-4					0.11	0.037	0.010					0.020	0.0067	0.0019				
OC10	Ore Stockpile Conveyor Transfer to Ore Stockpile	Underground wet ore	0.0046	0.0015	4.3E-4					0.11	0.037	0.010					0.020	0.0067	0.0019				
OC11	Load Reclaim Hopper	Underground wet ore	0.0046	0.0015	4.3E-4					0.11	0.037	0.010					0.020	0.0067	0.0019				
OC12	Reclaim Hopper to Ball Mill Feed Conveyor Tansfer	Underground wet ore	0.0046	0.0015	4.3E-4					0.11	0.037	0.010					0.020	0.0067	0.0019				
OC13	Ball Mill Feed Conveyor to Ball Mill Transfer	Underground wet ore	0.0046	0.0015	4.3E-4					0.11	0.037	0.010					0.020	0.0067	0.0019				
BC1	Dump of Borrow to Surge Bin		0.28	0.10	0.016					3.3	1.2	0.19					0.43	0.16	0.025				
BC2	Surge Bin to Vibrating Grizzly Transfer		0.28	0.10	0.016					3.3	1.2	0.19					0.43	0.16	0.025				
BC3	Primary Crusher (including transfers in and out)		0.50	0.22	0.033					6.0	2.7	0.40					0.78	0.35	0.052				
BC4	Crusher Discharge Conveyor Transfer Point		0.28	0.10	0.016					3.3	1.2	0.19					0.43	0.16	0.025				
BC5	Screen Feed Conveyor 1 Transfer Point		0.28	0.10	0.016					3.3	1.2	0.19					0.43	0.16	0.025				
BC6	Screen Feed Conveyor 2 Transfer Point		0.28	0.10	0.016					3.3	1.2	0.19					0.43	0.16	0.025				
BC7	Screen (including transfers in and out)		2.3	0.81	0.12					27.9	9.7	1.5					3.6	1.3	0.19				
BC8	Cone Crusher (including transfers in and out)		0.50	0.22	0.033					6.0	2.7	0.40					0.78	0.35	0.052				
BC9	Screen Discharge Conveyor Transfer to Stockpile Conveyor		0.28	0.10	0.016					3.3	1.2	0.19					0.43	0.16	0.025				
BC10	Ore Stockpile Conveyor Transfer to Borrow Stockpile		0.28	0.10	0.016					3.3	1.2	0.19					0.43	0.16	0.025				
WM1	Wet Milling	Wet process																					
LS1	Lime Silo Loading	Bin Vent	0.054	0.019	0.0028					0.054	0.019	0.0028					1.4E-4	5.0E-5	7.3E-6				
LS2	Lime Silo Unloading to Lime Slaker		1.6E-4	9.3E-5	1.3E-5					0.0038	0.0022	3.2E-4					7.0E-4	4.1E-4	5.8E-5				
CKD	Carbon Regeneration Kiln (Drum)	Wet Scrubber / Carbon Filter	0.060	0.060	0.060	1.1				1.4	1.4	1.4	25.2				0.26	0.26	0.26	4.6			
CKB	Carbon Regeneration Kiln (Burners)		0.013	0.013	0.013	0.14	0.24	0.030	0.015	0.31	0.31	0.31	3.3	5.8	0.71	0.36	0.057	0.057	0.057	0.61	1.1	0.13	0.065

SOURCE DESCRIPTION		OPERATING LIMITS							EMISSION FACTORS								
Model ID	Source Description	Design Throughput unit/hr	unit/day	unit/yr	units	Material	hr/yr	reference	PM	PM_{10}	$PM_{2.5}$	CO	NOx	SO_2	VOC	unit	reference
EW	Electrowinning Cells & Pregnant Solution Tank																Hg and HCN emissions only
MR	Mercury Retort			8	ton	Wet Au Conc	8,760	(MDA 2018) p. 174 (1.5x Au+Ag)									Hg emissions only
MF	Induction Melting Furnace	#######	12 hr	8	ton	Wet Au Conc	960	(MDA 2018) p. 174 (1.5x Au+Ag)	0.12	0.12	0.12					lb/hr	Based on NDEP-BAPC Permit for Carbon Regeneration Kiln [Marigold (NDEP 2018)]
LABSP	Sample Preparation	0.75	6	2,190	ton	Samples	8,760	(Mills 2019.03.29) 100x of est.	0.0200	0.00772	0.00074					lb/ton	AP-42, Table 11.19.2-2 (08/04), 6 splitters, 3 crushers, 3, screens, 3 pulverizers - ctrl
LABFA	Fire Assay	0.003125	0.025	9	ton	Samples	8,760	(Mills 2019.03.29)	20	20	20					lb/ton	AP-42 Tab. 12.7-2, Zinc smelting, Electric retort furnace
EDG1	Emergency Generator (Mfr. Yr. >2007; diesel)	400	110	40,000	kW	Diesel	100	(Mills 2019.03.21); (DSS 2019a)	0.00044	0.00044	0.00044	0.00772	0.01411	1.45E-05	0.00287	lb/kW-hr	40 CFR Subpart 60.4202(a)(2); SO2 - mass balance (15 ppm ULSD) (CFR 2018b)
HA	Administration HVAC	1.00	24.00	8,760	MMBtu	Propane	8,760	Standard industry size	0.00765	0.00765	0.00765	0.0820	0.142	0.01738	0.00874	lb/MMBtu	AP-42, Table 1.5-1 (07/08) Com. Boilers; SO2 - 15.9 gr/100ft^3 & 91,500 Btu/gal
HPO	Plant Office and Dry HVAC	1.00	24.00	8,760	MMBtu	Propane	8,760	Standard industry size	0.00765	0.00765	0.00765	0.0820	0.142	0.01738	0.00874	lb/MMBtu	AP-42, Table 1.5-1 (07/08) Com. Boilers; SO2 - 15.9 gr/100ft^3 & 91,500 Btu/gal
HL	Laboratory HVAC	1.00	24.00	8,760	MMBtu	Propane	8,760	Standard industry size	0.00765	0.00765	0.00765	0.0820	0.142	0.01738	0.00874	lb/MMBtu	AP-42, Table 1.5-1 (07/08) Com. Boilers; SO2 - 15.9 gr/100ft^3 & 91,500 Btu/gal
HWW	Plant Workshop and Warehouse HVAC	1.00	24.00	8,760	MMBtu	Propane	8,760	Standard industry size	0.00765	0.00765	0.00765	0.0820	0.142	0.01738	0.00874	lb/MMBtu	AP-42, Table 1.5-1 (07/08) Com. Boilers; SO2 - 15.9 gr/100ft^3 & 91,500 Btu/gal
HTW	Truck Workshop and Warehouse HVAC	2.00	48.00	17,520	MMBtu	Propane	8,760	Standard industry size	0.00765	0.00765	0.00765	0.0820	0.142	0.01738	0.00874	lb/MMBtu	AP-42, Table 1.5-1 (07/08) Com. Boilers; SO2 - 15.9 gr/100ft^3 & 91,500 Btu/gal
HMO	Mine Office and Changehouse HVAC	1.00	24.00	8,760	MMBtu	Propane	8,760	Standard industry size	0.00765	0.00765	0.00765	0.0820	0.142	0.01738	0.00874	lb/MMBtu	AP-42, Table 1.5-1 (07/08) Com. Boilers; SO2 - 15.9 gr/100ft^3 & 91,500 Btu/gal
CEM1	Cement/Shotcrete loading to silo	80	80	7,053	ton	Cement	8,760	(Dyer 2019.06.24)	0.00099	0.00034	0.00005					lb/ton	AP-42, Table 11.12-2 (6/06), pneumatic loading-ctrl.
CEM2	Cement/Shotcrete unloading to batch plant	80	80	7,053	ton	Cement	8,760	(Dyer 2019.06.24)	0.00099	0.00034	0.00005					lb/ton	AP-42, Table 11.12-2 (6/06), pneumatic loading-ctrl.
CEM3	Aggregate transfer	141	1,125	134,000	ton	Aggregate	8,760	(MDA 2018) p. 139 & (Dyer 2019.06.24)	0.0069	0.0033	0.0005					lb/ton	AP-42, Table 11.12-2 (6/06), aggregate transfer-unctrl.
CEM4	Weigh hopper loading	141	1,125	134,000	ton	Aggregate	8,760	(MDA 2018) p. 139 & (Dyer 2019.06.24)	0.0048	0.0028	0.0004					lb/ton	AP-42, Table 11.12-2 (6/06), weigh hopper loading-unctrl.
CEM5	Mixer loading (central mix)	7.42 (475)	59.36	7,053 (131k)	ton	Cemented Rock Fill	8,760		0.0184	0.0055	0.0008					lb/ton	AP-42, Table 11.12-2 (6/06), central mixer-ctrl.
TG1	Mine Site Gasoline Tank #1			52,000	gal	Gasoline	8,760	Based on 1 turaround per week							0.045	lb/hr	EPA Tanks 4.0.9d (EPA 1999)
TD1	Mine Site Diesel Tank #1			240,000	gal	Diesel	8,760	(Mills 2019.03.29)							4.3E-4	lb/hr	EPA Tanks 4.0.9d (EPA 1999)
TD2	Mine Site Diesel Tank #2			3,000	gal	Diesel	8,760	Based on 100 hr/yr of emer. gen. oper.							5.1E-5	lb/hr	EPA Tanks 4.0.9d (EPA 1999)
Total																	

SOURCE DESCRIPTION		EMISSION CONTROLS	HOURLY EMISSIONS							DAILY EMISSIONS							ANNUAL EMISSIONS						
Model ID	Source Description	control system	PM lb/hr	PM_{10} lb/hr	$PM_{2.5}$ lb/hr	CO lb/hr	NOx lb/hr	SO_2 lb/hr	VOC lb/hr	PM lb/day	PM_{10} lb/day	$PM_{2.5}$ lb/day	CO lb/day	NOx lb/day	SO_2 lb/day	VOC lb/day	PM ton/yr	PM_{10} ton/yr	$PM_{2.5}$ ton/yr	CO ton/yr	NOx ton/yr	SO_2 ton/yr	VOC ton/yr
EW	Electrowinning Cells & Pregnant Solution Tank	Shared Carbon Filter																					
MR	Mercury Retort	Condenser / Carbon Filter																					
MF	Induction Melting Furnace	Baghouse / Carbon Filter	0.12	0.12	0.12					2.9	2.9	2.9					0.058	0.058	0.058				
LABSP	Sample Preparation	Fume Hood	0.015	0.0058	5.5E-4					0.12	0.046	0.0044					0.022	0.0084	8.1E-4				
LABFA	Fire Assay	Fume Hood	0.063	0.063	0.063					0.50	0.50	0.50					0.091	0.091	0.091				
EDG1	Emergency Generator (Mfr. Yr. >2007; diesel)		0.18	0.18	0.18	3.1	5.6	0.0058	1.1	0.049	0.049	0.049	0.85	1.6	0.0016	0.32	0.0088	0.0088	0.0088	0.15	0.28	2.9E-4	0.057
HA	Administration HVAC		0.0077	0.0077	0.0077	0.082	0.142	0.0174	0.0087	0.184	0.184	0.184	1.97	3.41	0.42	0.210	0.0335	0.0335	0.0335	0.359	0.62	0.076	0.0383
HPO	Plant Office and Dry HVAC		0.0077	0.0077	0.0077	0.082	0.142	0.0174	0.0087	0.184	0.184	0.184	1.97	3.41	0.42	0.210	0.0335	0.0335	0.0335	0.359	0.62	0.076	0.0383
HL	Laboratory HVAC		0.0077	0.0077	0.0077	0.082	0.142	0.0174	0.0087	0.184	0.184	0.184	1.97	3.41	0.42	0.210	0.0335	0.0335	0.0335	0.359	0.62	0.076	0.0383
HWW	Plant Workshop and Warehouse HVAC		0.0077	0.0077	0.0077	0.082	0.142	0.0174	0.0087	0.184	0.184	0.184	1.97	3.41	0.42	0.210	0.0335	0.0335	0.0335	0.359	0.62	0.076	0.0383
HTW	Truck Workshop and Warehouse HVAC		0.0153	0.0153	0.0153	0.164	0.28	0.035	0.0175	0.37	0.37	0.37	3.9	6.8	0.83	0.42	0.067	0.067	0.067	0.72	1.24	0.152	0.077
HMO	Mine Office and Changehouse HVAC		0.0077	0.0077	0.0077	0.082	0.142	0.0174	0.0087	0.184	0.184	0.184	1.97	3.41	0.42	0.210	0.0335	0.0335	0.0335	0.359	0.62	0.076	0.0383
CEM1	Cement/Shotcrete loading to silo	Bin Vent	0.079	0.027	0.0040					0.079	0.027	0.0040					0.0035	0.0012	1.8E-4				
CEM2	Cement/Shotcrete unloading to batch plant	Bin Vent	0.079	0.027	0.0040					0.079	0.027	0.0040					0.0035	0.0012	1.8E-4				
CEM3	Aggregate transfer		0.97	0.47	0.071					7.8	3.7	0.56					0.46	0.22	0.034				
CEM4	Weigh hopper loading		0.68	0.39	0.056					5.4	3.2	0.45					0.32	0.19	0.027				
CEM5	Mixer loading (central mix)	Types of controls used may include water sprays, enclosures, hoods, curtains, shrouds, movable and telescoping chutes, central duct collection systems, and the like.	0.14	0.041	0.0059					1.1	0.33	0.047					0.065	0.019	0.0028				
TG1	Mine Site Gasoline Tank #1								0.045							1.1							0.20
TD1	Mine Site Diesel Tank #1								4.3E-4							0.010							0.0019
TD2	Mine Site Diesel Tank #2								5.1E-5							0.0012							2.2E-4
Total			**8.0**	**3.5**	**0.9**	**4.8**	**6.9**	**0.2**	**1.3**	**89.1**	**39.2**	**11.4**	**43.2**	**31.2**	**3.6**	**3.24**	**10.7**	**4.6**	**1.3**	**7.9**	**5.7**	**0.7**	**0.6**

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Hazardous Air Pollutants and Greenhouse Gas Emissions

HAP Emissions Summary

	Emissions		
Pollutant	lb/yr	ton/yr	
1,3-Butadiene	0.015	7.3E-6	
Acetaldehyde	0.84	4.2E-4	
Acrolein	0.37	1.8E-4	
Antimony and compounds	-	1.6E-4	
Arsenic and compounds	2.8141	1.4E-3	
Barium and compounds	0.33	1.6E-4	
Benzene	0.51	2.5E-4	
Copper and compounds	0.064	3.2E-5	
Beryllium and compounds	7.9E-3	4.0E-6	
Cadmium and compounds	0.086	4.3E-5	
Chromium VI, chromate, and dichrom	0.349	1.7E-4	
Cobalt and compounds	0.0418	2.1E-5	
Cyanide, Hydrogen	40.0	2.0E-2	*See HCN Sheet*
p-Dichlorobenzene	0.090	4.5E-5	
Diesel Particulate Matter	17.6	8.8E-3	
Ethyl benzene	0.168	8.4E-5	
Formaldehyde	6.0	3.0E-3	
Hexane	134.5	6.7E-2	
Lead and compounds	-	4.7E-5	
Manganese and compounds	1.058	5.3E-4	
Mercury and compounds	3.3	1.6E-3	
Naphthalene	0.046	2.3E-5	
Nickel and compounds	0.215	1.1E-4	
Propylene	12.2	6.1E-3	
Polycyclic aromatic hydrocarbons (PA	0.070	3.5E-5	
Selenium and compounds	1.8E-3	9.0E-7	
Toluene	0.41	2.0E-4	
Vanadium (fume or dust)	0.172	8.6E-5	
Xylene (mixture)	0.85	4.3E-4	
Zinc and compounds	2.17	1.1E-3	
Total HAP	**222.53**	**0.112**	

chk

cao-chk

GHG Emissions Summary

Source Category	**CO2e (ton/yr)**
Propane Combustion	5,303
Diesel Combustion	31
Total GHGs	**5,334**

Conversions

2,000	lb/ton
907.186	kg/ton
1.341	hp/kW
1E+6	Btu/MMBtu

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PROPANE COMBUSTION

Source Data

Source II	Description	MMBtu/yr
CKB	Carbon Regeneration Kiln (Burners)	14,892
HA	Administration HVAC	8,760
HPO	Plant Office and Dry HVAC	8,760
HL	Laboratory HVAC	8,760
HWW	Plant Workshop and Warehouse HVAC	8,760
HTW	Truck Workshop and Warehouse HVAC	17,520
HMO	Mine Office and Changehouse HVAC	8,760
Total		76,212

**Propane heating value* 91,500 *Btu/gal*

HAP Emissions - Propane Combustion

Pollutant	Emission Factor* lb/MMScf	Emission Factor* lb/MMBtu**	Emissions ton/yr
Acetaldehyde ***	7.41E-03	7.26E-6	2.77E-04
Acrolein ***	4.44E-03	4.35E-6	1.66E-04
Barium and compounds	4.40E-03	4.31E-6	1.64E-04
Benzene	2.10E-03	2.06E-6	7.85E-05
Copper and compounds	8.50E-04	8.33E-7	3.18E-05
p-Dichlorobenzene	1.20E-03	1.18E-6	4.48E-05
Ethyl benzene ***	2.25E-03	2.21E-6	8.41E-05
Formaldehyde	7.50E-02	7.35E-5	2.80E-03
Hexane	1.80E+00	1.76E-3	6.72E-02
Naphthalene	6.10E-04	5.98E-7	2.28E-05
Propylene ***	1.63E-01	1.60E-4	6.09E-03
Toluene	3.40E-03	3.33E-6	1.27E-04
Xylene (mixture) ***	1.00E-02	9.80E-6	3.74E-04
Polycyclic aromatic hydrocarbons (PAHs)	< 8.82E-05	8.65E-8	3.30E-06
Arsenic and compounds	2.00E-04	1.96E-7	7.47E-06
Beryllium and compounds	< 1.20E-05	1.18E-8	4.48E-07
Cadmium and compounds	1.10E-03	1.08E-6	4.11E-05
Chromium VI, chromate, and dichromate particulate	1.40E-03	1.37E-6	5.23E-05
Cobalt and compounds	8.40E-05	8.24E-8	3.14E-06
Manganese and compounds	3.80E-04	3.73E-7	1.42E-05
Mercury and compounds	2.60E-04	2.55E-7	9.71E-06
Nickel and compounds	2.10E-03	2.06E-6	7.85E-05
Selenium and compounds	< 2.40E-05	2.35E-8	8.97E-07
Vanadium (fume or dust)	2.30E-03	2.25E-6	8.59E-05
Zinc and compounds	2.90E-02	2.84E-5	1.08E-03
Total HAP			7.89E-02

**AP-42, Table 1.4-3 & 1.4-4 (7/98) Natural Gas Combustion*

***Natural Gas Higher Heating Value* 1,020 *MMBtu/MMScf*

****California Air Toxics Emission Factors Database, Natural Gas Heaters (SCC 31000404)*

PROPANE COMBUSTION - CONTINUED

Propane CO_2e Emission Factors:	62.87	*kg CO2/MMBtu*	*40 CFR Part 98, Table C-1 to Subpart C (11/2013) Propane (CFR 2018d)*
	3.0E-03	*kg CH4/MMBtu*	*40 CFR Part 98, Table C-2 to Subpart C (11/2013) Petroleum (CFR 2018d)*
	6.0E-04	*kg N2O/MMBtu*	*40 CFR Part 98, Table C-2 to Subpart C (11/2013) Petroleum (CFR 2018d)*

Total Propane Combustion 76,212 *MMBtu/yr*

Propane CO2e Emissions - Process Sources:

Greenhouse Gas	Emissions ton/yr	Global Warming Potential*	CO2e ton/yr
CO2	5,282	1	5,282
CH4	0.25	25	6
N2O	0.05	298	15
Total GHG			5,303

** 40 CFR 98, Table A-1 (12/2014) (CFR 2018d)*

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DIESEL COMBUSTION

Source Data

		Power Rating		Operation	Fuel Consumption	
Source ID	Description	kW	hp	hr/yr	MMBtu/hr*	MMBtu/yr
EDG1	Emergency Generator (Mfr. Yr. >2007; diesel)	400	536	100	3.75	375.5
Total						375.5

** Based on brake specific fuel consumption for diesel generators* 7,000 *Btu/hp-hr AP-42 Tbl 3.3-1*

*** Heat Content of* 0.137 *MMBtu/gal*

HAP Emissions - Diesel Combustion, Small Engines

Pollutant	Emission Factor* lb/MMBtu	Emissions ton/yr
1,3-Butadiene	3.91E-05	7.34E-06
Acetaldehyde	7.67E-04	1.44E-04
Acrolein	9.25E-05	1.74E-05
Benzene	9.33E-04	1.75E-04
Formaldehyde	1.18E-03	2.22E-04
Polycyclic aromatic hydrocarbons (PAHs)	1.68E-04	3.16E-05
Toluene	4.09E-04	7.68E-05
Xylene (mixture)	2.85E-04	5.35E-05
Total HAPs		7.27E-04

**AP-42, Tab. 3.3-2, 10/96, diesel engines (≤ 600 hp)*

Combustion Diesel Particulate Matter Emissions

Pollutant/Group		Total lbs/yr	Total ton/yr
Diesel Particulate Matter	(as PM2.5)	18	0.01
DPM Total		18	0.01

Diesel CO2e Emission Factors:	73.96 *kg CO_2/MMBtu*	*40 CFR Part 98, Table C-1 to Subpart C (11/2013) No.2*
	3.0E-03 *kg CH_4/MMBtu*	*40 CFR Part 98, Table C-2 to Subpart C (11/2013) Petroleum*
	6.0E-04 *kg N_2O/MMBtu*	*40 CFR Part 98, Table C-2 to Subpart C (11/2013) Petroleum*
Total Diesel Combustion	375.5 *MMBtu/yr*	

Diesel CO2e Emissions - Process Sources:

Greenhouse Gas	Emissions ton/yr	Global Warming Potential*	CO2e ton/yr
CO2	30.61	1	30.61
CH4	1.24E-03	25	0.03
N2O	2.48E-04	298	0.07
Total GHG			30.72

** 40 CFR 98, Table A-1 (CFR 2018d)*

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FUGITIVE DUST EMISSIONS

HAP Emissions Summary - Fugitive Dust Sources

Activity Information

0	PM ton/yr	
Process Area Crushing	0.87	*See Process Sheet*
Borrow Crushing	8.23	*See Process Sheet*
Ore/Waste Subtotal	9.10	

Ore and Waste Dust HAP Concentrations [1] and Emissions

CAS No	Pollutant	Ore ppm	Waste ppm	Ore lb/ton	Waste lb/ton	Total [2] lb/yr	Total ton/yr	AG lb/ton
7440-38-	Arsenic and compounds	152	154	0.3040	0.31	2.80	1.4E-3	0.0093617
7440-41-	Beryllium and compounds	1.1	0.31	0.0022	0.00	0.01	3.5E-6	2.346E-05
7440-43-	Cadmium and compounds	0.2	0.24	0.0004	0.00	0.00	2.1E-6	1.438E-05
7440-48-	Cobalt and compounds	1.5	2	0.0030	0.00	0.04	1.8E-5	0.0001188
18540-2!	Chromium VI, chromate, and dichromate particul	27	12	0.0540	0.02	0.24	1.2E-4	0.0008176
7439-97-	Mercury and compounds	2.2	2.5	0.0044	0.01	0.04	2.2E-5	0.0001504
7439-96-	Manganese and compounds	81	54	0.1620	0.11	1.03	5.1E-4	0.0034437
7440-02-	Nickel and compounds	4.8	3	0.0096	0.01	0.06	2.9E-5	0.0001931
7439-92-	Lead and compounds	7	5	0.0140	0.01	0.09	4.7E-5	0.000316
7440-36-	Antimony and compounds	37	16	0.0740	0.03	0.33	1.6E-4	0.0010959
Dust HAP Total						4.64	2.3E-3	

(Wolverson 2019.03.04)

Process Area activities using ore EF; Borrow activities using waste EF

Conversions
2,000 lb/ton

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40 CFR 63 Subpart 7E MERCURY SOURCES

Mercury Emissions

Description	Subpart 7E Hg Emissions ton/yr	% of Subpart 7E for Controlled Systems* %	Controlled Hg Emissions* lb/yr	Controlled Hg Emissions* ton/yr
Refinery Sources (Kiln, EW, Retort, Furnace)	0.003	50%	3.20	1.6E-03
Total	0.003		3.20	1.6E-03

**Based on Similar Source Hg Reporting Levels provided below*

Subpart 7E Limit - Carbon Processes with Mercury Retorts

$$\frac{0.8\ \text{lb}}{\text{ton}} \times \frac{8\ \text{ton}}{\text{yr}} = \frac{6.4\ \text{lb}}{\text{yr}}$$

Similar Source Hg Reporting Levels

Cortez Hills (2017 Hg Report) *(NDEP 2017.06)*

$$\frac{1.92\ \text{lb}}{\text{yr}} \times \frac{\text{yr}}{47.40\ \text{ton}} = \frac{0.04\ \text{lb}}{\text{ton}} \times \frac{\text{ton}}{0.8\ \text{lb}} = 5.1\%$$

Rawhide Mine (2017 Hg Report) *(NDEP 2017.06)*

$$\frac{0.32\ \text{lb}}{\text{yr}} \times \frac{\text{yr}}{35.40\ \text{ton}} = \frac{0.01\ \text{lb}}{\text{ton}} \times \frac{\text{ton}}{0.8\ \text{lb}} = 1.1\%$$

Gold Hill Mine (2017 Hg Report) *(NDEP 2017.06)*

$$\frac{0.16\ \text{lb}}{\text{yr}} \times \frac{\text{yr}}{16.90\ \text{ton}} = \frac{0.01\ \text{lb}}{\text{ton}} \times \frac{\text{ton}}{0.8\ \text{lb}} = 1.2\%$$

Gold Hill Mine (2017 Hg Report) *(NDEP 2017.06)*

$$\frac{0.002\ \text{lb}}{\text{yr}} \times \frac{\text{yr}}{0.94\ \text{ton}} = \frac{0.00\ \text{lb}}{\text{ton}} \times \frac{\text{ton}}{0.8\ \text{lb}} = 0.3\%$$

Conversions

2,000 lb/ton

Grassy Mountain HCN Emissions

Snow Cover 0 days w/ 0.5+ in. 0% snow

Wind: m/s 3.20, Fw 1.05

Fugitive Emissions

Area	Source	Cat.	Category Description	Acres	Snow Cover Adjustment Acres		Solution Parameters (M3 2017c) pH	Free CN- g/m3	T C	pKa	a0	H	Overall kG or Flux m/s or g/m2-s[1]	Fa*Fw	g/s	lb/yr
Tails	Tailings Storage Facility	TA	Tails, Aqueous Surface	8.03	8.03		8.00	1.00	12.82	9.567	0.9736	0.00350	1.89E-05	0.49	0.0010	71.3
		TW	Tails, Wet Sediment	26.37	26.37	snow							5.31E-08	0.49	0.0028	192.9
		TD	Tails, Dry Sediment	53.53	53.53	snow							2.33E-08	1.00	0.0050	350.3
			Active Surface Subtotal	***34.40***												
Mill																
	Tailings Pipeline Reclaim Pond	TA	Tails, Aqueous Surface	2.502	2.502		8.00	1.00	12.82	9.567	0.9736	0.00350	1.89E-05	0.57	0.0004	25.6
	CN Detoxification Tank 1	TK	Tanks	0.0076	0.008		10.00	238.87	25.00	9.250	0.1510	0.00545	3.11E-04	0.78	0.0015	101.5
	CN Detoxification Tank 2	TK	Tanks	0.0076	0.008		10.00	238.87	25.00	9.250	0.1510	0.00545	3.11E-04	0.78	0.0015	101.5
	CIL Tank 1	TK	Tanks	0.0574	0.057		10.00	238.87	25.00	9.250	0.1510	0.00545	3.11E-04	0.70	0.0099	688.1
	CIL Tank 2	TK	Tanks	0.0574	0.057		10.00	238.87	25.00	9.250	0.1510	0.00545	3.11E-04	0.70	0.0099	688.1
	CIL Tank 3	TK	Tanks	0.0574	0.057		10.00	238.87	25.00	9.250	0.1510	0.00545	3.11E-04	0.70	0.0099	688.1
	CIL Tank 4	TK	Tanks	0.0574	0.057		10.00	238.87	25.00	9.250	0.1510	0.00545	3.11E-04	0.70	0.0099	688.1
	CIL Tank 5	TK	Tanks	0.0574	0.057		10.00	238.87	25.00	9.250	0.1510	0.00545	3.11E-04	0.70	0.0099	688.1
	CIL Tank 6	TK	Tanks	0.0574	0.057		10.00	238.87	25.00	9.250	0.1510	0.00545	3.11E-04	0.70	0.0099	688.1
	CIL Tank 7	TK	Tanks	0.0574	0.057		10.00	238.87	25.00	9.250	0.1510	0.00545	3.11E-04	0.70	0.0099	688.1
													Overall			
	Snow Adjustments	Tsn	Tails, Snow Covered		0.00	snow							1.17E-08	1.00	0.0000	0.0
			Snow Covered Surface Subtotal		***0.0***											
			TOTAL AREA	**90.85**	**90.85**											

Fugitive Total (lb/yr) **5,659.7**
Fugitive Total (ton/yr) **2.83**

Stack Emissions

	lb/hr[2]	hr/yr	lb/yr
EW Cells	0.000567	8,760	**5.0**
Preg/Barren Tanks	0.004	8,760	**35.0**
Stack Total (lb/yr)			**40.0**
Stack Total (ton/yr)			**0.02**
Total (ton/yr)			**2.85**

