4. EMISSIONS OF REGULATED AIR POLLUTANTS

The emissions of regulated air pollutants, resulting of the proposed Project, involves the following pollutants:

- Particulate matter ($PM/PM_{2.5}/PM_{10}$);
- Nitrogen oxides (NO_x);
- Carbon monoxide (CO);
- Sulphur dioxide (SO_2);
- Volatile organic compounds (VOCs);
- Hazardous Air Pollutants (HAPs); and
- Greenhouse gases (GHGs).

Detailed emissions calculations are included in **Appendix F** along with information regarding the development of the emission factors, throughputs and controls used to develop the emissions estimates. Additional information on the calculation methodologies is presented in the sections below.

4.1 Emission Calculations

4.1.1 Mining

4.1.1.1 Drilling (Unit ID: MN01)

Process Rate

Drilling activity rates were developed for each modeled operational year based on the number of drills and the rate of drilling per day and per year. The maximum drilling rates for each of the modeled operational years are summarized as follows:

- Year 2: 280 holes drilled per day and 49,000 holes drilled per year (total activity rate from combined activity in Peach, Elgin, Copper World and Heavy Weight pits);
- Year 8: 400 holes drilled per day and 46,000 holes drilled per year (total activity rate from combined activity in Broadtop Butte and Rosemont pits); and
- Year 14: 200 holes drilled per day and 30,000 holes drilled per year. (Rosemont Pit activity rate). (see **Appendix F**).

Drilling activity rates in other operational years are not anticipated to exceed the maximum total activity rates presented above; however, the activity rate from any single pit will fluctuate based on operational year.

Emission Factor

Uncontrolled PM, PM_{10}, and $PM_{2.5}$ emissions from drilling are calculated using the emission factor of 1.3 lb/hole, from AP-42, Table 11.9-4 (10/98) for total suspended particulates (TSP) from drilling of overburden at western surface coal mines. The TSP emission factor is assumed to be applicable for PM. PM_{10} and $PM_{2.5}$ emissions from drilling are not listed in Table 11.9-4. PM_{10} emissions are assumed equal to 33% of PM emissions based on the ratio of PM_{10} to PM emissions for tertiary crushing of high moisture ore in AP-42, Table 11.24-2 (08/82).

$PM_{2.5}$ emissions are estimated to be 18.5% of PM_{10} emissions based on the ratio of $PM_{2.5}$ to PM_{10} controlled emissions for tertiary crushing in AP-42, Table 11.19.2-2 (08/04). This is higher than the actual value because pollution control devices have a lower efficiency for smaller size particulates.

Control Efficiency

Based on Year 2, Year 8, and Year 14 mine planning, control strategies for drilling emissions associated with blasthole drilling will be utilized. For production drilling operations in all pits, the drills will be equipped with drilling shrouds and a dry fogging particulate suppression system designed to reduce drilling particulate emissions by 95%.

4.1.1.2 Blasting (MN02)

Process Rate

Many factors are considered when determining a blast pattern including material density, hole spacing, hole depth, ANFO charge rate and total area to be blasted. Based on the methodology for emissions calculation from blasting, the variables that limit blast emissions are the total horizontal area of the blast and the total amount of ANFO utilized. As a result, these values were developed, based on mine planning. In general, the maximum blasting rates for each of the modeled operational years are summarized as follows:

- Year 2: 253,684 ft^2 horizontal area blasted per day and 44,394,700 ft^2 horizontal area blasted per year. 84 tons ANFO use per hour and per day, 14,700 tons of ANFO use per year (total activity rate from combined activity in Peach, Elgin, Copper World and Heavy Weight pits);
- Year 8: 543,606 ft^2 horizontal area blasted per day and 62,695,892 ft^2 horizontal area blasted per year. 120 tons ANFO use per hour and per day, 14,070 tons of ANFO use per year (total activity rate from combined activity in Broadtop Butte and Rosemont pits); and
- Year 14: 181,202 ft^2 horizontal area blasted per day and 54,360,600 ft^2 horizontal area blasted per year. 60 tons ANFO use per hour and per day, 18,000 tons of ANFO use per year (Rosemont Pit activity rate).

Blasting activity rates in other operational years are not anticipated to exceed the maximum total activity rates presented above; however, the activity rate from any single pit will fluctuate based on operational year. These values were used to limited emissions generation for the Copper World Project and are included in the emissions inventories in **Appendix F**.

Emission Factor

Uncontrolled PM, PM_{10}, and $PM_{2.5}$ emissions from blasting are calculated using the emission factor expression from AP-42, Table 11.9-1 (10/98) for blasting at western surface coal mines (Equation 1):

(Equation 1):

$$EF = (k)(0.000014)(A)^{1.5}$$

where:

EF	=	emission factor (lb/blast)
K	=	scaling factor (1 for TSP, assumed to be equivalent to PM, 0.52 for PM_{10}, 0.03 for $PM_{2.5}$)
A	=	horizontal area of the blast (ft^2; varies by year, calculated by multiplying the average amount of holes drilled per blast (varies by year) by the approximate spacing (30 ft) and burden (30 ft) of the drilling pattern)

Uncontrolled CO emissions from blasting are calculated using the emission factors from AP-42, Table 13.3-1 (02/80) for the detonation of ANFO. Uncontrolled SO_2 emissions are calculated using a mass balance based on a diesel fuel sulfur content of 0.0015% by weight (15 ppm ULSD) and diesel fuel to ANFO ratio of 6%. Uncontrolled NO_x emissions are calculated using the emission factor found in "NO_x Emissions from Blasting

Operations in Open-Cut Coal Mining" by Moetaz I. Attalla, Stuart J. Day, Tony Lange, William Lilley, and Scott Morgan (2008) (0.9 kg per metric ton based on reported average on page 7881 of the reference).

Uncontrolled CO_2, CH_4, and N_2O emissions are calculated using the emission factors of 73.96 kg/MMBtu, $3*10^{-3}$ kg/MMBtu, and $6*10^{-4}$ kg/MMBtu, respectively, from 40 CFR 98, Tables C-1 and C- 2 for distillate fuel oil No. 2. A diesel fuel oil to ammonium nitrate ratio of 6% and a diesel heating value of 19,300 Btu/pound of diesel fuel were used to express the CO_2, CH_4, and N_2O emission factors in terms of lb/ton of ANFO.

The gaseous emission factors for blasting are presented in the emissions inventory in **Appendix F**.

Control Efficiency

Besides good operating practices, other pollution control methods cannot be implemented during blasting.

4.1.1.3 Loading Ore and Waste Rock (Unit IDs: MN03, MN04, and MN05)

Process Rate

The annual process rates for loading ore (destined for crusher), ROM ore (destined for HLP), and waste rock into haul trucks are equal to the annual ore and waste rock mining rates at the Copper World Project. The mining rates (see **Appendix F**) are based on geologic and pit development studies completed at the Copper World Project and presented in the mine plan of operations. The average daily process rates for loading ore and waste rock in Years 2, 8 and 14 in the life of the mine are calculated by dividing the annual loading rates by 365, the quantity of days per year when mining will be performed. The hourly process rates for loading ore and waste rock are calculated by dividing the daily loading rates by 24 hours/day.

