ADEQ Arizona Department of Environmental Quality
Janice K. Brewer, Governor
Henry R. Darwin, Director

DRAFT TECHNICAL SUPPORT DOCUMENT

AIR QUALITY PERMIT NO. 55223
ROSEMONT COPPER COMPANY

I. INTRODUCTION

This Class II synthetic minor permit is issued to Rosemont Copper Company (RCC) for the construction and operation of an open pit copper mine, milling, leaching, and solvent extraction and electrowinning facility to be located approximately 30 miles southeast of Tucson, west of State Highway 83, within Pima County, Arizona. The facility has an anticipated lifetime production of 123 million tons of ore and waste rock and an anticipated operating life of 16 years.

A. Company Information

Facility Name:	Rosemont Copper Company
Facility Location:	21900 S Sonoita Highway Vail, Arizona 85641 Approximately 30 miles southeast of Tucson
Mailing Address:	P.O. Box 35130 Tucson, Arizona 85740-5130

B. Attainment Classification

The Sonoita area is attainment for all criteria pollutants.

C. Learning Sites Evaluation

In accordance with ADEQ's Environmental Permits and Approvals Near Learning Sites Policy, the Department conducted an evaluation to determine if any nearby learning sites would be adversely impacted by the facility. Learning sites consist of all existing public schools, charter schools and private schools the K-12 level, and all planned sites for schools approved by the Arizona School Facilities Board. The learning sites policy was established to ensure that the protection of children at learning sites is considered before a permit approval is issued by ADEQ.

Upon review of ADEQ's database, it was determined that there are no learning sites within two miles of the facility.

II. PROCESS DESCRIPTION

The Rosemont Copper Company will primarily mine copper along with minor quantities of molybdenum, silver and other by-products. The copper mineralization in the area is a sulfide ore with a cap of oxide copper close to the surface. The sulfide and oxide ore will be mined through conventional open pit mining techniques. Concentrate ore (mostly comprised of sulfide ore) will be processed by crushing, grinding, and floatation to produce copper concentrate product, which contains copper, silver, and possibly small amount of gold, and molybdenum. Leach ore (mostly comprised of oxide ore) will be leached and the resulting leach solution processed through a solvent extraction and electrowinning facility to produce a copper cathode product for market.

Description of the various steps involved is outlined below:

A. Open-Pit Mining

Open pit mining activities will include drilling, blasting, loading and hauling of ore and development rock using large-scale equipment including rotary blast hole drills (diesel and electric powered), a hydraulic percussion track drill, electric mining shovels, front end loaders, off-highway haul trucks, crawler dozers, rubber-tired dozers, motor graders and off-highway water trucks. Ore will be transported to the leach pad or the primary crushing area.

B. Primary Crushing and Coarse Ore Stockpile

Ore trucks will either dump the ore into the crusher dump hopper or stockpiled near the primary crusher and loaded to the crusher using a front end loader. Primary crushed ore will be conveyed to the coarse ore stockpile to be located within the stockpile building.

C. Stockpile Reclaim

A reclaim tunnel will be installed beneath the stockpile that will draw ore via apron feeders and onto conveyor belts that discharge to the semi-autogenous (SAG) grinding mill.

D. Milling and Flotation

Ore will be ground in water to the final product size in a SAG mill primary grinding circuit and a ball mill secondary grinding circuit. The primary grinding SAG mill will operate in closed circuit with a trammel screen, pebble wash screen, and a pebble crusher. Undersize from the trommel screen will be conveyed to the SAG mill grinding circuit. Oversize will be sent to the pebble crusher for further processing and then returned to the SAG mill. Material from the SAG mill undergoes a floatation process to produce copper and molybdenum mineral concentrate slurries which will then be transported to the dewatering circuits.

D. Copper Concentrate and Molybdenum Concentrate Dewatering and Preparation for Shipment

Copper concentrate slurry will be dewatered and thickened in a copper concentrate thickener. Thickener underflow will be pumped to copper concentrate filters. Filter cake will be stockpiled in the copper concentrate load out building that will be trucked for shipment. Molybdenum concentrate slurry from the filter feed tank will be pumped to a plate and frame filter press. The filter cake will be discharged to a electric hot-oil dryer. Dried concentrate is stored in storage bins which are then trucked for shipment.