(1) *Per EPA's request, three gold mines in Nevada conducted fugitive HCN emission measurements in the fourth quarter of 2009 in order to quantify emissions from the various fugitive HCN sources at gold mines. The Quality Assurance Project Plan (QAPP) for this testing, the EPA's approval letter of this QAPP, and the final fugitive HCN test report are provided on the federal docket website athttps://www.regulations.gov/docketBrowser?rpp=25&so=DESC&sb=commentDueDate&po=0&s=EPA-HQ-OAR-2010-0239-0163&dct=SR&D=EPA-HQ-OAR-2010-0239. The IDs for these documents are EPA-HQ-OAR-2010-0239-0102, EPA-HQ-OAR-2010-0239-0103, and EPA-HQ-OAR-2010-0239-0163 (0163.0 through 0163.6), respectively. The above emission factors were taken from the final fugitive HCN test report, "Card and Schmidt. Evaluation of Air Emissions of Hydrogen Cyanide from Fugitive Sources at Nevada Gold Mines Using the USEPA Surface Isolation Flux Chamber Technology. April 2010." (Card 2009) (EPA 2009) (Schmidt 2010)*

(2) The emission factor is baes on the average HCN test data from similar facilities (EW cells with carbon control):

See: http://www.regulations.gov/#!docketDetail;rpp=250;po=0;s=HCN;D=EPA-HQ-OAR-2010-0239

Hydrogen Cyanide (HCN) Stack Test for Cortez November 2009
Hydrogen Cyanide (HCN) Stack Test for Goldstrike September & November 2009
HCN (Hydrogen Cyanide) Stack Test for Round Mountain November 2009
HCN (Hydrogen Cyanide) Stack Test for Gold Quarry July 2009
HCN (Hydrogen Cyanide) Stack Test for Twin Creeks November 2009

Conversion Factors:

453.59	g/lb
4046.86	m2/acre
8760	hr/yr
60	min/hr
3600	s/hr
43560	ft2/acre
2000	lb/ton
1	lb/ton NaCN =
265.408	g/m^3 CN

Air Sciences Inc.	PROJECT TITLE: Grassy Mountain Mine	BY: M. Mavko
	PROJECT NO: 343-1	PAGE: 1 OF: 7 SHEET: Tanks
AIR EMISSION CALCULATIONS	SUBJECT: Process HAP and GHG Emissions	DATE: July 26, 2019

Fuel Storage Tanks

	Dimensions					VOC		
	Capacity	Diameter	Length	Throughput		Emissions[1]		Reference
Storage Tank	gal	ft	ft	gal/yr	**Configuration**	lb/yr	ton/yr	
Mine Site Gasoline Tank #1	1,000	4.4	9	52,000	Horizontal	397.6	0.20	*Based on 1 turaround per week*
Mine Site Diesel Tank #1	5,000	10	10	240,000	Vertical	3.8	0.0019	*(Dyer 2019.03.21)*
Mine Site Diesel Tank #2	2,200	6	12	3,000	Horizontal	0.44	2.2E-4	*(Dyer 2019.03.21)*

[1] *Emissions calculated using EPA Tanks 4.0.9d (EPA 1999)*

Mine Site Gasoline Tank #1

TANKS 4.0 Report

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	TG1
City:	Malheur County
State:	Oregon
Company:	Paramount Gold Nevada Corp.
Type of Tank:	Horizontal Tank
Description:	Mine Site Gasoline Tank #1

Tank Dimensions

Shell Length (ft):	9.00
Diameter (ft):	4.40
Volume (gallons):	1,000.00
Turnovers:	52.00
Net Throughput(gal/yr):	52,000.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Boise, Idaho (Avg Atmospheric Pressure = 13.28 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

TG1 - Horizontal Tank
Malheur County, Oregon

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Gasoline (RVP 9)	All	52.81	46.88	58.74	50.94	3.9950	3.5384	4.4980	67.0000			92.00	Option 4: RVP=9, ASTM Slope=3

Mine Site Gasoline Tank #1 - continued

TANKS 4.0 Report

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

TG1 - Horizontal Tank
Malheur County, Oregon

Annual Emission Calcaulations	
Standing Losses (lb):	151.2133
Vapor Space Volume (cu ft):	87.1642
Vapor Density (lb/cu ft):	0.0487
Vapor Space Expansion Factor:	0.1431
Vented Vapor Saturation Factor:	0.6822
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	87.1642
Tank Diameter (ft):	4.4000
Effective Diameter (ft):	7.1025
Vapor Space Outage (ft):	2.2000
Tank Shell Length (ft):	9.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0487
Vapor Molecular Weight (lb/lb-mole):	67.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	3.9950
Daily Avg. Liquid Surface Temp. (deg. R):	512.4830
Daily Average Ambient Temp. (deg. F):	50.9208
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	510.6108
Tank Paint Solar Absorptance (Shell):	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	1,400.5355
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.1431
Daily Vapor Temperature Range (deg. R):	23.7125
Daily Vapor Pressure Range (psia):	0.9596
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	3.9950
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	3.5384
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	4.4980
Daily Avg. Liquid Surface Temp. (deg R):	512.4830
Daily Min. Liquid Surface Temp. (deg R):	506.5548
Daily Max. Liquid Surface Temp. (deg R):	518.4111
Daily Ambient Temp. Range (deg. R):	23.6750
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.6822
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	3.9950
Vapor Space Outage (ft):	2.2000
Working Losses (lb):	246.4222
Vapor Molecular Weight (lb/lb-mole):	67.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	3.9950
Annual Net Throughput (gal/yr.):	52,000.0000
Annual Turnovers:	52.0000
Turnover Factor:	0.7436
Tank Diameter (ft):	4.4000
Working Loss Product Factor:	1.0000
Total Losses (lb):	397.6356

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

TG1 - Horizontal Tank
Malheur County, Oregon

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Gasoline (RVP 9)	246.42	151.21	397.64

Mine Site Diesel Tank #1

TANKS 4.0 Report

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification	
User Identification:	TD3
City:	Malheur County
State:	Oregon
Company:	Paramount Gold Nevada Corp.
Type of Tank:	Vertical Fixed Roof Tank
Description:	Mine Site Diesel Tank #2
Tank Dimensions	
Shell Height (ft):	10.00
Diameter (ft):	10.00
Liquid Height (ft) :	8.51
Avg. Liquid Height (ft):	5.00
Volume (gallons):	5,000.00
Turnovers:	48.00
Net Throughput(gal/yr):	240,000.00
Is Tank Heated (y/n):	N
Paint Characteristics	
Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good
Roof Characteristics	
Type:	Dome
Height (ft)	1.00
Radius (ft) (Dome Roof)	10.00
Breather Vent Settings	
Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Boise, Idaho (Avg Atmospheric Pressure = 13.28 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

TD3 - Vertical Fixed Roof Tank
Malheur County, Oregon

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Distillate fuel oil no. 2	All	52.81	46.88	58.74	50.94	0.0051	0.0041	0.0062	130.0000			188.00	Option 1: VP50 = .0045 VP60 = .0065

Mine Site Diesel Tank #1 - continued

TANKS 4.0 Report

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

TD3 - Vertical Fixed Roof Tank
Malheur County, Oregon

Annual Emission Calcaulations	
Standing Losses (lb):	0.7907
Vapor Space Volume (cu ft):	432.4926
Vapor Density (lb/cu ft):	0.0001
Vapor Space Expansion Factor:	0.0419
Vented Vapor Saturation Factor:	0.9985
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	432.4926
Tank Diameter (ft):	10.0000
Vapor Space Outage (ft):	5.5067
Tank Shell Height (ft):	10.0000
Average Liquid Height (ft):	5.0000
Roof Outage (ft):	0.5067
Roof Outage (Dome Roof)	
Roof Outage (ft):	0.5067
Dome Radius (ft):	10.0000
Shell Radius (ft):	5.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0001
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0051
Daily Avg. Liquid Surface Temp. (deg. R):	512.4830
Daily Average Ambient Temp. (deg. F):	50.9208
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	510.6108
Tank Paint Solar Absorptance (Shell):	0.1700
Tank Paint Solar Absorptance (Roof):	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	1,400.5355
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0419
Daily Vapor Temperature Range (deg. R):	23.7125
Daily Vapor Pressure Range (psia):	0.0022
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0051
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0041
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0062
Daily Avg. Liquid Surface Temp. (deg R):	512.4830
Daily Min. Liquid Surface Temp. (deg R):	506.5548
Daily Max. Liquid Surface Temp. (deg R):	518.4111
Daily Ambient Temp. Range (deg. R):	23.6750
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9985
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0051
Vapor Space Outage (ft):	5.5067
Working Losses (lb):	2.9773
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0051
Annual Net Throughput (gal/yr.):	240,000.0000
Annual Turnovers:	48.0000
Turnover Factor:	0.7917
Maximum Liquid Volume (gal):	5,000.0000
Maximum Liquid Height (ft):	8.5103
Tank Diameter (ft):	10.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	3.7680

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

TD3 - Vertical Fixed Roof Tank
Malheur County, Oregon

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	2.98	0.79	3.77

Mine Site Diesel Tank #2

TANKS 4.0 Report

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	TD4
City:	Malheur County
State:	Oregon
Company:	Paramount Gold Nevada Corp.
Type of Tank:	Horizontal Tank
Description:	Mine Site Diesel Tank #3

Tank Dimensions

Shell Length (ft):	12.00
Diameter (ft):	6.00
Volume (gallons):	2,200.00
Turnovers:	1.36
Net Throughput(gal/yr):	3,000.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Boise, Idaho (Avg Atmospheric Pressure = 13.28 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

TD4 - Horizontal Tank
Malheur County, Oregon

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Distillate fuel oil no. 2	All	52.81	46.88	58.74	50.94	0.0051	0.0041	0.0062	130.0000			188.00	Option 1: VP50 = .0045 VP60 = .0065

Mine Site Diesel Tank #2 - continued

TANKS 4.0 Report

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

TD4 - Horizontal Tank
Malheur County, Oregon

Annual Emission Calcaulations	
Standing Losses (lb):	0.3954
Vapor Space Volume (cu ft):	216.1096
Vapor Density (lb/cu ft):	0.0001
Vapor Space Expansion Factor:	0.0419
Vented Vapor Saturation Factor:	0.9992
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	216.1096
Tank Diameter (ft):	6.0000
Effective Diameter (ft):	9.5770
Vapor Space Outage (ft):	3.0000
Tank Shell Length (ft):	12.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0001
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0051
Daily Avg. Liquid Surface Temp. (deg. R):	512.4830
Daily Average Ambient Temp. (deg. F):	50.9208
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	510.6108
Tank Paint Solar Absorptance (Shell):	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	1,400.5355
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0419
Daily Vapor Temperature Range (deg. R):	23.7125
Daily Vapor Pressure Range (psia):	0.0022
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0051
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0041
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0062
Daily Avg. Liquid Surface Temp. (deg R):	512.4830
Daily Min. Liquid Surface Temp. (deg R):	506.5548
Daily Max. Liquid Surface Temp. (deg R):	518.4111
Daily Ambient Temp. Range (deg. R):	23.6750
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9992
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0051
Vapor Space Outage (ft):	3.0000
Working Losses (lb):	0.0470
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0051
Annual Net Throughput (gal/yr.):	3,000.0000
Annual Turnovers:	1.3636
Turnover Factor:	1.0000
Tank Diameter (ft):	6.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	0.4424

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

TD4 - Horizontal Tank
Malheur County, Oregon

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	0.05	0.40	0.44

Air Sciences Inc.	PROJECT TITLE: Grassy Mountain Mine	BY: M. Mavko
AIR EMISSION CALCULATIONS	PROJECT NO: 343-1	PAGE: 1 OF: 26 SHEET: Mine
	SUBJECT: Mining Activity Emissions	DATE: July 26, 2019

Mining Scenario Ore

Mining Activity Emissions Emissions Summary

By Area/Model ID

Area/ Model ID	Location of Activity	PM ton/yr (PM_TPY)	PM10 lb/day (PM10_PPD)	PM10 ton/yr (PM10_TPY)	PM2.5 lb/day (PM2.5_PPD)	PM2.5 ton/yr (PM2.5_TPY)	CO lb/hr (CO_PPH)	CO ton/yr (CO_TPY)	NOX lb/hr (NOX_PPH)	NOX ton/yr (NOX_TPY)	SO2 lb/hr (SO2_PPH)	SO2 ton/yr (SO2_TPY)	VOC ton/yr (VOC_TPY)
UG	Underground Activity	30.50	77.43	8.05	14.28	1.48	89.14	24.59	17.36	5.86	0.01	0.03	1.14
BRW	Borrow Activities	1.24	5.86	0.76	2.14	0.28	2.69	4.20	4.12	6.42	0.01	0.01	6.42
BRW_BLAST	Borrow Blasting	0.06	2.57	0.03	0.15	0.00	175.88	2.29	4.73	0.06	0.01	0.00	--
STK	Ore Stockpile	0.17	0.72	0.09	0.18	0.02	0.68	1.70	0.07	0.18	0.00	0.00	0.08
HR-BRW	Borrow Pit Hauling	5.56	14.15	1.47	1.42	0.15	--	--	--	--	--	--	--
HR-PC	Process Area Hauling	3.04	7.73	0.80	0.77	0.08	--	--	--	--	--	--	--
WRSF	WRSF	0.16	0.66	0.08	0.10	0.01	--	--	--	--	--	--	--
CRF	CRF Stockpile	0.08	0.30	0.04	0.05	0.01	--	--	--	--	--	--	--
TS1	Topsoil Storage 1	0.02	0.07	0.01	0.01	0.00	--	--	--	--	--	--	--
TS2	Topsoil Storage 2	0.01	0.03	0.00	0.00	0.00	--	--	--	--	--	--	--
HR	Aboveground Haul Roads	9.08	23.87	2.76	4.80	0.53	2.50	6.24	2.32	5.79	0.00	0.01	4.54
Total		49.92	133.40	14.10	23.89	2.56	270.89	39.02	28.60	18.32	0.03	0.05	12.18

See worksheet ROADS for haul road (HR) emissions by Model ID.

By Activity

Activity	PM ton/yr (chk)	PM10 lb/day (chk)	PM10 ton/yr (chk)	PM2.5 lb/day (chk)	PM2.5 ton/yr (chk)	CO lb/hr (chk)	CO ton/yr (chk)	NOX lb/hr (chk)	NOX ton/yr (chk)	SO2 lb/hr (chk)	SO2 ton/yr (chk-17)	VOC ton/yr (chk)
Underground Drilling	0.02	0.11	0.01	0.017	0.0018							
Borrow Drilling	0.85	3.38	0.44	0.195	0.025							
Underground Blasting	0.05	0.24	0.03	0.014	0.0015	82.73	8.60	15.67	1.63	--	--	
Borrow Blasting	0.06	2.57	0.03	0.15	0.0019	175.88	2.29	4.73	0.06	9.5E-03	1.2E-04	
Onsite Hauling	31.20	79.41	8.26	7.94	0.826							
Material Load / Unload	0.11	0.52	0.05	0.078	0.0081							
Material Load / Unload UG	0.04	0.16	0.02	0.025	0.0026							
Mobile Tailpipes	0.57	4.99	0.57	4.61	0.528	5.87	12.14	6.51	12.40	0.01	0.02	11.05
Mobile Tailpipes UG	0.39	3.75	0.39	2.40	0.249	6.41	15.99	1.70	4.23	0.01	0.03	1.14
Dozing	5.44	9.99	1.04	5.49	0.571							
Grading	5.45	15.73	1.64	1.63	0.17							
Water Truck Travel	5.27	10.72	1.39	1.07	0.139							
Wind Erosion	0.47	1.81	0.24	0.271	0.035							
Total	49.92	133.40	14.10	23.89	2.56	270.89	39.02	28.60	18.32	0.03	0.05	12.18

Air Sciences Inc.	PROJECT TITLE: Grassy Mountain Mine	BY: M. Mavko
	PROJECT NO: 343-1	PAGE: 2 OF: 26 SHEET: Mine
AIR EMISSION CALCULATIONS	SUBJECT: Mining Activity Emissions	DATE: July 26, 2019

Mining Scenario Ore

Mining Activity Emissions Source Parameters Summary

		TYPE	UTM_E	UTM_N	ELEV_M	RELHT_M	SIG_Y_M	SIG_Z_M	SXINIT_M	SYINIT_M	ANGL_DEG
	Location of	Source	UTM NAD 83		Elev.	Rel. Ht.	S-y	S-z	X-init.	Y-init.	Angle
Model ID	Activity	Type	E m	N m	m	m	m	m	m	m	deg
UG	Underground	POINT	471,034	4,835,236	1,209.0	3.0	*point*	*point*	*point*	*point*	*point*
BRW	Borrow	AREA	471,613	4,834,706	1,185.3	2.3	*area*	2.1	222.1	1,013.6	1.9
BRW_BLAST	Borrow Blasting	VOLUMI	471,725	4,835,153	1,185.3	75.0	20.9	34.9	*volume*	*volume*	*volume*
WRSF	WRSF	VOLUME	470,608	4,835,502	1,113.7	2.3	55.1	2.1	*volume*	*volume*	*volume*
STK	Ore Stockpile	VOLUME	470,945	4,835,633	1,137.0	2.3	7.2	2.1	*volume*	*volume*	*volume*
CRF	CRF Stockpile	VOLUME	470,903	4,835,531	1,140.3	2.3	4.9	2.1	*volume*	*volume*	*volume*
TS1	Topsoil Storage 1	AREA	470,129	4,835,233	1,108	-	*area*	-	110.4	195.7	14.4
TS2	Topsoil Storage 2	AREA	470,538	4,836,301	1,084	-	*area*	-	54.4	215.2	44.3
HR	Aboveground Hauling	LINE	See worksheet: ROADS			2.3	9.9	2.1	*volume*	*volume*	*volume*
TAILS	Tailings Storage Facility	AREA	470,070	4,835,804	1,103	-	*area*	-	*399.8*	*881.1*	*54.1*
POND	Tailings Pipeline Reclaim Pond	AREA	470,692	4,836,296	1,076	-	*area*	-	*100.0*	*100.0*	*10.5*
DETOX1	CN Detoxification Tank 1	AREA	471,067	4,835,689	1,131	5.8	*area*	-	4.2	4.2	-
DETOX2	CN Detoxification Tank 2	AREA	471,073	4,835,689	1,131	5.8	*area*	-	4.2	4.2	-
CILTANK1	CIL Tank 1	AREA	471,038	4,835,680	1,131	7.8	*area*	-	*6.4*	*6.4*	-
CILTANK2	CIL Tank 2	AREA	471,043	4,835,688	1,131	7.8	*area*	-	*6.4*	*6.4*	-
CILTANK3	CIL Tank 3	AREA	471,047	4,835,680	1,131	7.8	*area*	-	*6.4*	*6.4*	-
CILTANK4	CIL Tank 4	AREA	471,051	4,835,688	1,131	7.8	*area*	-	*6.4*	*6.4*	-
CILTANK5	CIL Tank 5	AREA	471,055	4,835,680	1,131	7.8	*area*	-	*6.4*	*6.4*	-
CILTANK6	CIL Tank 6	AREA	471,059	4,835,688	1,131	7.8	*area*	-	*6.4*	*6.4*	-
CILTANK7	CIL Tank 7	AREA	471,063	4,835,680	1,131	7.8	*area*	-	*6.4*	*6.4*	-

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Mining Scenario Ore

Pit and Tunnel Drilling

Activity Information

Underground schedule	208	day/yr	24	hrs/day	*(MDA 2018) p. 168*
Underground Blast sched.	54	holes/blast	3	hrs/cycle	*(MDA 2018) p. 158*
Borrow schedule	260	day/yr	12	hrs/day	*(Dyer 2019.04.26)*
Borrow Pit Blast sched.	50	holes/blast	1,300	holes/yr	*(Dyer 2019.04.26)*

Annual LOM-Ore rates			Material blasted			Drilling	
Underground	1,400	ton/day	291,200	ton/yr	*(MDA 2018) p. 6*	89,856	hole/yr
Borrow	1,115	ton/day	289,800	ton/yr	*(Dyer 2019.04.26)*	1,300	hole/yr
Total			581,000	ton/yr		91,156	hole/yr

Emission Factors	Underground			Borrow		
TSP (PM)				1.3	lb/hole	*(EPA 1995), Tab. 11.9-4, 7/98 (overburden)*
PM10	0.00008	lb/ton	*(EPA 1995), Table 11.19.2-2, 8/04*			
PM Scaling Factors						
PM	0.74		*(EPA 1995), Sec. 13.2.4-4, 11/06*	1		
PM10	0.35		*(EPA 1995), Sec. 13.2.4-4, 11/06*	0.52		*(EPA 1995), Tab. 11.9-1, 7/98 (blasting, overburden)*
PM2.5	0.053		*(EPA 1995), Sec. 13.2.4-4, 11/06*	0.03		*(EPA 1995), Tab. 11.9-1, 7/98 (blasting, overburden)*

Underground drilling will be a wet process: (MDA 2018) p. 154

Emissions by Model ID

		PM_TPY	PM10_PPD	PM10_TPY	PM2.5_PPD	PM2.5_TPY
		PM	PM10		PM2.5	
Model ID	Activity	ton/yr	lb/day	ton/yr	lb/day	ton/yr
UG	Underground Drilling	0.025	0.11	0.012	0.017	0.0018
BRW	Borrow Drilling	0.85	3.4	0.44	0.20	0.025
Total	Pit and Tunnel Drilling	0.87	3.5	0.45	0.21	0.027

Source Parameters [(1)]

		TYPE	UTM_E	UTM_N	ELEV_M	FLOW_MPS	DIA_M	TEMP_K	RELHT_M
		Source	UTM NAD 83		Elev.	Vel.	Dia.	Temp	Ht
Model ID	Activity	Type	E m	N m	m	mps	m	K	m
UG	Underground	POINT	471,034	4,835,236	1,209	7.07	6.78	298.15	3

[(1)] *UTM, Elev. - (Wolverson 2019.03.17); Stack Params: (MDA 2018) page 153*

Source Parameters [(1)]

		TYPE	UTM_E	UTM_N	ELEV_M	RELHT_M	SIG_Z_M	SXINIT_M	SYINIT_M	ANGL_DEG		Area
		Source	UTM NAD 83		Elev.	Rel. Ht.	S-z	Pit X	Pit Y	Angle	WCB	
[(1)] *Model ID*	Activity	Type	E m	N m	m	m	m^3	m	m	deg	deg	
BRW	Borrow	AREA	471,613	4,834,706	1,185	2.27	2.11	222.1	1013.6	1.9	88.09	225067.6595

UTM, Elev., Pit Vol. - (Wolverson 2019.03.17); Rel. Ht. - (EPA 2012); Pit X, Pit Y, Angle - best-fit equal area rectangle

Conversions

2,000	lb/ton
3.28084	ft/m
60	sec/min

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Mining Scenario Ore

Open Pit and Underground Blasting

Activity Information

Underground schedule	208	day/yr	24	hr/day	*(MDA 2018) p. 168*
Underground Blasting	260	ft^2/blast	8	blast/da	*(MDA 2018) pp. 158, 168*
Borrow Schedule	260	day/yr	12	hr/day	*(Dyer 2019.04.26)*
Borrow Blasting	100	ft^2/hole	50	holes/bl	*(Dyer 2019.04.26)*

Annual LOM-Ore rates	Material blasted		Blasting		ANFO/emulsion use		
Underground	291,200	ton/yr	1,664	blast/yr	529	ton emulsion/yr	*(MDA 2018) p. 159*
Borrow	289,800	ton/yr	26	blast/yr	68	ton ANFO/yr	*(Dyer 2019.04.26)*
Total	581,000	ton/yr	1,690	blast/yr			

Emission Factors

	Underground			Borrow		
A = Area per blast	260	ft^2		5,000	ft^2	TSP (lb/blast) = 0.000014 x $A^{1.5}$
TSP (PM)	0.06	lb/blast		4.95	lb/blast	*(EPA 1995), Tab. 11.9-1, 7/98 (blasting, overburden)*
CO	32.53	lb/ton-emulsion	*(NIOSH n.d.)*	67	lb/ton-ANFO	*(EPA 1995), Tab. 13.3-1, 2/80 (ANFO)*
NOX	6.16	lb/ton-emulsion	*(NIOSH n.d.)*	0.9	kg/t-ANFO	*(CSIRO 2008)*
				1.8	lb/ton-ANFO	
SO2	0.0	lb/ton-emulsion		3.6E-03	lb/ton-ANFO	
				Based on:	6%	*diesel content in ANFO (NIOSH n.d.)*

1.5E-05 ~~lb S~~	2 lb SO2	6% ~~lb FO~~	2,000 ~~lb ANFO~~	=	3.6E-03 lb SO2
~~lb FO~~	~~lb S~~	~~lb ANFO~~	ton ANFO		ton ANFO

PM Scaling Factors

PM10	0.52	*(EPA 1995), Tab. 11.9-1, 7/98 (blasting, overburden)*
PM2.5	0.03	*(EPA 1995), Tab. 11.9-1, 7/98 (blasting, overburden)*

Emissions by Model ID

		PM_TPY	PM10_PPD	PM10_TPY	PM2.5_PPD	PM2.5_TPY	CO_PPH	CO_TPY	NOX_PPH	NOX_TPY	SO2_PPH	SO2_TPY
		PM	PM10		PM2.5		CO		NOX[1]		SO2	
Model ID	Activity	ton/yr	lb/day	ton/yr	lb/day	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
UG	Underground Blasting	0.049	0.24	0.025	0.014	0.0015	82.7	8.6	15.67	1.6	0.0E+0	0.0E+0
BRW_BLAST	Borrow Blasting	0.064	2.6	0.033	0.15	0.0019	176	2.3	4.7	0.061	0.0095	1.2E-4
Total	Blasting	0.11	2.8	0.059	0.16	0.0034	259	10.9	20.4	1.7	0.0095	0.0001

(1) *NO2/NOX:* 0.0357 *(CSIRO 2008)*

Source Parameters (1)

		TYPE	UTM_E	UTM_N	ELEV_M	RELHT_M	SIG_Y_M	SIG_Z_M
		Source	UTM NAD 83		Elev.	Rel. Ht.	S-y	S-z
Model ID	Activity	Type	E m	N m	m	m	m	m
BRW_BLAST	Borrow Blasting	VOLUME	471,725	4,835,153	1,185	75	20.93	34.88

(1) *UTM, Elev. - (Wolverson 2019.03.17); Rel. Ht. - (CSIRO 2008); S-y, S-z factors - (EPA 2016)*

Source Parameters (1)

		TYPE	UTM_E	UTM_N	ELEV_M	FLOW_MPS	DIA_M	TEMP_K	RELHT_M
		Source	UTM NAD 83		Elev.	Flow	Dia.	Temp	Ht
Model ID	Activity	Type	E m	N m	m	mps	m	K	m
UG	Underground Blasting	POINT	471,034	4,835,236	1,209	7.07	6.78	298.15	3

(1) *UTM, Elev. - (Wolverson 2019.03.17); Stack Params: (MDA 2018) page 153*

Conversions						Sigma divider			
		Blast height (BH)	150	m	*(CSIRO 2008)*				
2,000	lb/ton	Blast width	90	m	*(CSIRO 2008)*	Rel. Ht.	2	of BH	*(EPA 2016)*
2.205	lb/kg	Blast depth	90	m	*(CSIRO 2008)*	S-y	4.3	of SL	*(EPA 2016)*
1.102	ton/t	Equal area side length (SL)	90	m		S-z	4.3	of BH	*(EPA 2016)*

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Mining Scenario Ore
Onsite Hauling

Activity Information

Operating schedule	208	day/yr	*(MDA 2018) p. 168*
Percent backfill as CRF	46%		*(MDA 2018) p. 139*

Hauling Routes, Production Rates and Distances

	Route Origin		Destination		Material Type	Material Hauled [1] Rate ton/yr	One-Way Hauling [2] mi	Truck Loads [3] load/yr	Total Travel [4] VMT/yr
	Unpaved Roads								
PC-WRSF	Portal Cut	PC	WRSF	WRSF	Rock	1,500	0.23	46	21
PC-STK	Portal Cut	PC	Ore Stockpile	STK	Ore	289,700	0.15	8,761	2,711
UG-PC	Underground	UG	Portal Cut	PC	Ore	289,700	2.27	8,761	39,823
UG-PC	Underground	UG	Portal Cut	PC	Rock	1,500	2.27	46	209
BRW-WRSF	Borrow	BRW	WRSF	WRSF	Rock	289,800	1.02	6,412	13,072
WRSF-PC	WRSF	WRSF	Portal Cut	PC	Rock	157,302	0.23	4,757	2,215
WRSF-CRF	WRSF	WRSF	CRF Stockpile	CRF	Rock	133,998	0.21	4,053	1,696
CRF-PC	CRF Stockpile	CRF	Portal Cut	PC	Rock	133,998	0.06	4,053	499
UGP-UG	UG Portal	UGP	Underground	UG	Rock	291,300	2.27	8,809	40,041
	Total					######	8.73		100,287
					Aboveground Subtotal		4.18		
					Underground Subtotal		4.55		

[1] *(MDA 2018) p. 164*
[2] *(Wolverson 2019.03.17); Underground: (MDA 2018) p. 166*
[3] *See truck fleet information below.*
[4] *Truck loads × One-way hauli* 2 *(round-trip)*

Truck Fleet

Truck		Payload Capacity [1] ton	Empty Weight [1] ton	Operation [2] hr/yr	Average Weight ton
Cat AD30	Mine	33.07	31.8	13,980	48.4
Cat 745C	Borrow	45.2	36.8	9,360	59.4
Weighted Average		37.9			52.8

[1] *(Caterpillar 2018)*
[2] *Cat AD30: (MDA 2018) p. 167; Cat 745: Borrow Schedule 3 units.*