Emission Factor

Uncontrolled PM, PM_{10}, and $PM_{2.5}$ emissions from loading ore (destined for crusher), ROM ore (destined for HLP), and waste rock into haul trucks are calculated using the emission factor expression from AP-42, Section 13.2.4.3 (11/06) for aggregate drop processes. This expression (Equation 2) is:

$$EF = (k)(0.0032)\frac{(\frac{U}{5})^{1.3}}{(\frac{M}{2})^{1.4}} \quad (2)$$

where:

EF	=	emission factor (lb/ton)
k	=	particle size multiplier (0.74 for PM_{30} (assumed to be equivalent to PM), 0.35 for PM_{10}, 0.053 for $PM_{2.5}$)
U	=	mean wind speed (The mean wind speed in the pits is 5.42 mph, 2/3 of the ambient mean wind speed of 8.13 mph to account for pit depth influence)
M	=	material moisture content (3.5% for ore (destined for crusher), ROM ore (destined for HLP), and waste rock from the mine as determined by

Control Efficiency

[1] 3.5% moisture represents a conservative minimum moisture content for water balance purposes, consistent with the Copper World Project's Aquifer Protection Permit (APP) application.

Watering of the bench and mine face will be implemented after blasting and prior to loading activities. As a result, an average control efficiency of 75% was utilized.

4.1.1.4 Hauling Ore and Waste Rock (Unit IDs: MN06, MN07, and MN08)

Process Rate

The annual, daily, and hourly process rates for the amount of vehicle miles traveled (VMT) by the haul trucks in order to haul sulfide ore to the primary crusher/temporary ore stockpile, leach ore to the leach pad, and waste rock to the waste rock storage area are calculated by multiplying the distance traveled (i.e. the distance from the mining location in the pit(s) to the primary crusher dump hopper/run of mine stockpile, leach pad, or waste rock storage area) by the amount of truckloads needed to haul the material. The number of truckloads is determined by dividing the anticipated annual, daily, or hourly amount of material mined by the average haul truck load (255 tons) and multiplying this number by two to account for the haul trucks returning empty to the mining location. For out of pit ore and waste rock hauling, the emissions are calculated utilizing the out of pit haul route length based on the calculated haul route as depicted within the AERMOD mine layout for each modeled mine year. This calculation is included in the emissions inventory for review by ADEQ. The emissions inventories calculate the VMT and resultant haul road surface emissions based on the haul road length multiplied by the number of trucks that travel the route in a given time period (1-hr, 24-hr and Annually). The truck trips are based on the amount of material movement on that route divided by the truck capacity and the size of the haul truck fleet allocated to that route. .

Emission Factor

Uncontrolled PM, PM_{10}, and $PM_{2.5}$ emissions resulting from the use of haul trucks on unpaved roads at the Copper World Project are calculated from the emission factor expression (Equation 3a) in AP-42, Section 13.2.2 (11/06):

$$EF = (k)(\frac{s}{12})^a(\frac{W}{3})^b \quad (3a)$$

where:

EF	=	emission factor (lb/VMT)
k	=	particle size multiplier (4.9 lb/VMT for PM_{30}, assumed to be equivalent to total suspended particulate matter and PM, 1.5 lb/VMT for PM_{10}, 0.15 lb/VMT for $PM_{2.5}$)
a	=	constant (0.7 for PM, 0.9 for PM_{10} and $PM_{2.5}$)
b	=	constant (0.45 for PM, PM_{10}, and $PM_{2.5}$)
s	=	surface material silt content (5.0%, a value consistent with recently permitted copper mines)
W	=	mean vehicle weight (294 tons, calculated by averaging the empty weight of the haul trucks [167 tons] and the loaded weight of the haul trucks [422 tons])

The emission factor for annual emissions is modified by the following precipitation factor to account for days when the roads are wet, and emissions are reduced:

$$EF_{annual} = (EF)(\frac{365-p}{365}) \quad (3b)$$

where:

EF_{annual} emission factor used to estimate annual emissions of particulate matter (lb/VMT)

EF = emission factor used to estimate hourly and daily emissions of particulate matter (lb/VMT, calculated by Equation 3a)

P = number of days per year with greater than 0.01 inch of precipitation (61 days/year, average data from 1950 – 2008 from the Western Region Climate Center, Santa Rita Experimental Range weather station located 8 miles southwest of the Copper World Project at 4,300 feet above mean sea level)

Control Efficiency

Emissions of particulate matter resulting from haul truck traffic on haul roads at the Copper World Project will be controlled by the application of water and/or chemical dust suppressant to the road surface. Additional details on haul road control efficiency are presented in **Section 2.4** above.

4.1.1.5 Unloading

This section covers unloading operations such as sulfide ore to the crusher or stockpile, leach ore to the crusher, stockpile or heap, and waste rock to the waste rock facility (WRF). Unit IDs covered include: MN09, MN10, and MN11.

Process Rate

The annual, maximum daily, and hourly process rates for unloading ore to the crusher stockpile, leach ore to the leach pad and waste rock to the waste rock storage area are equal to the leach ore and waste rock loading rates.

Emission Factor

Uncontrolled PM, PM_{10}, and $PM_{2.5}$ emissions from unloading leach ore to the leach pad, sulfide ore to the crusher stockpile, and waste rock to the storage area are calculated using Equation 2 in **Section 4.1.1.3**. The material moisture content (M, 3.5%) is the material moisture content of the ore as determined by Rosemont. The mean wind speed (8.13 mph) is the average wind speed out of the pit based on the on-site May 2023 – April 2024 CWP Met-2 Station AERMET data. Since the unloading process at the Copper World Project is unprotected from the wind, the unaltered wind speed is used in the emission factor equation presented in Equation 2.

Control Efficiency

Besides good operating practices, other pollution control methods are not implemented while unloading sulfide ore to the crusher stockpile (or crusher), leach ore to the leach pad (or stockpile or crusher), and waste rock to the waste rock facility area (WRF). However, as described in **Section 4.1.1.3** above, the bench and face of the mine will be controlled by intensive watering during loading. A portion of this moisture is expected to be retained on the material and will provide control during unloading. The moisture content of the unloaded material is anticipated to exceed 6%. As a result, a conservative average control efficiency of 45% was utilized.

4.1.1.6 Bulldozer Use (Unit ID: MN12)

Process Rate

The daily process rates for bulldozer use are calculated by multiplying each type of the bulldozer's daily utilization rate, as determined by the mine plan (see **Appendix F**), multiplied by 24 hours/day. The maximum annual process rates are calculated by multiplying the daily hours by 365, the quantity of days per year the bulldozers will be used. The hourly process rates are calculated by dividing the maximum daily process rates by 24 hours/day.

Emission Factor

Uncontrolled PM, PM_{10}, and $PM_{2.5}$ emissions from bulldozing operations are calculated from the emission factor expression in AP-42, Table 11.9-1 (10/98) for the bulldozing of overburden at western surface coal mines. This expression (Equation 4) is:

$$EF = (k)(\frac{s^a}{M^b}) \quad (4)$$

where:

EF	=	emission factor (lb/hr)
k	=	particle size multiplier (5.7 for TSP assumed to be equivalent to PM, 0.75 for PM_{10}, 0.60 for $PM_{2.5}$ (5.7*0.105))
s	=	material silt content (bulldozing operations primarily represent handling of waste rock and ore with a bulldozer. The silt content of these materials is uncertain. AP-42, Table 13.2.4-1 (11/06) provides the silt content of various materials. The silt content of overburden in this table is 7.5% and was assumed for the silt content of the material handled by bulldozers.)
M	=	material moisture content (3.5% for sulfide ore, leach ore, and waste rock from the mine as determined by Rosemont)
a	=	constant (1.2 for PM and $PM_{2.5}$, 1.5 for PM_{10})
b	=	constant (1.3 for PM and $PM_{2.5}$, 1.4 for PM_{10})

Control Efficiency

Watering will immediately proceed ahead of the use of bulldozers. As a result, an average control efficiency of 75% was utilized.

4.1.1.7 Water Truck Use (Unit ID: MN13)

Process Rate

The annual, daily, and hourly process rates for water truck use were provided by Rosemont based on anticipated needs for each mine plan year.

