Statement of Basis

Permit to Construct No. P-2011.0108
Project No. 60880

Essential Metals Corporation
Kellogg, Idaho

Facility ID No. 079-00016

Final Permit

CZ

August 31, 2011
Carole Zundel
Permit Writer

The purpose of this Statement of Basis is to satisfy the requirements of IDAPA 58.01.01.et seq, Rules for the Control of Air Pollution in Idaho, for issuing air permits.

ACRONYMS, UNITS, AND CHEMICAL NOMENCLATURE

AAC	acceptable ambient concentrations
AACC	acceptable ambient concentrations for carcinogens
Au	Gold
Btu	British thermal units
CAA	Clean Air Act
CAS No.	Chemical Abstracts Service registry number
CFR	Code of Federal Regulations
Co	Cobalt
CO	carbon monoxide
CPF	Cobalt Production Facility
Cu	Copper
DEQ	Department of Environmental Quality
dscf	dry standard cubic feet
EL	screening emission levels
EPA	U.S. Environmental Protection Agency
EW	electrowinning
gr	grain (1 lb = 7,000 grains)
HAP	hazardous air pollutants
IDAPA	a numbering designation for all administrative rules in Idaho promulgated in accordance with the Idaho Administrative Procedures Act
lb/hr	pounds per hour
LRR	leach residue repository
MACT	Maximum Achievable Control Technology
mg/dscm	milligrams per dry standard cubic meter
MgO	Magnesium oxide
$MgSO_4$	Magnesium sulfate
MMBtu	million British thermal units
MMBtu/hr	million British thermal units per hour
MMscf	million standard cubic feet
NAAQS	National Ambient Air Quality Standard
NAICS	North American Industry Classification System
NESHAP	National Emission Standards for Hazardous Air Pollutants
Ni	Nickel
NO_2	nitrogen dioxide
NO_X	nitrogen oxides
NSPS	New Source Performance Standards
O&M	operation and maintenance
PM	particulate matter
PM_{10}	particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers
PSD	Prevention of Significant Deterioration
PTC	permit to construct
PTE	potential to emit
Rules	Rules for the Control of Air Pollution in Idaho
scf	standard cubic feet
SIC	Standard Industrial Classification
SO_2	sulfur dioxide
T/yr	tons per consecutive 12-calendar month period
TAP	toxic air pollutants
UTM	Universal Transverse Mercator
VOC	volatile organic compounds
$\mu g/m^3$	micrograms per cubic meter
Zn	Zinc

FACILITY INFORMATION

Description

The primary objective of the Cobalt Production Facility (CPF) is to produce super-alloy grade Cobalt for sale to the aerospace, renewable energy, and chemical industries. In addition, there are several secondary products produced in the CPF. The CPF employs a hydrometallurgical process to recover cobalt (Co), copper (Cu), gold (Au), and other metals from a bulk concentrate produced at the Idaho Cobalt Mine.

Water, acid and oxygen at elevated temperature and pressure in an autoclave (similar to a pressure cooker) is used to dissolve metals in a sulfuric acid solution. Primary products are then extracted from the solution through electrowinning Cu and Co. Additionally, Nickel (Ni) and Zinc (Zn) metal salts are recovered as minor products. The sulfuric acid is then reacted with magnesium oxide (MgO) to produce magnesium sulfate ($MgSO_4$). Because the leach reaction generates heat which is used to evaporate water, the CPF operates as a zero liquid discharge facility.

The leach residue (material that does not go into solution) consists of gold, clays, silica and other elements that do not dissolve. Gold is recovered from the leach residue using a chelating leach process. The remaining leach residue is then placed in the Leach Residue Repository (LRR) and permanently stored in a lined facility within geotextile tubes (similar to very large sandbags that are securely closed on all sides) called geotubes. The resulting solids are inert and very stable in the environment.

Permitting History

This permit is the initial PTC for this facility. The facility was formerly Formation Chemical Incorporated and was issued an exemption on November 10, 2004.

Application Scope

This permit is the initial PTC for this facility. The applicant has proposed to install and operate a cobalt production facility.

Application Chronology

June 21, 2011	DEQ received an application and an application fee.
June 29, 2011	DEQ approved pre-permit construction.
June 28 – July 13, 2011	DEQ provided an opportunity to request a public comment period on the application and proposed permitting action.
July 12, 2011	DEQ received supplemental information from the applicant.
July 20, 2011	DEQ determined that the application was complete.
July 29, 2011	DEQ made available the draft permit and statement of basis for peer and regional office review.
August 9, 2011	DEQ made available the draft permit and statement of basis for applicant review.
August 23, 2011	DEQ received an e-mail from the facility that there were no comments on draft permit
August 31, 2011	DEQ received the permit processing fee.

TECHNICAL ANALYSIS

Emissions Units and Control Devices

Table 1 EMISSIONS UNIT AND CONTROL DEVICE INFORMATION

Source Description	Control Equipment Description
Autoclaves, Noram	None
Cu Electrowinning Process	Cu EW Circuit Scrubber
Co Electrowinning Process	Co EW Circuit Scrubber
Lime Silo	Lime Silo Dust Collector
Leach Reactor Crystallizer	Cooling Tower[a]
MgO Silo	MgO Silo Dust Collector
Plant	Plant Ventilation Scrubber[b]
Space Heaters	None

[a] The cooling tower does not have specific permit requirements because it is process equipment and not control equipment. See also description in the Emissions Inventories section of this SOB.

[b] The plant ventilation scrubber is not regulated because it is not required for emissions control. It is listed here to address the fact that it is there, but is not specifically regulated.

Emissions Inventories

An emission inventory was developed for the cobalt process at the facility (see Appendix A) associated with this proposed project. Summaries of the estimated uncontrolled and controlled emissions of criteria pollutants, TAPs, and HAPs from the facility are provided in the following tables.

The process emissions are based on a process throughput of 2.38 tons per hour (dry basis), which is the design capacity of the autoclave(s). The material is delivered wet, so tracking could be based on the wet weight of the concentrate, but because there has not been a method established to do so, the tracking requirement is currently based on the parameter that was used to estimate the emissions, which is dry weight.

The process potential emission points are listed in Table 2. There are wet process steps, such as unloading the concentrate from the truck, that are identified in the application that have not been included in this permit analysis because the emissions are expected to be zero because the moisture will control the emissions of particulate, and at that point in the process, there are no volatile pollutants.

Noram

Noram is a proprietary NO recovery system designed to capture and recover off-gas from the autoclaves. This equipment is installed as a recovery device to recycle nitric acid, not as an emissions control device. The estimated emission rates were obtained from the manufacturer (Noram) and adjusted. Testing for NO_x is required in this permit to verify the emissions estimate.

Copper Electrowinning Circuit

From the permit application spreadsheet, "*The electrolyte mist results from oxygen gas bubble production on the anode. The gas bubbles rise to the surface and pop, causing mist of electrolyte. A rate of 200 mg/min/cell is based on historical operating data from Cu EW operations. This standard is discussed in the September 1996 issue of "Mining Engineering". The article titled "Bechtel's electrode cap limits acid mist in electrowinning" uses 200 mg/min/cell mist rate as a standard criteria for sizing copper electrowinning ventilation systems.*"

The emission estimates are based on the amount of electrolyte mist that is formed, the estimated concentration of the constituents in the electrolyte solution, and the control efficiency of the scrubber. The individual concentrations of constituents in the electrolyte solution were derived from empirical lab data and the computer model software, METSIM, which is process simulator. The control efficiency of the scrubber is from the manufacturers guarantee, which applies to particulates down to 5 μm. The liquid droplet particulates (mists) contain dissolved phases of all the constituents listed on the copper EW tab. The emission estimates used 90% control efficiency in calculating the emissions from the copper EW circuit to be conservative as the manufacture guarantees 95% efficiency. Venturi type scrubbers of this type capture particulate and with the exception of particulate size, the character of the particulate does not affect the scrubber efficiency. Therefore the scrubber efficiency does apply to all dissolved constituents including acid and metals., and is the same for all constituents (90%).