Conversions
2,000 lb/ton
5,280 ft/mi

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Mining Scenario Ore

Onsite Hauling - continued

Hauling Emissions by Route

	Route Origin		Destination		Material Hauled Material Type	PM_TPY PM ton/yr	PM10_PPD PM10 lb/day	PM10_TPY PM10 ton/yr	PM2.5_PPD PM2.5 lb/day	PM2.5_TPY PM2.5 ton/yr
	Unpaved Roads									
PC-WRSF	Portal Cut	PC	WRSF	WRSF	Rock	0.0091	0.023	0.0024	0.0023	2.4E-4
PC-STK	Portal Cut	PC	Ore Stockpile	STK	Ore	1.2	2.9	0.31	0.29	0.031
UG-PC	Underground	UG	Portal Cut	PC	Ore	11.2	28.6	3.0	2.9	0.30
UG-PC	Underground	UG	Portal Cut	PC	Rock	0.059	0.15	0.016	0.015	0.0016
BRW-WRSF	Borrow	BRW	WRSF	WRSF	Rock	5.6	14.2	1.5	1.4	0.15
WRSF-PC	WRSF	WRSF	Portal Cut	PC	Rock	0.94	2.4	0.25	0.24	0.025
WRSF-CRF	WRSF	WRSF	CRF Stockpile	CRF	Rock	0.72	1.8	0.19	0.18	0.019
CRF-PC	CRF Stockpile	CRF	Portal Cut	PC	Rock	0.21	0.54	0.056	0.054	0.0056
UGP-UG	UG Portal	UGP	Underground	UG	Rock	11.3	28.8	3.0	2.9	0.30
	Pit Subtotal					31.2	79.4	8.3	7.9	0.83

Aboveground Emission Factors

Emission factor equation	$E = k(s/12)^a (W/3)^b [(365-P)/365]$				*(EPA 1995), Tab. 13.2.2-2, Eqs. 1a and 2, 11/06*
s = Surface material silt content	5.8 %				*(EPA 1995), Tab. 13.2.2-1 Taconite Mining*
W = Mean vehicle weight	59.4 ton				
P = Days/year with ≥0.01 in precip.	90 day/yr				*(EPA 1995), Fig. 13.2.2-1, 11/06*
	PM	PM10	PM2.5		
k = Size-specific empirical constant	4.9	1.5	0.15		*(EPA 1995), Tab. 13.2.2-2, Eqs. 1a and 2, 11/06*
a = Size-specific empirical constant	0.7	0.9	0.9		*(EPA 1995), Tab. 13.2.2-2, Eqs. 1a and 2, 11/06*
b = Size-specific empirical constant	0.45	0.45	0.45		*(EPA 1995), Tab. 13.2.2-2, Eqs. 1a and 2, 11/06*
E = Size-specific emission factor	8.51	2.25	0.225	lb/VMT	

Aboveground Emission Controls

Aboveground unpaved roads - periodic application of water and chemical dust suppressant

Control efficiency: 90% *(Air Sciences 2018)*

Underground Emission Factors

Emission factor equation	$E = k(s/12)^a (W/3)^b$				*(EPA 1995), Tab. 13.2.2-2, Eq. 1a, 11/06*
	PM	PM10	PM2.5		
k = Size-specific empirical constant	4.9	1.5	0.15		
a = Size-specific empirical constant	0.7	0.9	0.9		
b = Size-specific empirical constant	0.45	0.45	0.45		
E = Size-specific emission factor	11.29	2.99	0.299	lb/VMT	

Underground Emission Controls

Control efficiency: 95% *AP-42, Fig. 13.2.2-2, 11/06*

Since dewatering is needed assume maximum control (wet conditions) (MDA 2018) p. 155

Conversions

2,000 lb/ton

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Mining Scenario Ore
Onsite Hauling - continued

Underground Emissions Comparison

Umax = PM2.5 conc. from Rock Dust in an underground gold mine	72.2	ug/m3	*(McDonald et al. 2003), Tab. 4*
V= Through-flow ventilation	142	m3/sec	*(McDonald et al. 2003), p. 387*
Production rate	1,300	tons/day	*(McDonald et al. 2003), p. 387*
Underground Rock Dust Emissions Rate (URDER)	$V * (U_{max}) * (sec/day) / (tons/day) / (g/lb) / (ug/g)$		

Summary of Underground Fugitive Emissions

Activity	PM2.5 lb/day		
Underground Hauling (95% CE)	5.8		
Underground load/unload (page 8)	0.025		
Underground Blasting	0.014		
Underground Drilling	0.017	URDER	0.0015 lb/ton
Total	5.8	Grassy Mtn	0.0041 lb/ton
Grassy Mtn. Production rate	1,400 tons/day		

Emissions by Area

		chk	PM_TPY	PM10_PPD	PM10_TPY	PM2.5_PPD	PM2.5_TPY
		Travel	PM	PM10		PM2.5	
Area ID	Activity	VMT/yr	ton/yr	lb/day	ton/yr	lb/day	ton/yr
HR-BRW	Borrow Pit Hauling	13,072	5.56	14.15	1.47	1.42	0.15
UG	Underground Hauling	80,073	22.60	57.53	5.98	5.75	0.60
HR-PC	Process Area Hauling	7,143	3.04	7.73	0.80	0.77	0.08
Total		100,287	31.20	79.41	8.26	7.94	0.83

See worksheet ROADS for haul road (HR) emissions by Model ID.

Source Parameters [1]

		TYPE	UTM_E	UTM_N	ELEV_M	RELHT_M	SIG_Y_M	SIG_Z_M
		Source	UTM NAD 83		Elev.	Rel. Ht.	S-y	S-z
Model ID	Activity	Type	E m	N m	m	m	m	m
HR	Aboveground Hauling	LINE	*See worksheet: ROADS*			2.27	9.88	2.11

UTM, Elev. - (Wolverson 2019.03.17); Rel. Ht., Sy, Sz - (EPA 2012)

Source Parameters [1]

		TYPE	UTM_E	UTM_N	ELEV_M	FLOW_MPS	DIA_M	TEMP_K	RELHT_M
		Source	UTM NAD 83		Elev.	Flow	Dia.	Temp	Ht
Model ID	Activity	Type	E m	N m	m	mps	m	K	m
UG	Underground	POINT	471,034	4,835,236	1,209	7.07	6.78	298.15	3

\# *UTM, Elev. - (Wolverson 2019.03.17); Stack Params: (MDA 2018) page 153*

Truck	Height		Reference
Cat AD30	2.4	m	*(Caterpillar 2018)*
Cat 745C	3	m	*(Caterpillar 2018)*
Weighted	2.67	m	
Road width (RW)	15.2	m	*(Wolverson 2019.03.17)*

Plume Parameter	Calculatio	Value (m)	Const.
Plume top (PT) - unpaved	1.7 x VH	4.54	1.7
Release height - unpaved	0.5 x PT	2.27	0.5
Plume width (PW)	RW + 6 m	21.24	6
Sigma-z - unpaved	PT / 2.15	2.11	2.15
Sigma-y	PW / 2.1	9.88	2.15

(EPA 2012)

Conversions

2,000	lb/ton	453.59	g/lb
3.28	ft/m	86,400	sec/day
12	in/ft	1.E+06	ug/g

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Mining Scenario Ore

Material Load / Unload

Activity Information

Mine Operating schedule 208 day/yr

Throughput Rates

Model ID	Location of Activity	No. of Xfers	Rate ton/yr	Total Rate ton/yr	Xfer Description
UG	Underground	2	291,200	582,400	Load Ore/Rock & Unload Backfill
BRW	Borrow	1	289,800	289,800	Load
WRSF	WRSF	2	291,300	582,600	Unload from Borrow & Load to CRF
STK	Ore Stockpile	1	289,700	289,700	Unload
CRF	CRF Stockpile	2	133,998	267,996	Unload from WRSF & Load to Portal

Emission Factors

		PM	PM10	PM2.5		
k = Particle size multiplier		0.74	0.35	0.053		*(EPA 1995), Sec. 13.2.4, Pg. 4, 11/06*
E = Emission factor	Load	0.00021	0.0001	0.00002	lb/ton	*(EPA 1995), Tab. 11.19.2-2, 8/04 (truck loading - crshed stone)*
	Unload	0.00003	1.6E-05	0.000002	lb/ton	*(EPA 1995), Tab. 11.19.2-2, 8/04 (truck unloading - fragmented stone)*

Emissions by Model ID

		chk	PM_TPY	PM10_PPD	PM10_TPY	PM2.5_PPD	PM2.5_TPY
	Location of	Total Rate	PM	PM10		PM2.5	
Model ID	Activity	ton/yr	ton/yr	lb/day	ton/yr	lb/day	ton/yr
UG	Underground	582,400	0.036	0.16	0.017	0.025	0.0026
BRW	Borrow	289,800	0.031	0.14	0.014	0.021	0.0022
WRSF	WRSF	582,600	0.036	0.16	0.017	0.025	0.0026
STK	Ore Stockpile	289,700	0.031	0.14	0.014	0.021	0.0022
CRF	CRF Stockpile	267,996	0.016	0.07	0.008	0.011	0.0012
Total	Material Load / Unload	######	0.15	0.68	0.071	0.10	0.011

Conversions

2.237 mi/hr per m/s

2,000 lb/ton

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Mining Scenario Ore

Material Load / Unload - continued

Source Parameters [(1)]

		TYPE	UTM_E	UTM_N	ELEV_M	RELHT_M	SIG_Z_M	SXINIT_M	SYINIT_M	ANGL_DEG	
	Location of	Source	UTM NAD 83		Elev.	Rel. Ht.	S-z	Pit X	Pit Y	Angle	WCB
Model ID	Activity	Type	E m	N m	m	m	m^3	m	m	deg	deg
BRW	Borrow	AREA	471,613	4,834,706	1,185	2.27	2.11	222.1	1,013.6	1.9	88.09

[(1)] *UTM, Elev., Pit Vol. - (Wolverson 2019.03.17); Rel. Ht. - (EPA 2012); Pit X, Pit Y, Angle - best-fit equal area rectangle*

Source Parameters [(1)]

		TYPE	UTM_E	UTM_N	ELEV_M	RELHT_M	SIG_Y_M	SIG_Z_M	Surface	
	Location of	Source	UTM NAD 83		Elev.	Rel. Ht.	S-y	S-z	Area	Length
Model ID	Activity	Type	E m	N m	m	m	m	m	m^2	m
WRSF	WRSF	VOLUME	470,608	4,835,502	1,114	2.27	55.08	2.11	56,089	236.8
STK	Ore Stockpile	VOLUME	470,945	4,835,633	1,137	2.27	7.25	2.11	971	31.2
CRF	CRF Stockpile	VOLUME	470,903	4,835,531	1,140	2.27	4.91	2.11	445	21.1

[(1)] *UTM, Elev., Area - (Wolverson 2019.03.17); Rel. Ht. - (Caterpillar 2018); S-y, S-z factors - (Wolverson 2019.03.17)*

Source Parameters [(1)]

		TYPE	UTM_E	UTM_N	ELEV_M	FLOW_MPS	DIA_M	TEMP_K	RELHT_M
		Source	UTM NAD 83		Elev.	Flow	Dia.	Temp	Ht
Model ID	Activity	Type	E m	N m	m	mps	m	K	m
UG	Underground	POINT	471,034	4,835,236	1,209	7.07	6.78	298.15	3

[(1)] *UTM, Elev. - (Wolverson 2019.03.17); Stack Params: (MDA 2018) page 153*

Vehicle height (VH):
Weighted Average 2.67 m

Plume Parameter	Calculation	Value (m)	Const.
Plume top (PT)	1.7 x VH	4.54	1.7
Release height	0.5 x PT	2.27	0.5
Sigma-z	PT / 2.15	2.11	2.15

(EPA 2012)

Sample calculation for WRSF

Plume Parameter	Calculation	Value (m)	Const.
Surface area (SA)	Map	56,089	
Side length (SL)	SA^0.5	236.8	0.5
Sigma-y	SL / 4.3	55.08	4.3

(EPA 2016)

Conversions
4,047 m2/acre

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Mining Scenario Ore

Mobile Equipment (Tailpipes)

Operating schedule	Underground schedule	208 day/yr	24 hrs/day
	Borrow schedule	260 day/yr	12 hrs/day

Mobile Equipment Specifications and Activity

Equipment[5,6+]	Equipment[1,5+] Model	ID	Rating hp	Rating kW	Oper. hr/yr	Equip. Count	Diesel gal/yr	Output[2] kW-hr/yr	Travel[3] VMT/yr	Equip. Cat.	MOVES[4] Class ID	LF
Drilling Development Juml	Sandvik DD21-40	EQP1	83	62 [11]	731 [5 6]	2 [5]	2,905 [12]	42,392		Non-road		94%
Bolter	Sandvik DS311	EQP2	83	62 [11]	466 [5]	1 [5]	1,853 [12]	27,043		Non-road		94%
LHD 5.2 yd3	Sandvik LH410	EQP3	315	235 [10]	4,428 [5]	4 [5]	37,432 [10]	546,305		Non-road		53%
Front-end Loader	Cat 926M	EQP4	153	114 [1]	2,220 [5]	1 [5]	5,994 [1]	87,480		Non-road		35%
Low Profile Truck	Cat AD30	EQP5	409	305 [1]	#####	3 [5]	######	2,234,164		Non-road		52%
Emulsion Loader	Paus Universa 50	EQP6	101	75 [13]	731	1[+]	3,565 [13]	52,031		Non-road		95%
Telehandler	Cat TL943D	EQP7	111	83 [1]	8,232 [5]	2 [5]	24,696 [1]+	360,430		Non-road		53%
Bulldozer	Cat D6T	EQP8	200	149 [1]	2,760 [5]	1 [5]	17,802 [1]	259,814		Non-road		63%
Motor Grader	Paus PG5HA	EQP9	101	75 [14]	2,796 [5]	1 [5]	13,640 [13]	199,067		Non-road		95%
Fuel Truck	F-650	EQP10	330 [15]	246	2,724 [5]	1 [5]	12,258[+]	178,901	68,100	On-road	MHD	27%
Service Truck	F-650	EQP11	330 [15]	246	1,944 [5]	1 [5]	8,748[+]	127,674	48,600	On-road	MHD	27%
Front-end Loader	Cat 988K	EQP12	579	432 [1]	3,120 [16]	1 [7]	32,448 [1]	473,567		Non-road		35%
Blast hole drill	Cat MD6420C	EQP13	912	680 [1]	3,120 [16]	1 [7]	42,120[+]	614,727		Non-road		29%
Articulated haul trucks	Cat 745C	EQP14	511	381 [1]	9,360 [16]	3 [7]	66,924 [1]	976,733		Non-road		27%
Man Van	F-350 (MV)	EQP15	440 [15]	328	4,992	2 [5]	7,488[+]	109,285	124,800	On-road	LHD45	7%
Pickup Truck	F-350	EQP16	440 [15]	328	9,984	4 [5]	9,984[+]	145,713	249,600	On-road	LHD45	4%
Front-end Loader	Cat 926M	EQP17	153	114 [1]	8,059 [8]	1 [5]	21,760 [1]	317,577		Non-road		35%
Water Truck	Cat 777G	EQP18	1,026	765 [1]	725[+]	1[+]	9,825 [1]	143,390		Non-road		26%
Forklift	Cat DP160N	EQP19	148	110 [9]	2,496	1 [5]	5,934 [9]	86,609		Non-road		32%
Motor Grader	Cat 160M	EQP20	213	159 [1]	2,496	1 [5]	11,232 [1]	163,927		Non-road		41%

[1] *(Caterpillar 2018)*

[2] *Based on:* 137,000 *BTU/gal* *(EPA 1995), App. A (Diesel)* 7,000 *BTU/hp-hr* *(EPA 1995), Sec. 3.3, (Diesel)*

[3] *Based on the following average speeds (mph), typical for mine sites:*

Fuel Truck	*F-650*	*25*
Service Truck	*F-650*	*25*
Man Van	*F-350 (MV)*	*25*
Pickup Truck	*F-350*	*25*

[4] *On-road vehicle codes and descriptions provided in MOVES2014b emission factors table (EPA 2018)*

[5] *(MDA 2018) pp. 166, 167, 217*

[6] *(Dyer 2019.03.29a)*

[7] *(Dyer 2019.03.29b)*

[8] *(Mills 2019.04.29)*

[9] *(Cat Lift Trucks 2008)*

(Sandvik 2017)

(Sandvik 2018)

(Deutz n.d. a)

(Deutz n.d. b)

(Paus 2013)

(Ford 2017)

(Dyer 2019.04.26)

[+] *Air Sciences recommended value/estimated from similar mine operations*

Underground drilling equipment tramming time:	*15%*	*(MDA 2018)*
Water Truck Utilization:	*12*	mph *(Li et al. 2008)*
Pickup/Van Utilization:	*50%*	*Air Sciences recommendation*
Forklift utilization:	*50%*	*Air Sciences recommendation*
Grader utilization (road maintenance):	*50%*	*Air Sciences recommendation*

VMT = Vehicle Miles Travelled

Conversions

7.05	lb/gal distillate oil
1.341	hp/kW
453.59	g/lb
0.2642	gal/L

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Mining Scenario Ore

Mobile Equipment (Tailpipes)
Operating schedule

EPA Non-Road Standards

ID	Equipment Type	Model[1] Year	Power Category	EPA Tier	Lookup ID	MOVES Class ID	EPA Non-Road Standards (g/kW-hr)[2] PM	CO	NOX	VOC
EQP1	Drill	>2018	56≤kW<75, Ph-in	4	T4-56≤kW<130 2015		0.02	5	0.4	0.19
EQP2	Support Truck	≥2018	56≤kW<75, Ph-in	4	T4-56≤kW<130 2015		0.02	5	0.4	0.19
EQP3	Loader	≥2018	130≤kW<560, Ph-ir	4	T4-130≤kW≤560 2015		0.02	3.5	0.4	0.19
EQP4	Loader	>2018	75≤kW<130, Ph-in	4	T4-56≤kW<130 2015		0.02	5	0.4	0.19
EQP5	Haul Truck	>2018	130≤kW<560, Ph-ir	4	T4-130≤kW≤560 2015		0.02	3.5	0.4	0.19
EQP6	Support Truck	>2018	75≤kW<130, Ph-in	4	T4-56≤kW<130 2015		0.02	5	0.4	0.19
EQP7	Forklift	>2018	56≤kW<75, Ph-in	4	T4-56≤kW<130 2015		0.02	5	0.4	0.19
EQP8	Dozer	>2018	130≤kW<560, Ph-ir	4	T4-130≤kW≤560 2015		0.02	3.5	0.4	0.19
EQP9	Grader	>2018	75≤kW<130, Ph-in	4	T4-56≤kW<130 2015		0.02	5	0.4	0.19
EQP10	Support Truck	>2018			No Standard	MHD				
EQP11	Support Truck	>2018			No Standard	MHD				
EQP12	Loader	>2010	225≤kW<450, ≤201	3	§89-225≤kW<450 200		0.2	3.5	4	4
EQP13	Drill	>2010	kW>560	2	§89-kW>560 2006		0.2	3.5	6.4	6.4
EQP14	Haul Truck	>2010	225≤kW<450, ≤201	3	§89-225≤kW<450 200		0.2	3.5	4	4
EQP15	Support Truck	>2018			No Standard	LHD45				
EQP16	Support Truck	>2018			No Standard	LHD45				
EQP17	Loader	>2018	130≤kW<560, Ph-ir	4	T4-130≤kW≤560 2015		0.02	3.5	0.4	0.19
EQP18	Water Truck	>2018	kW>560	4	T4-kW>560 2015		0.04	3.5	3.5	0.19
EQP19	Forklift	>2018	75≤kW<130, Ph-in	4	T4-56≤kW<130 2015		0.02	5	0.4	0.19
EQP20	Grader	>2018	130≤kW<560, Ph-ir	4	T4-130≤kW≤560 2015		0.02	3.5	0.4	0.19

(1) *(Dyer 2019.04.19)*
(2) *(CFR 2017)*

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Mining Scenario Ore

Mobile Equipment (Tailpipes) - continued
Fuel Sulfur-Content Based SO2 Emission Factor

Fuel Sulfur-Content	0.0015%		*Non-road diesel specification per 40 CFR 80.510*
Diesel Density	7.05	lb/gal	*(EPA 1995), App. A*
Molecular Wt. of SO2	64.064	lb/lb-mol	
Molecular Wt. of S	32.065	lb/lb-mol	
Diesel Heat Content	137,000	BTU/gal	*(EPA 1995), App. A (Diesel)*
Brake-Specific Fuel Use	7,000	BTU/hp-hr	*(EPA 1995), Sec. 3.3, (Diesel)*

SO2 emission factor:

0.000011 lb/hp-hr	0.0015% ~~lb S~~ / ~~lb Fuel~~	7.05 ~~lb Fuel~~ / ~~gal Fuel~~	64.064 lb SO2 / 32.065 ~~lb S~~	~~gal Fuel~~ / 137,000 ~~BTU~~	7,000 ~~BTU~~ / hp-hr
0.006567 g/kW-hr	0.000011 ~~lb~~ / ~~hp~~-hr	1.341 ~~hp~~ / kW	453.593 g / ~~lb~~		

EPA MOVES 2014b Emission Factors[1]

Vehicle Class	Description	PM	PM10	PM2.5	CO	NOX	VOC	SO2
		Emission Factor (g/VMT)[2]						
LHD45	Single Unit Truck 14k-19.5k lb, Diesel	0.680	0.680	0.375	2.311	6.019	0.884	0.011
MHD	Single Unit Truck 19.5k-33k lb, Diesel	0.924	0.924	0.498	2.725	7.218	1.097	0.011

(1) *MOVES 2014b run dated 2019-07-10*
(2) *PM = PM10*

EPA Engine Certification Data

ID	Lookup I Engine Description			PM	PM10	PM2.5	CO	NOX	VOC
				Emission Factor (g/kW-hr)					
	EPA_Cert	hp	(1)						
	EPA_Cert	hp	(1)						

(1)

Conversions
1.341 hp/kW
453.593 g/lb

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Mining Scenario Ore

Mobile Equipment (Tailpipes) - continued

Final Emission Factors

ID	Lookup	PM	PM10	PM2.5	CO	NOX	VOC	SO2	EF Unit	Final EF	Activity	
EQP1	T4-56≤kW<130 2015	0.02	0.02	0.02	5.00	0.40	0.19	0.007	g/kW-hr	*EPA_NRS*	42,392	kW-hr/yr
EQP2	T4-56≤kW<130 2015	0.02	0.02	0.02	5.00	0.40	0.19	0.007	g/kW-hr	*EPA_NRS*	27,043	kW-hr/yr
EQP3	T4-130≤kW≤560 2015	0.02	0.02	0.02	3.50	0.40	0.19	0.007	g/kW-hr	*EPA_NRS*	546,305	kW-hr/yr
EQP4	T4-56≤kW<130 2015	0.02	0.02	0.02	5.00	0.40	0.19	0.007	g/kW-hr	*EPA_NRS*	87,480	kW-hr/yr
EQP5	T4-130≤kW≤560 2015	0.02	0.02	0.02	3.50	0.40	0.19	0.007	g/kW-hr	*EPA_NRS*	######	kW-hr/yr
EQP6	T4-56≤kW<130 2015	0.02	0.02	0.02	5.00	0.40	0.19	0.007	g/kW-hr	*EPA_NRS*	52,031	kW-hr/yr
EQP7	T4-56≤kW<130 2015	0.02	0.02	0.02	5.00	0.40	0.19	0.007	g/kW-hr	*EPA_NRS*	360,430	kW-hr/yr
EQP8	T4-130≤kW≤560 2015	0.02	0.02	0.02	3.50	0.40	0.19	0.007	g/kW-hr	*EPA_NRS*	259,814	kW-hr/yr
EQP9	T4-56≤kW<130 2015	0.02	0.02	0.02	5.00	0.40	0.19	0.007	g/kW-hr	*EPA_NRS*	199,067	kW-hr/yr
EQP10	MHD	0.92	0.92	0.50	2.72	7.22	1.10	0.011	g/VMT	*EPA_MOVES2014b*	68,100	VMT/yr
EQP11	MHD	0.92	0.92	0.50	2.72	7.22	1.10	0.011	g/VMT	*EPA_MOVES2014b*	48,600	VMT/yr
EQP12	§89-225≤kW<450 2006	0.20	0.20	0.20	3.50	4.00	4.00	0.007	g/kW-hr	*EPA_NRS*	473,567	kW-hr/yr
EQP13	§89-kW>560 2006	0.20	0.20	0.20	3.50	6.40	6.40	0.007	g/kW-hr	*EPA_NRS*	614,727	kW-hr/yr
EQP14	§89-225≤kW<450 2006	0.20	0.20	0.20	3.50	4.00	4.00	0.007	g/kW-hr	*EPA_NRS*	976,733	kW-hr/yr
EQP15	LHD45	0.68	0.68	0.37	2.31	6.02	0.88	0.011	g/VMT	*EPA_MOVES2014b*	124,800	VMT/yr
EQP16	LHD45	0.68	0.68	0.37	2.31	6.02	0.88	0.011	g/VMT	*EPA_MOVES2014b*	249,600	VMT/yr
EQP17	T4-130≤kW≤560 2015	0.02	0.02	0.02	3.50	0.40	0.19	0.007	g/kW-hr	*EPA_NRS*	317,577	kW-hr/yr
EQP18	T4-kW>560 2015	0.04	0.04	0.04	3.50	3.50	0.19	0.007	g/kW-hr	*EPA_NRS*	143,390	kW-hr/yr
EQP19	T4-56≤kW<130 2015	0.02	0.02	0.02	5.00	0.40	0.19	0.007	g/kW-hr	*EPA_NRS*	86,609	kW-hr/yr
EQP20	T4-130≤kW≤560 2015	0.02	0.02	0.02	3.50	0.40	0.19	0.007	g/kW-hr	*EPA_NRS*	163,927	kW-hr/yr

Final emission factor options:

Category	EF Unit	Activity Unit	Emission Unit	Multiplier
EPA_CERT	g/kW-hr	kW-hr/yr	ton/yr	1.10E-6
EPA_NRS	g/kW-hr	kW-hr/yr	ton/yr	1.10E-6
EPA_MOVES2014b	g/VMT	VMT/yr	ton/yr	1.10E-6

Conversions

453.6	g/lb
1.341	hp/kW
2,000	lb/ton

Mining Scenari Ore

Mobile Equipment (Tailpipes) - continued

Emissions by Area

			chk	chk	chk	chk	chk	chk	chk	chk	chk	chk	chk-17	chk
		Equipment	PM	PM10		PM2.5		CO		NOX		SO2		VOC
Area ID (	Equipn	Type	ton/yr	lb/day	ton/yr	lb/day	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	ton/yr
UG	EQP1	Drill	9.3E-4	0.0090	9.3E-4	0.0090	9.3E-4	0.094	0.23	0.0075	0.019	1.2E-4	3.1E-4	0.0089
UG	EQP2	Support Truck	6.0E-4	0.0057	6.0E-4	0.0057	6.0E-4	0.060	0.15	0.0048	0.012	7.8E-5	2.0E-4	0.0057
UG	EQP3	Loader	0.012	0.12	0.012	0.12	0.012	0.84	2.1	0.097	0.24	0.0016	0.0040	0.11
UG	EQP4	Loader	0.0019	0.019	0.0019	0.019	0.0019	0.193	0.48	0.015	0.039	2.5E-4	6.3E-4	0.018
HR-MINE	EQP5	Haul Truck	0.049	0.47	0.049	0.47	0.049	3.5	8.6	0.39	0.99	0.0065	0.016	0.47
UG	EQP6	Support Truck	0.0011	0.011	0.0011	0.011	0.0011	0.11	0.29	0.009	0.023	1.5E-4	3.8E-4	0.011
UG	EQP7	Forklift	0.0079	0.076	0.0079	0.076	0.0079	0.80	2.0	0.064	0.16	0.0010	0.0026	0.075
UG	EQP8	Dozer	0.0057	0.055	0.0057	0.055	0.0057	0.40	1.00	0.046	0.11	7.5E-4	0.0019	0.054
UG	EQP9	Grader	0.0044	0.042	0.0044	0.042	0.0044	0.44	1.1	0.035	0.088	5.8E-4	0.0014	0.042
HR-All	EQP10	Support Truck	0.069	0.67	0.069	0.36	0.037	0.082	0.20	0.22	0.54	3.2E-4	8.1E-4	0.082
HR-All	EQP11	Support Truck	0.049	0.48	0.049	0.26	0.027	0.058	0.15	0.15	0.39	2.3E-4	5.8E-4	0.059
BRW	EQP12	Loader	0.10	0.80	0.10	0.80	0.10	1.2	1.8	1.3	2.1	0.0022	0.0034	2.1
BRW	EQP13	Drill	0.14	1.0	0.14	1.0	0.14	1.5	2.4	2.8	4.3	0.0029	0.0044	4.3
HR-BRW	EQP14	Haul Truck	0.22	2.1	0.22	2.1	0.22	1.5	3.8	1.7	4.3	0.0028	0.0071	4.3
HR-All	EQP15	Support Truck	0.09	0.9	0.09	0.5	0.05	0.13	0.32	0.33	0.8	0.0006	0.0015	0.12
HR-All	EQP16	Support Truck	0.19	1.8	0.19	1.0	0.10	0.25	0.6	0.7	1.7	0.0012	0.0029	0.24
STK	EQP17	Loader	0.0070	0.067	0.0070	0.067	0.0070	0.49	1.23	0.056	0.140	9.2E-4	0.0023	0.067
HR	EQP18	Water Truck	0.006	0.06	0.006	0.06	0.006	0.2	0.6	0.2	0.6	0.0004	0.0010	0.03
STK	EQP19	Forklift	0.0019	0.018	0.0019	0.018	0.0019	0.19	0.5	0.015	0.038	2.5E-4	0.0006	0.018
HR	EQP20	Grader	0.0036	0.035	0.0036	0.035	0.0036	0.25	0.6	0.029	0.07	4.8E-4	0.0012	0.034
Total			1.0	8.7	1.0	7.0	0.78	12.3	28.1	8.2	16.6	0.023	0.053	12.2

(1) *"HR-All" includes aboveground and underground haul routes; "HR-MINE" includes aboveground and underground haul routes used to move ore*

		Travel	Distance	Proportional Dist.
Area ID	Activity	VMT/yr	mi	pct
HR-BRW	Borrow Pit Hauling	13,072	1.02	12%
UG	Underground Hauling	80,073	6.82	78%
HR-PC	Process Area Hauling	7,143	0.89	10%
Total		100,287	8.73	100%

See worksheet ROADS for haul road (HR) emissions by Model ID.