Emission Factor

Uncontrolled PM, PM_{10}, and $PM_{2.5}$ emissions resulting from the use of water trucks on unpaved roads at the Copper World Project are calculated using Equations 3a and 3b. The surface material silt content (s, 5.0%) and number of days per year with greater than 0.01 inches of precipitation (p, 61 days/year) are equal to the values used to calculate the emission factor in **Section 4.1.1.4** above. Explanations for how these values are determined are presented in **Section 4.1.1.4** above.

The mean vehicle weight (W, 186.5 tons) is calculated by averaging the empty (125 tons) and loaded weights (248 tons) of the water trucks.

Control Efficiency
Emissions of particulate matter resulting from water truck use on haul roads at the Copper World Project will be controlled by the application of water and/or chemical dust suppressant to the road surface. Additional details on haul road control efficiency are presented in **Section 2.4** above.

4.1.1.8 Grader Use (Unit ID: MN14)

Process Rate
The daily process rates for grader use are calculated by summing the daily amounts of VMT for the grader. The VMTs are calculated by multiplying the hours of operation for the graders, as determined by the mine plan of operations (see **Appendix F**) by the average speed the graders will be traveling (1.0 mph). The maximum annual amounts of VMT by the graders are calculated by multiplying the daily VMT by 365, the quantity of days per year graders will be used. The hourly process rates are calculated by dividing the daily grader usage rates by 24 hours/day.

Emission Factor
Uncontrolled PM, PM_{10}, and $PM_{2.5}$ emissions from grader use are calculated from the emission factor expression in AP-42, Table 11.9-1 (10/98) for grading at western surface coal mines. This expression (Equation 5) is:

$$EF = (k)(a)(S)^b \quad (5)$$

where:

EF = emission factor (lb/VMT)

k = particle size multiplier (1 for TSP assumed to be equivalent to PM, 0.60 for PM_{10}, 0.031 for $PM_{2.5}$)

S = mean vehicle speed (4.6 mph – Utilized higher travel speed for conservatism)

a = constant (0.040 for PM, 0.051 for PM_{10}, 0.040 for $PM_{2.5}$)

b = constant (2.5 for PM, 2.0 for PM_{10}, 2.5 for $PM_{2.5}$)

Control Efficiency
Watering will immediately proceed the use of graders. As a result, an average control efficiency of 75% was utilized.

4.1.1.9 Support Vehicle Use

Process Rate
The annual, maximum daily, and hourly process rates for support vehicle use were provided by Rosemont based on anticipated needs for each mine plan year.

Except for the drills and shipment and delivery vehicles, the annual amount of VMTs for each type of support vehicle is based on usage determinations, which are anticipated to be consistent throughout the life of the mine.

For the drills, the annual, maximum daily, and hourly amounts of VMTs are determined by the distance traveled to prepare for a blast and the maximum number of blasts per year, day, or hour.

For the shipment and delivery trucks, the annual, maximum daily, and hourly amounts of VMTs are calculated by multiplying the number of shipments and deliveries in any given year, day, or hour by the distance the shipment and delivery trucks have to travel within the Copper World Project property boundaries.

The annual number of shipments and deliveries are calculated by dividing the quantity of the material being shipped or delivered by the capacity of the shipment or delivery truck. The quantities of material being shipped are assumed to be equal throughout the life of the mine except for the copper concentrate, copper cathodes produced, molten sulfur, diesel fuel delivery vehicles, and ANFO delivery vehicles which have specific values for each modeled mine life year. The daily amounts of shipments and deliveries, and the hourly amounts of shipments and deliveries, are based on the maximum number of shipments or deliveries the Copper World Project can accommodate in any one day or hour for each material.

The annual, maximum daily, and hourly VMT process rates, the support vehicle fleet size, and the support vehicle weight are presented in the emissions inventory in **Appendix F**.

Emission Factor

Uncontrolled PM, PM_{10}, and $PM_{2.5}$ emissions resulting from the use of support vehicles on unpaved roads at the Copper World Project are calculated using Equations 3a and 3b. The surface material silt content (s, 5.0%) and number of days per year with greater than 0.01 inch of precipitation (p, 61 days/year) are equal to the values used to calculate the emission factor in **Section 4.1.1.4** above. Explanations for how these values are determined are presented in **Section 4.1.1.4** above.

The vehicle weight (W, tons) is the vehicle weight for each of the support vehicles that will be used at the Copper World Project. The vehicle weight values are presented in the emissions inventory in **Appendix F**.

Control Efficiency

Emissions of particulate matter resulting from water truck use on haul roads at the Copper World Project will be controlled by the application of water and/or chemical dust suppressant to the road surface. Additional details on haul road control efficiency are presented in **Section 2.4** above.

4.1.2 Primary Crushing, Conveying, Coarse Ore Storage, and Reclaim Conveying

4.1.2.1 Wind Erosion of the Temporary Ore Stockpile (Unit ID: PC01 – Year 2 and Year 8 Only)

Process Rate

The annual, daily, and hourly process rates for wind erosion of the temporary ore stockpile are equal to the maximum area of the land containing the stockpile (14 acres) and continuous operation of the stockpile (i.e., 8,760 hours/year, 24 hours/day, 1 hour/hour).

Emission Factor

Uncontrolled PM, PM_{10}, and $PM_{2.5}$ emissions due to wind erosion of the temporary ore stockpile are determined using the methodology and equations from AP-42, Section 13.2.5 (11/06), including:

$$EF = (k)\left(\sum_{i=1}^{N} P_i\right)\left(\frac{1\ lb}{453.59\ g}\right)\left(\frac{4{,}406.86\ m^2}{1\ acre}\right) \qquad (6a)$$

$$P = (58)(u^* - u_t^*)^2 + (25)(u^* - u_t^*) \qquad \text{for } u^* > u_t^* \qquad (6b)$$

$$P = 0 \qquad \text{for } u^* \leq u_t^* \qquad (6c)$$

$$u^* = (0.053)(u_{10}^+) \qquad (6d)$$

where:

EF = emission factor (lb/acre-year), the PM emission factor is assumed to be equal to the emission factor for PM_{30}

k = particle size multiplier (1 for PM, 0.5 for PM_{10}, 0.075 for $PM_{2.5}$)

P = erosion potential function

N = number of disturbances (1, temporary ore stockpile will only be disturbed when ore is added)

u^* = friction velocity (m/s)

u_t^* = threshold friction velocity (0.17 m/s, equal to mine tailings in Hayden, AZ from Table 4-4 of EPA Document, Control of Open Fugitive Dust Sources, September 1988)

u_{10}^* = fastest mile for the time period between disturbances (calculated using the linear regression proposed by ADEQ from previous project modeling and maximum hourly average wind speed (16.3 m/s) from the on-site May 2023-April 2024 CWP Met-2 Station AERMET file.)

Control Efficiency

Besides good operating practices, water sprays will be used as needed to control emissions from the temporary ore stockpile. An average control efficiency of 50% has been utilized based on review of published controls of wind erosion when utilizing water sprays.

4.1.2.2 Unprotected Transfer Points (Unit ID: Various)

Process Rate

The annual, daily, and hourly process rates are dependent on the point in the material processing process but are typically based on the respective ore mining rates. Process rates for transfers associated with the secondary process such as the secondary screen transfer points and the secondary crusher transfer points are dependent on anticipated routing to the secondary process and are shown in the emissions inventory included in **Appendix F**.

Emission Factor

Uncontrolled PM, PM10, and PM2.5 emissions from unprotected transfer points (indicated in the emissions inventory with Particulate Matter Process Code 'TrStnUnp') are calculated using Equation 2. The mean wind speed (U, 8.13 mph) and material moisture content (M, 3.5%) are equal to the values used to calculate the emission factors in **Section 4.1.5** above.