Cobalt Electrowinning Circuit

The emission estimations were done similarly to the Cu electrowinning circuit estimates. In addition, a mist eliminator is used, as follows:

From the permit application spreadsheet, "*The SAME is a proprietary mist/air collection system that captures mist and offgas from the Co EW circuit. Unlike the Cu EW circuit, cobalt plating requires near neutral pH. Because oxygen gas bubbles are produced at the anode, the anolyte (solution) at the anode becomes acidic. To prevent migration of acid to the plating cathode, fabric bags are placed over the anode. All electrolyte (anolyte) mist is captured within the fabric bag and is conveyed to a liquid/air separation tank for reuse in the process. The SAME captures any hydrogen gas that may be produced at the cathode. Because hydrogen gas should not be produced in a properly performing Co EW cell, 10% of historically based mist production estimates are assumed to be captured by the SAME. Therefore, a rate of 20 mg/min/cell is assumed to be captured in the Co EW scrubber.*"

Lime and MgO Silos

The emissions are estimated using a throughput of 0.837 tons per hour for the Lime Silo and 0.285 tons per hour for the MgO Silo, and the PM_{10} emission factor from AP-42 Table 11.12-2 for cement unloading to elevated storage silo. The factor used was 0.46 lb/ton and the factor in AP-42 is 0.47 lb/ton, but that will not change the estimated emissions substantially. The control efficiency in AP-42 is 99.928%, and the referenced in the application footnote was 99.92%. The calculation actually used a 90% control value, so the calcs are conservatively high. Based on the low estimated emissions from the stated maximum throughput, no specific emissions limits were written into the permit.

Cooling Tower

The cooling tower water does not come in contact with the mineral extraction process water, and the process water is contained so that there are no emissions at the cooling tower from the mineral extraction process. The only emissions from the tower are from the minerals in the creek water that is used for cooling. As that water evaporates in the tower, some particulate emissions are estimated to occur, with the calculation based on the measured total dissolved solids in the water.

Plant Ventilation Scrubber

The plant ventilation scrubber will be installed on the building ventilation system to control humidity in the building, and as a safeguard to control any emissions that occur unexpectedly inside the building. The process design does not have any emissions into the building, so the emissions from this scrubber are estimated to be zero and the scrubber is not regulated in the permit.

From the application additional information, "*The CPF contains a hot water process that will generate a substantial amount of water vapor inside the building. In order to maintain an acceptable humidity level in the building, adequate air exchange is needed. Unchecked humidity inside the building will cause a very uncomfortable work environment and condensation on the building structure, which will lead to corrosion and deterioration of insulation.*

Because the CPF will operate as a zero-liquid discharge facility, recycle and recovery of water is essential to the process water balance. Rather than just venting the humid air to the atmosphere, EMC included a scrubber to

recover water vapor for use in the process and to provide additional protection in the event a particulate is unexpectedly drawn into the building exhaust system. It is correct that no emissions are expected from the plant scrubber."

Space Heaters

There are several space heaters that have not yet been purchased, so the exact specs are not know, but the design is that the rating of all space heaters combined will not exceed 5MMBtu/hr and will burn natural gas. The estimated emissions are based on that combined rating and fuel type. Because the space heaters are not needed in the warm months, and the mineral extraction processes generate heat inside the building, the space heaters will only be used occasionally to supplement the process heat. The emissions from the space heaters were estimated based on running continuously for half of the year using AP-42 emission factors, which is a conservative emissions estimate. Because this estimate is high, no specific regulation is required. The general design specs are listed in the permit.

General Emissions Information

Geochemical analysis of the ore to be processed at the CPF shows that very little to no mercury is present

in the ore.

No cyanide is used in the process.

Uncontrolled Emissions:

The following table presents the post project uncontrolled emissions for criteria pollutants as submitted by the Applicant and verified by DEQ staff. See Appendix A for a detailed presentation of the calculations of these emissions for each emissions unit.

Table 2 UNCONTROLLED EMISSIONS FOR CRITERIA POLLUTANTS

Emissions Unit	PM_{10} T/yr	$PM_{2.5}$ T/yr	SO_2 T/yr	NO_X T/yr	CO T/yr	VOC T/yr
Noram		0.0		3.8		
Cu EW Circuit Scrubber		0.0				
Co EW Circuit Scrubber		0.0				
Lime Silo Dust Collector	1.7	1.7				
Cooling Tower	0.04	0.04				
MgO Silo Dust Collector	0.57	0.57				
Plant Ventilation Scrubber	0.0	0.0				
Space Heaters	0.1	0.1	0.0	1.1	0.9	0.0
Total	2.41	2.41	0.0	4.9	0.9	0.0

Part of the facility is existing. However, since this is the first time the facility is receiving a permit, pre-project emissions are set to zero for all criteria pollutants.

Potential to Emit

The following table presents the potential to emit for criteria pollutants from all emissions units at the facility as submitted by the Applicant and verified by DEQ staff. See Appendix A for a detailed presentation of the calculations of these emissions for each emissions unit.

Table 3 POTENTIAL TO EMIT FOR CRITERIA POLLUTANTS

Emissions Unit	PM_{10}		$PM_{2.5}$		SO_2		NO_X		CO		VOC	
	lb/hr[a]	T/yr[b]	lb/hr[a]	T/yr[b]	lb/hr[a]	T/yr[b]	lb/hr[a]	T/yr[b]	lb/hr[a]	T/yr[b]	lb/hr	T/yr
Noram							0.9	3.8				
Cu EW Circuit Scrubber			0.0	0.0								
Co EW Circuit Scrubber			0.0	0.0								
Lime Silo Dust Collector	0.0	0.2	0.0	0.2								
Cooling Tower	0.01	0.04	0.01	0.04								
MgO Silo Dust Collector	0.01	0.06	0.01	0.06								
Plant Ventilation Scrubber	0.0	0.0	0.0	0.0								
Space Heaters	0.0	0.1	0.0	0.1		0.0	0.5	1.1	0.4	0.9		
Total	0.02	0.40	0.02	0.40	0.00	0.00	1.4	4.9	0.40	0.90	0.00	0.00

a) Controlled average emission rate in pounds per hour is a daily average, based on the proposed daily operating schedule and daily limits.
b) Controlled average emission rate in tons per year is an annual average, based on the proposed annual operating schedule and annual limits.

As demonstrated in Table 2, this facility has uncontrolled potential to emit for PM_{10}, $PM_{2.5}$, SO_2, NO_x, CO, and VOC emissions less than the Major Source threshold of 100 T/yr. As demonstrated in Table 3, the facility's PTE for all criteria pollutants is less than 80% of the Major Source thresholds of 100 T/yr. Therefore, this facility will not be designated as a SM-80 facility.