Emissions by Model ID (1)

		PM_TPY	PM10_PPD	PM10_TPY	PM2.5_PPD	PM2.5_TPY	CO_PPH	CO_TPY	NOX_PPH	NOX_TPY	SO2_PPH	SO2_TPY	VOC_TPY
		PM	PM10		PM2.5		CO		NOX(2)		SO2		VOC
Model ID	Activity	ton/yr	lb/day	ton/yr	lb/day	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	ton/yr
UG	Underground (Incl. Haulir	0.39	3.8	0.39	2.4	0.25	6.4	16.0	1.7	4.2	0.012	0.030	1.1
HR	Aboveground Haul Roads	0.32	3.1	0.32	2.7	0.28	2.5	6.2	2.3	5.8	0.0050	0.012	4.5
BRW	Borrow Pit	0.24	1.8	0.24	1.8	0.24	2.7	4.2	4.1	6.4	0.0050	0.0079	6.4
STK	Ore Stockpile	0.0089	0.086	0.0089	0.086	0.0089	0.68	1.7	0.071	0.18	1.2E-3	0.0029	0.085
Total	Mobile Tailpipes	1.0	8.7	1.0	7.0	0.78	12.3	28.1	8.2	16.6	0.023	0.053	12.2

(1) *See worksheet ROADS for haul road (HR) emissions by Model ID.*

(2) *NO2/NOX: 11% (CAPCOA 2011)*

Short-term emissions are based on annual emissions divided by Underground schedule or the Borrow schedule

Conversions

2,000	lb/ton
453.59	g/lb

		Multipliers	
LT Unit	ST Unit	*BRW*	*UG*
ton/yr	lb/day	7.692	9.615
ton/yr	lb/hr	0.641	0.401

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Mining Scenario Ore

Mobile Equipment (Tailpipes) - continued

Source Parameters [(1)]

		TYPE	UTM_E	UTM_N	ELEV_M	FLOW_MPS	DIA_M	TEMP_K	RELHT_M
		Source	UTM NAD 83		Elev.	Flow	Dia.	Temp	Ht
Model ID	Activity	Type	E m	N m	m	mps	m	K	m
UG	Underground	POINT	471,034	4,835,236	1,209	7.07	6.78	298.15	3

(1) *UTM, Elev. - (Wolverson 2019.03.17); Stack Params: (MDA 2018) page 153*

Source Parameters [(1)]

		TYPE	UTM_E	UTM_N	ELEV_M	RELHT_M	SIG_Z_M	SXINIT_M	SYINIT_M	ANGL_DEG	
	Location of	Source	UTM NAD 83		Elev.	Rel. Ht.	S-z	Pit X	Pit Y	Angle	WCB
Model ID	Activity	Type	E m	N m	m	m	m^3	m	m	deg	deg
BRW	Borrow	AREA	471,613	4,834,706	1,185	2.27	2.11	222.1	1,013.6	1.9	88.09

(1) *UTM, Elev., Pit Vol. - (Wolverson 2019.03.17); Rel. Ht. - (EPA 2012); Pit X, Pit Y, Angle - best-fit equal area rectangle*

Source Parameters [(1)]

		TYPE	UTM_E	UTM_N	ELEV_M	RELHT_M	SIG_Y_M	SIG_Z_M	Surface	
	Location of	Source	UTM NAD 83		Elev.	Rel. Ht.	S-y	S-z	Area	Length
Model ID	Activity	Type	E m	N m	m	m	m	m	m^2	m
STK	Ore Stockpile	VOLUME	470,945	4,835,633	1,137	2.27	7.25	2.11	971	31.2

(1) *UTM, Elev., Area - (Wolverson 2019.03.17); Rel. Ht. - (Caterpillar 2018); S-y, S-z factors - (Wolverson 2019.03.17)*

Mining Scenario Ore

Dozing and Grading

Activity Information

Operating schedule 208 day/yr

Dozer and Grader Fleet

Equip. Cat.	Activity	
Dozer	2,760 hr/yr	
Grader Underground	2,796 hr/yr	18,174 VMT/yr
Grader Aboveground	2,496 hr/yr	16,224 VMT/yr

Dozing Emission Factors

Emission Factor Equation	TSP (lb/hr) = 5.7 $(s)^{1.2}/(M)^{1.3}$	*(EPA 1995), Tab. 11.9-1, 07/98, (bulldozing, overburden)*
	PM15 (lb/hr) = 1.0 $(s)^{1.5}/(M)^{1.4}$	*(EPA 1995), Tab. 11.9-1, 07/98, (bulldozing, overburden)*
s = Surface material silt content	6.9 %	*(EPA 1995), Table 11.9-3, 07/98, (bulldozers, overburden)*
M = Material moisture content	7.9 %	*(EPA 1995), Table 11.9-3, 07/98, (bulldozers, overburden)*
TSP(PM)	3.941 lb/hr	
PM15	1.004 lb/hr	

Dozing PM Scaling Factors

PM10	0.75	*(EPA 1995), Tab. 11.9-1, 07/98, (applies to PM15 EF, footnote d)*
PM2.5	0.105	*(EPA 1995), Tab. 11.9-1, 07/98, (applies to TSP EF, footnote e)*

Grading Emission Factors

Emission Factor Equation	TSP (lb/VMT) = 0.04 $(S)^{2.5}$	*(EPA 1995), Tab. 11.9-1, 07/98, (grading)*
	PM15 (lb/VMT) = 0.051 $(S)^{2}$	*(EPA 1995), Tab. 11.9-1, 07/98, (grading)*
S - Grader average speed	6.5 mph	*(Caterpillar 2018), Road Maintenance, page 11-6, average*
TSP(PM)	4.309 lb/VMT	
PM15	2.155 lb/VMT	

Grading PM Scaling Factors

PM10	0.6	*(EPA 1995), Tab. 11.9-1, 07/98, (applies to PM15 EF, footnote d)*
PM2.5	0.031	*(EPA 1995), Tab. 11.9-1, 07/98, (applies to TSP EF, footnote e)*

Emission Controls

Grading

Aboveground Control efficiency:	90%	*See Onsite Hauling (Aboveground)*
Underground Control efficiency:	95%	*See Onsite Hauling (Underground)*

Emissions by Model ID

		PM_TPY	PM10_PPD	PM10_TPY	PM2.5_PPD	PM2.5_TPY
		PM	PM10		PM2.5	
Area ID	Activity	ton/yr	lb/day	ton/yr	lb/day	ton/yr
UG	Dozing	5.44	9.99	1.04	5.49	0.57
UG	Grading	1.96	5.65	0.59	0.58	0.06
HR	Grading	3.50	10.08	1.05	1.04	0.11

See worksheet ROADS for haul road (HR) emissions by Model ID.

Source Parameters [1]

		TYPE	UTM_E	UTM_N	ELEV_M	FLOW_MPS	DIA_M	TEMP_K	RELHT_M	SIG_Y_M	SIG_Z_M
		Source	UTM NAD 83		Elev.	Flow	Dia.	Temp	Ht	S-y	S-z
Model ID	Activity	Type	E m	N m	m	mps	m	K	m	m	m
HR	Haul Roads	LINE	*See worksheet: ROADS*						2.27	9.88	2.11
UG	Underground	POINT	471,034	4,835,236	1,209	7.07	6.78	298.15	3		

 # UTM, Elev. - (Wolverson 2019.03.17); Stack Params: (MDA 2018) page 153

Conversions

2,000 lb/ton

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Mining Scenario Ore

Water Truck Travel

Activity Information

Operating schedule 260 day/yr

Truck Fleet

Water Truck	Payload Capacity ton	Empty Weight ton	Gross Weight ton	Units	Reference	Average Weight ton
Cat 777G	100	80	180	1	*(Caterpillar 2018)*	130

Total vehicle miles traveled (VMT) 8,701 VMT/yr 4 passes/day (max) 4.18 mi, aboveground haul roads

8.37 mi (round trip), aboveground haul roads

Emission Factors

Emission factor equation	$E = k(s/12)^a (W/3)^b [(365-P)/365]$				*(EPA 1995), Tab. 13.2.2-2, Eqs. 1a and 2, 11/06*
s = Surface material silt content	5.8 %				*(EPA 1995), Tab. 13.2.2-1 Taconite Mining*
W = Mean vehicle weight	130 ton				
P = Days/year with ≥0.01 in precip.	90 day/yr				*(EPA 1995), Fig. 13.2.2-1, 11/06*
	PM	PM10	PM2.5		
k = Size-specific empirical constant	4.9	1.5	0.15		*AP-42, Tab. 13.2.2-2, Eqs. 1a and 2, 11/06*
a = Size-specific empirical constant	0.7	0.9	0.9		*AP-42, Tab. 13.2.2-2, Eqs. 1a and 2, 11/06*
b = Size-specific empirical constant	0.45	0.45	0.45		*AP-42, Tab. 13.2.2-2, Eqs. 1a and 2, 11/06*
E = Size-specific emission factor	12.11	3.20	0.32	lb/VMT	

Emission Controls

Periodic application of water and chemical dust suppressant

Control efficiency: 90% *See Onsite Hauling (Aboveground)*

Emissions by Area

		PM_TPY	PM10_PPD	PM10_TPY	PM2.5_PPD	PM2.5_TPY
		PM	PM10		PM2.5	
Area ID	Activity	ton/yr	lb/day	ton/yr	lb/day	ton/yr
HR	Water Truck Travel	5.27	10.72	1.39	1.07	0.14

Source Parameters

Source Parameters [(1)]

		TYPE	UTM_E	UTM_N	ELEV_M	RELHT_M	SIG_Y_M	SIG_Z_M
		Source	UTM NAD 83		Elev.	Rel. Ht.	S-y	S-z
Model ID	Activity	Type	E m	N m	m	m	m	m
HR	Aboveground Hauling	LINE	*See worksheet: ROADS*			2.27	9.88	2.11

UTM, Elev. - (Wolverson 2019.03.17); Rel. Ht., Sy, Sz - (EPA 2012)

Conversions

2,000 lb/ton

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Mining Scenario Ore

Wind Erosion

Activity Information

Operating schedule 260 day/yr

Erodible Area

Model ID	Location of Activity		Surface Type	Unload ton/yr	Erodible Area (acre/yr)[2] Flat	Pile	Surface Footprint
WRSF	WRSF		Pile	291,300		53.4	13.9
STK	Ore Stockpile		Pile	289,700		53.1	0.2
BRW	Borrow Stockpile		Pile	289,800		53.1	0.2
CRF	CRF Stockpile		Pile	133,998		24.6	0.1
TS1	Topsoil Storage 1		Pile	0		7.1	7.1
TS2	Topsoil Storage 2		Pile	0		3.0	3.0
HR	Haul Roads	(1)	Flat		158.7		8

(1) *Based on total haul road length of* *2,152* *m* *(Wolverson 2019.03.17)* *and width of* 15.2 *m* *(Wolverson 2019.03.17)*

(2) *Pile surface area calculations:*

Truck dump (TD) size	37.9	ton	
Material density	140.0	lb/ft^3	
	0.070	ton/ft^3	*(Dyer 2019.04.26)*
Material specific volume	14.3	ft^3/ton	
TD volume (V)	542	ft^3	
Conical surface calculations			
Side slope	38	deg	
	0.7	rad	

Conical surface area (SA) Π × r × (h^2 + r^2)^0.5

Conical volume (V) (Π × h × r^2) ÷ 3

Conical base radius r = s × cos(slope)

Conical height h = s × sin(slope)

Sloped side length s = (h^2 + r^2)^0.5

Solution of conical volume equation

Replacing h and r with s × sin(slope) and s × cos(slope), respectively:

s = [3 × V/(pi × sin(slope) × cos^2(slope)]^(1/3)	11.1	ft
r	8.7	ft
h	6.8	ft
SA	303	ft^2
	0.007	acre
	1.8E-4	acre/ton-TD

Scaling Factors

PM10	0.5	*(EPA 1995), Pg. 13.2.5-3, 11/06*
PM2.5	0.075	*(EPA 1995), Pg. 13.2.5-3, 11/06*

Conversions

4,046.86	$m^2/acre$
43,560	$ft^2/acre$
1609.34	m/mi
3.28084	ft/m
2,000	lb/ton

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Mining Scenario Ore

Wind Erosion - continued *Wind erosion potential calculations based on Sep-2014 through Sep-2015 Grassy Mtn on site meteorological data*

Stockpile Surface Wind Erosion Event Emission Calculations

Based on 1 acre/yr 8,760 hr/yr 0.00011 acre/hr

Threshold Wind Event	Date / Hour	u10 (m/s) (1)	u10+ (m/s) (2)	u* (m/s) ID-A (3)	u* (m/s) ID-B (3)	u* (m/s) ID-C (3)	Hours Elapsed ID-A (4)	Hours Elapsed ID-B (4)	Hours Elapsed ID-C (4)	Erodible Surface Area (acre) ID-A (5)	Erodible Surface Area (acre) ID-B (5)	Erodible Surface Area (acre) ID-C (5)
0	9/25/2014 21:00											
1	10/15/2014 09:00	11.300	13.560	1.220	0.814	0.271	468	468	468	0.00641	0.0256	0.0214
2	10/15/2014 10:00	11.700	14.040	1.264	0.842	0.281	1	469	469	0.00001	0.0257	0.0214
3	10/15/2014 13:00	10.200	12.240	1.102	0.734	0.245	3	472	472	0.00004	0.0259	0.0216
4	10/15/2014 14:00	11.000	13.200	1.188	0.792	0.264	1	473	473	0.00001	0.0259	0.0216
5	10/20/2014 21:00	12.700	15.240	1.372	0.914	0.305	127	600	600	0.00174	0.0329	0.0274
6	10/20/2014 22:00	11.400	13.680	1.231	0.821	0.274	1	601	601	0.00001	0.0329	0.0274
7	10/20/2014 23:00	10.900	13.080	1.177	0.785	0.262	1	602	602	0.00001	0.0330	0.0275
8	10/21/2014 00:00	10.300	12.360	1.112	0.742	0.247	1	603	603	0.00001	0.0330	0.0275
9	10/25/2014 16:00	12.200	14.640	1.318	0.878	0.293	112	715	715	0.00153	0.0392	0.0326
10	10/25/2014 17:00	13.100	15.720	1.415	0.943	0.314	1	716	716	0.00001	0.0392	0.0327
11	10/25/2014 18:00	10.200	12.240	1.102	0.734	0.245	1	717	717	0.00001	0.0393	0.0327
12	10/25/2014 22:00	11.400	13.680	1.231	0.821	0.274	4	721	721	0.00005	0.0395	0.0329
13	10/25/2014 23:00	12.200	14.640	1.318	0.878	0.293	1	722	722	0.00001	0.0396	0.0330
14	10/26/2014 00:00	11.200	13.440	1.210	0.806	0.269	1	723	723	0.00001	0.0396	0.0330
15	10/26/2014 01:00	11.300	13.560	1.220	0.814	0.271	1	724	724	0.00001	0.0397	0.0331
16	11/1/2014 14:00	9.600	11.520	1.037	0.691	0.230	157	881	881	0.00215	0.0483	0.0402
17	11/1/2014 15:00	10.700	12.840	1.156	0.770	0.257	1	882	882	0.00001	0.0483	0.0403
18	11/22/2014 18:00	10.200	12.240	1.102	0.734	0.245	507	1,389	1,389	0.00695	0.0761	0.0634
19	11/22/2014 19:00	10.200	12.240	1.102	0.734	0.245	1	1,390	1,390	0.00001	0.0762	0.0635
20	11/23/2014 13:00	9.500	11.400	1.026	0.684	0.228	18	1,408	1,408	0.00025	0.0772	0.0643
21	11/23/2014 15:00	9.900	11.880	1.069	0.713	0.238	2	1,410	1,410	0.00003	0.0773	0.0644
22	11/28/2014 14:00	10.400	12.480	1.123	0.749	0.250	119	1,529	1,529	0.00163	0.0838	0.0698
23	11/28/2014 15:00	12.400	14.880	1.339	0.893	0.298	1	1,530	1,530	0.00001	0.0838	0.0699
24	11/28/2014 16:00	9.600	11.520	1.037	0.691	0.230	1	1,531	1,531	0.00001	0.0839	0.0699
25	11/28/2014 17:00	9.900	11.880	1.069	0.713	0.238	1	1,532	1,532	0.00001	0.0839	0.0700
26	11/29/2014 09:00	9.800	11.760	1.058	0.706	0.235	16	1,548	1,548	0.00022	0.0848	0.0707
27	12/21/2014 01:00	10.600	12.720	1.145	0.763	0.254	520	2,068	2,068	0.00712	0.1133	0.0944
28	12/21/2014 02:00	14.800	17.760	1.598	1.066	0.355	1	1	2,069	0.00001	0.0001	0.0945
29	12/21/2014 03:00	15.000	18.000	1.620	1.080	0.360	1	1	2,070	0.00001	0.0001	0.0945
30	12/21/2014 04:00	15.200	18.240	1.642	1.094	0.365	1	1	2,071	0.00001	0.0001	0.0946
31	12/21/2014 05:00	15.100	18.120	1.631	1.087	0.362	1	1	2,072	0.00001	0.0001	0.0946
32	12/21/2014 06:00	12.400	14.880	1.339	0.893	0.298	1	2	2,073	0.00001	0.0001	0.0947
33	12/21/2014 07:00	10.000	12.000	1.080	0.720	0.240	1	3	2,074	0.00001	0.0002	0.0947
34	12/21/2014 08:00	9.800	11.760	1.058	0.706	0.235	1	4	2,075	0.00001	0.0002	0.0947
35	12/24/2014 19:00	9.800	11.760	1.058	0.706	0.235	83	87	2,158	0.00114	0.0048	0.0985
36	12/24/2014 20:00	9.700	11.640	1.048	0.698	0.233	1	88	2,159	0.00001	0.0048	0.0986
37	12/25/2014 07:00	11.500	13.800	1.242	0.828	0.276	11	99	2,170	0.00015	0.0054	0.0991
38	12/25/2014 08:00	9.700	11.640	1.048	0.698	0.233	1	100	2,171	0.00001	0.0055	0.0991
39	2/6/2015 17:00	11.800	14.160	1.274	0.850	0.283	1,041	1,141	3,212	0.01426	0.0625	0.1467
40	2/6/2015 20:00	10.600	12.720	1.145	0.763	0.254	3	1,144	3,215	0.00004	0.0627	0.1468
41	2/7/2015 00:00	10.000	12.000	1.080	0.720	0.240	4	1,148	3,219	0.00005	0.0629	0.1470

Mining Scenario Ore

Wind Erosion - continued *Wind erosion potential calculations based on Sep-2014 through Sep-2015 Grassy Mtn on site meteorological data*

Stockpile Surface Wind Erosion Event Emission Calculations - continued

Based on 1 acre/yr 8,760 hr/yr 0.00011 acre/hr

Threshold Wind Event	Date / Hour	u10 (m/s) (1)	u10+ (m/s) (2)	u* (m/s) ID-A (3)	u* (m/s) ID-B (3)	u* (m/s) ID-C (3)	Hours Elapsed ID-A (4)	Hours Elapsed ID-B (4)	Hours Elapsed ID-C (4)	Erodible Surface Area (acre) ID-A (5)	Erodible Surface Area (acre) ID-B (5)	Erodible Surface Area (acre) ID-C (5)
42	2/7/2015 06:00	10.100	12.120	1.091	0.727	0.242	6	1,154	3,225	0.00008	0.06323	0.14726
43	2/7/2015 11:00	15.100	18.120	1.631	1.087	0.362	5	5	3,230	0.00007	0.00027	0.14749
44	2/7/2015 12:00	15.400	18.480	1.663	1.109	0.370	1	1	3,231	0.00001	0.00005	0.14753
45	2/7/2015 13:00	12.700	15.240	1.372	0.914	0.305	1	2	3,232	0.00001	0.00011	0.14758
46	2/7/2015 14:00	11.800	14.160	1.274	0.850	0.283	1	3	3,233	0.00001	0.00016	0.14763
47	2/7/2015 15:00	11.700	14.040	1.264	0.842	0.281	1	4	3,234	0.00001	0.00022	0.14767
48	2/7/2015 16:00	10.600	12.720	1.145	0.763	0.254	1	5	3,235	0.00001	0.00027	0.14772
49	2/7/2015 17:00	10.000	12.000	1.080	0.720	0.240	1	6	3,236	0.00001	0.00033	0.14776
50	2/9/2015 16:00	10.000	12.000	1.080	0.720	0.240	47	53	3,283	0.00064	0.00290	0.14991
51	2/9/2015 17:00	10.100	12.120	1.091	0.727	0.242	1	54	3,284	0.00001	0.00296	0.14995
52	2/21/2015 17:00	9.800	11.760	1.058	0.706	0.235	288	342	3,572	0.00395	0.01874	0.16311
53	3/11/2015 13:00	11.000	13.200	1.188	0.792	0.264	428	770	4,000	0.00586	0.04219	0.18265
54	3/15/2015 21:00	12.500	15.000	1.350	0.900	0.300	104	874	4,104	0.00142	0.04789	0.18740
55	3/15/2015 22:00	14.500	17.400	1.566	1.044	0.348	1	1	4,105	0.00001	0.00005	0.18744
56	3/15/2015 23:00	11.900	14.280	1.285	0.857	0.286	1	2	4,106	0.00001	0.00011	0.18749
57	3/16/2015 00:00	12.500	15.000	1.350	0.900	0.300	1	3	4,107	0.00001	0.00016	0.18753
58	3/21/2015 10:00	10.400	12.480	1.123	0.749	0.250	130	133	4,237	0.00178	0.00729	0.19347
59	3/21/2015 12:00	11.100	13.320	1.199	0.799	0.266	2	135	4,239	0.00003	0.00740	0.19356
60	3/21/2015 13:00	11.400	13.680	1.231	0.821	0.274	1	136	4,240	0.00001	0.00745	0.19361
61	3/23/2015 02:00	11.400	13.680	1.231	0.821	0.274	37	173	4,277	0.00051	0.00948	0.19530
62	3/23/2015 03:00	11.200	13.440	1.210	0.806	0.269	1	174	4,278	0.00001	0.00953	0.19534
63	3/23/2015 04:00	10.900	13.080	1.177	0.785	0.262	1	175	4,279	0.00001	0.00959	0.19539
64	3/23/2015 11:00	9.500	11.400	1.026	0.684	0.228	7	182	4,286	0.00010	0.00997	0.19571
65	3/23/2015 12:00	9.600	11.520	1.037	0.691	0.230	1	183	4,287	0.00001	0.01003	0.19575
66	3/28/2015 02:00	10.200	12.240	1.102	0.734	0.245	110	293	4,397	0.00151	0.01605	0.20078
67	3/28/2015 03:00	10.900	13.080	1.177	0.785	0.262	1	294	4,398	0.00001	0.01611	0.20082
68	3/28/2015 06:00	11.800	14.160	1.274	0.850	0.283	3	297	4,401	0.00004	0.01627	0.20096
69	3/31/2015 15:00	10.100	12.120	1.091	0.727	0.242	81	378	4,482	0.00111	0.02071	0.20466
70	3/31/2015 16:00	9.700	11.640	1.048	0.698	0.233	1	379	4,483	0.00001	0.02077	0.20470
71	4/14/2015 03:00	11.300	13.560	1.220	0.814	0.271	323	702	4,806	0.00442	0.03847	0.21945
72	4/14/2015 04:00	10.800	12.960	1.166	0.778	0.259	1	703	4,807	0.00001	0.03852	0.21950
73	4/14/2015 10:00	10.100	12.120	1.091	0.727	0.242	6	709	4,813	0.00008	0.03885	0.21977
74	4/14/2015 12:00	9.600	11.520	1.037	0.691	0.230	2	711	4,815	0.00003	0.03896	0.21986
75	4/14/2015 17:00	10.400	12.480	1.123	0.749	0.250	5	716	4,820	0.00007	0.03923	0.22009
76	4/15/2015 16:00	9.700	11.640	1.048	0.698	0.233	23	739	4,843	0.00032	0.04049	0.22114
77	5/12/2015 19:00	10.400	12.480	1.123	0.749	0.250	651	1,390	5,494	0.00892	0.07616	0.25087
78	5/12/2015 20:00	14.700	17.640	1.588	1.058	0.353	1	1	5,495	0.00001	0.00005	0.25091
79	5/12/2015 21:00	12.900	15.480	1.393	0.929	0.310	1	2	5,496	0.00001	0.00011	0.25096
80	6/21/2015 18:00	10.500	12.600	1.134	0.756	0.252	957	959	6,453	0.01311	0.05255	0.29466
81	6/21/2015 19:00	9.500	11.400	1.026	0.684	0.228	1	960	6,454	0.00001	0.05260	0.29470
82	6/29/2015 01:00	9.700	11.640	1.048	0.698	0.233	174	1,134	6,628	0.00238	0.06214	0.30265
83	6/29/2015 02:00	11.200	13.440	1.210	0.806	0.269	1	1,135	6,629	0.00001	0.06219	0.30269

Air Sciences Inc.	PROJECT TITLE: Grassy Mountain Mine	BY: M. Mavko
	PROJECT NO: 343-1	PAGE: 21 OF: 26 SHEET: Mine
AIR EMISSION CALCULATIONS	SUBJECT: Mining Activity Emissions	DATE: July 26, 2019

Mining Scenario Ore

Wind Erosion - continued ***Wind erosion potential calculations based on Sep-2014 through Sep-2015 Grassy Mtn on site meteorological data***

Stockpile Surface Wind Erosion Event Emission Calculations - continued

Based on 1 acre/yr 8,760 hr/yr 0.00011 acre/hr

Threshold Wind Event	Date / Hour	u10 (m/s) (1)	u10+ (m/s) (2)	u* (m/s) ID-A (3)	u* (m/s) ID-B (3)	u* (m/s) ID-C (3)	Hours Elapsed ID-A (4)	Hours Elapsed ID-B (4)	Hours Elapsed ID-C (4)	Erodible Surface Area (acre) ID-A (5)	Erodible Surface Area (acre) ID-B (5)	Erodible Surface Area (acre) ID-C (5)
84	7/5/2015 07:00	9.600	11.520	1.037	0.691	0.230	149	1,284	6,778	0.00204	0.07036	0.30950
85	7/5/2015 08:00	10.600	12.720	1.145	0.763	0.254	1	1,285	6,779	0.00001	0.07041	0.30954
86	7/5/2015 09:00	10.600	12.720	1.145	0.763	0.254	1	1,286	6,780	0.00001	0.07047	0.30959
87	7/5/2015 10:00	9.500	11.400	1.026	0.684	0.228	1	1,287	6,781	0.00001	0.07052	0.30963
88	7/5/2015 16:00	10.200	12.240	1.102	0.734	0.245	6	1,293	6,787	0.00008	0.07085	0.30991
89	7/8/2015 14:00	10.200	12.240	1.102	0.734	0.245	70	1,363	6,857	0.00096	0.07468	0.31311
90	7/8/2015 15:00	10.600	12.720	1.145	0.763	0.254	1	1,364	6,858	0.00001	0.07474	0.31315
91	7/8/2015 19:00	10.600	12.720	1.145	0.763	0.254	4	1,368	6,862	0.00005	0.07496	0.31333
92	7/9/2015 23:00	10.700	12.840	1.156	0.770	0.257	28	1,396	6,890	0.00038	0.07649	0.31461
93	7/10/2015 00:00	10.000	12.000	1.080	0.720	0.240	1	1,397	6,891	0.00001	0.07655	0.31466
94	7/21/2015 21:00	9.900	11.880	1.069	0.713	0.238	285	1,682	7,176	0.00390	0.09216	0.32767
95	8/3/2015 02:00	9.900	11.880	1.069	0.713	0.238	293	1,975	7,469	0.00401	0.10822	0.34105
96	8/3/2015 03:00	15.400	18.480	1.663	1.109	0.370	1	1	7,470	0.00001	0.00005	0.34110
97	8/3/2015 04:00	13.600	16.320	1.469	0.979	0.326	1	2	7,471	0.00001	0.00011	0.34114
98	8/3/2015 05:00	11.500	13.800	1.242	0.828	0.276	1	3	7,472	0.00001	0.00016	0.34119
99	8/4/2015 00:00	10.500	12.600	1.134	0.756	0.252	19	22	7,491	0.00026	0.00121	0.34205
100	8/14/2015 18:00	9.600	11.520	1.037	0.691	0.230	258	280	7,749	0.00353	0.01534	0.35384
101	8/14/2015 19:00	9.800	11.760	1.058	0.706	0.235	1	281	7,750	0.00001	0.01540	0.35388
102	8/29/2015 12:00	10.200	12.240	1.102	0.734	0.245	353	634	8,103	0.00484	0.03474	0.37000
103	8/29/2015 14:00	11.000	13.200	1.188	0.792	0.264	2	636	8,105	0.00003	0.03485	0.37009
104	8/29/2015 15:00	10.100	12.120	1.091	0.727	0.242	1	637	8,106	0.00001	0.03490	0.37014
105	9/4/2015 17:00	11.700	14.040	1.264	0.842	0.281	146	783	8,252	0.00200	0.04290	0.37680
106	9/4/2015 18:00	12.700	15.240	1.372	0.914	0.305	1	784	8,253	0.00001	0.04296	0.37685

Flat Surface Wind Erosion Event Emission Calculations

Threshold Wind Event	Date / Hour	u10 (m/s) (1)	u10+ (m/s) (2)	u* (m/s) Flat (3)	Hours Elapsed Flat (4)	Erodible Surface Area (acre) Flat (5)
N/A	No wind events above 16.04 m/s					

Mining Scenario Ore

Wind Erosion - continued

Stockpile Surface Wind Erosion Event Emission Calculations - continued

Threshold	Erosion Potential (lb/acre)(1)			PM Emissions (lb)				PM10 (lb)	PM2.5 (lb)
Wind	ID-A	ID-B	ID-C	ID-A	ID-B	ID-C	Total	Total	Total
Event	(6)	(6)	(6)	(7)	(7)	(7)	(8)	(9)	(10)
1	65.48	--	--	0.420	--	--	0.420	0.210	0.031
2	85.04	--	--	0.001	--	--	0.001	0.001	0.000
3	21.65	--	--	0.001	--	--	0.001	0.000	0.000
4	52.08	--	--	0.001	--	--	0.001	0.000	0.000
5	142.4	--	--	0.248	--	--	0.248	0.124	0.019
6	70.19	--	--	0.001	--	--	0.001	0.000	0.000
7	47.85	--	--	0.001	--	--	0.001	0.000	0.000
8	25.03	--	--	0.000	--	--	0.000	0.000	0.000
9	112.21	--	--	0.172	--	--	0.172	0.086	0.013
10	168.71	--	--	0.002	--	--	0.002	0.001	0.000
11	21.65	--	--	0.000	--	--	0.000	0.000	0.000
12	70.19	--	--	0.004	--	--	0.004	0.002	0.000
13	112.21	--	--	0.002	--	--	0.002	0.001	0.000
14	60.89	--	--	0.001	--	--	0.001	0.000	0.000
15	65.48	--	--	0.001	--	--	0.001	0.000	0.000
16	3.89	--	--	0.008	--	--	0.008	0.004	0.001
17	39.76	--	--	0.001	--	--	0.001	0.000	0.000
18	21.65	--	--	0.150	--	--	0.150	0.075	0.011
19	21.65	--	--	0.000	--	--	0.000	0.000	0.000
20	1.36	--	--	0.000	--	--	0.000	0.000	0.000
21	12.23	--	--	0.000	--	--	0.000	0.000	0.000
22	28.53	--	--	0.047	--	--	0.047	0.023	0.003
23	123.92	--	--	0.002	--	--	0.002	0.001	0.000
24	3.89	--	--	0.000	--	--	0.000	0.000	0.000
25	12.23	--	--	0.000	--	--	0.000	0.000	0.000
26	9.33	--	--	0.002	--	--	0.002	0.001	0.000
27	35.90	--	--	0.256	--	--	0.256	0.128	0.019
28	302.12	11	--	0.004	0.001	--	0.005	0.002	0.000
29	320.11	15	--	0.004	0.001	--	0.005	0.003	0.000
30	338.59	19	--	0.005	0.001	--	0.006	0.003	0.000
31	329.29	17	--	0.005	0.001	--	0.005	0.003	0.000
32	123.92	--	--	0.002	--	--	0.002	0.001	0.000
33	15.25	--	--	0.000	--	--	0.000	0.000	0.000
34	9.33	--	--	0.000	--	--	0.000	0.000	0.000
35	9.33	--	--	0.011	--	--	0.011	0.005	0.001
36	6.55	--	--	0.000	--	--	0.000	0.000	0.000
37	75.02	--	--	0.011	--	--	0.011	0.006	0.001
38	6.55	--	--	0.000	--	--	0.000	0.000	0.000
39	90.23	--	--	1.287	--	--	1.287	0.643	0.097
40	35.90	--	--	0.001	--	--	0.001	0.001	0.000
41	15.25	--	--	0.001	--	--	0.001	0.000	0.000
Stockpile Subtotal							2.655	1.327	0.199

Mining Scenario Ore

Wind Erosion - continued

Stockpile Surface Wind Erosion Event Emission Calculations - continued

Threshold Wind Event	Erosion Potential (lb/acre)[1] ID-A (6)	ID-B (6)	ID-C (6)	PM Emissions (lb) ID-A (7)	ID-B (7)	ID-C (7)	Total (8)	PM10 (lb) Total (9)	PM2.5 (lb) Total (10)
42	18.39	--	--	0.002	--	--	0.002	0.001	0.000
43	329.29	17	--	0.023	0.005	--	0.027	0.014	0.002
44	357.54	24	--	0.005	0.001	--	0.006	0.003	0.000
45	142.39	--	--	0.002	--	--	0.002	0.001	0.000
46	90.23	--	--	0.001	--	--	0.001	0.001	0.000
47	85.0	--	--	0.001	--	--	0.001	0.001	0.000
48	35.90	--	--	0.000	--	--	0.000	0.000	0.000
49	15.25	--	--	0.000	--	--	0.000	0.000	0.000
50	15.25	--	--	0.010	--	--	0.010	0.005	0.001
51	18.39	--	--	0.000	--	--	0.000	0.000	0.000
52	9.33	--	--	0.037	--	--	0.037	0.018	0.003
53	52.08	--	--	0.305	--	--	0.305	0.153	0.023
54	129.96	--	--	0.185	--	--	0.185	0.093	0.014
55	276.05	6	--	0.004	0.000	--	0.004	0.002	0.000
56	95.55	--	--	0.001	--	--	0.001	0.001	0.000
57	129.96	--	--	0.002	--	--	0.002	0.001	0.000
58	28.53	--	--	0.051	--	--	0.051	0.025	0.004
59	56.42	--	--	0.002	--	--	0.002	0.001	0.000
60	70.19	--	--	0.001	--	--	0.001	0.000	0.000
61	70.19	--	--	0.036	--	--	0.036	0.018	0.003
62	60.89	--	--	0.001	--	--	0.001	0.000	0.000
63	47.85	--	--	0.001	--	--	0.001	0.000	0.000
64	1.36	--	--	0.000	--	--	0.000	0.000	0.000
65	3.89	--	--	0.000	--	--	0.000	0.000	0.000
66	21.65	--	--	0.033	--	--	0.033	0.016	0.002
67	47.85	--	--	0.001	--	--	0.001	0.000	0.000
68	90.23	--	--	0.004	--	--	0.004	0.002	0.000
69	18.39	--	--	0.020	--	--	0.020	0.010	0.002
70	6.55	--	--	0.000	--	--	0.000	0.000	0.000
71	65.48	--	--	0.290	--	--	0.290	0.145	0.022
72	43.74	--	--	0.001	--	--	0.001	0.000	0.000
73	18.39	--	--	0.002	--	--	0.002	0.001	0.000
74	3.89	--	--	0.000	--	--	0.000	0.000	0.000
75	28.53	--	--	0.002	--	--	0.002	0.001	0.000
76	6.55	--	--	0.002	--	--	0.002	0.001	0.000
77	28.53	--	--	0.254	--	--	0.254	0.127	0.019
78	293.31	9	--	0.004	0.001	--	0.005	0.002	0.000
79	155.31	--	--	0.002	--	--	0.002	0.001	0.000
80	32.15	--	--	0.421	--	--	0.421	0.211	0.032
81	1.36	--	--	0.000	--	--	0.000	0.000	0.000
82	6.55	--	--	0.016	--	--	0.016	0.008	0.001
83	60.89	--	--	0.001	--	--	0.001	0.000	0.000
Stockpile Subtotal							1.728	0.864	0.130

Mining Scenario Ore

Wind Erosion - continued

Stockpile Surface Wind Erosion Event Emission Calculations - continued

Threshold	Erosion Potential (lb/acre)[1]			PM Emissions (lb)				PM10 (lb)	PM2.5 (lb)
Wind	ID-A	ID-B	ID-C	ID-A	ID-B	ID-C	Total	Total	Total
Event	(6)	(6)	(6)	(7)	(7)	(7)	(8)	(9)	(10)
84	3.89	--	--	0.008	--	--	0.008	0.004	0.001
85	35.90	--	--	0.000	--	--	0.000	0.000	0.000
86	35.90	--	--	0.000	--	--	0.000	0.000	0.000
87	1.36	--	--	0.000	--	--	0.000	0.000	0.000
88	21.65	--	--	0.002	--	--	0.002	0.001	0.000
89	21.65	--	--	0.021	--	--	0.021	0.010	0.002
90	35.90	--	--	0.000	--	--	0.000	0.000	0.000
91	35.90	--	--	0.002	--	--	0.002	0.001	0.000
92	39.76	--	--	0.015	--	--	0.015	0.008	0.001
93	15.25	--	--	0.000	--	--	0.000	0.000	0.000
94	12.23	--	--	0.048	--	--	0.048	0.024	0.004
95	12.23	--	--	0.049	--	--	0.049	0.025	0.004
96	357.54	24	--	0.005	0.001	--	0.006	0.003	0.000
97	204.33	--	--	0.003	--	--	0.003	0.001	0.000
98	75.02	--	--	0.001	--	--	0.001	0.001	0.000
99	32.15	--	--	0.008	--	--	0.008	0.004	0.001
100	3.89	--	--	0.014	--	--	0.014	0.007	0.001
101	9.33	--	--	0.000	--	--	0.000	0.000	0.000
102	21.65	--	--	0.105	--	--	0.105	0.052	0.008
103	52.08	--	--	0.001	--	--	0.001	0.001	0.000
104	18.39	--	--	0.000	--	--	0.000	0.000	0.000
105	85.04	--	--	0.170	--	--	0.170	0.085	0.013
106	142.39	--	--	0.002	--	--	0.002	0.001	0.000
Stockpile Subtotal							0.457	0.228	0.034

Final Emission Factors (lb/acre-yr)

Surface Type	PM	PM10	PM2.5
Pile	4.84	2.42	0.36
Flat	--	--	--

Mining Scenario Ore

Wind Erosion - continued

Stockpile Surface Wind Erosion Event Emission Calculations - Notes

(1) u10 = wind speed at 10 meters reference height, m/s

(2) u10+ = fastest-mile wind speed, m/s
Based on hourly to fastest-mile wind speed conversion factor of 1.2 *(EPA 1994)*

(3) Pile: u* = friction velocity, m/s = (us/ur) × 0.1 × u10+ *(EPA 1995), Sec. 13.2.5, Eqs. 6 & 7, 11/06*

Area ID	A	B	C
(us/ur)	0.9	0.6	0.2

(EPA 1995), Page 13.2.5-10, 11/06

Flat surface:
u* = friction velocity, m/s = 0.053 × u10+ *(EPA 1995), Sec. 13.2.5, Eq. 4, 11/06*

(4) Hours elapsed since previous wind erosion event

(5) Erodible surface area = hours elapsed since previous erosion event × hourly erodible surface area (acre) × surface regime area fraction Surface regime area fractions:

Area ID	A	B	C
% Surface	0.12	0.48	0.4

(EPA 1995), Page 13.2.5-10, 11/06

(6) Erosion potential, g/m^2, = P = 58(u* - ut*)^2 + 25(u* - ut*); P = 0 for u* ≤ ut* *(EPA 1995), Page 13.2.5, Eq. 3, 11/06*
where, ut* = threshold friction velocity 1.02 m/s *(EPA 1995), Page 13.2.5-5 (overburden), 11/06*
P converted to lb/acre by multiplying with: 0.0022 lb/g and 4,046.86 m^2/acre
Solving u* = (us/ur) × 0.1 × u10+ for u10, when u* = ut* = 1.02 m/s and u10+ = u* × 1.2
yields the following minimum wind speeds to disturb each stockpile surface regime:

ID-A	9.44	m/s
ID-B	14.17	m/s
ID-C	42.50	m/s

The threshold wind speed to disturb flat surfaces is 1.02/0.053/1.2
Flat surface 16.04 m/s
The maximum hourly wind speed in the onsite data is 12.7 m/s, which is less than the threshold wind speeds to cause a disturbance of stockpile regimes ID-B and ID-C, and flat surfaces.

(7) PM emissions, lb = P (lb/acre) × erodible surface area (acre)

(8) Total PM emissions, lb = PM (ID-A), lb + PM (ID-B), lb + PM(ID-C), lb

(9) Total PM10 emissions, lb = total PM emissions, lb × PM10 scaling factors of 0.5 *(EPA 1995), Page 13.2.5-3, 11/06*

(10) Total PM2.5 emissions, lb = total PM emissions, lb × PM2.5 scaling factors of 0.075 *(EPA 1995), Page 13.2.5-3, 11/06*

Mining Scenario Ore

Wind Erosion - continued

chk

Emissions by Model ID

				PM_TPY	PM10_PPD	PM10_TPY	PM2.5_PPD	PM2.5_TPY
	Location of	Control[1]		PM	PM10		PM2.5	
Model ID	Activity		Type	ton/yr	lb/day	ton/yr	lb/day	ton/yr
WRSF	WRSF	--	Pile	0.129	0.497	0.065	0.075	0.010
STK	Ore Stockpile	--	Pile	0.129	0.494	0.064	0.074	0.010
BRW	Borrow Stockpile	--	Pile	0.129	0.494	0.064	0.074	0.010
CRF	CRF Stockpile	--	Pile	0.059	0.229	0.030	0.034	0.004
TS1	Topsoil Storage 1		Pile	0.017	0.067	0.009	0.010	0.001
TS2	Topsoil Storage 2		Pile	0.007	0.027	0.004	0.004	0.001
HR	Haul Roads	90%	Flat	--	--	--	--	--
Total	Wind Erosion			0.470	1.808	0.235	0.271	0.035

No wind events above 16.04 m/s - Threshold wind speed for flat surfaces

Conversions
2,000 lb/ton

Air Sciences Inc.	PROJECT TITLE: Grassy Mountain Mine	BY: M. Mavko
	PROJECT NO: 343-1	PAGE: 1 OF: 3 SHEET: MineHAP
AIR EMISSION CALCULATIONS	SUBJECT: Mine HAP and GHG Emissions	DATE: July 26, 2019

Mining Scenario **Ore**

Hazardous Air Pollutants and Greenhouse Gas Emissions

HAP Emissions Summary

CAS No.	Pollutant/Group	UG lb/yr	AG lb/yr	Total ton/yr
106-99-0	1,3-Butadiene	-	-	-
75-07-0	Acetaldehyde	-	-	-
107-02-8	Acrolein	-	-	-
7440-36-0	Antimony and compounds	7.33E-03	6.00E-02	3.37E-05
7440-38-2	Arsenic and compounds	3.33E-02	4.59E-01	2.46E-04
No RBC	Barium and compounds	-	-	-
71-43-2	Benzene	-	-	-
7440-41-7	Beryllium and compounds	2.12E-04	1.39E-03	7.99E-07
7440-43-9	Cadmium and compounds	4.51E-05	6.93E-04	3.69E-07
18540-29-9	Chromium VI, chromate, and dichı	5.36E-03	4.46E-02	2.50E-05
7440-48-4	Cobalt and compounds	3.45E-04	5.68E-03	3.01E-06
74-90-8	Cyanide, Hydrogen	-	5.7E+03	2.8E+00
106-46-7	p-Dichlorobenzene	-	-	-
	Diesel Particulate Matter			-
100-41-4	Ethyl benzene	-	-	-
50-00-0	Formaldehyde	-	-	-
110-54-3	Hexane	-	-	-
7439-92-1	Lead and compounds	1.46E-03	1.61E-02	8.78E-06
7439-96-5	Manganese and compounds	1.67E-02	1.77E-01	9.69E-05
7439-97-6	Mercury and compounds	4.91E-04	7.29E-03	3.89E-06
91-20-3	Naphthalene	-	-	-
7440-02-0	Nickel and compounds	9.84E-04	1.00E-02	5.50E-06
115-07-1	Propylene	-	-	-
	Polycyclic aromatic hydrocarbons (	-	-	-
7782-49-2	Selenium and compounds	-	-	-
108-88-3	Toluene	-	-	-
7440-62-2	Vanadium (fume or dust)	-	-	-
1330-20-7	Xylene (mixture)	-	-	-
No RBC	Zinc and compounds	-	-	-
Total HAP			5,660	2.8
		chk-17	chk	chk

GHG Emissions Summary

Pollutant	Emissions ton/yr
Total GHGs	5,488

Conversions

2,000	lb/ton
1.10231	ton/t

Air Sciences Inc.	PROJECT TITLE: Grassy Mountain Mine	BY: M. Mavko		
AIR EMISSION CALCULATIONS	PROJECT NO: 343-1	PAGE: 2	OF: 3	SHEET: MineHAP
	SUBJECT: Mine HAP and GHG Emissions	DATE: July 26, 2019		

Mining Scenario Ore

Greenhouse Gas Emissions - Combustion Sources

Activity Information chk

Mining Mobile Equipment	Underground				Aboveground				
Large diesel machinery (> 600 h	--	gal/yr	--	MMBtu/yr[1]	51,945	gal/yr	7,116	MMBtu/yr[1]	*See Mine Sheet*
Small diesel machinery (≤ 600 h	273,329	gal/yr	37,446	MMBtu/yr[1]	164,414	gal/yr	22,525	MMBtu/yr[1]	*See Mine Sheet*

[1] Based on diesel heating value of 137,000 Btu/gal *AP-42, Appendix A, p. A-5, 9/85*

Greenhouse Gas Emission Factors [1] and Emissions

Fuel	CO2	CH4	N2O	CO2	CH4	N2O	CO2e
		kg/MMBtu		mt/yr	mt/yr	mt/yr	mt/yr
Diesel	73.96	3.0E-3	6.0E-4	4,962	0.20	0.040	4,979
Combustion Total GHG				4,962	0.20	0.040	4,979

[1] *40 CFR 98 Tab. C-1 and C-2 (CFR 2018d)*

Global Warming Potential [1]

CO2	1
CH4	25
N2O	298

[1] *40 CFR 98 Tab. A-1 (CFR 2018d)*

Conversions
2,000 lb/ton
1,000 kg/mt

Air Sciences Inc.	PROJECT TITLE: Grassy Mountain Mine	BY: M. Mavko
	PROJECT NO: 343-1	PAGE: 3 OF: 3 SHEET: MineHAP
AIR EMISSION CALCULATIONS	SUBJECT: Mine HAP and GHG Emissions	DATE: July 26, 2019

Mining Scenario **Ore**

Hazardous Air Pollutants and Greenhouse Gas Emissions - Fugitive Dust Sources

Activity Information

By Activity	UG/AG	PM ton/yr	
Underground Drilling	UG	0.02	*See Mine Sheet*
Borrow Drilling	AG	0.85	*See Mine Sheet*
Underground Blasting	UG	0.05	*See Mine Sheet*
Borrow Blasting	AG	0.06	*See Mine Sheet*
Material Load / Unload	AG	0.11	*See Mine Sheet*
Material Load / Unload UG	UG	0.04	*See Mine Sheet*
Wind Erosion	AG	0.47	*See Mine Sheet*
Ore/Waste Subtotal		0.98	

Ore and Waste Dust HAP Concentrations [(1)] and Emissions

CAS No.	Pollutant	Ore ppm	Waste ppm	Ore lb/ton	Waste lb/ton	UG[(2)] lb/yr	AG[(3)] lb/yr	Total ton/yr	UG lb/ton	AG lb/ton
7440-38-2	Arsenic and compounds	152	154	0.3040	0.31	0.033	0.46	2.5E-4	0.304654	0.307218
7440-41-7	Beryllium and compounds	1.1	0.31	0.0022	6.2E-4	2.1E-4	0.0014	8.0E-7	0.001942	0.000929
7440-43-9	Cadmium and compounds	0.2	0.24	0.0004	4.8E-4	4.5E-5	6.9E-4	3.7E-7	0.000413	0.000464
7440-48-4	Cobalt and compounds	1.5	2	0.003	0.0040	3.5E-4	0.0057	3.0E-6	0.003164	0.003805
18540-29-9	Chromium VI, chromate, and dichromate parti	27	12	0.054	0.024	0.0054	0.045	2.5E-5	0.049093	0.029863
7439-97-6	Mercury and compounds	2.2	2.5	0.0044	0.0050	4.9E-4	0.0073	3.9E-6	0.004498	0.004883
7439-96-5	Manganese and compounds	81	54	0.162	0.11	0.017	0.18	9.7E-5	0.153168	0.118554
7440-02-0	Nickel and compounds	4.8	3	0.0096	0.0060	9.8E-4	0.010	5.5E-6	0.009011	0.006704
7439-92-1	Lead and compounds	7	5	0.014	0.0100	0.0015	0.016	8.8E-6	0.013346	0.010782
7440-36-0	Antimony and compounds	37	16	0.074	0.032	0.0073	0.060	3.4E-5	0.067131	0.040209
Dust HAP Total						0.066	0.78	4.2E-4		

(1) *(Wolverson 2019.03.04)*

(2) *Underground activities using ore EF, material load/unload split between ore and waste*

(3) *Borrow activities using waste EF, material load/unload and wind erosion split between ore and waste*

Conversions

2,000 lb/ton

Air Sciences Inc.	PROJECT TITLE: Grassy Mountain Mine	BY: M. Mavko
	PROJECT NO: 343-1	PAGE: 1 OF: 2 SHEET: Conv
AIR EMISSION CALCULATIONS	SUBJECT: Conversions and Constants	DATE: July 26, 2019

Conversions

60	sec/min
60	min/hr
24	hr/day
365	day/yr
8,760	hr/yr
3,600	s/hr
2,000	lb/ton
453.593	g/lb
3.28084	ft/m
35.3147	ft^3/m^3
7,000	gr/lb
1.341	hp/kW
907.1858	kg/ton
459.67	°R at 0°F
68	°F, standard
7,000	BTU/hp-hr *(EPA 1995), Sec. 3.3, (Diesel)*
7.05	lb/gal distillate oil *(EPA 1995), Appendix A 'Weights of Selected Substances' (Distillate oil)*
137,000	BTU/gal *(EPA 1995), App. A (Diesel)*
2.2369	mi/hr per m/s
7.48052	gal/ft^3
1.10231	ton/t
2.20462	lb/kg
1609.34	m/mi
4046.9	m^2/acre
43,560	ft^2/acre
12	in/ft
1.10231	ton/mt
1.0E+6	g/mt
3	ft/yd
1.0E+6	scf/MMscf
10,000	m^2/ha
1,000	kg/mt
273.15	°K at 0°C
32	°F at 0°C
1.8	°F/°C
1,000	ng/µg
0.293297	MW-hr/MMBtu
12	mo/yr
5280	ft/mi
29.9213	inHg/atm

Fuel Specifications

15	ppm S content	*40 CFR 80.510 (Non-road diesel)*
7.05	lb/gal-fuel	*(EPA 1995), App. A*
32.065	lb/lb-mol S, and	
64.06	lb/lb-mol SO2	
7,000	Btu/hp-hr	*(EPA 1995), Sec. 3.3, (Diesel engine)*
0.00939	MMBtu/kW-hr	Diesel
0.137	MMBtu/gal	*(EPA 1995), App. A (Diesel)*
0.0915	MMBtu/gal Propane	

Bulk Material

2,750	kg/m^3, Limestone	*https://www.engineeringtoolbox.com/soil-rock-bulking-factor-d_1557.html*		
4,635	lb/yd^3			
4,024	lb/yd^3, concrete	*(EPA 1995)AP-42 p. 11-12.9, 6/06*	0.00025	0.49702

14.5833	troy oz/lb
1	(g/s)/(g/s)
0.126	(g/s)/(lb/hr)
0.00525	(g/s)/(lb/day)
0.02877	(g/s)/(ton/yr)

Constants

M.W. SO2	64.0638
M.W. S	32.065
M.W. O	15.9994

Diesel SO2

15 parts S	7.05 lb	64.06 SO2	gal	0.00939 MMBtu	453.593 g	=	6.57E-03 g SO2
1.0E+06	gal diese	32.065 S	0.137 MMBtu	kW-hr	lb		kW-hr

Calculation

185 lb S	44.08 lb C3H8	lb mol	7,000 gr	100 SCF	=	15.90 gr S
1.00E+06 lb C3H8	lb mol	359.05 SCF (0C)	lb	100SCF		100 SCF

Propane heating value 91,500 *Btu/gal* *(EPA 1995), Table 1.5-1 (07/08) Footnote a*

AP-42, Chapter 13.2.4 Particle Size Fractions

0.35	PM10
0.053	PM2.5

Air Sciences Inc.	PROJECT TITLE: Grassy Mountain Mine	BY: M. Mavko
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AIR EMISSION CALCULATIONS	SUBJECT: Conversions and Constants	DATE: July 26, 2019

Fuel Combustion Exhaust Flow (EPA Method 19, F-factor)

Propane Heater

F-factor	8,710	dscf/MMBtu	Propane, dry
O2%dry	3	%	
Heat input	1	MMBtu/hr	
Standard exhaust flow	10,170	dscf/hr	
	169	dscfm	
Vol % moisture	15.0%	standard for propane boilers	
Temperature	360	°F, Engineering Toolbox* (LPG heating appliances)	
Pressure, site	0.87	atm	
Actual exhaust flow	356	acfm (wet)/MMBtu	

Diesel Engine

F-factor	9,190	dscf/MMBtu	Oil, dry
O2%dry	9	%	
Heat input	0.007	MMBtu/hp-hr	*(EPA 1995), Sec. 3.3, (Diesel engine)*
Standard exhaust flow	113	dscf/hp-hr	
	1.9	dscfm/hp	2.5 dscfm/kW
Vol % moisture	8.0%	standard for diesel engines	
Temperature	1,100	°F, Engineering Toolbox* (diesel exhaust)	
Pressure, site	0.87	atm	
Actual exhaust flow	7.0	acfm (wet)/hp	9.3 acfm (wet)/kW

* *http://www.engineeringtoolbox.com/fuels-exhaust-temperatures-d_168.html*

Refinery Exhaust Flow

			dscfm	acfm	temp_F		dia_ft	
	Hourly		Exhaust Parameters					BH
			Flow		Temp	Velocity	Dia	PM
Source	Design Rate	Water	dscfm	acfm	F	ft/s	ft	gr/dscf
Carbon Regeneration Kiln (Drum)	0.2 ton	1%	80	110	150	10	0.48	
Electrowinning Cells & Pregnant Solution Tank		4%	2,660	3,380	100	161	0.67	
Mercury Retort		1%	16	20	150	5	0.29	
Induction Melting Furnace	0.1/batch ton	1%	3,500	4,700	150	100	1	0.004

(NDEP 2017.07)

Site Pressure Calculation

http://www.sensorsone.com/altitude-pressure-units-conversion/

~ Site Elev. (m)	~ Site Elev. (ft)	
1160	3805.77	
Elev(ft)	Pres(inHg)	
3000	26.817	
4000	25.842	
Site (ft)	Site (inH	Site(atm)
3805.77	26.0314	0.86999

Attachment B – Modeling Report and CAO Risk Assessment Work Plan

AIR SCIENCES INC.

DENVER • PORTLAND • LOS ANGELES

Grassy Mountain Mine Air Quality Modeling Report and Risk Assessment Work Plan

PREPARED FOR:
CALICO RESOURCES, INC.

PROJECT NO. 343-1
AUGUST 2, 2019

1.0 INTRODUCTION

Calico Resources is providing this Modeling Report and Risk Assessment Work Plan to support its request for a Standard Air Contaminant Discharge Permit (ACDP) for the proposed Grassy Mountain Mine facility (facility). The facility will be located approximately 24 kilometers south southwest of Adrian, Oregon, in Malheur County. A location map for the facility is presented in Figure 1. The facility is expected to emit particulate matter of 10 microns or less in diameter (PM_{10}) at a rate above the Significant Emission Rate (SER) for PM_{10}.

The Modeling Report presents the methods used for an air quality evaluation of the potential air emissions from Facility sources. The dispersion model (AERMOD), modeling techniques, source characterizations and emissions, the receptors, the meteorological dataset, the background concentrations, and the ambient air quality standards are described in the Report.

As part of the Standard ACDP application, it is expected that the facility will be required to demonstrate compliance under the Cleaner Air Oregon Rules (CAO). For that demonstration, the facility has conducted a Level 3 Risk Assessment. For a Level 3 Risk Assessment, a Risk Assessment Work Plan (work plan) is required as described in the Oregon Administrative Rules (OAR)[1]. The work plan includes a conceptual site model, the proposed exposure assessment using AERMOD and risk characterization, and an uncertainty evaluation.

1.1 Facility Process Description

The Project will consist of an underground gold and silver ore mine using the Drift and Fill method, and a process facility to mill, refine, and melt gold and silver ore into doré bars for further processing off-site.

The underground mine will be developed by blasting, using emulsion, a level access tunnel and then mining drifts off of the main tunnel. As ore is removed, backfill from a nearby borrow pit will be hauled in to fill the drifts. Cemented rock fill (CRF) will be used for a portion of the backfill, requiring a batch cement plant at the surface. A mobile crushing unit will crush borrow material in the borrow pit, and material will be loaded and hauled to the waste rock storage facility, the CRF plant, or directly underground.

Ore removed from the mine is dumped by haul trucks directly into a mobile crushing unit that consists of a primary jaw crusher and a secondary screening/cone crusher unit. Crushed ore is then conveyed to a covered ore stockpile. A front-end loader transfers stockpiled ore to the mill via a feed conveyor; from here, the process is a closed, wet process. Milled ore is cycloned to

[1] OAR 340-245-0210. https://secure.sos.state.or.us/oard/viewSingleRule.action?ruleVrsnRsn=252165. Accessed July 25th, 2019.

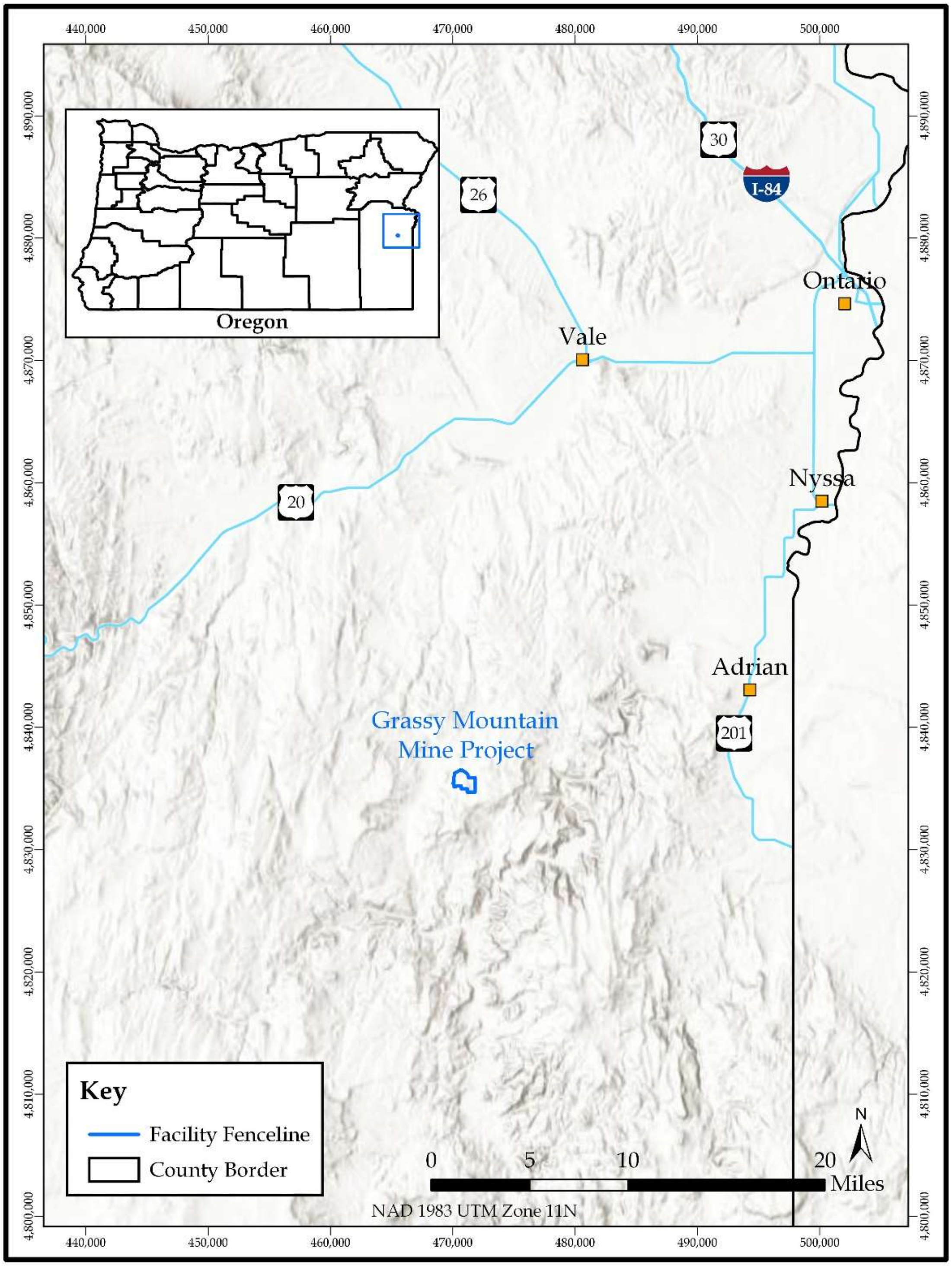
separate free gold in coarse ore that will be extracted in a gravity concentrate intensive leaching process; the remaining ore slurry is sent directly to the carbon-in-leach (CIL) process.

The CIL circuit consists of a pre-aeration tank and a series of 7 CIL tanks. Lime is added during pre-aeration to control pH, and cyanide is added to the first CIL tank. Leached gold and silver will be adsorbed onto granular carbon, which is present in all tanks. Slurry advances through each of the 7 tanks, once per day. Barren carbon is added to the last tank and flows through the circuit in the opposite direction: loaded carbon extracted for the elution process is removed from tank 1. The elution process strips gold and silver from the carbon into solution. Pregnant solution (solution loaded with gold and silver) is transferred to the gold room, and stripped carbon is regenerated in the propane-fired carbon regeneration kiln before being recycled for the leach process. Some carbon loss occurs during heating in the kiln, and new carbon is added along with regenerated carbon to CIL tank 7.

The gold room will house the electrowinning cells, retort, induction furnace, and associated support equipment. In the electrowinning cells, gold and silver are plated onto cathodes using electrolysis. Periodically, the electrowinning cells will be opened and the sludge cleaned out manually with a high-pressure spray gun. Sludge from the cells will flow by gravity to the electrowinning-sludge-filter feed tank and into manually operated pressure canister filters to be dewatered. Dewatered sludge is to be collected in trays and placed in the mercury retort to dry the sludge and remove mercury. Dried sludge will be removed from the retort and combined with fluxes in a flux mixer before being charged into the melting furnace, where the sludge is melted and poured into doré bars.

The CIL tailings will be pumped to the 2-stage agitated cyanide-detoxification tanks, where lime will be added to buffer pH, copper sulfate will be added as a reaction catalyst, and sodium meta-bisulfite will be added. Detoxified slurry will overflow the second detoxification tank to the final tailings pump box where it will be pumped to the tailings management facility by the final tailings pumps.

Figure 1. Facility Location Map



2.0 MODELING PROTOCOL

2.1 Model Selection

The analysis was conducted using version 18081 of the AERMOD modeling system. The AERMOD modeling system is the recommended model for short-range analyses (up to 50 kilometers) in the Guideline on Air Quality Models, which is maintained by the United States Environmental Protection Agency (EPA) and published as Appendix W to the Code of Federal Regulations, Title 40, Part 51.

2.2 Modeled Sources

This analysis included evaluation of potential emissions from all sources identified in the ACDP application at the facility. Emission sources include exhaust stacks (generators, silo vents, heaters, and process sources) as well as fugitive emission sources (blasting, hauling, material handling, crushing, and conveying). Fugitive emissions of Hazardous Air Pollutants (HAPs) from several additional sources were modeled, including the tailings management facility, tailings pond, and CIL process tanks.

A complete list of modeled sources and descriptions is provided in 3.4Appendix A.

2.3 Air Pollutants and Emissions

A summary of facility-wide potential annual emissions of pollutants subject to National Ambient Air Quality Standards (NAAQS) in tons per year (ton/yr) is provided in Table 1, along with the Significant Emission Rates (SERs) as defined in OAR 340-200-0020.

Table 1. Facility-Wide Potential Emissions, NAAQS (ton/yr)

Source Category	PM_{10}	$PM_{2.5}$	CO	NO_X	SO_2	VOC	$NO_X + SO_2$	NO_X + VOC	Lead (Pb)
Process	4.55	1.30	7.88	5.70	0.66	0.59	6.36	6.29	4.72E-05
Mining & Fugitive	14.10	2.56	39.02	18.32	0.05	12.18	18.37	30.50	8.78E-06
Facility-Wide Total	**18.65**	**3.86**	**46.89**	**24.01**	**0.72**	**12.78**	**24.73**	**36.79**	**5.60E-05**
SER	***15***	***10***	***100***	***40***	***40***	***40***	***40***	***40***	***0.6***

As shown in Table 1, with the exception of PM_{10}, expected emissions of all NAAQS pollutants are below their respective SERs. The quality analysis presents modeling results for comparison with the PM_{10} 24-hour NAAQS.

Emissions of HAPs for the Risk Assessment are discussed in the Risk Assessment Work Plan.

2.4 Source Characterization and Model Input Parameters

All the sources with stacks included in this analysis were characterized as POINT sources in the model. An exhaust temperature of 0˚K was entered for sources not associated with heated processes (e.g., silo vents). AERMOD substitutes a 0˚K exhaust temperature with the hourly ambient temperature provided in the meteorological data for dispersion calculations.

All process fugitive sources without a stack (e.g., crushing) were characterized as VOLUME sources. The initial lateral and vertical dispersion parameters were calculated based on approximate source dimensions and coefficients provided in EPA guidance.[2]

Emissions from underground mining activities were characterized as a single POINT source located at and assuming the stack parameters of the mine ventilation exhaust vent.

Aboveground road-way emissions from on-site hauling and water truck activity were characterized as LINE sources. The sources' release heights were based on the mobile equipment heights, and the sources' width based on planned road widths.

Several fugitive emissions sources were characterized as AREA sources, including: wind erosion emissions at the topsoil storage locations; general mining activity across the borrow site; and Hazardous Air Pollutants (HAPs) emissions from the tailings management facility, a tailings pond, and the carbon-in-leach and cyanide detoxification tanks. For these sources whose emission location extents are not rectangular, the AREA sources were characterized as rectangular approximations of the locations.

The model input parameters for each source are presented in 3.4Appendix A, and the modeled emission are summarized in 3.4Appendix B. A facility plot plan showing the project boundary and layout of sources is provided in Figure 2.

For references and additional details regarding source characterization, the reader is referred to Attachment A of the Grassy Mountain Mine Standard Air Contaminant Discharge Permit Application (August 2019).

2.5 Coordinate System

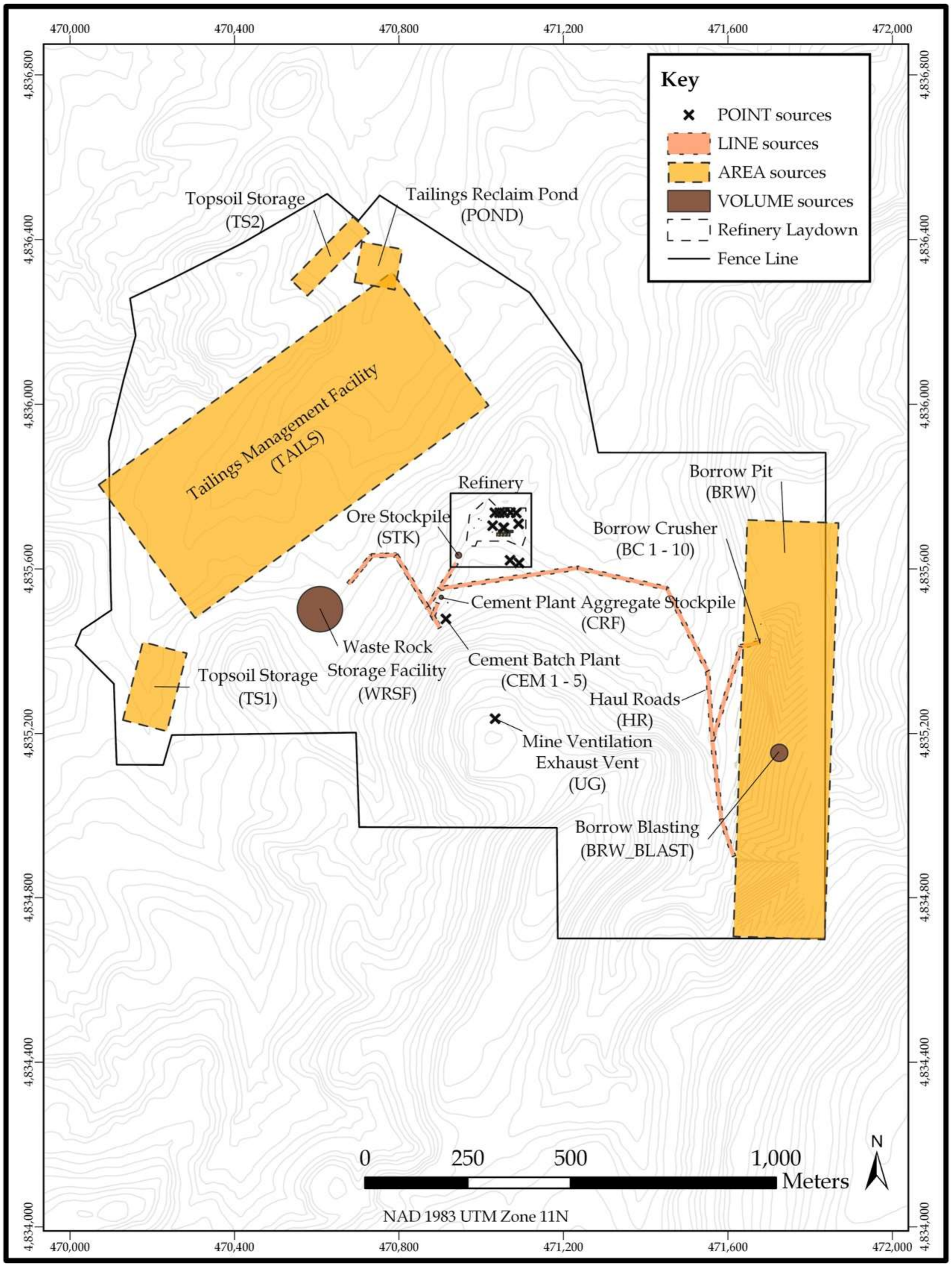
The Universal Transverse Mercator (UTM) coordinate system projected in North American Datum of 1983 (NAD83), Zone 11, was used in this modeling analysis to define all locations in the modeling domain (sources, buildings, and receptors).

[2] EPA. 2016. User's Guide for the AMS/EPA Regulatory Model (AERMOD). EPA-454/B-16-011. December 2016.

2.6 Building Downwash

The effects of the building-induced downwash were incorporated into this modeling analysis. The building downwash parameters were calculated using the Building Profile Input Program (BPIP) with the Plume Rise Model Enhancement (PRIME) algorithm (BPIP-PRIME version 04274). The building parameters used in the modeling are provided in a BPIP-ready format in Appendix C.

Figure 2. Model Source Locations for Grassy Mountain Mine Facility



2.7 Receptors

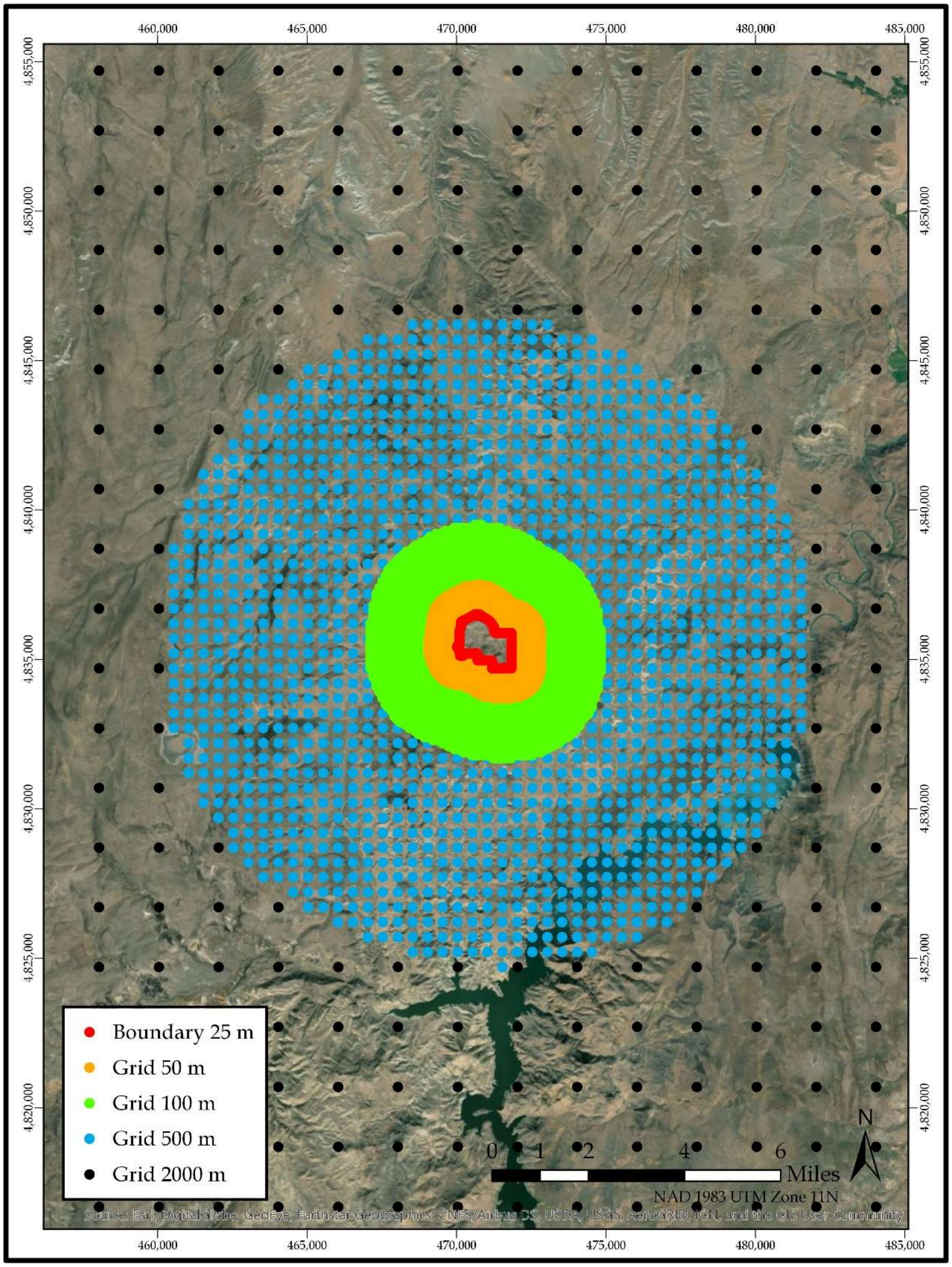
A series of nested Cartesian receptor grids were used to assess ground-level impacts from the facility air emissions:

- Boundary line receptors at 25-meter spacing
- Gridded receptors at 50-meter spacing out to 2 kilometers from the modeling boundary
- Gridded receptors at 100-meter spacing out to 5 kilometers from the modeling boundary
- Gridded receptors at 500-meter spacing to 10 kilometers from the modeling boundary
- Gridded receptors at 2-kilometer spacing to 50 kilometers from the modeling boundary

All of the above grids were centered on the facility. Receptors within the project boundary were not modeled. The receptor locations are shown in Figure 3. Additional receptors were modeled for the risk assessment, and are discussed in the Risk Assessment Work Plan.

All receptors were processed with the AERMOD terrain preprocessor (AERMAP, version 11103) to generate receptor terrain elevations and hill height values using the one-third-arc-second (10-meter) resolution United States Geographical Survey National Elevation Dataset (NED) files.

Figure 3. Receptor Locations



2.8 Meteorological Data

This air quality analysis was conducted using one year (2014/10/1–2015/9/30) of site-specific hourly meteorological data. The meteorological data were collected at the Calico-Vale meteorological station as part of the Air Quality Baseline study for the facility project area (Baseline Study)[3]. The site is located approximately four kilometers west of the facility project area, as shown in Figure 4. A wind frequency distribution diagram (wind rose) for the meteorological data is presented in Figure 5. The data quality meets or exceeds all specifications described in the Environmental Protection Agency's (EPA's) Meteorological Monitoring Guidance for Regulatory Modeling Applications[4].

The data set was processed with AERMET version 18081, supplemented with upper-air data from Boise, ID, and National Weather Service (NWS) surface station data, including cloud cover, from Ontario, OR. The processing included the AERMET stage 3 adjusted surface friction velocity option (ADJ_U*).

[3] EM Strategies. 2018. Grassy Mountain Mine Project Air Quality Resources Baseline Report. January, 2018.
[4] EPA. 2000. Meteorological Monitoring Guidance for Regulatory Modeling Applications. EPA-454/R-9905. February, 2000.

Figure 4. Calico-Vale Meteorological Tower Location

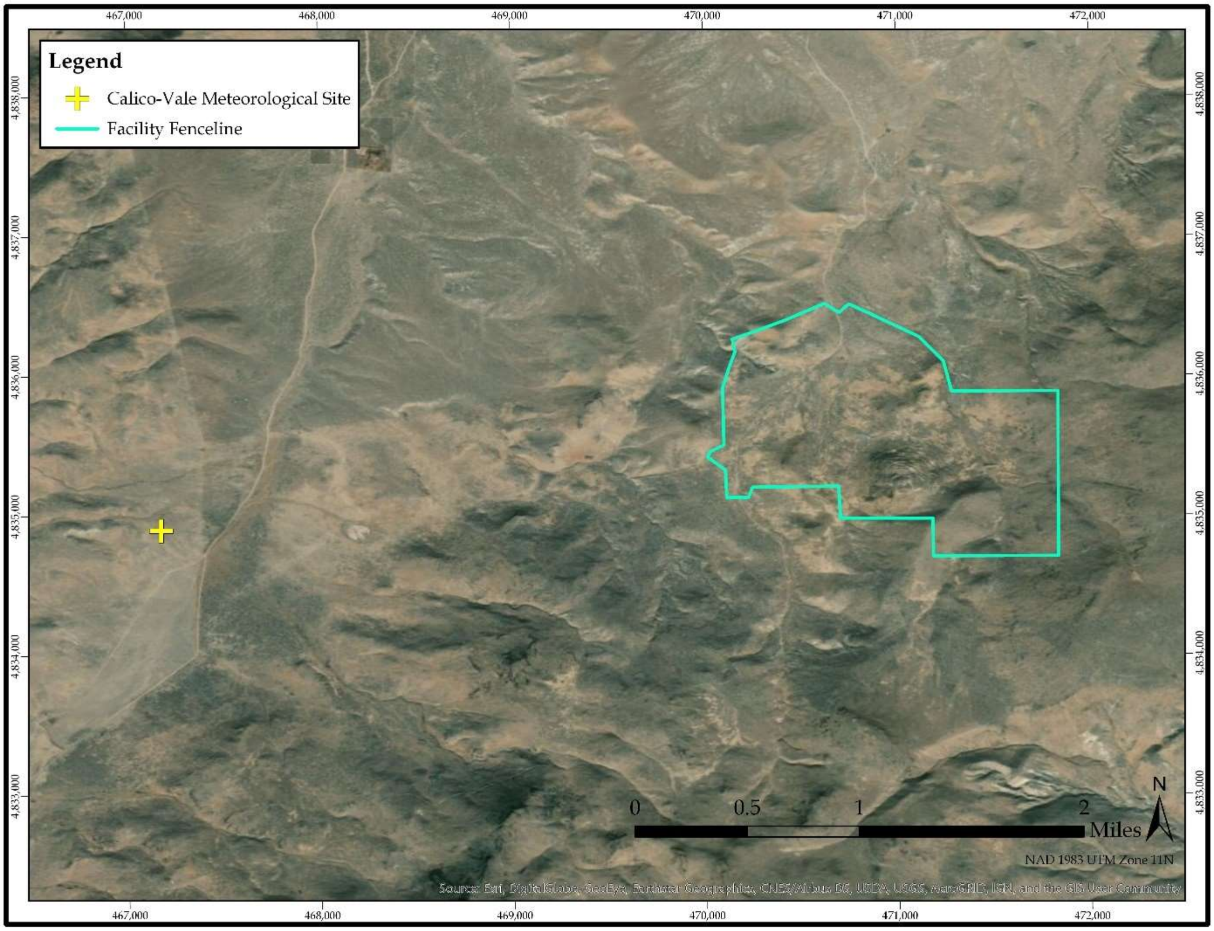
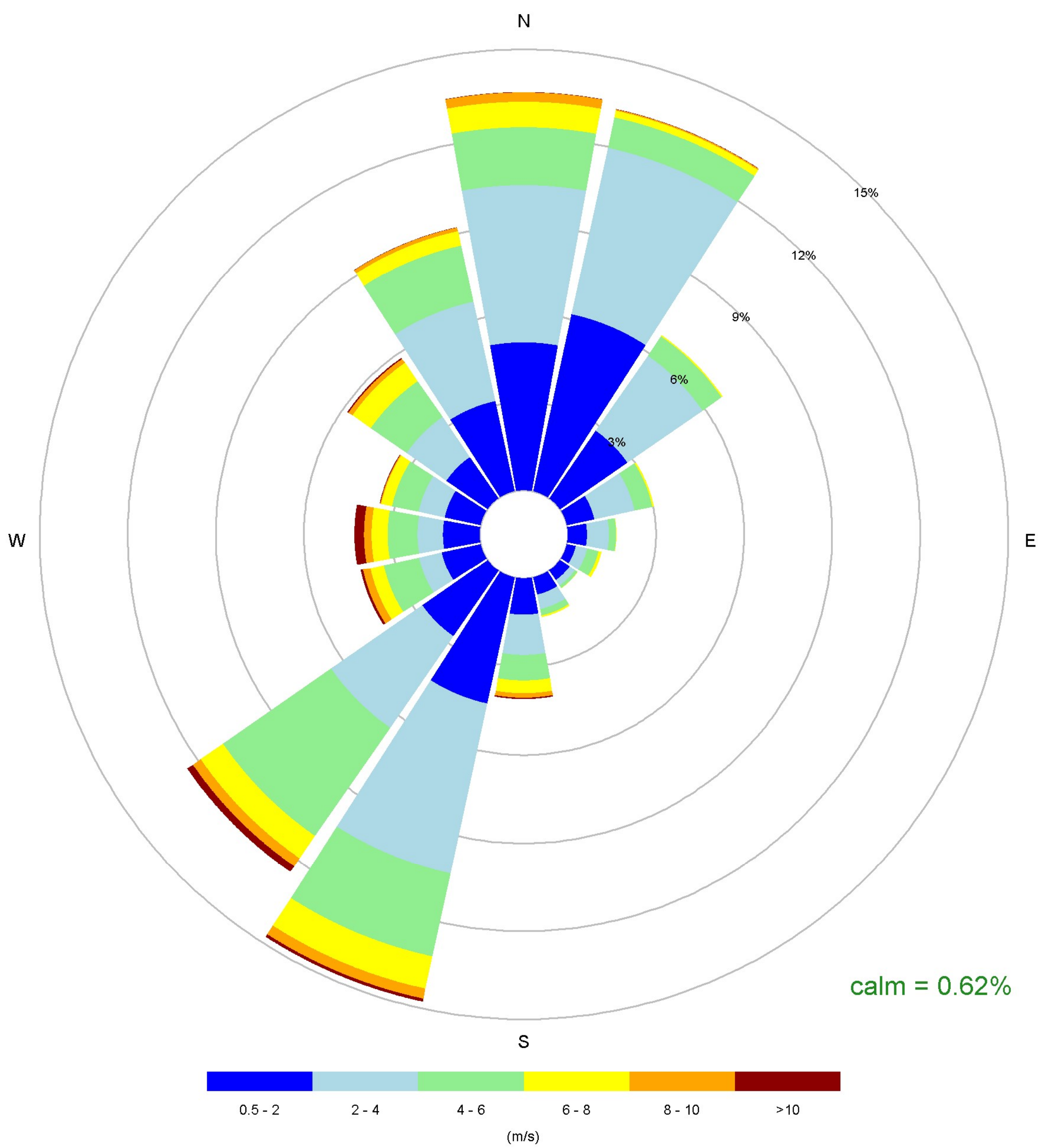


Figure 5. Wind rose for the Calico-Vale Meteorological Station



2.9 Background Concentrations

A background concentration was added to the modeled PM_{10} concentrations to account for the prevailing air pollution in the modeling domain before comparison with standard for the NAAQS compliance demonstration. The Baseline Study included monitoring PM_{10} and determining a background concentration as the second highest concentration Oct. 2014 – Sept. 2015 period, excluding periods affected by wildfires[5]. The background concentration used is presented in Table 2.

Table 2. Background Concentration

Pollutant	Averaging Period	Form	Background Concentration (µg/m³)
PM_{10}	24-Hour	2nd High	23.0

2.10 NAAQS Modeling Methodology

Regulatory default options in AERMOD were used to estimate the ground-level concentrations for the PM_{10} standard.

2.11 NAAQS Modeling Results

A summary the results of NAAQS modeling demonstration is provided in Table 3. The total PM_{10} concentrations (modeled plus background) are below the PM_{10} 24-hour NAAQS.

Table 3. NAAQS Modeling Results Summary

Pollutant	Averaging Period	Form	Background Concentration (µg/m³)	Modeled Concentration (µg/m³)	Total Concentration (µg/m³)	Standard (µg/m³)
PM_{10}	24-Hour	Highest 2nd High	23	20.6	43.6	150

[5] EM Strategies. 2018. Grassy Mountain Mine Project Air Quality Resources Baseline Report. January, 2018.

3.0 RISK ASSESSMENT WORK PLAN

3.1 Level 3 Risk Assessment

As part of the application for the Standard ACDP, a Level 3 Risk Assessment was performed for the facility. The Risk Assessment used many of the same modeling procedures described in the Modeling Protocol, including source characterization, meteorology, and receptor grids. For the Level 3 Risk Assessment, this Risk Assessment Work Plan provides additional information regarding a conceptual site model for exposure, the exposure assessment and risk characterization, and an uncertainty evaluation.