Control Efficiency

Various control technologies such as fogging sprays, dust collectors, water sprays, enclosures, and wet process are used to control emissions from unprotected transfer points and are documented in the emissions inventory included in **Appendix F**. Emissions of particulate matter resulting from unloading ore to the feed bins will be controlled by water fogging sprays. The fogging sprays have a control efficiency of 93%.

4.1.2.3 Rock Breaker and Primary Crusher (Unit ID: OCR02, OCR04, SCR02, SCR04)

Process Rate

The annual and daily process rate for the rock breakers and primary crushers is based on the maximum quantity of ore mined per year and per day (respectively). The hourly process rates are based on the respective maximum hourly crusher capacities. The utilization of the rock breakers is limited as they will only be relied upon in instances where blasting has not sufficiently fractured the material. It is estimated that only 1% of the total crusher throughput would require use of the rock breakers.

Emission Factor

Uncontrolled PM and PM_{10} emissions from the rock breakers and primary crushing are calculated using the emission factors of 0.50 lb/ton and 0.0.05 lb/ton, respectively, from AP-42, Table 11.24-2 (08/82) for primary crushing of low moisture ore. Although in practice, the moisture content of the crushed ore at the Copper World Project would possess a moisture content above 4%, which would classify the material as "high moisture" according to AP-42 Section 11.24.2, the low moisture ore emissions factors have been utilized to ensure conservatism.

Uncontrolled $PM_{2.5}$ emissions are estimated to be 18.5% of PM_{10} emissions based on the ratio of $PM_{2.5}$ to PM_{10} controlled emissions for tertiary crushing in AP-42, Table 11.19.2-2 (08/04). This is greater than the actual value because pollution control devices have a lower efficiency for smaller size particulates.

Control Efficiency

Emissions of particulate matter resulting from the oxide and sulfide rock breakers are controlled by the oxide and sulfide primary crusher fogging systems, respectively, with a control efficiency of 93%. Emissions of particulate matter from the oxide and sulfide primary crushers are controlled by the oxide area primary crusher cartridge dust collector and sulfide area primary crusher dust collector, respectively. The primary crushers are designed in a conical shape such that crushing and particulate matter generation occurs near the bottom of the crusher and is emitted through the exit of the crusher. The dust collectors have a control efficiency of 99%.

4.1.2.4 Oxide Secondary Feeder Screen (Unit ID: OCR16)

Process Rate

The annual and daily process rate for the oxide secondary feeder screen is based on the maximum quantity of ore mined per year and per day (respectively). The hourly process rate is based on the maximum hourly oxide ore crusher capacity.

Emission Factor

Uncontrolled PM and PM_{10} emissions from the secondary feeder screen are calculated using the emission factors of 0.025 lb/ton and 0.0087 lb/ton, respectively, from AP-42, Table 11.19.2-2 (08/04) screening. Uncontrolled $PM_{2.5}$ emissions are estimated to be 6.8% of PM_{10} emissions based on the ratio of $PM_{2.5}$ to PM_{10} controlled emissions for controlled screening in AP-42, Table 11.19.2-2 (08/04). This is greater than the actual value because pollution control devices have a lower efficiency for smaller size particulates.

Control Efficiency
Emissions of particulate matter resulting from the secondary feeder screen are controlled by the oxide secondary crusher dust collector system. The dust collector has a control efficiency of 99%.

4.1.2.5 Oxide Secondary Crusher (Unit ID: OCR23)

Process Rate
The annual, daily, and hourly process rate for the oxide secondary crusher is based on the portion of the mined oxide ore per year, per day, and per hour (respectively) that will be diverted to the secondary crusher (approximately 20%).

Emission Factor
Uncontrolled PM emissions from the secondary crusher are calculated using the emission factor of 1.2 lb/ton from AP-42, Table 11.24-2 (08/82). Uncontrolled PM_{10} and $PM_{2.5}$ emissions are estimated to be 45% and 18.5%, respectively of PM emissions based on the ratios of PM_{10} and $PM_{2.5}$ to PM controlled emissions for controlled tertiary crushing in AP-42, Table 11.19.2-2 (08/04). This is greater than the actual value because pollution control devices have a lower efficiency for smaller size particulates.

Control Efficiency
Emissions of particulate matter resulting from the secondary feeder screen are controlled by the oxide secondary crusher dust collector system. The dust collector has a control efficiency of 99%.

4.1.2.6 Wind Erosion of the Coarse Ore Stockpile (Unit ID: OCR10, SCR10)

Process Rate
The annual, daily, and hourly process rates for wind erosion of the coarse ore stockpiles are equal to the surface area of the stockpile building during each modeled operational mine year (oxide stockpile - 3 acres in all active years, sulfide stockpile – 2 acres in Year 2, 3 acres in Year 8 and 14) and continuous operation of the stockpile (i.e., 8,760 hours/year, 24 hours/day, 1 hour/hour).

Emission Factor
Uncontrolled PM, PM_{10}, and $PM_{2.5}$ emissions due to wind erosion of the coarse ore stockpiles are determined using the methodology and equations from AP-42, Section 13.2.5, as documented in **Section 4.1.2.1** above.

Control Efficiency
Besides good operating practices, water sprays are used to control emissions from the coarse ore stockpiles. The water sprays will provide watering as needed to control particulate emissions. An average control efficiency of 50% has been utilized based on review of published controls of wind erosion when utilizing water sprays.

4.1.3 Milling

4.1.3.1 Sulfide SAG Mill (Unit ID: SCR15)

Process Rate
The annual, daily, and hourly process rates for the SAG mill are equal to the sulfide ore mining rates.

Emission Factor
Uncontrolled PM emissions from the secondary crusher are calculated using the emission factor of 1.2 lb/ton from AP-42, Table 11.24-2 (08/82). Uncontrolled PM_{10} and $PM_{2.5}$ emissions are estimated to be 45% and 18.5%, respectively of PM emissions based on the ratios of PM_{10} and $PM_{2.5}$ to PM controlled emissions for controlled tertiary crushing in AP-42, Table 11.19.2-2 (08/04). This is higher than the actual value because pollution control devices have a lower efficiency for smaller size particulates.

Control Efficiency
The SAG mill is a wet process where added moisture causes fine particles in the crushed ore to agglomerate such that no potential particulate emissions are formed, and a 100% control efficiency is assumed.

4.1.3.2 Pebble Crusher (Unit ID: SCR21)

Process Rate
The annual, daily, and hourly process rate for the pebble crusher is based on the portion of the mined sulfide ore per year, per day, and per hour (respectively) that will be diverted to the pebble crusher (approximately 20%).

Emission Factor
Uncontrolled PM and PM_{10} emissions from the pebble crusher are calculated using the emission factors of 2.70 lb/ton and 0.16 lb/ton, respectively, from AP-42, Table 11.24-2 (08/82) for tertiary crushing of low moisture ore.

Uncontrolled $PM_{2.5}$ emissions are estimated to be 18.5% of PM_{10} emissions based on the ratio of $PM_{2.5}$ to PM_{10} controlled emissions for tertiary crushing in AP-42, Table 11.19.2-2 (08/04). This is a higher than actual value because pollution control devices have a lower efficiency for smaller size particulates.

Control Efficiency
The pebble crusher is a wet process where added moisture causes fine particles in the crushed ore to agglomerate such that no potential particulate emissions are formed, and a 100% control efficiency is assumed.

4.1.4 Copper Concentrate Dewatering and Stockpiling

4.1.4.1 Material Transfers

This section discusses material transfers from the Copper Concentrate Filters to the Copper Concentrate Stockpile Building, from the Copper Concentrate Loadout Stockpile to shipment trucks via front end loader, and from the Copper Concentrate Stockpile Building Dust Collector Filtered Media Pump to the process circuit (Unit IDs: CCD01, CCD03 and CCD04).