Non-Carcinogenic TAP Emissions

A summary of the estimated uncontrolled and controlled non-carcinogenic emissions of toxic air pollutants (TAP) is provided in the following table. The estimated controlled emissions of TAP were below applicable emissions screening levels (EL).

Non-carcinogenic TAP emissions are presented in the following table:

Table 4 TAP EMISSIONS SUMMARY POTENTIAL TO EMIT

Non-Carcinogenic Toxic Air Pollutants	24-hour Average Uncontrolled Emissions Rates for Units at the Facility (lb/hr)	24-hour Average Controlled Emissions Rates for Units at the Facility (lb/hr)	Non-Carcinogenic Screening Emission Level (lb/hr)	Exceeds Screening Level? (Y/N)
Co	0.0015	0.0002	0.007[a]	No
Cu	0.0135	0.0013	0.067	No
Zn	0.00000	0.0000	0.667	No
Fe	0.0003	0.0000	0.053[b]	No
Mg	0.0004	0.0000	0.667[c]	No
Mn	0.0001	0.0000	0.067[d]	No
H_2SO_4	0.0731	0.0073	0.067	No (for controlled emissions)

a. Cobalt carbonyl or cobalt hydrocarbonyl as Co
b. Iron pentacarbonyl, the lowest EL of all forms of iron
c. Magnesium oxide fume, the only form of magnesium regulated
d. Mn fume, the lowest EL of the forms of Mn

Carcinogenic TAP Emissions

A summary of the estimated uncontrolled and controlled carcinogenic emissions of toxic air pollutants (TAP) is provided in the following table. The estimated uncontrolled and controlled emissions of TAP were below applicable emissions screening levels (EL). Estimated controlled TAP emissions were below the annual major source threshold.

Carcinogenic TAP emissions are presented in the following table:

Table 5 CARCINOGENIC TAP EMISSIONS SUMMARY POTENTIAL TO EMIT

Carcinogenic Toxic Air Pollutants	Annual Average Uncontrolled Emissions Rates for Units at the Facility (lb/hr)	Annual Average Controlled Emissions Rates for Units at the Facility (lb/hr)	Carcinogenic Screening Emission Level (lb/hr)	Exceeds Screening Level? (Y/N)
Nickel	0.0000	0.00000	0.000027	No
Formaldehyde	0.0004	0.0004	0.00051	No
Benzene	0.00001	0.00001	0.0008	No

HAP Emissions

The following table presents potential to emit for HAP pollutants from all emissions units at the facility as submitted by the Applicant and verified by DEQ staff. See Appendix A for a detailed presentation of the calculations of these emissions for each emissions unit. These are uncontrolled emission estimates. Actual maximum estimated emissions are less.

Table 6 HAP EMISSIONS SUMMARY POTENTIAL TO EMIT

HAP Pollutants	PTE (T/yr)
Cobalt compounds	0.007
Manganese compounds	0.000
Nickel compounds	0.000
Formaldehyde	0.001
Benzene	0.000
Total HAP	0.008

Ambient Air Quality Impact Analyses

The applicant has demonstrated pre-construction compliance to DEQ's satisfaction that emissions from this facility will not cause or significantly contribute to a violation of any ambient air quality standard. The applicant has also demonstrated pre-construction compliance to DEQ's satisfaction that the emissions increase due to this permitting action will not exceed any acceptable ambient concentration (AAC) or acceptable ambient concentration for carcinogens (AACC) for toxic air pollutants (TAP).

REGULATORY ANALYSIS

Attainment Designation (40 CFR 81.313)

The facility is located in Shoshone County, which is designated as attainment or unclassifiable for $PM_{2.5}$, PM_{10}, SO_2, NO_2, CO, and Ozone. Refer to 40 CFR 81.313 for additional information.

Permit to Construct (IDAPA 58.01.01.201)

IDAPA 58.01.01.201 Permit to Construct Required

The permittee has requested that a PTC be issued to the facility for the proposed new emissions source. Therefore, a permit to construct is required to be issued in accordance with IDAPA 58.01.01.220. This permitting action was processed in accordance with the procedures of IDAPA 58.01.01.200-228.

Tier II Operating Permit (IDAPA 58.01.01.401)

IDAPA 58.01.01.401 Tier II Operating Permit

The application was submitted for a permit to construct (refer to the Permit to Construct section), and an optional Tier II operating permit has not been requested. Therefore, the procedures of IDAPA 58.01.01.400–410 were not applicable to this permitting action.

Fuel Burning Equipment (IDAPA 58.01.01.675-677)

IDAPA 58.01.01.677 Standards for Minor and Existing Sources

This rule limits PM emissions from fuel burning equipment to 0.015 gr/dscf at 3% Oxygen when burning gas.

From 40 CFR 60 Appendix A-7 Table 19-2, the F Factor for natural gas is 8,710 dscf/MMBtu. The emission factor for PM from AP-42 is 7.6 lb/MMscf. From AP-42, the typical heating value of natural gas is 1,050 Btu/scf.

As an approximation, 7.6 lb/MMscf x 1 scf/1,050 Btu x 7,000 gr/lb x 1 MMBtu/8,760 dscf = 0.0058gr/dscf. This is less than half of the limit, so as long as the space heaters combust only natural gas as specified in the permit application, it is estimated that the fuel burning equipment limit will not be exceeded.

Visible Emissions (IDAPA 58.01.01.625)

IDAPA 58.01.01.625 Visible Emissions

A person shall not discharge any air pollutant into the atmosphere from any point of emission for a period or periods aggregating more than three (3) minutes in any sixty (60) minute period which is greater than twenty percent (20%) opacity as determined by this section.

The provisions of this section shall not apply when the presence of uncombined water, nitrogen oxides and/or chlorine gas are the only reason(s) for the failure of the emission to comply with the requirements of this rule.

This rule applies to the point sources at the facility.

Process Weight Rate (IDAPA 58.01.01.701)

IDAPA 58.01.01.701 Particulate Matter – New Equipment Process Weight Limitations

In accordance with IDAPA 58.01.01.701.03, if the process weight is 175 lb/hr or less, the allowable emissions from the entire source are 1 lb/hr. The total PM emissions for the facility are less than 1 lb/hr, so the estimated emissions are less than the process weight rate limit.

Title V Classification (IDAPA 58.01.01.300, 40 CFR Part 70)

IDAPA 58.01.01.301 Requirement to Obtain Tier I Operating Permit

Post project facility-wide emissions from this facility do not have a potential to emit greater than 100 tons per year for PM_{10}, SO_2, NO_X, CO, and VOC or 10 tons per year for any one HAP or 25 tons per year for all HAPs combined as demonstrated previously in the Emissions Inventories Section of this analysis. Therefore, the facility is not a Tier I source in accordance with IDAPA 58.01.01.006.113 and the requirements of IDAPA 58.01.01.301 do not apply.

PSD Classification (40 CFR 52.21)

40 CFR 52.21 Prevention of Significant Deterioration of Air Quality

The facility is not a major stationary source as defined in 40 CFR 52.21(b)(1), nor is it undergoing any physical change at a stationary source not otherwise qualifying under paragraph 40 CFR 52.21(b)(1) as a major stationary source, that would constitute a major stationary source by itself as defined in 40 CFR 52. Therefore in accordance with 40 CFR 52.21(a)(2), PSD requirements are not applicable to this permitting action. The facility is/is not a designated facility as defined in 40 CFR 52.21(b)(1)(i)(a), and does not have facility-wide emissions of any criteria pollutant that exceed 250 T/yr.