E. Tailings Dewatering and Placement

Tailings slurry will be dewatered and thickened in tailings thickeners. Thickener underflow will be pumped to tailings plate and frame filters. Filtered tailings cake will be discharged to the tailings placement system via conveyor belts. The tailings placement system will be used to deposit the filtered tailings behind large pre-formed containment buttresses constructed from waste rock in the two tailings storage areas. A dozer will be used to spread the filtered tailings in close proximity to the containment buttresses and as needed to provide sufficient compaction for the conveyor and stackers.

F. Heap Leaching

Leach ore will be transported from the open pit to the lined leach pad by mine haul trucks via a haul road

running along the south and east edges of the pad area. The ore will be stacked on the lined leach pad area and irrigated with an acidified leach solution (raffinate). Crawler dozers will be used to spread the leach ore and cross rip the material to promote leach solution infiltration. Drip emitters located close to the ground will distribute the leach solution to the surface of the ore to minimize evaporation losses. Copper ions are leached into the leach solution from the ore. The pregnant leach solution (PLS) gravity flow into a double-lined collection pond.

G. Solvent Extraction and Electrowinning (SX/EW)

Copper contained in the aqueous phase will be extracted using reagents carried in an organic phase solution in the SX circuit. The resulting copper-depleted aqueous solution, or raffinate, will be transferred to a storage pond before being reused in the heap leaching process. Copper transferred to the organic phase will be stripped by an acidic aqueous solution, or lean electrolyte, thereby enriching the solution to produce a rich electrolyte. The rich electrolyte will be heated using diesel-fired hot water heater and two electrolyte heat exchangers and then returned to the electrowinning cells for copper plating onto stainless steel blanks. The copper will be stripped using a cathode stripping machine, weighed and bundled for shipment.

III. POLLUTION CONTROL EQUIPMENT

RCC will operate high efficiency cartridge filter dust collectors, one electrostatic precipitator, one wet scrubber, water sprays, and dust suppressants on haul roads to reduce emissions from the facility.

IV. EMISSIONS

Emissions from this facility occur during processing of ore and waste rock (crushing, screening, conveying), operating the diesel-fired boiler, the solvent extraction/electrowinning (SX/EW) process, emergency generators and fire pumps, and miscellaneous sources. The Permittee will install high efficiency cartridge filters, an electrostatic precipitator and use water sprays to reduce particulate matter emissions. The emission factors used to calculate the potential emissions are based on voluntarily accepted emission limits and from the Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources, Fifth Edition (AP-42). Table 1 below provides the facility's Potential to Emit (PTE) in tons per year.

Table 1: Potential Non-Fugitive and Fugitive Emissions

Pollutant	Non-Fugitive Emissions (tons per year)	Fugitive Emissions (tons per year)
PM	78.33	3490
PM_{10}	39.51	947
$PM_{2.5}$	10.97	106
NO_x	16.76	154
CO	9	606
SO_2	0.055	18
VOC	1.54	3.77
H_2SO_4	0.0	0.27
GHG	5792.62	5125
HAPs	0.0132	0.00

Since the facility is a non-categorical source under state law, fugitive emissions are not considered for major-source applicability determinations. The fugitive emissions, however, are accounted for in the modeling analysis to determine compliance with the National Ambient Air Quality Standards (NAAQS).

IV. APPLICABLE REGULATIONS

The applicable regulations were identified by the company as part of the application packet. If necessary, the source is required to list any additional regulations that may be applicable. Table 2 displays the applicable requirements for each piece of equipment under this proposed permit.