Process Rate

The annual process rates for the material transfers from the copper concentrate filters to the copper concentrate loadout stockpile and from the copper concentrate loadout stockpile to the copper concentrate shipment trucks via front end loaders are based on past project experience.

Emission Factor

Uncontrolled PM, PM_{10}, and $PM_{2.5}$ emissions from the material transfers from the copper concentrate filters to the copper concentrate loadout stockpile, from the copper concentrate loadout stockpile to the copper concentrate shipment trucks and from the copper concentrate stockpile building dust collector filtered media pump to process are calculated using Equation 2. The filters are designed to remove 90% of the water from the copper concentrate such that a 10% material moisture content is used in Equation 2. The mean wind speed (U, 1.3 mph for protected transfer points and 8.13 mph for unprotected transfer points) is equal to the minimum value used to develop the AP-42 emission factors and the average wind speed out of the pit based on the on-site May 2023-April 2024 CWP Met-2 Station AERMET data, respectively.

Control Efficiency

The material transfers from the copper concentrate filters to the copper concentrate loadout stockpile and from the copper concentrate stockpile building dust collector filtered media pump to process area a wet process where added moisture causes fine particles in the crushed ore to agglomerate such that no potential particulate emissions are formed, and a 100% control efficiency is assumed. The copper concentrate loadout via front end loader is located within a building. Emissions from the building are controlled by the Copper Concentrate Building Dust Collector; therefore, emissions associated with the stockpile are represented by the dust collector emissions.

4.1.4.2 Copper Concentrate Loadout Stockpile (Unit ID: CCD02)

Process Rate

The copper concentrate stockpile is completely enclosed in a building. Emissions from the building are controlled by the Copper Concentrate Building Dust Collector; therefore, emissions associated with the stockpile are represented by the dust collector emissions.

4.1.5 Molybdenum Dewatering and Packaging

4.1.5.1 Molybdenum Material Transfers (Unit IDs: MD01, MD02 and MD04 through MD07)

Process Rate

The annual process rates for the material transfers associated with the molybdenum concentrate process were estimated from mine process knowledge.

Emission Factor

Uncontrolled PM, PM_{10}, and $PM_{2.5}$ emissions from the material transfers from the molybdenum concentrate filter to the molybdenum dryer and from the molybdenum dryer to the molybdenum concentrate packaging and weigh system are calculated using Equation 2. The plate and frame filter is designed to remove 85% of the water from the molybdenum concentrate. The dryer removes an additional 3% to 5% of moisture, resulting in a material moisture content of 10%. A material moisture content of 10% was used in Equation 2 for all molybdenum material transfers as a worst-case estimate.

The mean wind speed (U, 1.3 mph for protected transfer points and 8.13 mph for unprotected transfer points) is equal to the minimum value used to develop the AP-42 emission factors and the average wind speed out of the pit based on the on-site May 2023-April 2024 CWP Met-2 Station AERMET data, respectively.

<u>Control Efficiency</u>
Emissions of particulate matter resulting from the material transfers from the molybdenum concentrate feeder to the molybdenum dryer and from the molybdenum dryer to the molybdenum concentrate storage bin are enclosed and considered 100% controlled. Transfers of molybdenum concentrate from the storage bin to the bag feeder, from the bag feeder to the bag loader and from the bag loader to the truck for shipment are controlled by the molybdenum concentrate storage bin dust collector and bag loader dust collector. The dust collector has a control efficiency of 99%.

4.1.5.2 Molybdenum Drying (Unit ID: MD03)

<u>Process Rate</u>
The annual, maximum daily, and hourly process rates for the molybdenum dryer are equal to the molybdenum concentrate material transfer process rates as shown in the emissions inventory in **Appendix F**.

<u>Emission Factor</u>
Uncontrolled PM and PM_{10} emissions from the molybdenum dryer are calculated using the emission factors of 19.7 lb/ton and 12.0 lb/ton, respectively, from AP-42, Table 11.24-2 (08/82) for drying of all high moisture minerals except titanium/zirconium sands. The moisture content of the molybdenum concentrate is 15% prior to drying, which according to AP-42, Section 11.24.2 classifies the concentrate as high moisture. Uncontrolled $PM_{2.5}$ emissions are estimated to be 30% of PM emissions based on the information presented for Category 4, material handling and processing of processed ore, in AP-42, Appendix B.2 (08/04). Since the molybdenum dryer is heated using an electric hot oil heater, there are no combustion emissions from the molybdenum drying operations.

<u>Control Efficiency</u>
Emissions of particulate matter resulting from the molybdenum drying are collected and processed by the molybdenum scrubber system. The scrubber system has a 100% capture efficiency and a control efficiency of 99%.

4.1.6 Tailings Storage

4.1.6.1 Tailings Storage (Unit ID: TDS19)

<u>Process Rate</u>
The annual, daily, and hourly process rates for wind erosion of the tailings storage are equal to the maximum area of the land containing the tailings that are susceptible to wind erosion (500 acres). This represents the area that is not actively wetted or covered with ponded tailings fluid. The tailings storage assumes continuous operation of the storage area (i.e., 8,760 hours/year, 24 hours/day, 1 hour/hour).

<u>Emission Factor</u>
Uncontrolled PM, PM_{10}, and $PM_{2.5}$ emissions from the tailings storage facilities are calculated using the methodology and equations from AP-42, Section 13.2.5 (11/06), as documented in **Section 4.1.2.1** above.

<u>Control Efficiency</u>

Emissions of particulate matter resulting from wind erosion of the tailings storage are controlled by ponding and the crustal formation that occurs during drying.

4.1.7 Fuel Burning Equipment

4.1.7.1 Plant Area Emergency Generators (Unit IDs: FB01 through FB03)

Process Rate

The annual, daily, and hourly process rates for the diesel fueled emergency generators are based on the power ratings of the generators and the hours of operation. The emergency generators have power ratings of 1,345 kW. All emergency generators will only be used in emergency power situations and for periodic testing and maintenance purposes, estimated at 500 hours/year (see EPA memorandum distributed on September 6, 1995, providing guidance on calculating the PTE for emergency generators). However, the emergency generators are capable of operating 24 hours/day and 1 hour/hour. Although PTE is calculated based on 500 hours/year, actual operation for testing, maintenance and other purposes will range from 100 to 50 hours or less a year consistent with NSPS and NESHAP requirements to maintain emergency status.

Emission Factor

Uncontrolled PM, PM_{10}, $PM_{2.5}$, CO, NO_x, and VOC emissions from the emergency generators are calculated using the exhaust emission standards for nonroad engines from the new source performance standards (NSPS), 40 CFR 89, Section 112. The emission standards for the emergency generators with engines rated greater than 560 kW and manufactured after 2006 (Tier 2) are presented in the emissions inventory in **Appendix F**. PM_{10} and $PM_{2.5}$ emissions from internal combustion engines are not listed as emission standards and are assumed to be equal to PM emissions. The NO_x and VOC emission standards are combined in the NSPS as a single emission standard. Based on EPA documentation (*Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling - Compression-Ignition*), NO_x and VOC emissions for engines greater than 560 kW are assumed to be equal to 93.75% and 6.25%, respectively, of the combined NO_x and VOC emission standard.

Uncontrolled SO_2 emissions are calculated assuming all the sulfur in the diesel fuel is converted to SO_2 emissions, and the sulfur content of the diesel fuel is 0.0015%. This leads to an uncontrolled SO_2 emission factor of 0.00003-pound SO_2 per pound of diesel fuel (or 0.0066 grams of SO_2 per kW-hr). Uncontrolled HAP emissions are calculated using the emission factors from AP-42, Tables 3.4-3 and 3.4-4 (10/96) for large (> 600 hp) stationary, diesel engines.