NSPS Applicability (40 CFR 60)

The facility is not subject to any NSPS requirements.

Subpart LL *Standards of Performance for Metallic Mineral Processing Plants*

§ 60.380 Applicability and designation of affected facility.

(a) The provisions of this subpart are applicable to the following affected facilities in metallic mineral processing plants: Each crusher and screen in open-pit mines; each crusher, screen, bucket elevator, conveyor belt transfer point, thermal dryer, product packaging station, storage bin, enclosed storage area, truck loading station, truck unloading station, railcar loading station, and railcar unloading station at the mill or concentrator with the following exceptions. All facilities located in underground mines are exempted from the provisions of this subpart. At uranium ore processing plants, all facilities subsequent to and including the beneficiation of uranium ore are exempted from the provisions of this subpart.

Definition:

Metallic mineral processing plant means any combination of equipment that produces metallic mineral concentrates from ore.

This facility is processing wet concentrate.

Metallic mineral processing commences with the mining of ore and includes all operations either up to and including the loading of wet or dry concentrates or solutions of metallic minerals for transfer to facilities at non-adjacent locations that will subsequently process metallic concentrates into purified metals (or other products), or up to and including all material transfer and storage operations that precede the operations that produce refined metals (or other products) from metallic mineral concentrates at facilities adjacent to the metallic mineral processing plant.

The facility is not adjacent to a metallic mineral processing plant. This is a facility at a non-adjacent location that will subsequently process metallic concentrates into purified metals. The EM facility is not mining the material and does not produce metallic mineral concentrates.

This definition shall not be construed as requiring that mining of ore be conducted in order for the combination of equipment to be considered a metallic mineral processing plant. (See also the definition of metallic mineral concentrate.)

Metallic mineral concentrate means a material containing metallic compounds in concentrations higher than naturally occurring in ore but requiring additional processing if pure metal is to be isolated. A metallic mineral concentrate contains at least one of the following metals in any of its oxidation states and at a concentration that contributes to the concentrate's commercial value: Aluminum, copper, gold, iron, lead, molybdenum, silver, titanium, tungsten, uranium, zinc, and zirconium. This definition shall not be construed as requiring that material containing metallic compounds be refined to a pure metal in order for the material to be considered a metallic mineral concentrate to be covered by the standards.

In accordance with Subpart LL, the facility is not a metallic mineral processing plant.

Subpart UUU *Standards of Performance for Calciners and Dryers in Mineral Industries*

§ 60.730 Applicability and designation of affected facility.

(a) The affected facility to which the provisions of this subpart apply is each calciner and dryer at a mineral processing plant. Feed and product conveyors are not considered part of the affected facility. For the brick and related clay products industry, only the calcining and drying of raw materials prior to firing of the brick are covered.

(b) An affected facility that is subject to the provisions of subpart LL, Metallic Mineral Processing Plants, is not subject to the provisions of this subpart. Also, the following processes and process units used at mineral processing plants are not subject to the provisions of this subpart: vertical shaft kilns in the magnesium compounds industry; the chlorination-oxidation process in the titanium dioxide industry; coating kilns, mixers, and aerators in the roofing granules industry; and tunnel kilns, tunnel dryers, apron dryers, and grinding equipment that also dries the process material used in any of the 17 mineral industries (as defined in §60.731, "Mineral processing plant").

A dryer is defined as follows:

Dryer means the equipment used to remove uncombined (free) water from mineral material through direct or indirect heating.

There is no water removal from mineral material through heating. Therefore, this facility is not subject to this subpart because there are no calciners or dryers.

NESHAP Applicability (40 CFR 61)

The facility is not subject to any NESHAP requirements in 40 CFR 61.

MACT Applicability (40 CFR 63)

The facility is not subject to any MACT standards in 40 CFR Part 63.

Subpart VVVVVV National Emission Standards for Hazardous Air Pollutants for Chemical Manufacturing Area Sources

Applicability and Compliance Dates

§ 63.11494 What are the applicability requirements and compliance dates?

(a) Except as specified in paragraph (c) of this section, you are subject to this subpart if you own or operate a chemical manufacturing process unit (CMPU) that meets the conditions specified in paragraphs (a)(1) through (3) of this section.

(1) The CMPU uses as feedstocks, generates as byproducts, or produces as products any of the hazardous air pollutants (HAP) listed in Table 1 to this subpart (Table 1 HAP).

Table 1 to Subpart VVVVVV of Part 63—Hazardous Air Pollutants Used To Determine Applicability of Chemical Manufacturing Operations

As required in §63.11494(a), chemical manufacturing operations that process, use, or produce the HAP shown in the following table are subject to subpart VVVVVV.

Type of HAP Chemical name CAS No.

1. Organic compounds

a. 1,3-butadiene 106990

b. 1,3-dichloropropene 542756

c. Acetaldehyde 75070

d. Chloroform 67663

e. Ethylene dichloride 107062

f. Hexachlorobenzene 118741

g. Methylene chloride 75092

h. Quinoline 91225

2. Metal compounds

a. Arsenic compounds

b. Cadmium compounds

c. Chromium compounds

d. Lead compounds

e. Manganese compounds

f. Nickel compounds

3. Others

a. Hydrazine 302012

Nickel is extracted during the process but is not emitted as a nickel compound air pollutant.

Subpart EEEEEEE National Emission Standards for Hazardous Air Pollutants: Gold Mine Ore Processing and Production Area Source Category

Applicability and Compliance Dates

§ 63.11640 Am I subject to this subpart?

(a) You are subject to this subpart if you own or operate a gold mine ore processing and production facility as defined in §63.11651, that is an area source.

(b) This subpart applies to each new or existing affected source. The affected sources are each collection of "ore pretreatment processes" at a gold mine ore processing and production facility, each collection of "carbon processes with mercury retorts" at a gold mine ore processing and production facility, each collection of "carbon processes without mercury retorts" at a gold mine ore processing and production facility, and each collection of "non-carbon concentrate processes" at a gold mine ore processing and production facility, as defined in §63.11651.

...

§ 63.11651 What definitions apply to this subpart?

...

Gold mine ore processing and production facility means any industrial facility engaged in the processing of gold mine ore that uses any of the following processes: Roasting operations, autoclaves, carbon kilns, preg tanks, electrowinning, mercury retorts, or melt furnaces. Laboratories (see CAA section 112(c)(7)), individual prospectors, and very small pilot scale mining operations that processes or produces less than 100 pounds of concentrate per year are not a gold mine ore processing and production facility. A facility that produces primarily metals other than gold, such as copper, lead, zinc, or nickel (where these metals other than gold comprise 95 percent or more of the total metal production) that may also recover some gold as a byproduct is not a gold mine ore processing and production facility. Those facilities whereby 95 percent or more of total mass of metals produced are metals other than gold, whether final metal production is onsite or offsite, are not part of the gold mine ore processing and production source category.

The facility estimated the following production amounts of Cobalt, Copper, and Gold:

Metal	Production (lbs)	Percentage of Total Production
Cobalt	27,973,053	49.4%
Copper	28,656,000	50.6%
Gold	1,972	0.003%

It is estimated that the percent of metals other than gold will comprise more than 95% of the total metal production. Therefore, in accordance with 40 CFR 63.11651, this regulation does not apply to this facility.

Permit Conditions Review

This section describes the permit conditions for this initial permit.