Table 2: Verification of Applicable Regulations

Unit	Control Device	Rule	Verification
Metallic Mineral Processing Equipment	Cartridge Filters, Electrostatic Precipitator, Scrubber & Water sprays	40 CFR 60.382(a) 40 CFR 60.382(a)(2) 40 CFR 60.382(b) 40 CFR 60.386(a) 40 CFR 60.386(b)(1) 40 CFR 60.386(b)(2) P.C.C Section 17.16.490 AZ SIP R9-3-521 A.A.C. R18-2-702	The crushers, screens, conveyor belt transfer points, storage bins and truck unloading are affected facilities located in a metallic mineral processing plant as defined in NSPS Subpart LL The non-NSPS equipment are subject to the state regulations
Boiler	N/A	A.A.C R18-2-724 40 CFR 63 Subpart JJJJJJ P.C.C Section 17.16.165	These standards apply to fossil fuel fired equipment rated at between 0.5 MMBTU/hr and 250 MMBTU/hr in which the products of combustion do not come into direct contact with process materials. Subpart JJJJJJ are NESHAP requirements for that apply to boilers located at an area sources
Solution Extraction / Electrowinning Process	Scrubbers, use of covers, foam, dispersion balls, surfactants	A.A.C. R18-2-730 A.A.C. R18-2-702 P.C.C Section 17.16.430	These standards are applicable to unclassified sources. The opacity standards from Article 702 apply.
Tailings Dewatering and Placement Miscellaneous Sources – Silos, Lime Storage Bins, Sodium Metasciliate Storage Bins, Flocculant Storage Bins, Guar and Cobalt Sulfate Feeders	Water sprays Dust suppressants Dust Collector	A.A.C. R18-2-730 A.A.C. R18-2-702 P.C.C. Section 17.16.430	The opacity standards from A.A.C R18-2-702 apply to existing stationary point sources. The standards from A.A.C. R18-2-730 apply to unclassified sources.
Internal Combustion Engines	N/A	40 CFR 60, Subpart IIII	These standards apply to internal combustion engines manufactured after 2006

Unit	Control Device	Rule	Verification
Fugitive dust sources	Water Trucks Dust Suppressants	A.A.C. R18-2 Article 6 A.A.C. R18-2-702	These standards are applicable to all fugitive dust sources at the facility.
Petroleum Liquid Storage Tanks - Gasoline	Submerged filling device; Pump/ compressor seals	AAC R18-2-710 40 CFR 63 Subpart CCCCCC	This standard applies to the gasoline storage tanks. NESHAP Subpart CCCCCC applies to gasoline dispensing facilities.
Diesel Storage Tanks	N/A	A.A.C. R18-2-730	These standards apply to unclassified sources.
Laboratory Dust Collector	Dust Collector	A.A.C. R18-2-721, 702 AZ SIP Provision R9-3-521	The PM limits from A.A.C. R18-2-721 and AZ SIP apply
Abrasive Blasting	Wet blasting; Dust collecting equipment; Other approved methods	A.A.C. R-18-2-702 A.A.C. R-18-2-726	These standards are applicable to any abrasive blasting operation.
Spray Painting	Enclosures	A.A.C. R18-2-702 A.A.C. R-18-2-727	This standard is applicable to any spray painting operation.
Demolition/renovation operations	N/A	A.A.C. R18-2-1101.A.8	This standard is applicable to any asbestos related demolition or renovation operations.
Mobile sources	None	A.A.C. R18-2-801	These are applicable to off-road mobile sources, which either move while emitting air pollutants or are frequently moved during the course of their utilization.

V. MONITORING AND RECORDKEEPING REQUIREMENTS

A. Facility Wide

1. The Permittee is required to maintain, on-site, records of the manufacturer's specifications or an operation and maintenance plan for all equipment listed in the permit.

2. The Permittee is required to keep records of dates and times when blasting is conducted along with the amount of ANFO used in the blast.

3. The Permittee is required to perform comprehensive annual preventative maintenance checks on all dust control equipment at the facility.

4. The Permittee is required to follow the procedures for reducing emissions as stated in the dust

control plan included in the permit and the tailings plan to be submitted prior to startup.

5. The Permittee is required to conduct daily visible emissions survey at places where facility fugitive dust generating activities are within 300 feet of the property boundary line in accordance with EPA Method 22. If any visible emissions are observed, it shall be reported as excess emissions.

B. Metallic Mineral Processing Subject To NSPS Subpart LL

1. The Permittee is required to show compliance with the opacity standards by having a Method 9 certified observer perform weekly surveys of visible emission from the dust collectors and process fugitive emission points. The observer is required to conduct a 6-minute Method 9 observation if the results of the initial survey appear on an instantaneous basis to exceed the applicable standard or baseline opacity level.