Uncontrolled CO_2, CH_4, and N_2O emissions are calculated using the emission factors of 73.96 kg/MMBtu, $3*10^{-3}$ kg/MMBtu, and $6*10^{-4}$ kg/MMBtu, respectively, from 40 CFR 98, Tables C-1 and C- 2 for distillate fuel oil No. 2.

A diesel heating value of 19,300 Btu/pound of diesel fuel, an average brake-specific fuel consumption value of 7,000 Btu/hp-hr, and a diesel fuel density of 7.3775 lb/gallon were used to calculate the HAP emissions and the SO_2, CO_2, CH_4, and N_2O emission factors in terms of g/kW-hr.

Control Efficiency

Besides good operating practices and inherent controls built into the design of the generators, other pollution control methods are not implemented during the use of the generators.

4.1.7.2 Primary Crusher Fire Water Pump (Unit IDs: FB04)

<u>Process Rate</u>

The annual, daily, and hourly process rates for the diesel fueled primary crusher fire water pump are based on the power ratings of the fire pumps and the hours of operation. The fire water pump has a power rating of 400 hp (298.4 kW) and will only be used in emergency situations and for periodic testing and maintenance purposes, estimated at 500 hours/year (see EPA memorandum distributed on September 6, 1995, providing guidance on calculating the PTE for emergency generators). However, the fire water pump is capable of operating 24 hours/day and 1 hour/hour. Although PTE is calculated based on 500 hours/year, actual operation for testing, maintenance and other purposes will range from 100 to 50 hours or less a year consistent with NSPS and NESHAP requirements to maintain emergency status.

<u>Emission Factor</u>

Uncontrolled PM, PM_{10}, $PM_{2.5}$, CO, NO_x, and VOC emissions from the fire water pump are calculated using the emission standards for stationary fire pump engines from NSPS, 40 CFR 60, Subpart IIII, Table 4. The emission standards for fire pump engines rated between 225 and 450 kW and manufactured after 2009 are presented in in the emissions inventory in **Appendix F**. PM_{10} and $PM_{2.5}$ emissions from fire pump engine is not listed as emission standards and are assumed to be equal to PM emissions. The NO_x and VOC emission standards are combined in the NSPS as a single emission standard. Based on EPA documentation (*Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling - Compression-Ignition*), NO_x and VOC emissions for engines between 300 and 600 hp are assumed to be equal to 93.33% and 6.67%, respectively, of the combined NO_x and VOC emission standard.

Uncontrolled SO_2 emissions are calculated assuming all the sulfur in the diesel fuel is converted to SO_2 emissions, and the sulfur content of the diesel fuel is 0.0015%. This leads to an uncontrolled SO_2 emission factor of 0.00003-pound SO_2 per pound of diesel fuel (or 0.0066 grams of SO_2 per kW-hr). Uncontrolled HAP emissions are calculated using the emission factors from AP-42, Table 3.3-2 (10/96) for industrial diesel engines.

Uncontrolled CO_2, CH_4, and N_2O emissions are calculated using the emission factors of 73.96 kg/MMBtu, $3*10^{-3}$ kg/MMBtu, and $6*10^{-4}$ kg/MMBtu, respectively, from 40 CFR 98, Tables C-1 and C- 2 for distillate fuel oil No. 2.

A diesel heating value of 19,300 Btu/pound of diesel fuel, an average brake-specific fuel consumption value of 7,000 Btu/hp-hr, and a diesel fuel density of 7.3775 lb/gallon were used to calculate the HAP emissions and the SO_2, CO_2, CH_4, and N_2O emission factors in terms of g/kW-hr.

<u>Control Efficiency</u>

Besides good operating practices, other pollution control methods are not implemented during the use of the fire water pump.

4.1.8 Miscellaneous Sources

4.1.8.1 Lime Loading (Unit ID: MS01)

<u>Process Rate</u>

The annual process rate for the lime loading is based on an annual lime usage rate of 32,120 tons in Year 2, 56,210 tons in Year 8 and 48,180 tons in Year 14. The usage rate varies throughout the life of the mine but is expected to be at a maximum in Year 8. The maximum daily process rate is calculated from the annual usage rate divided by 365 days/year, the quantity of days per year lime will be used at the Copper World Project. The hourly process rate is determined by dividing the maximum daily usage rate by 24 hours/day.

Emission Factor
Uncontrolled PM emissions from the lime loading are calculated using the emission factor of 0.61 lb/ton, from AP-42, Table 11.17-4 (02/98) for lime product loading, enclosed truck. Uncontrolled PM_{10} and $PM_{2.5}$ emissions are estimated to be 47% and 7.2%, respectively, of PM emissions based on the particle size fractions in AP-42, Section 13.2.4.3 (11/06) for aggregate drop processes.

Control Efficiency
Emissions of particulate matter resulting from loading lime into the storage vessels are controlled by the quick lime dust collector system. The dust collector system is designed to be used as a collector to prevent the loss of material, but also treat the dust entrained displacement air generated during the loading process. The dust collector system has a pickup efficiency of 100% (it will be located directly on the storage containers) and a 99% control efficiency, as determined by the dust collector vendor.

4.1.8.2 Lime Slaking Mill (Unit ID: MS05)

Process Rate
The annual process rate for the lime slaking mill is based on an annual lime usage rate of 32,120 tons in Year 2, 56,210 tons in Year 8 and 48,180 tons in Year 14. The usage rate varies throughout the life of the mine but is expected to be at a maximum in Year 8. The maximum daily process rate is calculated from the annual usage rate divided by 365 days/year, the quantity of days per year lime will be used at the Copper World Project. The hourly process rate is determined by dividing the maximum daily usage rate by 24 hours/day.

Emission Factor
Uncontrolled PM emissions from the lime loading are calculated using the emission factor of 8.0 lb/ton, from AP-42, Table 11.17-2 (02/98) for atmospheric hydrator with wet scrubber. A control efficiency of 99% for the wet scrubber was used to back-calculate the uncontrolled PM emission factor.

Control Efficiency
The lime slaking mill is a wet process; therefore, it is considered to be 100% controlled.

4.1.8.3 Reagent Material Transfer Points (Unit IDs: MS02-MS04, MS06, MS08- MS16)

Process Rate
The annual process rates for the reagent material transfer points are based on the annual reagent usage rates presented in the emissions inventory in **Appendix F**. The usage rates will vary throughout the life of the mine but are expected to be at a maximum in Year 8. The maximum daily process rates are calculated from the annual usage rates divided by 365 days/year, the quantity of days per year reagents will be used at the Copper World Project. The hourly process rate is determined by dividing the maximum daily usage rate by 24 hours/day.

Emission Factor
Uncontrolled PM, PM_{10}, and $PM_{2.5}$ emissions from the reagent material transfer points are calculated using Equation 2. The mean wind speed (U, 8.13 mph for unprotected transfer points) is the average wind speed out of the pit (based on the on-site May 2023-April 2024 CWP Met-2 Station AERMET data). The material

moisture content value used in Equation 2 is unknown for the different chemicals. A 1% material moisture content is used as a worst-case scenario.

Control Efficiency

Emissions of particulate matter resulting from the reagent material transfer points are controlled either by good operating practices, enclosures, dust collector systems - or they are wet processes. When process material is transferred to an enclosed piece of equipment, particulate emissions are controlled due to the emissions not being able to escape and a 100% control efficiency is assumed. The dust collector systems provide a 100% pick up efficiency and a 99% control efficiency of particulate emissions (as determined by the dust collector vendors). Wet processes are considered 100% controlled. The particulate matter control method used at each reagent material transfer point is presented in the emissions inventory in **Appendix F**.