Initial Permit Condition 5

The hourly emissions for NO_x for the Noram unit is limited to the estimate made in the permit application because the manufacturer's guarantee was for 2 lb/hr with no documentation of the process rate associated with that estimate, except a general statement, "based on the numbers in the RFQ issued by Samuel Engineering, Inc." The application, and subsequent additional information, did not include the RFQ, so it is unknown what process throughput value was used to make the guaranteed emissions rate. Also, the estimate made in the application of 0.9 lb/hr is less than the manufacturer's guarantee. Therefore, source testing is required to determine the actual NO_x emissions. No air dispersion modeling has been done for NO_x because the estimated emissions are low.

Initial Permit Condition 6

An opacity limit was set on all point sources at the facility. It is not known if there is the potential for visible emissions from any of the point sources, so quarterly monitoring is required. Also, visible emissions are one indicator of dust collector and scrubber proper operation.

Initial Permit Condition 7

A throughput limit on the concentrate through the process was established because the emission estimates were based on this rate, and source testing is required to determine if this rate results in the emissions that were estimated for NO_x from the Noram unit.

Initial Permit Condition 8

Because emission estimates from the silos were based on control provided by dust collectors, this permit condition requires that the dust collectors be used to control the emissions. The emission control equipment is required to be properly maintained in the general provisions.

Initial Permit Condition 9

An operation and maintenance manual is required to be created to provide guidance on the proper maintenance of the dust collectors. Proper maintenance will help assure compliance with the visible emissions limitation in this permit and maintain particulate control at the level estimated in the permit application.

Initial Permit Condition 10

Because emission estimates from the electrowinning circuits were based on control provided by scrubbers, this permit condition requires that the scrubbers be used to control the emissions. The emission control equipment is required to be properly maintained in the general provisions.

Initial Permit Condition 11

An operation and maintenance manual is required to be created to provide guidance on the proper maintenance of the scrubbers. Proper maintenance will help maintain particulate control at the level estimated in the permit application and to help assure compliance with General Provision 16.

Initial Permit Condition 12

The throughput of concentrate into the autoclaves needs to be monitored to assess compliance with the throughput limit.

Initial Permit Condition 13

Monitoring, recordkeeping, and reporting are required for opacity at the point sources of emissions.

Initial Permit Condition 14

NO_x source testing for the Noram unit is required to assess compliance with the limit derived from the application.

Initial Permit Condition 15

The duty to comply general compliance provision requires that the permittee comply with all of the permit terms and conditions pursuant to Idaho Code §39-101.

Initial Permit Condition 16

The maintenance and operation general compliance provision requires that the permittee maintain and operate all treatment and control facilities at the facility in accordance with IDAPA 58.01.01.211.

Initial Permit Condition 17

The obligation to comply general compliance provision specifies that no permit condition is intended to relieve or exempt the permittee from compliance with applicable state and federal requirements, in accordance with IDAPA 58.01.01.212.01.

Initial Permit Condition 18

The inspection and entry provision requires that the permittee allow DEQ inspection and entry pursuant to Idaho Code §39-108.

Initial Permit Condition 19

The construction and operation notification provision requires that the permittee notify DEQ of the dates of construction and operation, in accordance with IDAPA 58.01.01.211.

Initial Permit Condition 20

The performance testing notification of intent provision requires that the permittee notify DEQ at least 15 days prior to any performance test to provide DEQ the option to have an observer present, in accordance with IDAPA 58.01.01.157.03.

Initial Permit Condition 21

The performance test protocol provision requires that any performance testing be conducted in accordance with the procedures of IDAPA 58.01.01.157, and encourages the permittee to submit a protocol to DEQ for approval prior to testing.

Initial Permit Condition 22

The performance test report provision requires that the permittee report any performance test results to DEQ within 30 days of completion, in accordance with IDAPA 58.01.01.157.04-05.

Initial Permit Condition 23

The monitoring and recordkeeping provision requires that the permittee maintain sufficient records to ensure compliance with permit conditions, in accordance with IDAPA 58.01.01.211.

Initial Permit Condition 24

The excess emissions provision requires that the permittee follow the procedures required for excess emissions events, in accordance with IDAPA 58.01.01.130.

Initial Permit Condition 25

The certification provision requires that a responsible official certify all documents submitted to DEQ, in accordance with IDAPA 58.01.01.123.

Initial Permit Condition 26

The false statement provision requires that no person make false statements, representations, or certifications, in accordance with IDAPA 58.01.01.125.

Initial Permit Condition 27

The tampering provision requires that no person render inaccurate any required monitoring device or method, in accordance with IDAPA 58.01.01.126.

Initial Permit Condition 28

The transferability provision specifies that this permit to construct is transferable, in accordance with the procedures of IDAPA 58.01.01.209.06.

Initial Permit Condition 29

The severability provision specifies that permit conditions are severable, in accordance with IDAPA 58.01.01.211.

PUBLIC REVIEW

Public Comment Opportunity

An opportunity for public comment period on the application was provided in accordance with IDAPA 58.01.01.209.01.c. During this time, there were no comments on the application and there was not a request for a public comment period on DEQ's proposed action. Refer to the chronology for public comment opportunity dates.

APPENDIX A – EMISSIONS INVENTORIES

CPF Controlled PTE

conservatively assumes all PM10 is PM2.5

Source ID	Source	NOx tpy	CO tpy	PM tpy	PM 10 tpy	PM 2.5 tpy	SOx tpy	TOC tpy	Co tpy	Cu tpy	Ni tpy	Zn tpy	Fe tpy	Mg tpy	Mn tpy	SO4 tpy	H2SO4 tpy	Formald tpy	Benzene tpy	N2O tpy
EP LRR	Leach Residue Repository			0.0	0.0	0.0														
EP100	Concentrate Transfer to Repulp Sump			0.0	0.0	0.0														
EP200	210-CM-001 - Noram	3.8				0.0														
EP300	400-SR-081 - Cu EW Circuit Scrubber					0.0			0.00011	0.00589	0.00000	0.00000	0.00015	0.00002	0.00000	0.00942	0.03138			
EP400	2600-SR-601 - Co EW Circuit Scrubber					0.0			0.00056	0.00000	0.00000	0.00000	0.00000	0.00016	0.00002	0.00092	0.00065			
EP500	2800-DC-81 - Lime Silo Dust Collector (in)			0.3	0.2	0.2														
EP550	2800-FE-81 - Lime Silo Feeder (out) fully enclosed			0.0	0.0	0.0														
EP600	2800-CW-801 - Cooling Tower			0.04	0.04	0.04							0.00000							
EP700	2800-DC-801 - MgO Silo Dust Collector (in)			0.09	0.06	0.06														
EP750	2800-FE-804 - MgO Silo Feeder (out) fully enclosed			0.0	0.0	0.0														
EP800	210-SR-52 - Plant Ventilation Scrubber			0.0	0.0	0.0														
SpcHt	Space Heater(s)	1.1	0.9	0.1	0.1	0.1	0.0											0.00082	0.00002	0.02409
	Space Heater(s) operate only when all other processes are not operating																			
	Total (Controlled) PTE (tons/yr)	**3.8**	**0.9**	**0.4**	**0.3**	**0.3**	**0.0**	**0.0**	**0.0007**	**0.0059**	**0.0000**	**0.0000**	**0.0002**	**0.0002**	**0.0000**	**0.0103**	**0.0320**	**0.0008**	**0.0000**	**0.0241**
	IDEQ Modeling Guidance modeling threshold	1	NA	NA	1	0.5	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Is Modeling Required?	**No***	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**