2. The Permittee is required to keep records of the name of the observer, the time, date, and location of the observation and the results of all surveys and observations.

3. The Permittee is required to keep records of any corrective action taken to lower the opacity of any emission point and any excess emission reports.

4. The Permittee is required to monitor the flow rate and pressure drop across the scrubber (PCL07).

5. The Permittee is required to monitor the voltage and current across the electrostatic precipitator according to the manufacturer's specifications.

C. Metallic Mineral Processing Subject To A.A.C. R18-2-721

1. The Permittee is required to show compliance with the opacity standards by having a Method 9 certified observer perform weekly surveys of visible emissions. The observer is required to conduct a 6-minute Method 9 observation if the results of the initial survey appear on an instantaneous basis to exceed the applicable standard.

2. The Permittee is required to keep records of the name of the observer, the time, date, and location of the observation and the results of all surveys and observations.

3. The Permittee is required to keep records of any corrective action taken to lower the opacity of any emission point and any excess emission reports.

D. Boiler

1. The Permittee is required to show compliance with the opacity standards by having a Method 9 certified observer perform a weekly survey of visible emissions from the stack of the electrolyte heater. The observer is required to conduct a 6-minute Method 9 observation if the results of the initial survey appear on an instantaneous basis to exceed the applicable standard.

2. The Permittee is required to keep records of the name of the observer, the time, date, and location of the observation and the results of all surveys and observations.

3. The Permittee is required to keep records of any corrective action taken to lower the opacity of any emission point and any excess emission reports.

4. The Permittee is required to keep records of the tune-ups, the procedures followed, manufacturer's specifications, fuel type, usage amount, concentrations of CO measured before and after tune-ups, taken, and any malfunction, duration and corrective actions taken.

E. Solution Extraction / Electrowinning (SX/EW) Process

The Permittee is required to maintain a record of all control measures used to limit emissions from the SX/EW process.

F. Internal Combustion Engines

1. The Permittee is required to record the hours of operation using a non-resettable hours meter and the reason of operation.

2. The Permittee is required to keep records of maintenance conducted on all engines.

G. Fugitive Dust

1. The Permittee is required to keep record of the dates and types of dust control measures employed.

2. The Permittee is required to show compliance with the opacity standards by having a Method 9 certified observer perform weekly survey of visible emission from fugitive dust sources. The observer is required to conduct a 6-minute Method 9 observation if the results of the initial survey appear on an instantaneous basis to exceed the applicable standard.

3. The Permittee is required to keep records of the name of the observer, the time, date, and location of the observation and the results of all surveys and observations.

4. The Permittee is required to keep records of any corrective action taken to lower the opacity of any emission point and any excess emission reports.

5. The Permittee is required to monitor the forecast and wind speeds and conduct inspections of tailings as deemed necessary.

H. Gasoline Storage and Dispensing

The Permittee is required to maintain monthly record of gasoline throughput, Reid vapor pressure and dates of storage and when the dates when the tank was empty. If the vapor pressure is greater than 470mm Hg, the Permittee is required to record the average monthly temperature and true vapor pressure of gasoline at such temperature. The Permittee is required to record and report any malfunction of operation and corrective actions taken.

I. Periodic Activities

1. The Permittee is required to record the date, duration and pollution control measures of any abrasive blasting project.

2. The Permittee is required to record the date, duration, quantity of paint used, any applicable MSDS, and pollution control measures of any spray painting project.

3. The Permittee is required to maintain records of all asbestos related demolition or renovation

projects. The required records include the "NESHAP Notification for Renovation and Demolition Activities" form and all supporting documents.

J. Mobile Sources

The Permittee is required to keep records of all emission related maintenance performed on the mobile sources.

VI. Testing Requirements

A. The Permittee is required to perform an annual Method 5, 17 or 201A performance test for PM/PM_{10} on the control equipment.

B. The Permittee is required to conduct an initial boiler tune-up and subsequent tune-ups every other year.

VII. Insignificant Activities

Table 3 below, lists insignificant activities conducted by the Permittee.

Table 3: Insignificant Activities

Equipment Description	Maximum Size or Capacity	Verification of Insignificance
Diesel and Fuel Oil Storage Tank < 40,000 gallons	11,000 gal – EW Hot Water Heater 11,845 gal – Concentrate Ore Area 1,000 gal – Motivator 10,000 gal – Light Vehicles	A.A.C. R18-2-101.57.c
Miscellenous Storage Tanks <40,000 gallons	5000 gal Flocculant Mix Tank 5,000 gal Flocculant Distribution Tank 3,000 gal Promoter Storage Tank 500 gal Guar Mix Tank 500 gal Guar Day Tank 9,500 gal Diluent Storage Tank 165 gal Decant Tank 3,000 gal Automatic Transmission Fluid Storage Tank 5,876 gal Engine Oil Storage Tank 1,650 gal Organic Separation Tank 840 gal Recovered Organic Tank 67,600 gal Loaded Organic Tank 90,000 gal Crud Holding Tank 10,000 gal Crud Decant Tank 5,000 gal Crud Filtrate Tank 3,000 gal Hydraulic Fluid Storage Tank 3,000 gal Gear Oil Storage Tank 5,876 gal Used Oil Storage Tank 275 gal Automatic Transmission Fluid Day Tank 275 gal Engine Oil Day Tank 275 gal Hydraulic Fluid Day Tank 275 gal Gear Oil Day Tank 275 gal Used Oil Day Tank	A.A.C. R18-2-101.57.j
Batch Mixers	<5 cu.ft	A.A.C. R18-2-101.57.d

Equipment Description	Maximum Size or Capacity	Verification of Insignificance
Wet Sand & Gravel Operations excluding crushing or grinding operations	<200 tons per hour	A.A.C. R18-2-101.57.e
Hand-held or manually operated equipment	Buffing, polishing, carving, cutting, drilling, machining, routing, sanding, sawing, surface, grinding, or turning of ceramic art work, precision parts, Leather, metals, plastics, fiberboard, masonry, carbon, glass, or wood	A.A.C. R18-2-101.57.f
Lab Equipment use for chemical and physical analyses	Analytical laboratory equipment Small pilot scale R&D projects	A.A.C. R18-2-101.57.i

VII. Ambient Air Impact Analysis

An ambient air quality impacts analysis was conducted to determine if emissions of any criteria pollutant will cause or contribute to an exceedance of a National Ambient Air Quality Standard (NAAQS). The most recent version of the American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD) was used in the modeling analysis. AERMOD is the EPA's preferred near-field dispersion modeling system for a wide range of regulatory applications.

For modeling demonstrations of compliance with the NAAQS, EPA requires the use of five years of National Weather Service (NWS) meteorological data or at least one year of site specific data. Three years of site specific meteorological data were collected in the Rosemont site, following the EPA's Meteorological Monitoring Guidance for Regulatory Modeling Applications. The on-site surface data, in combination with the upper air data obtained from the NWS Tucson Airport Station, were processed with AERMET, the meteorological data processor for AERMOD.

Three years of site specific PM_{10} data were collected in the Rosemont site. The highest concentration for 24-hour PM_{10} over the three-year period was 71.3 $\mu g/m^3$. While this monitored concentration is a statistical outlier, the reasons resulting in this extreme high concentration are unknown. Therefore, the background concentration for 24-hour PM_{10} was determined separately. For other criteria pollutants, background concentrations were determined on the basis of the data collected from representative monitoring sites, with the considerations of surrounding emission sources, terrain features as well as elevations.

A receptor network was developed to determine areas of maximum predicted concentrations. The grid spacing utilized for the receptors are as follows: process area boundary set at 25 m intervals; fine receptor grid of 100 m, extending from PAB to 1 km; medium receptor grid of 500 m, extending from 1 km to 5 km; coarse grid receptor grid of 500 m, extending from 5 km to 10 km. Receptor elevations and hill height scale factors were calculated with AERMAP, the terrain processor for AERMOD. Building downwash was evaluated using building and stack location and dimensions, and the EPA approved Building Profile Input Program Plume Rise Model Enhancements (BPIP-PRME).

A modeling analysis was performed for both Year 1 and Year 5, during which the maximum emission rates will most likely occur according to Mine Plan of Operations. All project emissions were modeled as either point sources or volume sources based on their release characteristics. The major particulate matter (PM) sources include haul road, open-pit, stockpiles, dust collectors, and conveyors. The major sources for gaseous pollutants include blasting, motor vehicles (tailpipe), emergency generators and hot water heaters. For modeling short-term impacts, the maximum daily process rates were used to estimate the short-term emissions. For modeling annual impacts, the average daily process rates were used to estimate the annual emissions.

NO_2 modeling

The compliance with 1-hour NO_2 was evaluated by using the Tier 3 - Ozone limiting Method (OLM) approach, following EPA's guidance memorandums entitled "Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard". Since the vast majority of the NO_2 emissions at the Rosemont facility are from mobile sources with low-level plumes, OLM is likely to provide a better estimation of the NO_2 impacts than Plume Volume Molar Ratio Method (PVMRM), another widely used Tier 3 approach. There are two key model inputs for the Tier 3 approach, namely in-stack ratios of NO_2/NO_X emissions and background ozone concentrations. The in-stack ratios for mobile sources and internal combustion engines were determined based on testing data or data published in scientific literatures. Due to the absence of in-stack ratios for blasting sources, a default in-stack ratio of 0.5 was used, per the EPA's guidance memorandums. Hourly ozone background concentrations were obtained from the CASTNET ozone monitor at the Chiricahua National Monument. Since the hourly maximum ozone concentrations of the Chiricahua site are comparable or higher than that of the Green Valley site (the nearest monitoring site to Rosemont), the use of Chirichua data is likely to provide a relatively conservative estimation for the 1-hour NO_2 impacts from the proposed sources.

Results of the modeling are presented in the below table:

Table 4 – Results of Ambient Air Impact Analysis

Pollutant (Averaging Time)	NAAQS ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Maximum Predicted Concentration Including Background ($\mu g/m^3$)
$PM_{2.5}$ (24-hour)	35	7.2	26.7
$PM_{2.5}$ (annual)	15	3.1	6.9
PM_{10} (24-hour)	150	37.4	136.7*
SO_2 (1-hour)	195	22.2	44.4
SO_2 (3-hour)	1,300	43.0	62.5
SO_2 (24-hour)	365	17.0	22.6
SO_2 (annual)	80	3.0	3.4
NO_x (annual)	100	4.0	26.3
NO_x (1-hour)	188.6	24.5	164.2
CO (1-hour)	40,000	582.0	2062.7
CO (8-hour)	10,000	582.0	1278.7

* The PM10 background concentration was calculated by replacing the outlier value of 71.3$\mu g/m^3$ with 40.3 $\mu g/m^3$. Inclusion of the outlier results in a background concentration of 47.7$\mu g/m^3$. Adding this to the modeled concentration results in an ambient concentration of 147$\mu g/m^3$.

IX. LIST OF ABBREVIATIONS

A.A.C	Arizona Administrative Code
AERMOD	American Meteorological Society/Environmental Protection Agency Regulatory Model
CO	Carbon Monoxide
HAPs	Hazardous Air Pollutants

H_2SO_4	Sulfuric Acid
GHG	Green House Gases
MSDS	Material Safety Data Sheets
NAAQS	National Ambient Air Quality Standards
NESHAP	National Emission Standards for Hazardous Air Pollutants
NO_2/NO_x	Nitrogen Oxides
NSPS	New Source Performance Standards
P.C.C	Pima County Code
PLS	Pregnant Leach Solution
PM	Particulate Matter
PM_{10}	Particulate Matter with an Aerodynamic Diameter of less than 10 microns
PTE	Potential to Emit
ROM	Run of Mine
RCP	Rosemont Copper Project
RCC	Rosemont Copper Company
SO_2	Sulfur Dioxide
SX/EW	Solution Extraction and Electrowinning
VOC	Volatile Organic Compounds
$\mu g/m^3$	Micro gram per cubic meter