3.2 Conceptual Site Model

3.2.1 Toxic Emissions

For the risk assessment, toxic emissions impacting the inhalation pathway are expected to occur from the following facility activities described in Section 1.1:

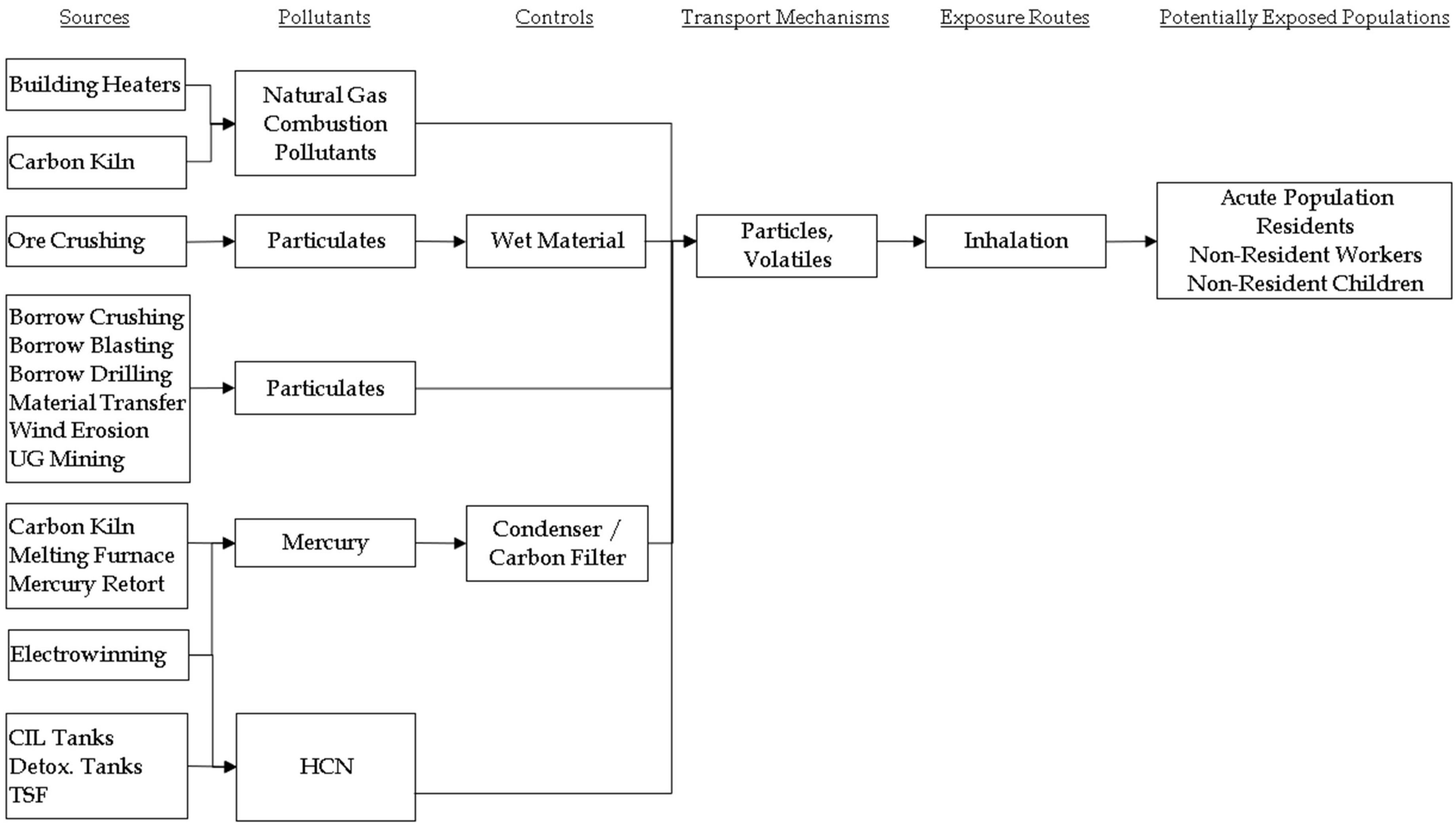
- Propane combustion, including combustion at the carbon regeneration kiln and assuming all building heaters are propane fired
- Toxic pollutants found in the dust emitted from site activities, including ore and waste rock crushing, rock drilling, rock blasting, material transfers, and wind erosion
- Mercury emissions from the following process sources: kiln, electrowinning circuit, mercury retort, and melting furnace
- Hydrogen cyanide emissions from CIL tanks, cyanide detoxification tanks, and the tailings management facility

A summary of facility-wide potential emissions of HAPs is provided in Table 4. Potential emissions of HAPs by individual TEU are provided in 3.4Appendix D. Detailed emissions calculations for are provided as Form AQ405CAO and in the emissions inventory. The conceptual site model for the CAO is summarized in Figure 6.

Table 4. Facility-Wide Potential Emissions of HAPs

HAP	Facility Total (ton/year)	Facility Total (pound/day)
1,3-Butadiene	7.34E-06	3.52E-03
Acetaldehyde	4.21E-04	7.06E-02
Acrolein	1.83E-04	9.24E-03
Antimony and compounds	1.98E-04	1.46E-03
Arsenic and compounds	1.65E-03	1.24E-02
Barium and compounds	1.64E-04	9.01E-04
Benzene	2.54E-04	8.45E-02
Beryllium and compounds	4.76E-06	3.37E-05
Cadmium and compounds	4.36E-05	2.44E-04
Chromium VI, chromate, and dichromate particulate	2.00E-04	1.37E-03
Cobalt and compounds	2.39E-05	1.74E-04
Copper and compounds	3.18E-05	1.74E-04
Cyanide, Hydrogen	2.85E+00	1.56E+01
Diesel Particulate Matter	8.82E-03	4.23E+00
Ethyl benzene	8.41E-05	4.61E-04
Formaldehyde	3.02E-03	1.22E-01
Hexane	6.72E-02	3.68E-01
Lead and compounds	5.60E-05	4.19E-04
Manganese and compounds	6.26E-04	4.64E-03
Mercury and compounds	1.64E-03	9.02E-03
Naphthalene	2.28E-05	1.25E-04
Nickel and compounds	1.13E-04	6.86E-04
p-Dichlorobenzene	4.48E-05	2.46E-04
Polycyclic aromatic hydrocarbons (PAHs)	3.48E-05	1.52E-02
Propylene	6.09E-03	3.34E-02
Selenium and compounds	8.97E-07	4.91E-06
Toluene	2.04E-04	3.76E-02
Vanadium (fume or dust)	8.59E-05	4.71E-04
Xylene (mixture)	4.27E-04	2.77E-02
Zinc and compounds	1.08E-03	5.94E-03

Figure 6. CAO Conceptual Site Model Diagram



3.2.2 Exposure Locations

For the risk assessment, the gridded receptors presented in Section 2.7 were compared with land use data to determine which receptor s represent the following types of locations (and potentially exposed population types):

- Acute open space (acute population)
- Residential (residents)
- Commercial (non-resident workers)
- Schools (non-resident children)

The classification of the receptors within the gridded receptor networks in shown in Figure 7.

In addition, receptors were modeled to represent specific population locations, including the closest campgrounds, residences, businesses, and schools. These specific receptors are listed and in Table 5 and the locations are shown in Figure 8.

Table 5. Specific Population Receptors for the CAO Risk Assessment

Receptor	Northing	Easting	Classification
Campground	480,119	4,833,116	Acute open space
Campground 2	479,233	4,834,611	Acute open space
Residential 1	481,167	4,835,722	Residential
Residential 2	484,473	4,838,898	Residential
Residential 3	486,593	4,842,860	Residential
Residential 4	485,667	4,843,772	Residential
Occupational 1	467,702	4,839,557	Commercial
Occupational 2	474,243	4,839,495	Commercial
Occupational 3	466,287	4,829,471	Commercial
School 1	451,130	4,857,129	School
School 2	480,485	4,869,487	School
School 3	494,402	4,843,162	School

For those receptors classified as representing any potential exposure population, the acute exposure hazard was calculated. Additionally, chronic cancer and chronic non-cancer risks were calculated for those receptors representing residents, non-resident workers, and non-resident children. A description of the risk calculation is provided in Section 3.3.

Figure 7. Gridded Receptor Classifications

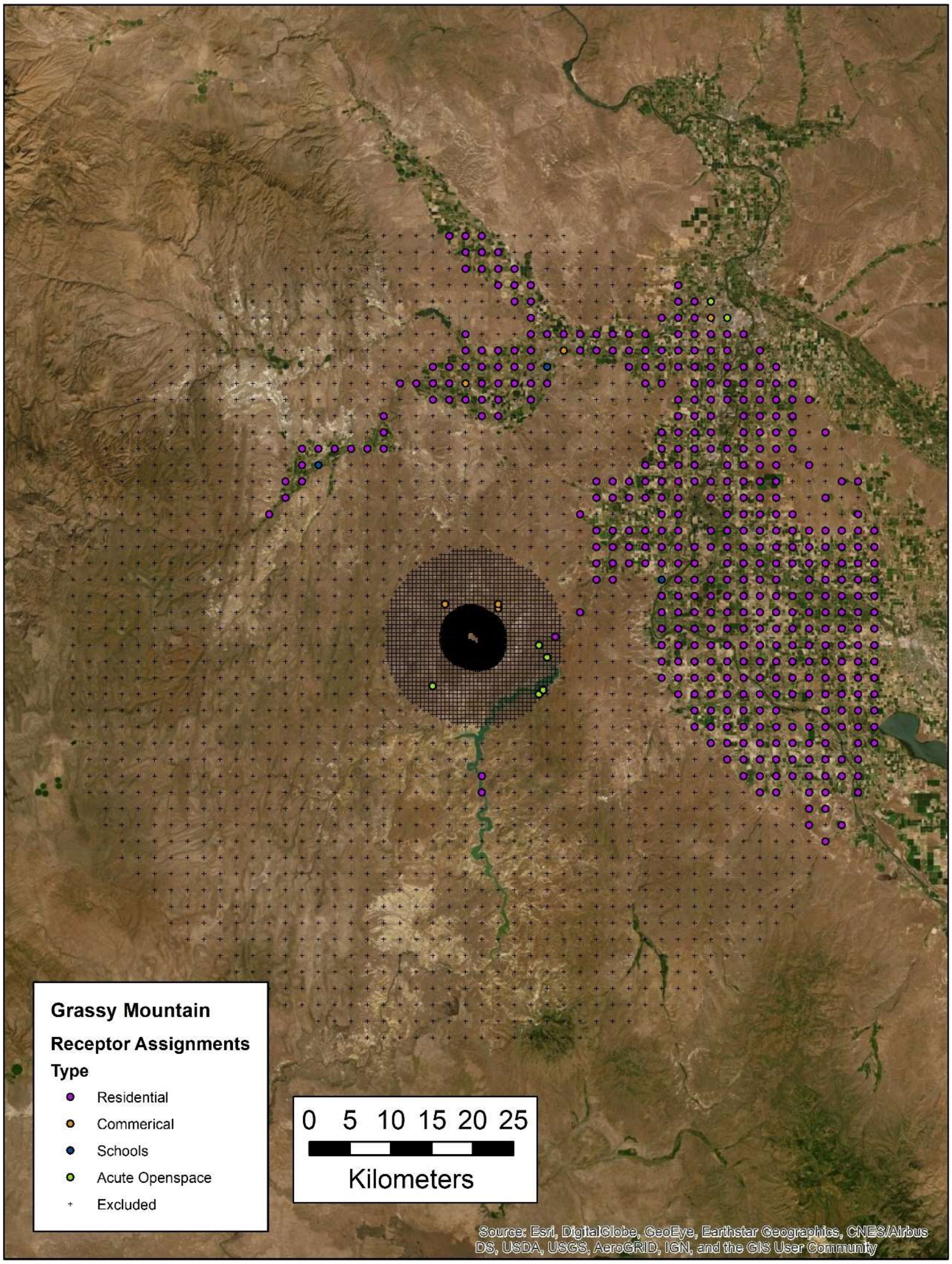
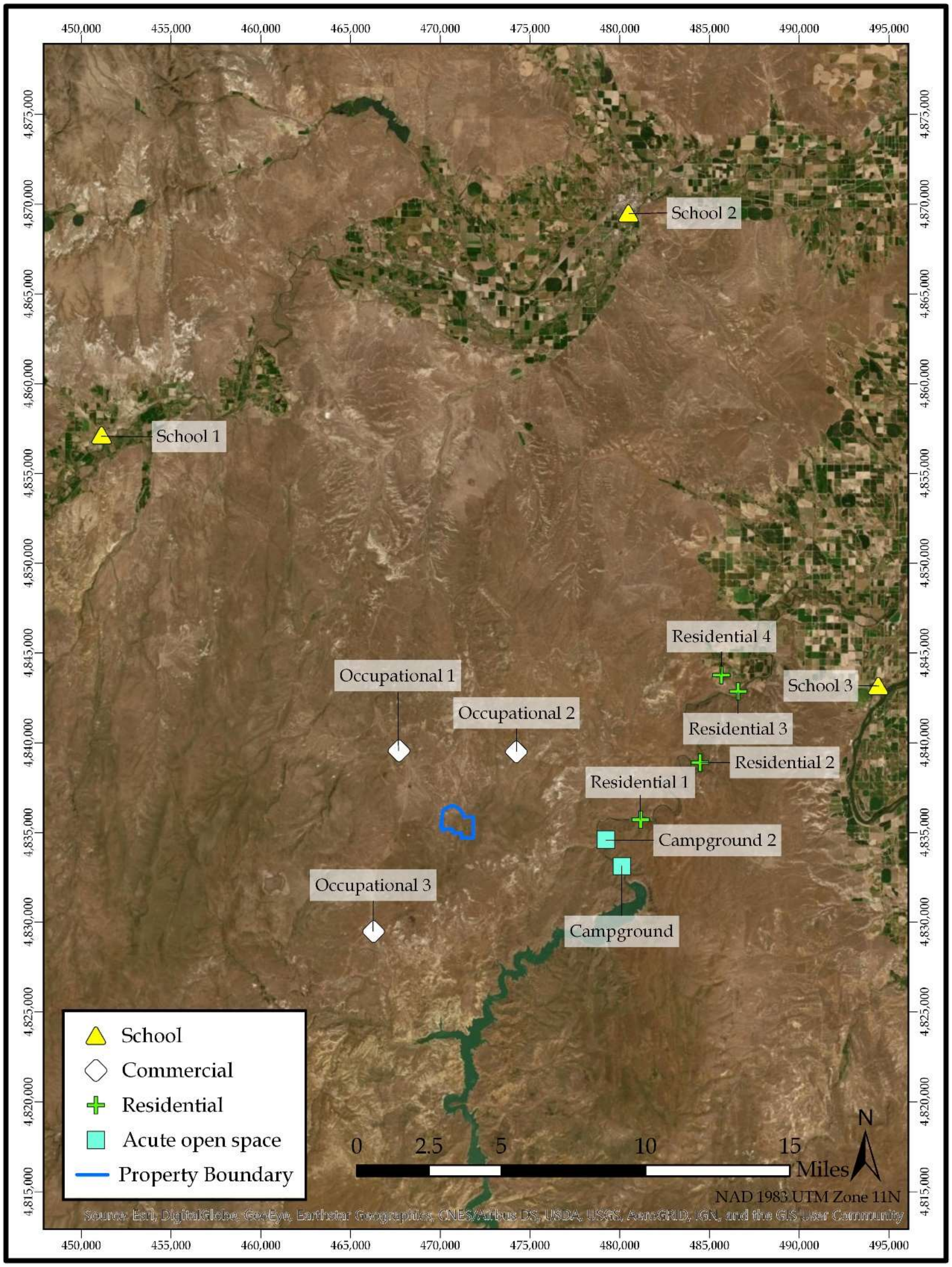


Figure 8. Specific Population Receptors



3.3 Exposure Assessment and Risk Characterization

Concentrations of each of the emitted HAPs listed in Table 4 were estimated using AERMOD modeling, as described in Section 3.3.1. Once concentrations were produced for each pollutant at the receptors, they were used along with the Risk-Based Concentrations (RBCs) provided in the OAR[6] to estimate the potential risks at the exposure locations as described in Section 3.3.2.

3.3.1 Exposure Assessment

AERMOD modeling for the Level 3 risk assessment used the same source characterizations, building downwash parameters, and meteorological data as described in the Modeling Report.

For the CAO risk assessment modeling, each Toxic Emissions Unit (TEU), as presented in the CAO form AQ405.2, was modeled at a unit emission rate (i.e., one gram per sec, or 1 g/s). Some TEU's in AQ405.2 represent multiple AERMOD sources. Those sources were aggregated into source groups, using the SRCGROUP cards in AERMOD, with each group representing a single TEU. Each group was modeled with a 1 g/s emission rate, allocated among the associated sources based on relative activity. A list of the proposed TEU's, associated model sources, and allocation percentages is provided in Table 6 and again in 3.4Appendix D for convenience.

For example, CAO HAPs emissions are calculated for Ore Crushing circuit source group (OC), based on the estimated total particulate matter (PM) emitted. Modeled sources for the OC group include sources OC1 through OC13, which represent individual material transfers and crusher emissions, and the PM emissions from each source are calculated for the emissions inventory. In the CAO model, the emission rates for OC1 through OC13 sum to the unit emission rate of 1 g/s, allocated to the thirteen specific sources based on the portion of PM emitted by each source. In Table 6, OC8 is shown to have an allocation of 20.0%, the percentage of the OC group PM emissions. In the CAO AERMOD modeling, then, OC8 will be modeled with a 0.200 g/s emission rate.

The maximum, time-independent concentrations for each TEU's source group were output into AERMOD plot files for both daily and annual averaging periods. The daily plot files are used for the acute exposure analysis, and the annual plot files are used for the chronic cancer and chronic non-cancer exposure analyses. The groups' concentrations were multiplied by the appropriate CAO emissions for each TEU and pollutant, as presented in CAO form AQ405.3.

[6] OAR 340-245-8040, Table 4.

Table 6. TEU Modeling Sources and Allocation

TEU / SRCGROUP	SOURCE	Allocation
OC	OC1	2.3%
	OC2	2.3%
	OC3	20.0%
	OC4	2.3%
	OC5	2.3%
	OC6	2.3%
	OC7	36.7%
	OC8	20.0%
	OC9	2.3%
	OC10	2.3%
	OC11	2.3%
	OC12	2.3%
	OC13	2.3%
BC	BC1	5.3%
	BC2	5.3%
	BC3	9.5%
	BC4	5.3%
	BC5	5.3%
	BC6	5.3%
	BC7	44.0%
	BC8	9.5%
	BC9	5.3%
	BC10	5.3%
CKB	CKB	100%
MR	MF	100%
EDG1	EDG1	100%
HA	HA	100%
HPO	HPO	100%
HL	HL	100%
HWW	HWW	100%
HTW	HTW	100%
HMO	HMO	100%
UFD	UG	100%
AFD	BRW	67.3%
	BRW_BLAST	4.3%
	STK	10.7%
	WRSF	11.0%
	CRF	5.1%
	TS1	1.2%
	TS2	0.5%
TAILS	TAILS	100%
POND	POND	100%
DETOX1	DETOX1	100%
DETOX2	DETOX2	100%
CILTANK1	CILTANK1	100%
CILTANK2	CILTANK2	100%
CILTANK3	CILTANK3	100%
CILTANK4	CILTANK4	100%
CILTANK5	CILTANK5	100%
CILTANK6	CILTANK6	100%
CILTANK7	CILTANK7	100%

The concentrations from all TEU's were summed, without pairing the concentrations in time, to produce total concentrations for each pollutant at each receptor for the CAO Level 3 analysis and risk assessment. This approach to the Level 3 analysis is conservative since it overestimates total acute exposure: the maximum exposure from each TEU is considered, even if those maximums did not occur in the same modeled day. This approach also reduces the number of models to be performed and reviewed.

3.3.2 Risk Characterization

Each TEU's risk at each receptor was calculated by dividing a TEU's pollutants' concentrations by the appropriate RBCs, then summing across all pollutants' risk. The total risk at each receptor will be calculated by summing all TEUs' risks.

The risk at each receptor from a single TEU ($R_{r,t}$) is given by:

$$R_{r,t} = X_{r,t} \sum_{p} \frac{Q_{p,t}}{RBC_{p,L(r)}}$$

where $X_{r,t}$ is the unit concentration for TEU t at receptor r, $Q_{p,t}$ is the emission rate (lb/day or lb/year) of pollutant p from TEU t, and $RBC_{p,L(r)}$ is the RBC for pollutant p and exposure location type L at the receptor r.

The total risk at the receptor, R_r, is the sum of each TEU's risk at the receptor:

$$R_r = \sum_{t} R_{r,t}$$

Each receptor has three risk values: chronic cancer risk, chronic non-cancer risk, and acute risk. For informational purposes, the chronic risk values are grouped by exposure location type (residents, non-resident workers, and non-resident children). This results in seven risk levels being determined.

The risk values are compared to the appropriate new facility Risk Action Levels (RALs), shown in Table 7.

Table 7. Risk Action Levels

Risk Action Level	Cancer	Non-Cancer
Source Permit Level	0.5	0.5
Community Engagement Level	5	1
TBACT Level	10	1
Permit Denial Level	25	1

3.3.1 Risk Assessment Results

The summary of the results of the Level-3 Risk Assessment for the facility are provided in Table 8. The risks shown represent the highest of each category type calculated at any modeled receptor, the RAL associated with that calculated risk, and the threshold for the associated RAL. The assessment demonstrates that the Source Permit Level is the appropriate RAL for the facility.

Table 8. Risk Assessment Results Summary

Risk Category	Maximum Calculated Risk	RAL	RAL Threshold
Residential Chronic Cancer	0.066	Source Permit Level	0.5
Non-Residential Chronic Child Cancer	0.000	Source Permit Level	0.5
Non-Residential Chronic Worker Cancer	0.031	Source Permit Level	0.5
Residential Chronic Non-Cancer	0.011	Source Permit Level	0.5
Non-Residential Chronic Child Non-Cancer	0.000	Source Permit Level	0.5
Non-Residential Chronic Worker Non-Cancer	0.015	Source Permit Level	0.5
Acute Non-Cancer	0.003	Source Permit Level	0.5

3.4 Uncertainty Evaluation

Several sources of uncertainty exist within the risk assessment, including,

- Uncertainty in emission factors
- Uncertainty in the existing RBC
- Uncertainty in AERMOD model performance

The Level-3 assessment includes several layers of expected overestimation of risk, including,

- Conservatively high emission factors for the PM emissions (a primary source of HAPs)
- Conservatively high activity estimates for facility emissions
- The time-independent summation of TEU impacts
- AERMOD's well-documented bias toward overprediction[7]

Given the source of known overestimation in the Level-3 assessment and the relatively low risks compared to the RALs, it is reasonable to conclude that the outcome of the risk assessment (Source Permit Level) is appropriate for the facility.

[7] See, e.g., EPA. 2018. Environmental Protection Agency, "AERMOD Model Formulation and Evaluation." EPA-454/R-18-2003. April, 2018.

Appendix A – Model Source Parameters

Table A-1. AERMOD POINT Source Parameters

Model ID	Description	UTM E. (m)	UTM N. (m)	Elev. (m)	Rel. Ht. (m)	T (K)	Vel. (m/s)	Dia. (m)
LS1	Lime Silo Loading	471,091.16	4,835,709.46	1130.81	13.41	0	30.48	0.15
CKD	Carbon Regeneration Kiln (Drum)	471,054.46	4,835,699.94	1130.81	5.52	338.71	3.09	0.15
CKB	Carbon Regeneration Kiln (Burners)	471,055.46	4,835,699.94	1130.81	12.19	699.82	22.46	0.15
MF	Induction Melting Furnace	471,027.90	4,835,705.04	1130.81	5.43	338.71	30.40	0.30
LABSP	Sample Preparation	471,071.49	4,835,736.88	1134.10	7.24	0	4.15	0.76
LABFA	Fire Assay	471,071.49	4,835,736.88	1134.10	7.24	0	4.15	0.76
EDG1	Emergency Generator (Mfr. Yr. >2007; diesel)	471,044.72	4,835,736.46	1134.19	3.05	727.59	28.82	0.20
HA	Administration HVAC	471,033.34	4,835,736.46	1133.84	8.32	455.37	0.17	1.13
HPO	Plant Office and Dry HVAC	471,056.10	4,835,736.46	1134.33	8.32	455.37	0.17	1.13
HL	Laboratory HVAC	471,071.49	4,835,736.88	1134.10	8.24	455.37	0.17	1.13
HWW	Plant Workshop and Warehouse HVAC	471,085.50	4,835,736.03	1133.68	8.32	455.37	0.17	1.13
HTW	Truck Workshop and Warehouse HVAC	471,070.38	4,835,621.18	1140.58	16.24	455.37	0.34	1.13
HMO	Mine Office and Changehouse HVAC	471,092.36	4,835,614.52	1140.69	8.41	455.37	0.17	1.13
CEM1	Cement/Shotcrete loading to silo	470,914.33	4,835,478.67	1141.73	13.41	255.37	30.48	0.15
UG	Underground	471,034.00	4,835,236.00	1209.00	3.00	298.15	7.07	6.78

Table A-2. AERMOD VOLUME Source Parameters

Model ID	Description	UTM E. (m)	UTM N. (m)	Elev. (m)	Rel. Ht. (m)	$\sigma_{y,0}$ (m)	$\sigma_{z,0}$ (m)
OC1	Dump of Ore to Ore Surge Bin	470,980.13	4,835,654.85	1,137.93	6.11	0.40	2.51
OC2	Surge Bin to Vibrating Grizzly Transfer	470,980.13	4,835,658.85	1,137.77	3.75	0.13	0.28
OC3	Primary Crusher (including transfers in and out)	470,980.13	4,835,661.24	1,137.77	2.67	0.17	0.50
OC4	Crusher Discharge Conveyor Transfer Point	470,980.13	4,835,663.76	1,137.77	2.62	0.17	0.23
OC5	Screen Feed Conveyor 1 Transfer Point	470,980.13	4,835,663.76	1,137.77	0.91	0.11	0.28
OC6	Screen Feed Conveyor 2 Transfer Point	470,980.13	4,835,663.76	1,137.77	3.78	0.11	0.23
OC7	Screen (including transfers in and out)	470,980.13	4,835,663.76	1,137.77	3.15	0.21	0.92
OC8	Cone Crusher (including transfers in and out)	470,980.13	4,835,661.24	1,137.77	3.67	0.14	0.44
OC9	Screen Discharge Conveyor Transfer to Stockpile Conveyor	470,969.93	4,835,663.76	1,137.77	2.07	0.17	0.37
OC10	Ore Stockpile Conveyor Transfer to Ore Stockpile	470,982.41	4,835,699.42	1,137.77	7.50	0.17	1.25
OC11	Load Reclaim Hopper	470,994.26	4,835,721.29	1,137.77	5.12	0.57	1.62
OC12	Reclaim Hopper to Ball Mill Feed Conveyor Transfer	470,999.86	4,835,717.64	1,137.77	2.76	0.14	1.03
OC13	Ball Mill Feed Conveyor to Ball Mill Transfer	471,027.30	4,835,689.08	1,130.81	6.87	0.24	1.09
BC1	Dump of Borrow to Surge Bin	471,677.83	4,835,421.21	1,162.61	6.11	0.40	2.51
BC2	Surge Bin to Vibrating Grizzly Transfer	471,677.83	4,835,425.21	1,161.78	3.75	0.13	0.28
BC3	Primary Crusher (including transfers in and out)	471,677.83	4,835,427.60	1,161.28	2.67	0.17	0.50
BC4	Crusher Discharge Conveyor Transfer Point	471,677.83	4,835,430.12	1,160.76	2.62	0.17	0.23
BC5	Screen Feed Conveyor 1 Transfer Point	471,677.83	4,835,430.12	1,160.76	0.91	0.11	0.28
BC6	Screen Feed Conveyor 2 Transfer Point	471,677.83	4,835,430.12	1,160.76	3.78	0.11	0.23
BC7	Screen (including transfers in and out)	471,677.83	4,835,430.12	1,160.76	3.15	0.21	0.92
BC8	Cone Crusher (including transfers in and out)	471,677.83	4,835,427.60	1,161.28	3.67	0.14	0.44
BC9	Screen Discharge Conveyor Transfer to Stockpile Conveyor	471,667.63	4,835,430.12	1,160.04	2.07	0.17	0.37
BC10	Ore Stockpile Conveyor Transfer to Borrow Stockpile	471,680.12	4,835,465.77	1,160.95	7.50	0.17	1.25
LS2	Lime Silo Unloading to Lime Slaker	471,083.54	4,835,702.30	1,130.81	1.14	0.17	1.06
CEM2	Cement/Shotcrete unloading to batch plant	470,918.73	4,835,517.90	1,141.73	1.14	0.17	1.06
CEM3	Aggregate transfer	470,918.73	4,835,517.90	1,141.73	1.86	0.59	1.73
CEM4	Weigh hopper loading	470,918.73	4,835,517.90	1,141.73	1.86	0.59	1.73
CEM5	Mixer loading (central mix)	470,918.73	4,835,517.90	1,141.73	1.86	0.59	1.73
BRW_BLAST	Borrow Blasting	471,725.00	4,835,153.00	1,185.27	75.00	20.93	34.88
WRSF	WRSF	470,608.00	4,835,502.00	1,113.73	2.27	55.08	2.11
STK	Ore Stockpile	470,945.00	4,835,633.00	1,137.03	2.27	7.25	2.11
CRF	CRF Stockpile	470,903.00	4,835,531.00	1,140.34	2.27	4.91	2.11

Table A-3. AERMOD AREA Source Parameters

Model ID	Description	UTM E. (m)	UTM N. (m)	Elev. (m)	Rel. Ht. (m)	X_0 (m)	Y_0 (m)	$\sigma_{z,0}$ (m)
BRW	Borrow	471,613.41	4,834,705.82	1,185.27	2.27	222.05	1,013.59	1.91
TS1	Topsoil Storage 1	470,128.59	4,835,232.66	1,108.38	0.00	110.43	195.65	14.35
TS2	Topsoil Storage 2	470,538.36	4,836,301.43	1,083.58	0.00	54.43	215.22	44.30
TAILS	Tailings Storage Facility	470,069.82	4,835,804.30	1,103.38	0.00	399.81	881.07	54.10
POND	Tailings Pipeline Reclaim Pond	470,691.92	4,836,296.31	1,076.06	0.00	100.00	100.00	10.50
DETOX1	CN Detoxification Tank 1	471,067.37	4,835,688.68	1,130.81	5.84	4.21	4.21	0.00
DETOX2	CN Detoxification Tank 2	471,072.85	4,835,688.68	1,130.81	5.84	4.21	4.21	0.00
CILTANK1	CIL Tank 1	471,038.40	4,835,680.29	1,130.81	7.80	6.37	6.37	0.00
CILTANK2	CIL Tank 2	471,042.51	4,835,687.60	1,130.81	7.80	6.37	6.37	0.00
CILTANK3	CIL Tank 3	471,046.63	4,835,680.29	1,130.81	7.80	6.37	6.37	0.00
CILTANK4	CIL Tank 4	471,050.74	4,835,687.60	1,130.81	7.80	6.37	6.37	0.00
CILTANK5	CIL Tank 5	471,054.86	4,835,680.29	1,130.81	7.80	6.37	6.37	0.00
CILTANK6	CIL Tank 6	471,058.97	4,835,687.60	1,130.81	7.80	6.37	6.37	0.00
CILTANK7	CIL Tank 7	471,063.09	4,835,680.29	1,130.81	7.80	6.37	6.37	0.00

Table A-4. AERMOD LINE Source Locations

Route	Model ID	X1	Y1	X2	Y2	Elev. (m)
Portal Cut to WRSF	HR_POR_WRF1	470,899.15	4,835,456.84	470,882.68	4,835,484.36	1,145.72
	HR_POR_WRF2	470,882.68	4,835,484.36	470,868.72	4,835,507.67	1,139.93
	HR_POR_WRF3	470,868.72	4,835,507.67	470,793.34	4,835,633.62	1,127.30
	HR_POR_WRF4	470,793.34	4,835,633.62	470,732.85	4,835,631.70	1,114.15
	HR_POR_WRF5	470,732.85	4,835,631.70	470,677.88	4,835,563.65	1,110.32
Portal Cut to Ore Stockpile	HR_POR_ORE1	470,899.15	4,835,456.84	470,882.68	4,835,484.36	1,145.72
	HR_POR_ORE2	470,882.68	4,835,484.36	470,868.72	4,835,507.67	1,139.93
	HR_POR_ORE3	470,868.72	4,835,507.67	470,939.99	4,835,614.43	1,137.82
South Entrance Borrow to WRSF	HR_BWS_WRF1	471,613.97	4,834,902.04	471,584.03	4,834,992.14	1,172.41
	HR_BWS_WRF2	471,584.03	4,834,992.14	471,562.21	4,835,182.20	1,158.90
	HR_BWS_WRF3	471,562.21	4,835,182.20	471,550.93	4,835,351.66	1,149.58
	HR_BWS_WRF4	471,550.93	4,835,351.66	471,451.28	4,835,552.61	1,140.36
	HR_BWS_WRF5	471,451.28	4,835,552.61	471,233.88	4,835,601.96	1,133.31
	HR_BWS_WRF6	471,233.88	4,835,601.96	470,898.18	4,835,551.79	1,135.69
	HR_BWS_WRF7	470,898.18	4,835,551.79	470,868.72	4,835,507.67	1,137.56
	HR_BWS_WRF8	470,868.72	4,835,507.67	470,793.34	4,835,633.62	1,127.30
	HR_BWS_WRF9	470,793.34	4,835,633.62	470,732.85	4,835,631.70	1,114.15
	HR_BWS_WRF10	470,732.85	4,835,631.70	470,677.88	4,835,563.65	1,110.32
North Entrance Borrow to WRSF	HR_BWN_WRF1	471,677.83	4,835,421.21	471,630.99	4,835,410.94	1,160.96
	HR_BWN_WRF2	471,630.99	4,835,410.94	471,562.21	4,835,182.20	1,155.40
	HR_BWN_WRF3	471,562.21	4,835,182.20	471,550.93	4,835,351.66	1,149.58
	HR_BWN_WRF4	471,550.93	4,835,351.66	471,451.28	4,835,552.61	1,140.36
	HR_BWN_WRF5	471,451.28	4,835,552.61	471,233.88	4,835,601.96	1,133.31
	HR_BWN_WRF6	471,233.88	4,835,601.96	470,898.18	4,835,551.79	1,135.69
	HR_BWN_WRF7	470,898.18	4,835,551.79	470,868.72	4,835,507.67	1,137.56
	HR_BWN_WRF8	470,868.72	4,835,507.67	470,793.34	4,835,633.62	1,127.30
	HR_BWN_WRF9	470,793.34	4,835,633.62	470,732.85	4,835,631.70	1,114.15
	HR_BWN_WRF10	470,732.85	4,835,631.70	470,677.88	4,835,563.65	1,110.32
WRSF to Portal Cut	HR_WRF_POR1	470,677.88	4,835,563.65	470,732.85	4,835,631.70	1,110.32
	HR_WRF_POR2	470,732.85	4,835,631.70	470,793.34	4,835,633.62	1,114.15
	HR_WRF_POR3	470,793.34	4,835,633.62	470,868.72	4,835,507.67	1,127.30
	HR_WRF_POR4	470,868.72	4,835,507.67	470,882.68	4,835,484.36	1,139.93
	HR_WRF_POR5	470,882.68	4,835,484.36	470,899.15	4,835,456.84	1,145.72
WRSF to CRF Stockpile	HR_WRF_CRF1	470,677.88	4,835,563.65	470,732.85	4,835,631.70	1,110.32
	HR_WRF_CRF2	470,732.85	4,835,631.70	470,793.34	4,835,633.62	1,114.15
	HR_WRF_CRF3	470,793.34	4,835,633.62	470,868.72	4,835,507.67	1,127.30
	HR_WRF_CRF4	470,868.72	4,835,507.67	470,882.68	4,835,484.36	1,139.93
	HR_WRF_CRF5	470,882.68	4,835,484.36	470,894.69	4,835,516.89	1,141.56
CRF Stockpile to Portal Cut	HR_CRF_POR1	470,894.69	4,835,516.89	470,882.68	4,835,484.36	1,141.56
	HR_CRF_POR2	470,882.68	4,835,484.36	470,899.15	4,835,456.84	1,145.72

Table A-5. AERMOD LINE Source Parameters[a]

Model ID	Rel. Ht. (m)	Width (m)	$\sigma_{z,0}$ (m)
HR_*	2.27	9.88	2.11

[a] All haul road LINE sources are characterized with identical release heights, widths, and initial vertical dispersion based on the mobile machinery parameters.

Appendix B – Emission Rates

Table B-1. POINT Source Emission Rates, PM_{10}

Model ID	PM_{10} (g/s)
LS1	9.817E-05
CKD	7.560E-03
CKB	1.639E-03
MF	1.512E-02
LABSP	2.431E-04
LABFA	2.625E-03
EDG1	2.546E-04
HA	9.639E-04
HPO	9.639E-04
HL	9.639E-04
HWW	9.639E-04
HTW	1.928E-03
HMO	9.639E-04
CEM1	1.428E-04
UG	4.065E-01

Table B-2. VOLUME Source Emission Rates, PM_{10}

Model ID	PM_{10} (g/s)
OC1	1.917E-04
OC2	1.917E-04
OC3	2.250E-03
OC4	1.917E-04
OC5	1.917E-04
OC6	1.917E-04
OC7	3.083E-03
OC8	2.250E-03
OC9	1.917E-04
OC10	1.917E-04
OC11	1.917E-04
OC12	1.917E-04
OC13	1.917E-04
BC1	6.437E-03
BC2	6.437E-03
BC3	1.404E-02
BC4	6.437E-03
BC5	6.437E-03
BC6	6.437E-03
BC7	5.091E-02
BC8	1.404E-02
BC9	6.437E-03
BC10	6.437E-03
LS2	1.176E-05
CEM2	1.428E-04
CEM3	1.949E-02
CEM4	1.654E-02
CEM5	1.714E-03
BRW_BLAST	1.351E-02
WRSF	3.462E-03
STK	3.776E-03
CRF	1.593E-03

Table B-3. AREA Source Emission Rates

Model ID	PM_{10} (g/s)	Area (m^2)	PM_{10} ($g/s/m^2$)
BRW	3.076E-02	225,067.66	1.367E-07
TS1	3.493E-04	21,605.49	1.617E-08
TS2	1.443E-04	11,714.48	1.232E-08
TAILS	0	352,263.95	0
POND	0	10,000.00	0
DETOX1	0	17.76	0
DETOX2	0	17.76	0
CILTANK1	0	40.64	0
CILTANK2	0	40.64	0
CILTANK3	0	40.64	0
CILTANK4	0	40.64	0
CILTANK5	0	40.64	0
CILTANK6	0	40.64	0
CILTANK7	0	40.64	0

Table B-4. LINE Source Emission Rates

Model ID	PM_{10} (g/s)	Area (m^2)	PM_{10} (g/s/m^2)
HR_POR_WRF1	2.305E-05	316.84	7.276E-08
HR_POR_WRF2	1.953E-05	268.42	7.276E-08
HR_POR_WRF3	1.055E-04	1,450.09	7.276E-08
HR_POR_WRF4	4.350E-05	597.89	7.276E-08
HR_POR_WRF5	6.288E-05	864.21	7.276E-08
HR_POR_ORE1	5.508E-03	316.84	1.738E-05
HR_POR_ORE2	4.666E-03	268.42	1.738E-05
HR_POR_ORE3	2.204E-02	1,268.11	1.738E-05
HR_BWS_WRF1	4.636E-03	937.96	4.942E-06
HR_BWS_WRF2	9.341E-03	1,889.95	4.942E-06
HR_BWS_WRF3	8.293E-03	1,677.81	4.942E-06
HR_BWS_WRF4	1.095E-02	2,215.89	4.942E-06
HR_BWS_WRF5	1.089E-02	2,202.35	4.942E-06
HR_BWS_WRF6	1.657E-02	3,353.24	4.942E-06
HR_BWS_WRF7	2.590E-03	524.10	4.942E-06
HR_BWS_WRF8	7.167E-03	1,450.09	4.942E-06
HR_BWS_WRF9	2.955E-03	597.89	4.942E-06
HR_BWS_WRF10	4.271E-03	864.21	4.942E-06
HR_BWN_WRF1	2.341E-03	473.73	4.941E-06
HR_BWN_WRF2	1.166E-02	2,359.69	4.941E-06
HR_BWN_WRF3	8.290E-03	1,677.81	4.941E-06
HR_BWN_WRF4	1.095E-02	2,215.89	4.941E-06
HR_BWN_WRF5	1.088E-02	2,202.35	4.941E-06
HR_BWN_WRF6	1.657E-02	3,353.24	4.941E-06
HR_BWN_WRF7	2.589E-03	524.10	4.941E-06
HR_BWN_WRF8	7.165E-03	1,450.09	4.941E-06
HR_BWN_WRF9	2.954E-03	597.89	4.941E-06
HR_BWN_WRF10	4.270E-03	864.21	4.941E-06
HR_WRF_POR1	6.502E-03	864.21	7.524E-06
HR_WRF_POR2	4.498E-03	597.89	7.524E-06
HR_WRF_POR3	1.091E-02	1,450.09	7.524E-06
HR_WRF_POR4	2.020E-03	268.42	7.524E-06
HR_WRF_POR5	2.384E-03	316.84	7.524E-06
HR_WRF_CRF1	4.945E-03	864.21	5.722E-06
HR_WRF_CRF2	3.421E-03	597.89	5.722E-06
HR_WRF_CRF3	8.297E-03	1,450.09	5.722E-06
HR_WRF_CRF4	1.536E-03	268.42	5.722E-06
HR_WRF_CRF5	1.960E-03	342.57	5.722E-06
HR_CRF_POR1	3.080E-03	342.57	8.991E-06
HR_CRF_POR2	2.849E-03	316.84	8.991E-06

Appendix C - BPIPPRM Building Parameters

Buildings dimensions were based on the planned facility layout. The formatted BPIP-Prime text file that includes building information is available upon request.

Appendix D – HAP Emission Rates

Table D-1. HAP Emissions by TEU for Chronic Exposure

	TEU Emissions (lb/yr)							
HAP	OC	BC	CKB	HA	HPO	HL	HWW	HTW
1,3-Butadiene	-	-	-	-	-	-	-	-
Acetaldehyde	-	-	1.082E-01	6.364E-02	6.364E-02	6.364E-02	6.364E-02	1.273E-01
Acrolein	-	-	6.482E-02	3.813E-02	3.813E-02	3.813E-02	3.813E-02	7.626E-02
Antimony and compounds	6.431E-02	2.634E-01	-	-	-	-	-	-
Arsenic and compounds	2.642E-01	2.535E+00	2.920E-03	1.718E-03	1.718E-03	1.718E-03	1.718E-03	3.435E-03
Barium and compounds	-	-	6.424E-02	3.779E-02	3.779E-02	3.779E-02	3.779E-02	7.558E-02
Benzene	-	-	3.066E-02	1.804E-02	1.804E-02	1.804E-02	1.804E-02	3.607E-02
Beryllium and compounds	1.912E-03	5.103E-03	1.752E-04	1.031E-04	1.031E-04	1.031E-04	1.031E-04	2.061E-04
Cadmium and compounds	3.476E-04	3.951E-03	1.606E-02	9.447E-03	9.447E-03	9.447E-03	9.447E-03	1.889E-02
Chromium VI, chromate, and dichromate particulate	4.693E-02	1.975E-01	2.044E-02	1.202E-02	1.202E-02	1.202E-02	1.202E-02	2.405E-02
Cobalt and compounds	2.607E-03	3.292E-02	1.226E-03	7.214E-04	7.214E-04	7.214E-04	7.214E-04	1.443E-03
Copper and compounds	-	-	1.241E-02	7.300E-03	7.300E-03	7.300E-03	7.300E-03	1.460E-02
Cyanide, Hydrogen	-	-	-	-	-	-	-	-
p-Dichlorobenzene	-	-	1.752E-02	1.031E-02	1.031E-02	1.031E-02	1.031E-02	2.061E-02
Diesel Particulate Matter	-	-	-	-	-	-	-	-
Ethyl benzene	-	-	3.285E-02	1.932E-02	1.932E-02	1.932E-02	1.932E-02	3.865E-02
Formaldehyde	-	-	1.095E+00	6.441E-01	6.441E-01	6.441E-01	6.441E-01	1.288E+00
Hexane	-	-	2.628E+01	1.546E+01	1.546E+01	1.546E+01	1.546E+01	3.092E+01
Lead and compounds	1.217E-02	8.230E-02	-	-	-	-	-	-
Manganese and compounds	1.408E-01	8.889E-01	5.548E-03	3.264E-03	3.264E-03	3.264E-03	3.264E-03	6.527E-03
Mercury and compounds	3.824E-03	4.115E-02	3.796E-03	2.233E-03	2.233E-03	2.233E-03	2.233E-03	4.466E-03
Naphthalene	-	-	8.906E-03	5.239E-03	5.239E-03	5.239E-03	5.239E-03	1.048E-02
Nickel and compounds	8.343E-03	4.938E-02	3.066E-02	1.804E-02	1.804E-02	1.804E-02	1.804E-02	3.607E-02
PAHs	-	-	-	-	-	-	-	-
Propylene	-	-	2.380E+00	1.400E+00	1.400E+00	1.400E+00	1.400E+00	2.800E+00
Selenium and compounds	-	-	3.504E-04	2.061E-04	2.061E-04	2.061E-04	2.061E-04	4.122E-04
Toluene	-	-	4.964E-02	2.920E-02	2.920E-02	2.920E-02	2.920E-02	5.840E-02
Vanadium (fume or dust)	-	-	3.358E-02	1.975E-02	1.975E-02	1.975E-02	1.975E-02	3.951E-02
Xylene (mixture)	-	-	1.460E-01	8.588E-02	8.588E-02	8.588E-02	8.588E-02	1.718E-01
Zinc and compounds	-	-	4.234E-01	2.491E-01	2.491E-01	2.491E-01	2.491E-01	4.981E-01
Polycyclic aromatic hydrocarbons (PAHs)	-	-	1.288E-03	7.575E-04	7.575E-04	7.575E-04	7.575E-04	1.515E-03

Table D-1. HAP Emissions by TEU for Chronic Exposure (cont.)

	TEU Emissions (lb/yr)							
HAP	HMO	EDG1	MR	UFD	AFD	TAILS	POND	DETOX1
1,3-Butadiene	-	1.468E-02	-	-	-	-	-	-
Acetaldehyde	6.364E-02	2.880E-01	-	-	-	-	-	-
Acrolein	3.813E-02	3.473E-02	-	-	-	-	-	-
Antimony and compounds	-	-	-	7.329E-03	6.003E-02	-	-	-
Arsenic and compounds	1.718E-03	-	-	3.326E-02	4.587E-01	-	-	-
Barium and compounds	3.779E-02	-	-	-	-	-	-	-
Benzene	1.804E-02	3.503E-01	-	-	-	-	-	-
Beryllium and compounds	1.031E-04	-	-	2.120E-04	1.387E-03	-	-	-
Cadmium and compounds	9.447E-03	-	-	4.510E-05	6.933E-04	-	-	-
Chromium VI, chromate, and dichromate particulate	1.202E-02	-	-	5.360E-03	4.458E-02	-	-	-
Cobalt and compounds	7.214E-04	-	-	3.454E-04	5.680E-03	-	-	-
Copper and compounds	7.300E-03	-	-	-	-	-	-	-
Cyanide, Hydrogen	-	-	4.000E+01	-	-	6.146E+02	2.564E+01	1.015E+02
p-Dichlorobenzene	1.031E-02	-	-	-	-	-	-	-
Diesel Particulate Matter	-	1.764E+01	-	-	-	-	-	-
Ethyl benzene	1.932E-02	-	-	-	-	-	-	-
Formaldehyde	6.441E-01	4.431E-01	-	-	-	-	-	-
Hexane	1.546E+01	-	-	-	-	-	-	-
Lead and compounds	-	-	-	1.457E-03	1.610E-02	-	-	-
Manganese and compounds	3.264E-03	-	-	1.672E-02	1.770E-01	-	-	-
Mercury and compounds	2.233E-03	-	3.200E+00	4.911E-04	7.290E-03	-	-	-
Naphthalene	5.239E-03	-	-	-	-	-	-	-
Nickel and compounds	1.804E-02	-	-	9.837E-04	1.001E-02	-	-	-
PAHs	-	-	-	-	-	-	-	-
Propylene	1.400E+00	-	-	-	-	-	-	-
Selenium and compounds	2.061E-04	-	-	-	-	-	-	-
Toluene	2.920E-02	1.536E-01	-	-	-	-	-	-
Vanadium (fume or dust)	1.975E-02	-	-	-	-	-	-	-
Xylene (mixture)	8.588E-02	1.070E-01	-	-	-	-	-	-
Zinc and compounds	2.491E-01	-	-	-	-	-	-	-
Polycyclic aromatic hydrocarbons (PAHs)	7.575E-04	6.310E-02	-	-	-	-	-	-

Table D-1. HAP Emissions by TEU for Chronic Exposure (cont.)

	TEU Emissions (lb/yr)							
HAP	DETOX2	CILTANK1	CILTANK2	CILTANK3	CILTANK4	CILTANK5	CILTANK6	CILTANK7
1,3-Butadiene	-	-	-	-	-	-	-	-
Acetaldehyde	-	-	-	-	-	-	-	-
Acrolein	-	-	-	-	-	-	-	-
Antimony and compounds	-	-	-	-	-	-	-	-
Arsenic and compounds	-	-	-	-	-	-	-	-
Barium and compounds	-	-	-	-	-	-	-	-
Benzene	-	-	-	-	-	-	-	-
Beryllium and compounds	-	-	-	-	-	-	-	-
Cadmium and compounds	-	-	-	-	-	-	-	-
Chromium VI, chromate, and dichromate particulate	-	-	-	-	-	-	-	-
Cobalt and compounds	-	-	-	-	-	-	-	-
Copper and compounds	-	-	-	-	-	-	-	-
Cyanide, Hydrogen	1.015E+02	6.881E+02	6.881E+02	6.881E+02	6.881E+02	6.881E+02	6.881E+02	6.881E+02
p-Dichlorobenzene	-	-	-	-	-	-	-	-
Diesel Particulate Matter	-	-	-	-	-	-	-	-
Ethyl benzene	-	-	-	-	-	-	-	-
Formaldehyde	-	-	-	-	-	-	-	-
Hexane	-	-	-	-	-	-	-	-
Lead and compounds	-	-	-	-	-	-	-	-
Manganese and compounds	-	-	-	-	-	-	-	-
Mercury and compounds	-	-	-	-	-	-	-	-
Naphthalene	-	-	-	-	-	-	-	-
Nickel and compounds	-	-	-	-	-	-	-	-
PAHs	-	-	-	-	-	-	-	-
Propylene	-	-	-	-	-	-	-	-
Selenium and compounds	-	-	-	-	-	-	-	-
Toluene	-	-	-	-	-	-	-	-
Vanadium (fume or dust)	-	-	-	-	-	-	-	-
Xylene (mixture)	-	-	-	-	-	-	-	-
Zinc and compounds	-	-	-	-	-	-	-	-
Polycyclic aromatic hydrocarbons (PAHs)	-	-	-	-	-	-	-	-

Table D-2. HAP Emissions by TEU for Acute Exposure

HAP	TEU Emissions (lb/day)							
	OC	BC	CKB	HA	HPO	HL	HWW	HTW
1,3-Butadiene	-	-	-	-	-	-	-	-
Acetaldehyde	-	-	2.964E-04	1.744E-04	1.744E-04	1.744E-04	1.744E-04	3.487E-04
Acrolein	-	-	1.776E-04	1.045E-04	1.045E-04	1.045E-04	1.045E-04	2.089E-04
Antimony and compounds	1.762E-04	1.013E-03	-	-	-	-	-	-
Arsenic and compounds	7.239E-04	9.750E-03	8.000E-06	4.706E-06	4.706E-06	4.706E-06	4.706E-06	9.412E-06
Barium and compounds	-	-	1.760E-04	1.035E-04	1.035E-04	1.035E-04	1.035E-04	2.071E-04
Benzene	-	-	8.400E-05	4.941E-05	4.941E-05	4.941E-05	4.941E-05	9.882E-05
Beryllium and compounds	5.238E-06	1.963E-05	4.800E-07	2.824E-07	2.824E-07	2.824E-07	2.824E-07	5.647E-07
Cadmium and compounds	9.524E-07	1.519E-05	4.400E-05	2.588E-05	2.588E-05	2.588E-05	2.588E-05	5.176E-05
Chromium VI, chromate, and dichromate particulate	1.286E-04	7.597E-04	5.600E-05	3.294E-05	3.294E-05	3.294E-05	3.294E-05	6.588E-05
Cobalt and compounds	7.143E-06	1.266E-04	3.360E-06	1.976E-06	1.976E-06	1.976E-06	1.976E-06	3.953E-06
Copper and compounds	-	-	3.400E-05	2.000E-05	2.000E-05	2.000E-05	2.000E-05	4.000E-05
Cyanide, Hydrogen	-	-	-	-	-	-	-	-
p-Dichlorobenzene	-	-	4.800E-05	2.824E-05	2.824E-05	2.824E-05	2.824E-05	5.647E-05
Diesel Particulate Matter	-	-	-	-	-	-	-	-
Ethyl benzene	-	-	9.000E-05	5.294E-05	5.294E-05	5.294E-05	5.294E-05	1.059E-04
Formaldehyde	-	-	3.000E-03	1.765E-03	1.765E-03	1.765E-03	1.765E-03	3.529E-03
Hexane	-	-	7.200E-02	4.235E-02	4.235E-02	4.235E-02	4.235E-02	8.471E-02
Lead and compounds	3.334E-05	3.166E-04	-	-	-	-	-	-
Manganese and compounds	3.857E-04	3.419E-03	1.520E-05	8.941E-06	8.941E-06	8.941E-06	8.941E-06	1.788E-05
Mercury and compounds	1.048E-05	1.583E-04	1.040E-05	6.118E-06	6.118E-06	6.118E-06	6.118E-06	1.224E-05
Naphthalene	-	-	2.440E-05	1.435E-05	1.435E-05	1.435E-05	1.435E-05	2.871E-05
Nickel and compounds	2.286E-05	1.899E-04	8.400E-05	4.941E-05	4.941E-05	4.941E-05	4.941E-05	9.882E-05
PAHs	-	-	-	-	-	-	-	-
Propylene	-	-	6.520E-03	3.835E-03	3.835E-03	3.835E-03	3.835E-03	7.671E-03
Selenium and compounds	-	-	9.600E-07	5.647E-07	5.647E-07	5.647E-07	5.647E-07	1.129E-06
Toluene	-	-	1.360E-04	8.000E-05	8.000E-05	8.000E-05	8.000E-05	1.600E-04
Vanadium (fume or dust)	-	-	9.200E-05	5.412E-05	5.412E-05	5.412E-05	5.412E-05	1.082E-04
Xylene (mixture)	-	-	4.000E-04	2.353E-04	2.353E-04	2.353E-04	2.353E-04	4.706E-04
Zinc and compounds	-	-	1.160E-03	6.824E-04	6.824E-04	6.824E-04	6.824E-04	1.365E-03
Polycyclic aromatic hydrocarbons (PAHs)	-	-	3.528E-06	2.075E-06	2.075E-06	2.075E-06	2.075E-06	4.151E-06

Table D-2. HAP Emissions by TEU for Acute Exposure (cont.)

	TEU Emissions (lb/ day)							
HAP	HMO	EDG1	MR	UFD	AFD	TAILS	POND	DETOX1
1,3-Butadiene	-	3.524E-03	-	-	-	-	-	-
Acetaldehyde	1.744E-04	6.912E-02	-	-	-	-	-	-
Acrolein	1.045E-04	8.336E-03	-	-	-	-	-	-
Antimony and compounds	-	-	-	3.523E-05	2.309E-04	-	-	-
Arsenic and compounds	4.706E-06	-	-	1.599E-04	1.764E-03	-	-	-
Barium and compounds	1.035E-04	-	-	-	-	-	-	-
Benzene	4.941E-05	8.408E-02	-	-	-	-	-	-
Beryllium and compounds	2.824E-07	-	-	1.019E-06	5.333E-06	-	-	-
Cadmium and compounds	2.588E-05	-	-	2.168E-07	2.666E-06	-	-	-
Chromium VI, chromate, and dichromate particulate	3.294E-05	-	-	2.577E-05	1.715E-04	-	-	-
Cobalt and compounds	1.976E-06	-	-	1.660E-06	2.185E-05	-	-	-
Copper and compounds	2.000E-05	-	-	-	-	-	-	-
Cyanide, Hydrogen	-	-	1.096E-01	-	-	1.684E+00	7.026E-02	2.782E-01
p-Dichlorobenzene	2.824E-05	-	-	-	-	-	-	-
Diesel Particulate Matter	-	4.233E+00	-	-	-	-	-	-
Ethyl benzene	5.294E-05	-	-	-	-	-	-	-
Formaldehyde	1.765E-03	1.063E-01	-	-	-	-	-	-
Hexane	4.235E-02	-	-	-	-	-	-	-
Lead and compounds	-	-	-	7.005E-06	6.191E-05	-	-	-
Manganese and compounds	8.941E-06	-	-	8.039E-05	6.807E-04	-	-	-
Mercury and compounds	6.118E-06	-	8.767E-03	2.361E-06	2.804E-05	-	-	-
Naphthalene	1.435E-05	-	-	-	-	-	-	-
Nickel and compounds	4.941E-05	-	-	4.730E-06	3.849E-05	-	-	-
PAHs	-	-	-	-	-	-	-	-
Propylene	3.835E-03	-	-	-	-	-	-	-
Selenium and compounds	5.647E-07	-	-	-	-	-	-	-
Toluene	8.000E-05	3.686E-02	-	-	-	-	-	-
Vanadium (fume or dust)	5.412E-05	-	-	-	-	-	-	-
Xylene (mixture)	2.353E-04	2.568E-02	-	-	-	-	-	-
Zinc and compounds	6.824E-04	-	-	-	-	-	-	-
Polycyclic aromatic hydrocarbons (PAHs)	2.075E-06	1.514E-02	-	-	-	-	-	-

Table D-2. HAP Emissions by TEU for Acute Exposure (cont.)

HAP	TEU Emissions (lb/ day)							
	DETOX2	CILTANK1	CILTANK2	CILTANK3	CILTANK4	CILTANK5	CILTANK6	CILTANK7
1,3-Butadiene	-	-	-	-	-	-	-	-
Acetaldehyde	-	-	-	-	-	-	-	-
Acrolein	-	-	-	-	-	-	-	-
Antimony and compounds	-	-	-	-	-	-	-	-
Arsenic and compounds	-	-	-	-	-	-	-	-
Barium and compounds	-	-	-	-	-	-	-	-
Benzene	-	-	-	-	-	-	-	-
Beryllium and compounds	-	-	-	-	-	-	-	-
Cadmium and compounds	-	-	-	-	-	-	-	-
Chromium VI, chromate, and dichromate particulate	-	-	-	-	-	-	-	-
Cobalt and compounds	-	-	-	-	-	-	-	-
Copper and compounds	-	-	-	-	-	-	-	-
Cyanide, Hydrogen	2.782E-01	1.885E+00	1.885E+00	1.885E+00	1.885E+00	1.885E+00	1.885E+00	1.885E+00
p-Dichlorobenzene	-	-	-	-	-	-	-	-
Diesel Particulate Matter	-	-	-	-	-	-	-	-
Ethyl benzene	-	-	-	-	-	-	-	-
Formaldehyde	-	-	-	-	-	-	-	-
Hexane	-	-	-	-	-	-	-	-
Lead and compounds	-	-	-	-	-	-	-	-
Manganese and compounds	-	-	-	-	-	-	-	-
Mercury and compounds	-	-	-	-	-	-	-	-
Naphthalene	-	-	-	-	-	-	-	-
Nickel and compounds	-	-	-	-	-	-	-	-
PAHs	-	-	-	-	-	-	-	-
Propylene	-	-	-	-	-	-	-	-
Selenium and compounds	-	-	-	-	-	-	-	-
Toluene	-	-	-	-	-	-	-	-
Vanadium (fume or dust)	-	-	-	-	-	-	-	-
Xylene (mixture)	-	-	-	-	-	-	-	-
Zinc and compounds	-	-	-	-	-	-	-	-
Polycyclic aromatic hydrocarbons (PAHs)	-	-	-	-	-	-	-	-

Table D-3. TEU Modeling Sources and Allocation

TEU / SRCGROUP	SOURCE	Allocation
OC	OC1	2.3%
	OC2	2.3%
	OC3	20.0%
	OC4	2.3%
	OC5	2.3%
	OC6	2.3%
	OC7	36.7%
	OC8	20.0%
	OC9	2.3%
	OC10	2.3%
	OC11	2.3%
	OC12	2.3%
	OC13	2.3%
BC	BC1	5.3%
	BC2	5.3%
	BC3	9.5%
	BC4	5.3%
	BC5	5.3%
	BC6	5.3%
	BC7	44.0%
	BC8	9.5%
	BC9	5.3%
	BC10	5.3%
CKB	CKB	100%
MR	MF	100%
EDG1	EDG1	100%
HA	HA	100%
HPO	HPO	100%
HL	HL	100%
HWW	HWW	100%
HTW	HTW	100%
HMO	HMO	100%
UFD	UG	100%
AFD	BRW	67.3%
	BRW_BLAST	4.3%
	STK	10.7%
	WRSF	11.0%
	CRF	5.1%
	TS1	1.2%
	TS2	0.5%
TAILS	TAILS	100%
POND	POND	100%
DETOX1	DETOX1	100%
DETOX2	DETOX2	100%
CILTANK1	CILTANK1	100%
CILTANK2	CILTANK2	100%
CILTANK3	CILTANK3	100%
CILTANK4	CILTANK4	100%
CILTANK5	CILTANK5	100%
CILTANK6	CILTANK6	100%
CILTANK7	CILTANK7	100%