Source ID	Source	NOx lbs/hr	CO lbs/hr	PM lbs/hr	PM 10 lbs/hr	PM 2.5 lbs/hr	SOx lbs/hr	TOC lbs/hr	Co lbs/hr	Cu lbs/hr	Ni lbs/hr	Zn lbs/hr	Fe lbs/hr	Mg lbs/hr	Mn lbs/hr	SO4 lbs/hr	H2SO4 lbs/hr	Formald lbs/hr	Benzene lbs/hr	N2O lbs/hr
EP LRR	Leach Residue Repository			0.0	0.0	0.0														
EP100	Concentrate Transfer to Repulp Sump			0.0	0.0	0.0														
EP200	210-CM-001 - Noram	0.9				0.0														
EP300	400-SR-081 - Cu EW Circuit Scrubber					0.0			0.00002	0.00135	0.00000	0.00000	0.00003	0.00000	0.00000	0.00215	0.00717			
EP400	2600-SR-601 - Co EW Circuit Scrubber					0.0			0.00013	0.00000	0.00000	0.00000	0.00000	0.00004	0.00001	0.00021	0.00015			
EP500	2800-DC-81 - Lime Silo Dust Collector (in)			0.1	0.0	0.0														
EP550	2800-FE-81 - Lime Silo Feeder (out) fully enclosed			0.0	0.0	0.0														
EP600	2800-CW-801 - Cooling Tower			0.01	0.01	0.01														
EP700	2800-DC-801 - MgO Silo Dust Collector (in)			0.02	0.01	0.01														
EP750	2800-FE-804 - MgO Silo Feeder (out) fully enclosed			0.0	0.0	0.0														
EP800	210-SR-52 - Plant Ventilation Scrubber			0.0	0.0	0.0														
SpcHt	Space Heater(s)	0.5	0.4	0.0	0.0	0.0	0.0											0.00038	0.00001	0.01100
	Space Heater(s) operate only when all other processes are not operating																			
	Total (Controlled) PTE (lbs/hr)	**0.9**	**0.4**	**0.1**	**0.1**	**0.1**	**0.0**	**0.0**	**0.0002**	**0.0013**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0024**	**0.0073**	**0.0004**	**0.0000**	**0.0110**
	IDAPA 585 modeling threshold	NA	14	NA	NA	NA	NA	NA	0.0033	0.0033	N/A	0.333	0.067	0.667	0.067	N/A	0.067	N/A	N/A	#REF!
	IDAPA 586 modeling threshold	NA	NA	NA	NA	NA	NA	NA	NA	N/A	0.000027	N/A	N/A	N/A	N/A	N/A	N/A	#REF!	#REF!	N/A
	Is Modeling Required?	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**#REF!**	**#REF!**	**#REF!**

Notes:

* virtually all NORAM Nox is NO and space heaters emissions are below specific modeling criteria (see Space Heater calcs)

CPF Uncontrolled PTE

Source ID	Source	NOx tpy	CO tpy	PM tpy	PM 10 tpy	PM 2.5 tpy	SOx tpy	TOC tpy	Co tpy	Cu tpy	Ni tpy	Zn tpy	Fe tpy	Mg tpy	Mn tpy	SO4 tpy	H2SO4 tpy	Formald tpy	Benzene tpy	N2O tpy
EP LRR	Leach Residue Repository			0.0	0.0	0.0														
EP100	Concentrate Transfer to Repulp Sump			0.0	0.0	0.0														
EP200	210-CM-001 - Noram	3.8				0.0														
EP300	400-SR-081 - Cu EW Circuit Scrubber					0.0			0.00109	0.05893	0.00001	0.00000	0.00150	0.00018	0.00000	0.09418	0.31384			
EP400	2600-SR-601 - Co EW Circuit Scrubber					0.0			0.00560	0.00000	0.00001	0.00000	0.00000	0.00159	0.00023	0.00919	0.00646			
EP500	2800-DC-81 - Lime Silo Dust Collector (in)			2.6	1.7	1.7														
EP550	2800-FE-81 - Lime Silo Feeder (out) fully enclosed			0.0	0.0	0.0														
EP600	2800-CW-801 - Cooling Tower			0.04	0.04	0.04														
EP700	2800-DC-801 - MgO Silo Dust Collector (in)			0.90	0.57	0.57														
EP750	2800-FE-804 - MgO Silo Feeder (out) fully enclosed			0.0	0.0	0.0														
EP800	210-SR-52 - Plant Ventilation Scrubber			0.0	0.0	0.0														
SpcHt	Space Heater(s)	1.1	0.9	0.1	0.1	0.1	0.0	0.0	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00082	0.00002	0.02409
	Space Heater(s) operate only when all other processes are not operating																			
	Total Unconmtrolled PTE (tons/yr)	**3.8**	**0.9**	**3.6**	**2.3**	**2.3**	**0.0**	**0.0**	**0.0067**	**0.0589**	**0.0000**	**0.0000**	**0.0015**	**0.0018**	**0.0002**	**0.1034**	**0.3203**	**0.0008**	**0.0000**	**0.0241**

Source ID	Source	NOx	CO	PM	PM 10	PM 2.5	SOx	TOC	Co	Cu	Ni	Zn	Fe	Mg	Mn	SO4	H2SO4	Formald	Benzene	N2O
		lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr
EP LRR	Leach Residue Repository			0.0	0.0	0.0														
EP100	Concentrate Transfer to Repulp Sump			0.0	0.0	0.0														
EP200	210-CM-001 - Noram	0.9				0.0														
EP300	400-SR-081 - Cu EW Circuit Scrubber					0.0			0.00025	0.01345	0.00000	0.00000	0.00034	0.00004	0.00000	0.02150	0.07165			
EP400	2600-SR-601 - Co EW Circuit Scrubber					0.0			0.00128	0.00000	0.00000	0.00000	0.00000	0.00036	0.00005	0.00210	0.00147			
EP500	2800-DC-81 - Lime Silo Dust Collector (in)			0.6	0.4	0.4														
EP550	2800-FE-81 - Lime Silo Feeder (out) fully enclosed			0.0	0.0	0.0														
EP600	2800-CW-801 - Cooling Tower			0.01	0.01	0.01														
EP700	2800-DC-801 - MgO Silo Dust Collector (in)			0.21	0.13	0.13														
EP750	2800-FE-804 - MgO Silo Feeder (out) fully enclosed			0.0	0.0	0.0														
EP800	210-SR-52 - Plant Ventilation Scrubber			0.0	0.0	0.0														
SpcHt	Space Heater(s)	0.5	0.4	0.0	0.0	0.0	0.0	0.0	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00038	0.00001	0.01100
	Space Heater(s) operate only when all other processes are not operating																			
	Total Uncontrolled PTE (lbs/hr)	**0.9**	**0.4**	**0.8**	**0.5**	**0.5**	**0.0**	**0.0**	**0.0015**	**0.0135**	**0.0000**	**0.0000**	**0.0003**	**0.0004**	**0.0001**	**0.0236**	**0.0731**	**0.0004**	**0.0000**	**0.0110**
		No uncontrolled emissions approach or reach CAM threshold																		