4.1.9 Solvent Extraction and Electrowinning

4.1.9.1 Solvent Extraction Mix Tanks and Settlers (Unit IDs: SXE01)

Process Rate

The annual, daily, and hourly process rates for the solvent extraction mix tanks and settlers are equal to the surface area of the tanks and continuous operation of the solvent extraction system (i.e., 8,760 hours/year, 24 hours/day, 1 hour/hour). The surface area of the solvent extraction mix tanks and settlers is presented in **Table 4-1** below.

Table 4-1. Surface Area of the Solvent Extraction Mix Tanks and Settlers

Solvent Extraction Mix Tank or Settler	Surface Area (ft^2)
5 DOP Tanks (13.125' D x 9.83' H each)	676.5
5 DOP Turbine Tanks (5.25' D x 5.73' H each)	108.2
5 Spirok Mixer Tanks (13.125' D x 19.6875' H each)	676.5
5 Spirok Mixer Tanks (9.28' D x 15.135' H each)	338.2
5 Extraction Settlers (104' L x 47.99' W x 8' H each)	24,955
Total	26,754

Emission Factor

Uncontrolled VOC and HAP emissions from the solvent extraction tanks are calculated using the methodology and equations from the Hydrometallurgy of Copper, presented at an international copper mining convention in 1999. The methodology presented in the paper is a more accurate way to estimate the evaporative loss of diluent than using the EPA Tanks program to model the mixers and settlers as tanks. The following equations (Equations 1a and 1b) and data (see **Table 4-2** below) are used to calculate VOC and HAP emissions from the solvent extraction mix tanks and settlers. The full paper is presented in **Appendix G**.

$$F_i = \frac{\left(C_i^0 - C_i^H\right)\left(\frac{D_i}{100^2}\right)}{(H)}\left(\frac{60\ \text{sec}}{1\ \text{min}}\right)\left(\frac{60\ \text{min}}{1\ \text{hr}}\right)\left(\frac{1\ \text{lb}}{453.59\ \text{g}}\right)\left(\frac{1\ \text{m}^2}{(3.2808\ \text{ft})^2}\right) \qquad (1a)$$

$$D_i = \left(10^{-3}\right)\left(T^{1.75}\right)\left(\frac{\left(\frac{(M_i + M_A)}{(M_i)(M_A)}\right)^{1/2}}{\left((P)\left(V_i^{1/3} + V_A^{1/3}\right)\right)^2}\right) \qquad (1b)$$

where:

F_i = diffusive flux of component i in the air (lb/ft^2-hr)

C_i^0 = component concentration at the surface (g/m^3, see Table 4-2)

C_i^H = component concentration at the measured height (g/m^3, see Table 4-2)

H = height at which concentration measurement was taken (1 m)

D_i = diffusivity of component i in the air (m^2/s)

T = temperature (335.6 K, the average value calculated from hourly data collected at the meteorological station at the RCP from April 2006 through May 2009)

M_i = molecular weight of the component in the air (gram/gram-mole, see Table 4-2)

M_A = molecular weight of the air (28.97 gram/gram-mole)

P = pressure (0.8 atm, calculated based on the elevation at the RCP (5,350 ft) and the estimate that for every 1,000 feet above sea level, the pressure decreases by 1 inch of mercury.)

V_i = sum of atmospheric diffusion volume increments by atom and structure for the component in the air (see Table 4-2)

V_A = sum of atmospheric diffusion volume increments by atom and structure for air (20.10)

Table 4-2. Data Used to Calculate VOC and HAP Emissions from the Solvent Extraction Mix Tanks and Settlers

Data	Benzene	Toluene	Ethylbenzene	Xylenes	Others (including Hexane)[a]
C_i^0 (ppm_v)	25	350	1400	1912	2500
C_i^H (ppm_v)	0.0018	0.0668	0.0568	0.0371	16.921
M_i (g/g-mole)	78.11	92.13	106.16	106.16	--
V_i	90.68	111.14	131.6	131.6	--

a. The diffusivity of the "other" component (D_{other}) is given in the Hydrometallurgy of Copper as 0.07. It is corrected for the temperature and pressure associated with the former Rosemont Copper Project (RCP) to be 0.10.

4.1.10 Sulfuric Acid Plant

Process Rate

The annual, daily, and hourly process rates for the sulfuric acid plant assume continuous operation of the plant (24 hours/day, 8,760 hours/year).

Emission Factor

The acid plant will be a source of particulates, sulfuric acid (as particulate), SO_2, NO_x and CO. The particulate emissions will be controlled by the acid plant scrubber; emissions are calculated based on the acid plant scrubber design control maximum emissions rate of 0.02 gr/dscf and a flow rate of 30,000 acfm. The emission factors for SO_2, NO_x and CO are based on best available modern facility design and emissions controls and are provided in units lb SO_2/ton H_2SO_4, lb NO_x/ton H_2SO_4 and lb/hr, respectively. The plant will produce approximately 413,000 tons of H_2SO_4 per year.

4.1.11 Dust Collectors and Scrubbers

Process Rate

The annual, daily, and hourly process rates for the dust collectors and scrubbers are based on the exhaust flow rate of the equipment and/or the hours of operation. The exhaust flow rate and the operating hours for each piece of pollution control equipment is presented in the emissions inventory in **Appendix F**. The particulate matter pollution control equipment is assumed to operate at maximum capacity and continuous operation throughout the life of the mine even if the processes being controlled are operating at less than maximum capacity.

Emission Factor

Particulate matter emissions from the pollution control devices are based on PM outlet grain loadings provided by the equipment vendor. The PM_{10} and $PM_{2.5}$ fractions of PM emissions are estimated based on the ratios of PM_{10} and $PM_{2.5}$ to PM for the materials that each emission unit controls. The PM grain loading and particulate size ratios are presented in the emissions inventory in **Appendix F**.

4.2 Emission Summary

The potential emissions of regulated air pollutants resulting from the proposed Copper World Project are summarized in **Tables 4-3 through 4-5** below.

Table 4-3. Copper World Project Stationary and Fugitive PTE* – Year 2

Description	Pollutant (tpy)													
	PM	PM10	PM2.5	Lead	CO	NO_X	SO_2	VOC	H_2SO4	CO_2	CH_4	N_2O	HAP	GHG
Total Fugitives	935.74	288.49	36.88	0.09	123.11	3.31	0.01	0.00	0.00E+00	693.90	0.03	0.01	1.49	695.08
Total Point Source Emissions	61.96	35.48	23.81	0.01	9.90	33.13	13.71	13.44	16.97	1658.14	0.07	0.01	9.79	1664.88
Nested Source (Includes Fugitives)	23.78	18.68	17.09	--	1.05	18.19	13.68	--	16.92	--	--	--	--	--
Copper World Project Site-Wide PTE	**997.69**	**323.97**	**60.69**	**0.10**	**133.01**	**36.44**	**13.71**	**13.44**	**16.97**	**2352.04**	**0.10**	**0.02**	**11.28**	**2359.96**
Federal NSR Thresholds (tpy)	250	250	250	250	250	250	250	250	250	N/A	N/A	N/A	N/A	N/A
Federal NSR Thresholds Nested Source(tpy)	100	100	100	100	100	100	100	100	100	N/A	N/A	N/A	N/A	N/A
Above Nested Source Thresholds?	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*
Above Projectwide NSR Thresholds?	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*
Class I Permit Thresholds (tpy)	100	100	100	100	100	100	100	100	100	N/A	N/A	N/A	25	N/A
Above Class I Thresholds?	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*

*Tailpipe emissions not included in total fugitives

Table 4-4. Copper World Project Stationary and Fugitive PTE* – Year 8

Description	Pollutant (tpy)													
	PM	PM10	PM2.5	Lead	CO	NO_X	SO_2	VOC	H_2SO4	CO_2	CH_4	N_2O	HAP	GHG
Total Fugitives	3155.03	918.39	99.51	0.36	471.35	12.66	0.03	0.00	0.00E+00	2656.65	0.11	0.02	4.80	2673.95
Total Point Source Emissions	62.18	35.60	23.86	0.01	10.31	33.17	13.70	13.46	16.97	1658.14	0.07	0.01	9.79	1664.88
Nested Source (Includes Fugitives)	24.26	18.81	17.11	--	1.05	18.19	13.68	--	16.92	--	--	--	--	--
Copper World Project Site-Wide PTE	**3217.21**	**954.00**	**123.37**	**0.36**	**481.65**	**45.83**	**13.73**	**13.46**	**16.97**	**4314.79**	**0.18**	**0.04**	**14.59**	**4338.83**
Federal NSR Thresholds (tpy)	250	250	250	250	250	250	250	250	250	N/A	N/A	N/A	N/A	N/A
Federal NSR Thresholds Nested Source(tpy)	100	100	100	100	100	100	100	100	100	N/A	N/A	N/A	N/A	N/A
Above Nested Source Thresholds?	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*
Above Projectwide NSR Thresholds?	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*
Class I Permit Thresholds (tpy)	100	100	100	100	100	100	100	100	100	N/A	N/A	N/A	25	N/A
Above Class I Thresholds?	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*

*Tailpipe emissions not included in total fugitives

Table 4-5. Copper World Facility Project Stationary and Fugitive PTE*– Year 14

Description	Pollutant (tpy)													
	PM	PM10	PM2.5	Lead	CO	NO_X	SO_2	VOC	H_2SO4	CO_2	CH_4	N_2O	HAP	GHG
Total Fugitives	3991.36	1112.31	120.02	0.46	603.00	16.20	0.03	0.00	0.00E+00	3398.70	0.14	0.03	6.05	3427.01
Total Point Source Emissions	62.10	35.56	23.85	0.01	10.51	33.18	13.70	13.46	16.97	1658.14	0.07	0.01	9.79	1664.88
Nested Source (Includes Fugitives)	24.26	18.81	17.11	--	1.05	18.19	13.68	--	16.92	--	--	--	--	--
Copper World Project Site-Wide PTE	**4053.46**	**1147.87**	**143.86**	**0.47**	**613.51**	**49.38**	**13.74**	**13.46**	**16.97**	**5056.84**	**0.21**	**0.04**	**15.84**	**5091.90**
Federal NSR Thresholds (tpy)	250	250	250	250	250	250	250	250	250	N/A	N/A	N/A	N/A	N/A
Federal NSR Thresholds Nested Source(tpy)	100	100	100	100	100	100	100	100	100	N/A	N/A	N/A	N/A	N/A
Above Nested Source Thresholds?	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*
Above Projectwide NSR Thresholds?	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*
Class I Permit Thresholds (tpy)	100	100	100	100	100	100	100	100	100	N/A	N/A	N/A	25	N/A
Above Class I Thresholds?	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*	*No*

*Tailpipe emissions not included in total fugitives

5.2 Permit Applicability Analysis

5.2.1 Major NSR Applicability

The Copper World mine and processing facility will be a non-categorical stationary under Prevention of Significant Deterioration (PSD). The potential to emit of criteria pollutants from the facility will be below the New Source Review major source threshold of 250 tons/year. Therefore, the facility will not be subject to Prevention of Significant Deterioration (PSD) regulations. The facility will also include a categorical source (nested source) associated with a Sulfuric Acid Plant. The emissions for this nested source (including fugitives) are required to be compared to a major source threshold of 100 tons per year. The emissions associated with the nested sources do not exceed the major source threshold.

Additionally, the potential to emit of hazardous air pollutants (HAPs) will be less than 10 tons/year for any individual (HAP), and less than 25 tons/year for all HAPs combined (fugitive and non-fugitive sources). Therefore, the facility will not be a major HAP source. The potential to emit of criteria pollutants from the facility will also be less than the Title V source threshold of 100 tons per year. Consequently, the facility is proposed to operate under a Class II Permit issued by ADEQ.

As detailed in the emissions calculations in **Appendix F**, the applicability described above will ensure that the Project will be a "minor source" for Major NSR purposes. Therefore, Major NSR does not apply to the Project.

5.2.2 Minor NSR Applicability

Per A.A.C §R18-2-334.A, minor New Source Review (mNSR) requirements shall apply when:

- *The project involves:*
    - *Construction of any new Class I or Class II source, including the construction of any source requiring a Class II permit under §R18-2-302.01I(4); or*
    - *any minor NSR modification to a Class I or Class II source.*

The Copper World Project will be classified as a new Class II source; therefore, mNSR requirements will apply to the Copper World facility.

- *A regulated minor NSR pollutant emitted by a new stationary source subject to this Section, if the source will have the potential to emit that pollutant at an amount equal to or greater than the permitting exemption threshold.*

Emissions of PM_{10} and $PM_{2.5}$ are above the permitting exemption threshold; therefore, mNSR requirements will apply to the Copper World facility for all other regulated minor NSR pollutants.

- *An increase in emissions of a regulated minor NSR pollutant from a minor NSR modification, if the modification would increase the source's potential to emit that pollutant by an amount equal to or greater than the permitting exemption threshold.*

The proposed Project is not a modification to an existing source.

As detailed above, the proposed Project will trigger requirements under A.A.C §R18-2-334 for mNSR purposes. Pursuant to A.A.C. R18-2-334.C, Copper World must submit either a Reasonably Available Control Technology (RACT) demonstration pursuant to R18-2-334.C.1 & D or a modeling demonstration pursuant to R18-2-334.C.2. Copper World has submitted a modeling demonstration meeting R18-2-334.C.2 requirements that demonstrates that the Copper World Project will not interfere with attainment or maintenance of any NAAQS as shown in **Appendix B**.

5.3 Applicable Requirements

5.3.1 Regulatory Review

A list of applicable requirements, including NSPS, NESHAP, Arizona Administrative Code (AAC) and Pima County Code (PCC) is included in **Appendix H**.

5.3.2 Post-Construction Air Quality and Meteorological Monitoring

It is anticipated that Copper World will be required to install, operate and maintain a continuous particulate matter monitor at the Project site to monitor ambient concentrations of $PM_{2.5}$ and PM_{10}. The monitor must operate continuously and collect consecutive hourly readings. The monitor must also be maintained to meet requirements set out in 40 CFR Parts 50 and 58 and the Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II, U.S. Environmental Protection Agency.

If the monitored daily average of PM_{10} is greater than 150 $\mu g/m^3$ and the monitored daily average of $PM_{2.5}$ is greater than 35 $\mu g/m^3$, Copper World will notify the Director by a FAX communication within 24-hours of discovery. The notification will include the cause and any actions that Copper World will take to avoid a repeat of the exceedance. It is anticipated that the permit will also have data validation and reporting requirements.

Copper World has installed a meteorological monitoring station, referred to herein as the on-site CWP Met-2 Station. . This station meets specific data collection quality requirements as set out in the Quality Assurance Handbook for Air Pollution Measurements Systems, Volume IV: Meteorological Measurements and is consistent with the Quality Assurance Project Plan (QAPP) submitted to the ADEQ for review and approval. Data collection and validation requirements are anticipated to be included in the permit.

APPENDIX B. REVISED MODELING REPORT

APPENDIX F. REVISED EMISSIONS INVENTORY (ELECTRONIC)