Material Transfers

Model Source name

Multi

Source ID	Fugitive Source	Moisture content	AP-42 EF Ref	PM EF (lb/ton)	PM-10 EF (lbs/ton)	Max Throughput			Uncontrolled PM Max Emissions			Uncontrolled PM-10 Max Emissions			Control Efficiency	Controlled PM Max Emissions			Controlled PM-10 Max Emissions		
						tons/hr	tons/day	tons/yr	lbs/hr	lbs/day	ton/yr	lbs/hr	lbs/day	ton/yr		lbs/hr	lbs/day	tons/yr	lbs/hr	lbs/day	tons/yr
EP100	Concentrate Transfer to Repulp Sump	6%	A	0.0001	0.0001	2.38	57.2	20877.39	0.0002	0.0057	0.0010	0.000	0.006	0.001	90.0%	0.000	0.001	0.000	0.000	0.001	0.000
EP500	2800-DC-81 - Lime Silo Dust Collector (in)	NA	B	0.72	0.46	0.837	20.1	7328	0.6023	14.4547	2.6380	0.385	9.235	1.685	90.0%	0.060	1.445	0.264	0.038	0.923	0.169
EP550	2800-FE-81 - Lime Silo Feeder (out) fully enclosed	NA	C	0.00014	4.60E-05	0.837	20.1	7328	0.0001	0.0028	0.0005	0.000	0.001	0.000	100.0%	0.000	0.000	0.000	0.000	0.000	0.000
EP700	2800-DC-801 - MgO Silo Dust Collector (in)	NA	B	0.72	0.46	0.285	6.8	2497	0.2052	4.9248	0.8988	0.131	3.146	0.574	90.0%	0.021	0.492	0.090	0.013	0.315	0.057
EP750	2800-FE-804 - MgO Silo Feeder (out) fully enclosed	NA	C	0.00014	4.60E-05	0.285	6.8	2497	0.0000	0.0010	0.0002	0.000	0.000	0.000	100.0%	0.000	0.000	0.000	0.000	0.000	0.000

AP-42 Emission Factor References	Description
A	AP-42 Table 11.19.2-2, Truck unloading to conveyor, crushed stone for PM-10. Same value assumed for PM.
B	AP-42 Table 11.12-2, Controlled cement unloading to elevated storage silo (pneumatic) and assumes 99.92% control efficiency for silos
C	AP-42 Table 11.19.2-2, Conveyor transport (controlled)

Control Efficienices	Description
Lime Silo Feeder (out)	100% physically enclosed from silo into building, where material immediately enters a wet process. Material is 3/8" pebble lime
MgO Silo Feeder (out)	100% physically enclosed from silo into building, where material immediately enters a wet process.
Concentrate Transfer to Repulp Sump	90% controlled by 6% moisture content of concentrate and material immediately enters a wet process.
Lime Silo Dust Colletor (in)	Typical controls for fine material silos achieve >= 99% control. EI calculations assume 90% control efficiency. Material is 3/8" pebble lime
MgO Silo Dust Colletor (in)	Typical controls for fine material silos achieve >= 99% control. EI calculations assume 90% control efficiency.

Notes:

Maximum design capacity for concentrate is 2.38 ton/hr (dry basis) through the autoclave process, based on 100% availability factor

210-CM-001 - Noram

Model Source name
EP200 Modeled with manufacturer's specs for scrubber release point

Noram is a proprietary NO recovery system designed to capture and recover off-gas from the autoclaves. This equipment is installed as a recovery device, not an emission control device. The emission rates below were obtained from the manufacturer (Noram).

	Uncontrolled Emissions			IDEQ Modeling threshold
	lb/hr	lb/day	ton/yr	ton/yr
NO	0.86	20.64	3.77	
NO2	0	0	0.00	1
NOx	0.86	20.64	3.7668	discretionary

NOx exhaust is 1.68 lb/hr, however we based the emissions inventory on a 120% basis, so the value is 2.016 lb/hr, 8.83 tons/yr
The majority of the NOx release is NO
HNO3 is neutralized during capture process as pH is >7

400-SR-081 - Cu EW Circuit Scrubber

Model Source name
EP300
Modeled with manufacturer's specs for scrubber release point

Notes:

All Operations inside a building			
Exhaust from the electrowinning circuit is captured and passed through a scrubber.			
Cu process container has	17	cells	
Cell electrolyte temperature =	93.9	°F	
Electrolyte S.G. =	1.18		
g/lb =	453.6		
Elevation	2495	ft	
Barometric pressure	13.4	psi	695 mm Hg
Air density @ 32 °F	0.074	lb/ft^3	
Air density @ STP	0.081	lb/ft^3	
Standard Temp	273.15	°K	
Standard Pressure	760	mm Hg	

90% Control efficiency is applied to calculated summed emission rates of the scrubber

				Note:
Electrolyte Mist	200 mg/min/cell x 17 cells x 60 min/hr =	0.450	lb/hr	1

Uncontrolled emission rate (ER)
ER = M x C
M = mist flow rate 0.1729 L/hr
C = concentration

	Solution Conc.	Uncontrolled		Control Efficiency	Controlled	
	g/L	lb/hr	tn/yr		lb/hr	tn/yr
Co	0.65	0.000249	0.001	90%	0.000025	0.0001
Cu	35.30	0.013454	0.059	90%	0.001345	0.0059
Ni	0.01	0.000003	0.000	90%	0.000000	0.0000
Zn	0.00	0.000001	0.000	90%	0.000000	0.0000
Fe	0.90	0.000343	0.002	90%	0.000034	0.0002
Mg	0.11	0.000041	0.000	90%	0.000004	0.0000
Mn	0.00	0.000000	0.000	90%	0.000000	0.0000
SO4	56.42	0.021502	0.094	90%	0.002150	0.0094
H2SO4	188.00	0.071653	0.314	90%	0.007165	0.0314

Notes:

1. The electrolyte mist results from oxygen gas bubble production on the anode . The gas bubbles rise to the surface and pop, causing mist of electrolyte. A rate of 200 mg/min/cell is based on historical operating data from Cu EW operations. This standard is discussed in the September 1996 issue of "Mining Engineering". The article titled "Bechtel's electrode cap limits acid mist in electrowinning" uses 200 mg/min/cell mist rate as a standard criteria for sizing copper electrowinning ventilation systems.

2600-SR-601 - Co EW Circuit Scrubber

Model Source name
EP400
Modeled with manufacturer's specs for scrubber release point

Notes:

All Operations inside a building			
Exhaust from the electrowinning circuit is captured and passed through a scrubber.			
Cu process container has	10	cells	
Cell electrolyte temperature =	154	°F	
Electrolyte S.G. =	1.26		
g/lb =	453.6		
Elevation	2495	ft	
Barometric pressure	13.4	psi	695 mm Hg
Air density @ 32°F	0.074	lb/ft^3	
Air density @ STP	0.081	lb/ft^3	
Standard Temp	273.15	°K	
Standard Pressure	760	mm Hg	

90% Control efficiency is applied to calculated summed emission rates of the scrubber

				Note:
SAME Mist	20 mg/min/cell x 10 cells x 60 min/hr =	0.026	lb/hr	1

Uncontrolled emission rate (ER)
ER = M x C
M = mist flow rate 0.0095 L/hr
C = concentration

	Solution Conc.	Uncontrolled		Control Efficiency	Controlled	
	g/L	lb/hr	tn/yr		lb/hr	tn/yr
Co	60.90	0.001279	0.006	90.0%	0.000128	0.001
Cu	0.00	0.000000	0.000	90.0%	0.000000	0.000
Ni	0.12	0.000003	0.000	90.0%	0.000000	0.000
Zn	0.01	0.000000	0.000	90.0%	0.000000	0.000
Fe	0.00	0.000000	0.000	90.0%	0.000000	0.000
Mg	17.34	0.000364	0.002	90.0%	0.000036	0.000
Mn	2.47	0.000052	0.000	90.0%	0.000005	0.000
SO4	99.91	0.002098	0.009	90.0%	0.000210	0.001
H2SO4	70.21	0.001474	0.006	90.0%	0.000147	0.001

Notes:

1. The SAME is a proprietary mist/air collection system that captures mist and offgas from the Co EW circuit. Unlike the Cu EW circuit, cobalt plating requires near neutral pH. Because oxygen gas bubbles are produced at the anode, the anolyte (solution) at the anode becomes acidic. To prevent migration of acid to the plating cathode, fabric bags are placed over the anode. All electrolyte (anolyte) mist is captured within the fabric bag and is conveyed to a liquid/air separation tank for reuse in the process. The SAME captures any hydrogen gas that may be produced at the cathode. Because hydrogen gas should not be produced in a properly performing Co EW cell, 10% of historically based mist production estimates* are assumed to be captured by the SAME. Therefore, a rate of 20 mg/min/cell is assumed to be captured in the Co EW scrubber.

* A rate of 200 mg/min/cell is based on historical operating data from Cu EW operations. This standard is discussed in the September 1996 issue of "Mining Engineering". The article titled "Bechtel's electrode cap limits acid mist in electrowinning" uses 200 mg/min/cell mist rate as a standard criteria for sizing copper electrowinning ventilation systems.

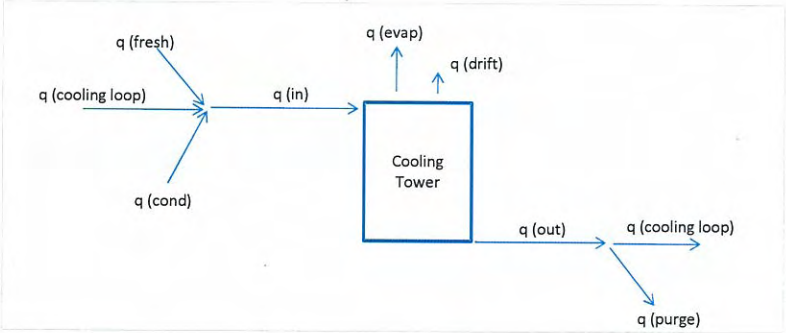
2800-CW-801 - Cooling Tower

Model Source name

EP600

Cooling Tower Flows (q)		
Total Inflow	**789**	**gpm**
Fresh (in)	20	gpm
Cooling Loop (in)	754	gpm
Condensate (in)	15	gpm
Total Evap	**27**	**gpm**
Drift	**2.0**	**gpm**
Drift	0.25%	
Total Outflow	**760**	**gpm**
Cooling Loop (out)	754	gpm
Purge (out)	6.2	gpm
Water density	8.4	lb/gal
Water conv.	3.7854	L/gal

Inflows	789	gpm
Outflows	789	gpm



Q = q * C

Q - mass flow rate
q - volumetric flow rate
C - concentration

C(out) = C(drift)

	C (Fresh Water) (measured)	Q (Fresh)	C (condensate) (estimated)	Q (condensate)	C (cooling loop)	Q (cooling loop)	C (in) (calculated)	Q (in)
Constituent	**mg/L**	**lb/hr**	**mg/L**	**lb/hr**	**mg/L**	**lb/hr**	**mg/L**	**lb/hr**
Hardness	0.01	0.0001	0.001	0.000	0.01	0.0038	0.0098	0.0039
TSS	3	0.0303	0.3	0.002	3	1.1313	2.9487	1.1639
TDS	10	0.1011	1	0.008	10	3.7711	9.8289	3.8796

Q(out)	C (out)	C (purge)	Q (purge)	Q(cooling loop)
lb/hr	**mg/L**	**mg/L**	**lb/hr**	**lb/hr**
0.0039	0.0102	0.0102	0.0000	0.0038
1.1609	3.0611	3.0611	0.0095	1.1514
3.8695	10.2036	10.2036	0.0316	3.8379

	C (drift) (calculated)	Q (drift)	PM, PM 10 Uncontrolled Emissions		
Constituent	**mg/L**	**lb/hr**	**lb/hr**	**lb/day**	**tn/yr**
TDS	10.2036	0.0101	0.0101	0.2417	0.0441

assumes all PM is PM10

Reference: AP42 Section 13.04

ER = (gpm drift) x (TDS ppm) = lbs PM10 /hr

Notes:

Cooling tower uses fresh water obtained from Big Creek via surface water diversion
Total Dissolved Solids (TDS) present in the fresh water supply are assumed to be 100% PM-10
Analysis of fresh water performed by Silver Valley Labs

Emission Calculations for CPF Space Heating

Model Source name
SpcHt

Samuels Engineering Estimate of potential space heating need only seasonally, when active processes have been shut down for an extended, unanticipated period.	4.865	Mmbtu/hr
Conservative estimate of space heating capacity	5	Mmbtu/hr
Natural Gas heat content	1000	Mmbtu/10^6 scf natural gas
Natural Gas Use Rate	0.005	x 10^6 scf/hr
Hours Used Annually (very conservatively assume 50% use)	4380	hrs/yr
Annual Natural Gas Used	21.9	x 10^6 scf

Emission factors criteria pollutants AP-42 Tables 1.4-1 (uncontrolled small boiler), 2, and 3, in lbs/10^6 scf natural gas

Pollutant	NOx	CO	PM	PM 10	PM 2.5	SOx	TOC	Lead	N2O	Benzene	Formaldehyde
AP-42 EF (lbs/10^6 scf NG)	100	84	7.6	7.6	7.6	0.6	11	5.00E-04	2.2	0.0021	0.075
lb/hr PTE	0.5	0.42	0.038	0.038	0.038	0.003	0.055	2.50E-06	0.011	1.05E-05	3.75E-04
ton/yr PTE	1.10	0.92	0.08	0.08	0.08	0.01	0.12	0.00	0.02	0.00	0.00

APPENDIX B– PROCESSING FEE

PTC Fee Calculation

Instructions:
Fill in the following information and answer the following questions with a Y or N. Enter the emissions increases and decreases for each pollutant in the table.

Company: Essential Metals Corporation
Address: 1098 Big Creek Road
City: Kellogg
State: ID
Zip Code: 83837
Facility Contact: Preston Rufe
Title: Environmental Manager
AIRS No.: 079-00016

N Does this facility qualify for a general permit (i.e. concrete batch plant, hot-mix asphalt plant)? Y/N

Y Did this permit require engineering analysis? Y/N

N Is this a PSD permit Y/N (IDAPA 58.01.01.205.04)

Emissions Inventory			
Pollutant	Annual Emissions Increase (T/yr)	Annual Emissions Reduction (T/yr)	Annual Emissions Change (T/yr)
NO_X	4.9	0	4.9
SO_2	0.0	0	0.0
CO	0.9	0	0.9
PM10	0.4	0	0.4
VOC	0.0	0	0.0
TAPS/HAPS	0.4	0	0.4
Total:	6.6	0	**6.6**
Fee Due	**$ 2,500.00**		

Comments: