

**TECHNICAL REVIEW AND EVALUATION
OF APPLICATION FOR
AIR QUALITY PERMIT No. 103818**

I. INTRODUCTION

This Class II synthetic minor permit renewal is for the continued operation of Freeport-McMoRan Bagdad Inc.'s (FMBI) copper and molybdenum ore mining and processing facility. Permit No. 103818 renews and supersedes Permit No. 77414.

FMBI has the potential to emit PM₁₀ and PM_{2.5} above major source thresholds. FMBI accepted voluntary emission limits and installed air pollution control equipment to stay under major source thresholds. This makes them a synthetic minor under Class II under Arizona Administrative Code (A.A.C.) R18-2-301.25. This includes Prevention of Significant Deterioration (PSD) major source thresholds (for attainment/non-categorical), and hazardous air pollutant (HAP) major source thresholds. Consequently, the facility is a non-Title V, minor PSD, and minor HAP source which requires a Class II air quality permit.

A. Company Information

Facility Name: Freeport-McMoRan Bagdad, Inc.

Mailing Address: P.O. Box 245, Bagdad, Arizona 86321

Facility Location: Terminus of Highway 96, Bagdad, Arizona 86321

B. Attainment Classification

The facility is located in Yavapai County which is in attainment for all criteria air pollutants.

II. PROCESS DESCRIPTION

A. Process Description

1. The facility is a large industrial complex comprised of ore mining and processing:

a. Mining Operations

Mining Operations begin with drilling and blasting of ore. At the anticipated mining location, blast holes are drilled to an appropriate depth using a fleet of mobile drills. The blast holes are filled with either a traditional ammonium nitrate prill and

fuel oil mixture (ANFO) or an ANFO emulsion. Following a blast, electric and hydraulic shovels are used to load the blasted material (i.e., sulfide ore, oxide ore, and overburden/low grade ore) into haul trucks. The haul trucks then transport the sulfide ore to the Primary Crushing Operations (see Section II.A.1.b), the oxide ore to leaching areas, and overburden/low grade ore to storage areas. Other nonroad vehicles that support Mining Operations include loaders, dozers, graders, low boys, compactors, excavators/trackhoes, backhoes, cable reels, and dump trucks.

b. Primary Crushing and Overland Conveying Operations

Ore is delivered to the Primary Crushing and Overland Conveying Operations via haul trucks from the Mining Operations (see Section II.A.1.a). The trucks dump the ore directly into the dump pockets associated with the two primary crushers (Primary Crushers 1 and 2). Primary Crusher 2 is currently operating at the FMBI facility, while Primary Crusher 1 is temporarily shut down. A Rock Breaker associated with Primary Crusher 2 is used as needed to split and break up larger sized ore to fit into the crusher. Ore is then transferred through feeders and conveyors to Coarse Ore Stockpiles 1 through 5. Ore from the Coarse Ore Stockpiles is processed by the Milling Operations (see Section II.A.1.c).

Scrubber and dust collector are used to control particulate emissions from the Primary Crushing Operations. Wet suppression is also used when necessary to control emissions.

c. Milling Operations

Ore is reclaimed from the Coarse Ore Stockpiles using four enclosed vibrating feeders per stockpile. The vibrating feeders deposit ore onto Belt Conveyors A, which feed the Primary Grinding Mills. In the Primary Grinding Mills, water is added, and the size of the ore is reduced. The wetted ore is then sent to the Vibrating Screens for wet size separation. Oversize ore from the Vibrating Screens is conveyed via belt conveyors to the Secondary Crushers for size reduction or together transferred to Belt Conveyors A. Undersize ore from

the Vibrating Screens is sent to the Hydroclone Sets for further size separation. Undersize ore from the Hydroclones Sets is in the form of a wet slurry and sent to the Bulk Flotation Operations (see Section II.A.1.d) while oversize is sent to the Secondary Grinding Mills. With the addition of water, the Secondary Grinding Mills reduce the size of the ore to the specification needed for the flotation operations.

Dust collectors are used to control particulate emissions from the Milling Operations. Emissions are also controlled by the inherent moisture content of the ore by involving a wet process.

d. Bulk and Molybdenum Flotation Operations

(1) Bulk Flotation Operations

The Bulk Flotation Operations are used to separate the wet slurry from the Milling Operations (see Section II.A.1.c) into: (a) a combined copper/molybdenum concentrate; and (b) tailings. The process stream sent from the Hydroclone Sets is first cleaned to remove oversized trash, and then go through Bulk Rougher Cells to make the initial separation of the copper/molybdenum concentrate from the tailings. The tailings from the Bulk Rougher Cells are sent to the Tailings Thickeners and then pumped to the tailings storage locations (see Section II.A.1.g). The copper/molybdenum concentrate from the Bulk Rougher Cells is pumped to the Cyclone Cluster for size separation. The undersize from the Cyclone Cluster is pumped to the 1st Cleaner Flotation Cells while the oversize is pumped to the Tower Mill for size reduction and reprocessing by the Cyclone Cluster. The copper/molybdenum concentrate from the Bulk Rougher Cells can also bypass the Cyclone Cluster and be pumped directly to the 1st Cleaner Flotation Cells.

The concentrate from the 1st Cleaner Flotation Cells is pumped to the 2nd Cleaner Flotation Column Cells. Concentrate from the 2nd Cleaner Flotation Column Cells is the final copper/molybdenum concentrate

product and is piped to the Copper/Molybdenum Concentrate Thickeners prior to processing by the Molybdenum Flotation Operations (see Section II.A.1.d(2)). Tailings are pumped to either the Bulk Rougher Cells or to the Tailings Thickeners.

(2) Molybdenum Flotation Operations

The Molybdenum Flotation Operations utilize three stages to separate the bulk copper/molybdenum concentrate from the Copper/Molybdenum Concentrate Thickeners in the Bulk Flotation Operations (see Section II.A.1.d(1)) into: (a) a copper concentrate product; and (b) a molybdenum concentrate product. At the first stage, the bulk copper/molybdenum concentrate is first conditioned by 3 tanks, processed by the Molybdenum Rougher Flotation Cells, and then pumped to the second separation stage while the copper concentrate product tails is pumped to the Copper Concentrate Thickeners prior to processing by the Copper Concentrate Processing and Loading Operations (see Section II.A.1.e). The second separation stage utilizes Molybdenum Cleaner Flotation Cells to further separate any remaining copper concentrate from the molybdenum concentrate. The product from the cleaner flotation cells is pumped to the third separation stage while the tailings are pumped back to the Molybdenum Rougher Flotation Cells for reprocessing. The third separation stage utilizes Molybdenum Flotation Column Cells to achieve the final separation of the copper concentrate from the molybdenum concentrate. The product from the column cells are pumped to the Larox Filter, the first step of the Molybdenum Concentrate Processing and Bagging Operations (see Section II.A.1.f). The tailings from the column cells are pumped back to the Molybdenum Cleaner Flotation Cells for reprocessing.

e. Copper Concentrate Processing and Loading Operations

Copper concentrate from the Copper Concentrate Thickeners (see Section II.A.1.d(2)) is first collected, processed to

remove excess water, transferred by conveyors to Copper Concentrate Stockpiles, and then loaded into trucks for shipping to offsite copper smelters.

f. Molybdenum Concentrate Processing and Bagging Operations

Molybdenum concentrate from the Molybdenum Flotation Column Cells (see Section II.A.1.d(2)) is first pumped to the Larox Filter to remove excess moisture from the molybdenum concentrate to become molybdenum concentrate cake. The molybdenum concentrate cake is then transferred to be stored prior to going to the molybdenum concentrate feed hopper associated with the Concentrate Leach Plant (CLP) (see Section II.A.1.h) or shipping offsite to customers.

g. Tailings Operations

Tailings are separated from the copper and molybdenum concentrates via bulk rougher flotation cells. Tailings are first sent to thickeners for water recovery before being pumped to the tailings storage areas in slurry form. At the storage area locations, tailings are separated by size. The larger particles are placed on the outside of the tailings storage areas to build berms while the smaller particles are pumped to the center of the tailings storage areas.

h. Concentrate Leach Plant

(1) Molybdenum Concentrate Pressure Leaching

Bagged molybdenum concentrate from the Molybdenum Concentrate Processing and Bagging Operations (see Section II.A.1.f) or from outside sources is delivered to different Molybdenum Concentrate Feed Hoppers depending on the moisture content of the concentrate and if the concentrate needs to be deoiled (i.e., high-oil concentrate) or not (i.e., low-oil concentrate). High moisture, high-oil concentrate can be delivered to Molybdenum Concentrate Feed Hopper 1. High or low moisture, high-oil concentrate can be delivered to Molybdenum Concentrate Feed Hopper 3, as controlled by Molybdenum Concentrate

Dust Collector 2. High or low moisture, low-oil concentrate is delivered to Molybdenum Concentrate Feed Hopper 4, as controlled by Molybdenum Concentrate Dust Collector 1. The low-oil concentrate is repulped through the addition of water in the Molybdenum Concentrate Repulp Tank 2. The high-oil concentrate is transferred to the Deoiler. The Deoiler removes the oil from the molybdenum concentrate and transfers it to Molybdenum Concentrate Repulp Tank 1.

From Molybdenum Concentrate Repulp Tanks 1 and 2, the molybdenum concentrate can be processed by the Molybdenum Concentrate Fine Grinding Mills 1 and 2 prior to being pumped to the Pressure Leach Vessel (PLV) via Molybdenum Concentrate Storage Tanks 1 and 2 and the Molybdenum Concentrate Feed Tank. The function of the PLV is to oxidize the molybdenum disulfide concentrate (MoS_2) to molybdenum trioxide (MoO_3) with a rhenium solution and raffinate byproduct. Exhaust from the PLV is processed by two venturi scrubbers operated in series (Primary Venturi Scrubber CH-02 and Secondary Venturi Scrubber CH-03).

The MoO_3 is then transferred through CCD Thickeners, a vibrating screen, a feed tank, and belt filters to remove the rhenium containing liquid portion of the MoO_3 slurry. The MoO_3 is repulped with water in Filter Cake Repulp Tanks 1 and 2, processed by the MoO_3 Product Screen, transferred to the MoO_3 Product Tank, and pumped to the Tube Press Filter. The Tube Press Filter removes water and any rhenium that may remain in the molybdenum trioxide and then the MoO_3 Product is bagged and shipped offsite.

The rhenium containing aqueous solution separated from the molybdenum trioxide can be processed to concentrate the rhenium, after which it is shipped offsite. Soda ash and an organic carrier are added to the settlers via the Soda Ash Slurry Tank to help facilitate the concentration process. The raffinate from

the rhenium concentration process is reused during copper leaching (see Section II.A.1.i(1)).

(2) Reprocessing CLP Cleanout Material

The equipment associated with the CLP (see Section II.A.1.h) is shut down for cleaning and maintenance purposes as needed. Because the material cleaned out of the CLP equipment is valuable, an onsite system is used to reprocess the material.

i. Solution Extraction/Electrowinning Operations

(1) Copper Leaching

Copper leaching begins with ore from Mining Operations (see Section II.A.1.a) being placed in stockpiles. An aqueous solution of weak acid (raffinate) is applied to the stockpiles by sprinkler irrigation methods and drip emitters and dissolves copper and other metals from the ore. The copper-containing raffinate, referred to as PLS, flows by gravity to collection ponds (PLS Collection Ponds). The PLS is subsequently pumped from the ponds to the solution extraction facilities. PLS from copper concentrate processing in the CLP (see Section II.A.1.h(1)) supplements the PLS from copper leaching.

(2) Solution Extraction

FMBI operates four solution extraction systems to extract copper from the PLS. Each solution extraction system contains a series of mixer-settler units. The mixer-settler units are designed in a series-parallel alignment. The PLS is pumped to the mixer portion of the Extraction Mixer-Settler Units and is vigorously mixed with an equal volume of organic solution. During mixing, the copper in the PLS is transferred to the organic solution. From the mixers, the solution is delivered to the settlers where the copper depleted PLS (now called raffinate) settles to the bottom and is pumped to Organic Recovery Tanks to reclaim any organic before being returned to the leaching

stockpiles via the Raffinate Pond. The copper containing organic solution (now called loaded organic) floats to the top of the settlers and is pumped to the Wash Mixer-Settler Units to rinse away any PLS entrained in the organic followed by the Strip Mixer-Settler Units via the Loaded Organic Tanks.

At the mixer portion of the Strip Mixer-Settler units, the loaded organic is mixed with a strong solution of H_2SO_4 (lean electrolyte) and the copper selectively moves from the loaded organic to the electrolyte (now called rich electrolyte). From the mixers, the solution is delivered to the settlers where the organic solution stripped of copper (now called barren organic) floats to the top and the rich electrolyte settles to the bottom. The barren organic is sent back to the Extraction Mixer-Settler Units via the Barren Organic Tanks and the rich electrolyte is pumped to the electrowinning operations.

(3) Electrowinning

The facility has 52 cells that are associated with the new tank house and 44 of the cells are currently active. Insoluble lead plates hang in the cells as anodes while stainless steel starter sheets hang in the cells as cathodes. The copper from the rich electrolyte is deposited onto the cathodes to create a copper plate. The cathodes are removed from the cells after they have been fully plated in copper. The copper depleted electrolyte (lean electrolyte) is returned to the solution extraction systems.

H_2SO_4 mist emissions from electrowinning are controlled mainly by the use of heat retention balls and surfactants. Foam, blankets, and brushes are also authorized to be used.

(4) Cathode Preparation

The copper plated cathodes from the electrowinning operations are washed prior to the copper being removed from the cathode. Then, the pure copper

plates are weighed and bundled for shipment to offsite facilities for further processing into copper products.

2. The facility consists of twelve supporting operations. These operations include:
 - Lime Storage and Handling Operations;
 - Ammonium Nitrate Prill Delivery and Handling Operations;
 - Portable Aggregate System;
 - Mill Recycle Operations;
 - Copper Decant Solids Handling Operations;
 - Storage Tanks and Parts Cleaning;
 - Diesel Emergency Internal Combustion Engines (ICE);
 - Propane Emergency ICE;
 - Natural Gas Emergency ICE;
 - Diesel Non-Emergency ICE;
 - Propane Non-Emergency ICE; and
 - Miscellaneous Fuel Burning Equipment.

B. Alternate Operating Scenarios

1. Alternate Operating Scenario 1 (AOS1) – Two Concentrator Operations

The facility is authorized to operate sulfide ore processing in one of two operating scenarios. The Primary Operating Scenario corresponds to the current operations at the facility. AOS1 – Two Concentrator Operations reflects the facility's expansion design to be implemented at a later date. AOS1 adds Second Concentrator operations consisting of milling operations, bulk and molybdenum flotation operations, concentrate handling operations, lime and other reagent operations, prill handling operations, and emergency ICE.

2. AOS3 – Upgrades to Milling Operations

Under this operating scenario, the facility was authorized to replace the Secondary Crushers and increase the belt width of Belt Conveyors B, which will be implemented at a later date.

3. AOS5 – Emergency Grizzly Systems

This operating scenario involves operation of the Emergency Grizzly Systems to process ore when a primary crusher malfunctions or is otherwise inoperative. A single line of the Emergency Grizzly Systems is authorized to operate for each primary crusher that is inoperative.

C. Air Pollution Control Equipment

1. Scrubbers, baghouses, and dust collectors are installed to control particulate matter emissions. Fugitive dust emissions are controlled by using water sprays, surfactants water jets, foggers, inherent moisture content (including moisture from upstream water sprays), or other equivalent controls.
2. Packed scrubbers, a flare, tank covers, and submerged filling devices are used to control volatile organic compound (VOC) emissions from the steam deoiler and the gasoline tanks.
3. Foam, blankets, surfactants, brushes, thermal retention balls, water foggers, or other effective means are used to control sulfuric acid from the SX/EW process.

D. Process Flow Diagram

A process flow diagram is shown in Appendix A.

III. COMPLIANCE HISTORY

A. Physical Inspections and Compliance Certification Reviews

During this permit term, FMBI received two (2) physical inspections and one (1) partial inspection. The facility also submitted six (6) compliance certifications. No formal enforcement action resulted from these inspections or compliance certification reviews.

B. Formal Enforcement

Case ID No. 209920

On November 18, 2022, FMBI submitted a permit deviation report for exceedance of the 50 hours per year limit for non-emergency use of their diesel-fired emergency compressor with Equipment ID IA05 which violated Condition XI.B.3.b.4 of Attachment “B”. The exceedance occurred from January 17, 2022 through January 19, 2022, and was caused by maintenance personnel’s use of the compressor during a maintenance event in the Mill. This was a repeat of a permit deviation which occurred in April, 2021, on the same unit and caused by the same situation. A Notice of Correction (NOC) was issued on November 21, 2022. The requested information was received on December 1, 2022 and this case was closed on December 6, 2022.

C. Performance Tests

During this permit term, the performance tests conducted, and results are shown in Table 1:

Table 1: Performance Test Results

Emission Unit	Pollutant	Date of Test	Results of Performance Test
Three Dust collectors: C2 (002-2), C3 (002-3), C51 (001-5)	PM and Visible Emissions	05/19/2021 – 05/20/2021	Pass
CM-DLC Input and CM-DLC Output	Visible Emissions	06/09/2021 – 06/11/2021	Pass
Dust Collectors: C1 and DC4	PM and Visible Emissions	08/26/2021	Pass
Dust Collectors M-DC1, Primary Venturi Scrubber CH-02 and Secondary Venturi Scrubber CH-03, and Natural Gas Flare (M-F)	M-DC1: PM and Visible Emissions; CH-02/CH-03: PM/PM ₁₀ ; M-F: PM and VOC	08/31/2021 – 09/02/2021	Pass
Primary Venturi Scrubber CH-02 and Secondary Venturi Scrubber CH-03	PM/PM ₁₀	02/09/2022	Pass
Dust Collector DC5	PM/PM ₁₀	09/29/2022	Pass

Emission Unit	Pollutant	Date of Test	Results of Performance Test
Production Screen, Screw Feeder, and Inclined Screw Conveyor	Visible Emissions	05/15/2023	Pass
Primary Venturi Scrubber CH-02 and Secondary Venturi Scrubber CH-03	PM/PM ₁₀	06/26/2023 – 06/27/2023	Pass
Molybdenum Concentrate Dust Collector 2 (M-DC2); Molybdenum Concentrate Feed Hopper 3 (M-CFH3)	M-DC2: PM/PM ₁₀ and Visible Emissions; M-CFH3: Visible Emissions	09/06/2023	Pass
Dust Collector DC5	PM/PM ₁₀ and Visible Emissions	09/25/2024	Pass

IV. EMISSIONS

The potential to emit (PTE) was calculated based on EPA’s Compilation of Air Pollution Emission Factors (AP-42 Section 1.3, 1.4, 1.5, 3.2, 3.3, 8.3, 8.12, 13.2.2, 13.2.4, 13.2.5, 13.4, 11.9, 11.17, 11.19.2, 4th Edition of AP-42 Section 11.2.3, emission standards from Table 2 of 40 CFR Part 60 Subpart IIII, 40 CFR Part 1039 Appendix I, Characterization of Inhalable Particulate Matter Emissions from a Lime Plant (05/83), and manufacturer’s specifications. This facility is a non-categorical source as it is not listed in A.A.C. R18-2-101.23 and thus, the PTE does not include fugitive emissions, except that the Hazardous Air Pollutants (HAPs) emissions include both non-fugitive and fugitive emissions. The facility has the PTE more than the significant thresholds of PM_{2.5}, PM₁₀, and NO_x. The facility’s PTE for Primary Operating Scenario and AOS1 is provided in Table 2 and Table 3 below:

Table 2: Potential to Emit for Primary Operating Scenario (TPY)

Pollutant	Previous PTE	Change in PTE	Current PTE (LTF No. 103818)	Permitting Exemption Threshold	Minor NSR Triggered?
NO _x	63.84	-2.65	61.19	20	No
PM ₁₀	86.84	-1.71	85.13	7.5	No
PM _{2.5}	65.63	-1.45	64.18	5	No
CO	82.31	-15.26	67.05	50	No
SO ₂	1.41	+0.01	1.42	20	No
VOC	38.06	-0.19	37.87	20	No
Lead	0.08	0.00	0.08	0.3	No
Single HAP (Carbon Disulfide)	7.73	0.00	7.73	N/A	No
HAPs (Total)	13.79	+0.76	14.55	N/A	No
GHG (CO ₂ e)	40,592	+1,474	42,066	N/A	No

Table 3: Potential to Emit for Alternate Operating Scenario 1* (TPY)

Pollutant	Previous PTE	Change in PTE	Current PTE (LTF No. 103818)	Permitting Exemption Threshold	Minor NSR Triggered?
NO _x	67.22	-2.64	64.58	20	No
PM ₁₀	87.56	-1.37	86.19	7.5	No
PM _{2.5}	76.31	-1.39	74.92	5	No
CO	92.67	-15.27	77.40	50	No
SO ₂	1.42	+0.01	1.43	20	No
VOC	47.71	-0.19	47.52	20	No

Lead	0.14	0.00	0.14	0.3	No
Single HAP (Carbon Disulfide)	9.04	0.00	9.04	N/A	No
HAPs (Total)	17.00	+0.61	17.61	N/A	No
GHG (CO ₂ e)	41,047	+1,474	42,520	N/A	No

*Emissions from Alternate Operating Scenarios 3 and 5 are either equal to or are less than these two operating scenarios such that they are not included in the PTE totals.

V. MINOR NEW SOURCE REVIEW (NSR)

Minor new source review is required if the emissions of any physical change or change in the method of an operation of an emission unit or stationary source results in an increase in emissions of any regulated minor NSR pollutant by an amount equal to or greater than the permitting exemption threshold (PET). As shown in Table 2 and Table 3 above, the emission increases resulting from this permit renewal are all below the permitting exemption thresholds and thus, minor NSR is not triggered at this time.

VI. VOLUNTARILY ACCEPTED EMISSION LIMITATIONS AND STANDARDS

The following voluntary emission limitations and standards were established under A.A.C. R18-2-306.01 to keep the facility’s PTE below major source thresholds.

A. Operating Limitation

The facility has voluntarily accepted the following operating limitation:

1. The Permittee shall limit the amount of total ore transferred to the following conveyors from the coarse ore stockpile to no more than 65,700,000 tons per year on a 12-month rolling basis:
 - a. GL1 Belt Conveyor A (GL1-BCA);
 - b. GL2 Belt Conveyor A (GL2-BCA);
 - c. GL3 Belt Conveyor A (GL3-BCA);
 - d. GL4 Belt Conveyor A (GL4-BCA); and

e. GL5 Belt Conveyor A (GL5-BCA).

The operating limitation was incorporated in this renewal.

2. The Permittee shall not produce more than 2,500,000 tons per year of aggregate material in the Portable Aggregate System. This was incorporated into Significant Permit Revision (SPR) No. 105717 in 2025.
3. The Permittee shall not produce more than 4,400,000 tons per year of aggregate material in the Supplemental Portable Aggregate System. This was incorporated in this renewal.

B. Emission Limitations

The permit contains the following voluntary emission limitations and standards in Table 4 for scrubbers and dust collectors with the permit numbers and years when the limits were incorporated.

Table 4: Scrubbers and Dust Collectors Voluntary Emission Limitations

Pollution Control Devices	Pollutants	Emission Limits	Permit No.	Year
Scrubber C18	PM/PM ₁₀	0.0135 gr/dscf	77414	2019
Dust Collector C51				
Dust Collector C51 (AOS1)				
GL1 Dust Collector C1	PM/PM ₁₀	0.0124 gr/dscf	77414	2019
GL2 Dust Collector C2				
GL3 Dust Collector DC3				
GL4 Dust Collector DC4				

Pollution Control Devices	Pollutants	Emission Limits	Permit No.	Year
GL5 Dust Collector DC5	PM/PM ₁₀	0.004 gr/dscf	76354	2019
PC1 Dust Collector 1 (AOS1)	PM/PM ₁₀	0.0023 gr/dscf	99644	2024
PC1 CCC1 Dust Collector 2 (AOS1)				
PC1 CCC2 Dust Collector 3 (AOS1)				
PC1 CCC3 Dust Collector 4 (AOS1)				
Coarse Ore Reclaim Conveyor 1 Dust Collector 5 (AOS1)				
Coarse Ore Reclaim Conveyor 2 Dust Collector 6 (AOS1)				
HPGR Discharge Dust Collector 7 (AOS1)				
HPGR Discharge				

Pollution Control Devices	Pollutants	Emission Limits	Permit No.	Year
Conveyor Transfer Dust Collector 8 (AOS1)				
HPGR Product Bin Dust Collector 9 (AOS1)				
HPGR Product Transfer Dust Collector 10 (AOS1)				
HPGR Product Transfer Dust Collector 11 (AOS1)				
Primary Venturi Scrubber CH-02 and Secondary Venturi Scrubber CH-03	PM/PM ₁₀	2.75 lb/hr	77414	2019
Venturi Scrubber / Venturi Scrubber (alternate), Packed Scrubber 1, Packed Scrubber 2, and Natural Gas Flare	VOC	1.36 lb/hr	77414	2019

VII. APPLICABLE REGULATIONS

Table 5 identifies applicable regulations and verification as to why each one applies.

Table 5: Applicable Regulations

Unit(s)	Control(s)	Rule	Discussion
Metallic Mineral Processing Equipment	Scrubbers, Dust Collectors, Wet Suppression	40 CFR Part 60 Subpart LL A.A.C. R18-2-721	40 CFR Part 60 Subpart LL for Metallic Mineral Processing Plants is applicable to the aboveground metallic mineral processing plants. A.A.C. R18-2-721 for Existing Nonferrous Metals Industry Sources is applicable to existing nonferrous metals industry sources including underground mining operations.
Unclassified Sources Subject to A.A.C. R18-2-730	Scrubbers; Natural Gas Flare, Bin Vent Filters, and Covers, Foam or/and Blankets or/and Surfactants or/and Brushes or/and Thermal Retention Balls	A.A.C. R18-2-730	These standards apply to unclassified sources.
Boilers, Steam Generators, Heaters, and Furnaces	N/A	A.A.C. R18-2-724 40 CFR Part 60 Subpart Dc	These standards apply to fossil-fuel fired industrial and commercial equipment. These standards apply to small industrial-commercial-institutional steam generating units.

Unit(s)	Control(s)	Rule	Discussion
Nonmetallic Mineral Processing Operations	Spray Bars, Wet Suppression	A.A.C. R18-2-722 40 CFR Part 60 Subpart OOO	These standards apply to existing gravel or crushed stone processing plants. These standards apply to nonmetallic mineral processing plants.
Reciprocating Internal Combustion Engines	N/A	A.A.C. R18-2-719 40 CFR Part 60 Subpart IIII 40 CFR Part 60 Subpart JJJJ 40 CFR Part 63 Subpart ZZZZ	These standards apply to existing stationary rotating machinery. These standards apply to stationary compression ignition internal combustion engines. These standards apply to stationary spark ignition internal combustion engines. These standards for hazardous air pollutants apply to stationary reciprocating internal combustion engines.
Gasoline Storage Tanks and Gasoline Dispensing Facilities	N/A	A.A.C. R18-2-710 40 CFR Part 63 Subpart CCCCCC	These standards apply to existing storage vessels for petroleum liquids. These standards for hazardous air pollutants apply to gasoline dispensing facilities.
Fugitive Dust	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.

Unit(s)	Control(s)	Rule	Discussion
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	These standards are applicable to any spray painting operation.
Demolition/Renovation	N/A	A.A.C. R18- 2-1101.A.12	This standard is applicable to any asbestos related demolition or renovation operations.

VIII. PREVIOUS PERMIT REVISIONS AND CONDITIONS

A. Previous Permit Revisions

Table 6 provides a description of the permit revisions made to Permit No. 77414 during the previous permit term.

Table 6: Permit Revisions to Permit No. 77414

Permit Revision No.	Permit Revision Type	Brief Description
79008	Minor Permit Revision (MPR)	This was to authorize FMBI to add a third ammonium nitrate prill bin, and allow for increased hazardous air pollutant (HAP) content (arsenic) of molybdenum concentrate from outside source.
80854	MPR	This was to authorize FMBI to add two diesel engines to the permit, clarify the scope of Alternate Operating Scenario (AOS) 2 and AOS3, correct the length of Gasoline Storage Tank FT-3, and correct the belt widths of Belt Conveyors B used in the Grinding Lines (GLs) of the Milling Operations.
81912	MPR	This was to authorize FMBI to install a system to be used for reprocessing Concentrate Leach Plant (CLP) cleanout material.

Permit Revision No.	Permit Revision Type	Brief Description
86846	MPR	This was to authorize FMBI to install a Delumper/Crusher to be used at the Concentrate Leach Plant (CLP) cleanout system and make corrections to equipment and process details.
88705	MPR	This was to authorize FMBI to install an alternate Venturi Scrubber (M-VSa) to the deoiling process associated with the Molybdenum Concentrate Handling portion of the Concentrate Leach Plant (CLP), and to reclassify two emergency diesel-fired engines (IA14-DN and IA15-DN) and two emergency propane-fired engines (IA10-PN and IA18-PN) as non-emergency engines.
89577	MPR	This was to authorize FMBI to replace existing Molybdenum Concentrate Feed Hopper 2 (M-CFH2) with new Molybdenum Concentrate Feed Hopper 4 (M-CFH4); and add an alternate system for feeding the Steam Deoiler (M-SD) including one hopper and three screw conveyors.
93110	MPR	This was to authorize FMBI to add unloading systems for leaching catalyst, add three diesel engines, incorporate AOS2 into the Primary Operating Scenario, and replace the shell of the GL4 Secondary Grinding Mill (GL4-GM2).
96299	MPR	This was to authorize FMBI to change the process equipment associated with the Concentrate Leach Plant (CLP), add 2 Prill Bins, incorporate AOS4 requirements into the requirements for the Primary Operating Scenario, update emergency engine details, and incorporate the Soda Ash Screw Conveyor.
99644	SPR	This was to authorize FMBI to update the design of AOS1 by modernizing the previously permitted primary crushing, overland conveying, milling, and bulk flotation operations as well as incorporating additional molybdenum flotation operations, concentrate handling operations, lime and other reagent operations, prill handling operations, and emergency engines.

Permit Revision No.	Permit Revision Type	Brief Description
100550	MPR	This was to authorize FMBI to install an emergency generator, upgrade the lime storage and handling plant, replace Natural Gas Truck Wash Boiler IA02c-NG with Natural Gas Mill Wash Rack Pressure Washer IA51-NG, replace Natural Gas Boiler IA01-NG with Natural Gas Shower Facility Hot Water Heater IA52-NG, install Gasoline Storage Tank Sycamore TSF, and a few other updates to the equipment list and potential emission estimates.
105227	MPR	This was to authorize FMBI to redesign and upgrade its lime storage and handling operations, install two emergency generators, replace Diesel Emergency Compressor IA05-D with Mill Compressor Diesel Non-Emergency Engine IA53-DN, install a boiler, replace Natural Gas Package Boiler G1 with Natural Gas Primary Package Boiler G3, and remove some CLP cleanup equipment that was never used.
105717	SPR	This was to authorize FMBI to add a Supplemental Portable Aggregate System.

B. Changes to Current Renewal

Table 7 addresses the major changes made to the sections and conditions from Permit Revision No. 105717:

Table 7: Previous Permit Conditions

Section No.	Determination			Comments
	Added	Revised	Deleted	
Att. "A"		X		General Provisions: Revised to represent the most recent template language.
Att. "B" Section I		X		Facility-Wide Requirements: Revised to represent the most recent template language including adding throughput limitations.
Att. "B" Section II		X		Requirements for Metallic Mineral Processing Operations: Updated performance test requirements and added

Section No.	Determination			Comments
	Added	Revised	Deleted	
				monitoring/differential pressure requirements for dust collection systems.
Att. "B" Section III		X		Requirements for Unclassified Sources Subject to A.A.C. R18-2-730: Revised to remove the leaching catalyst operations, updated the name of the Deoiler, revised performance test requirements, added monitoring/differential pressure requirements for the scrubbers and H ₂ S monitoring.
Att. "B" Section V		X		Requirements for Nonmetallic Mineral Processing Operations: Revised to update the production limitation for the Supplemental Portable Aggregate System.
Att. "B" Section VI		X		Requirements for Reciprocating Internal Combustion Engines (RICES): Updated to reflect the most recent language in applicable regulations.
Att. "C"		X		Equipment List: Revised to reflect the most recent equipment operating at the facility including equipment information provided.
Att. "D"		X		Processes with Voluntary Emission Limitations: Revised to remove the Filtered Concentrate Dust Collector. Updated the name of the Deoiler.

IX. MONITORING, RECORDKEEPING, AND REPORTING REQUIREMENTS

Table 8 contains an inclusive but not an exhaustive list of the monitoring, recordkeeping and reporting requirements prescribed by the air quality permit. The table below is intended to provide insight to the public for how the facility is required to demonstrate compliance with the emission limits in the permit. Records are required be kept for a minimum of 5 years as outlined in Section XIII of Attachment “A” of the permit.

Table 8: Permit No. 103818

Emission Unit	Pollutant	Emission Limit	Monitoring Requirements	Recordkeeping Requirements	Reporting Requirements
Metallic Mineral Processing Operations	PM (A.A.C. R18-2-721)	If process rate ≤ 30 tons/hr, PM $\leq 4.10P^{0.67}$; if process rate > 30 tons/hr, PM $\leq 55.0P^{0.11} - 40$. P = the process weight rate in tons-mass per hour.	Record daily and hourly process rate.	Keep records of d daily and hourly process rate.	Report excess emissions and deviations if applicable.
	Opacity (A.A.C. R18-2-721)	20%	Conduct weekly opacity monitoring.	Record the results of any observations, and any corrective action taken.	Submit semiannual compliance certifications including excess emissions and

				deviations reports if applicable.
PM (40 CFR Part 60 Subpart LL)	0.05 g/dscm	Conduct performance tests.	Keep data and test reports for continuous monitoring.	Report test results. Report excess emissions and deviations if applicable.
Opacity (40 CFR Part 60 Subpart LL)	7% (stack emissions), 10% (fugitive emissions)	Conduct visible emission monitoring and performance tests.		
PM/PM ₁₀	Scrubber C18, Dust Collector C51, Dust Collector C51 (AOS1) ≤ 0.0135 gr/dscf; GL1 Dust Collector C1, GL2 Dust Collector C2, GL3 Dust Collector DC3, GL4 Dust Collector DC4 ≤ 0.0124 gr/dscf;	Conduct performance tests.	Keep data and test reports for continuous monitoring.	Report test results. Report excess emissions and deviations if applicable.

	<p>Filtered Concentrate Dust Collector CuDC, GL5 Dust Collector DC5 \leq 0.004 gr/dscf; PC1 Dust Collector 1 (AOS1), PC1 CCC1 Dust Collector 2 (AOS1), PC1 CCC2 Dust Collector 3 (AOS1), PC1 CCC3 Dust Collector 4 (AOS1), Coarse Ore Reclaim Conveyor 1 Dust Collector 5 (AOS1), Coarse Ore Reclaim Conveyor 2 Dust Collector 6 (AOS1), HPGR Discharge Dust Collector 7 (AOS1), HPGR Discharge Conveyor Transfer Dust Collector 8 (AOS1), HPGR Product Bin Dust Collector 9 (AOS1),</p>			
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		HPGR Product Transfer Dust Collector 10 (AOS1), HPGR Product Transfer Dust Collector 11 (AOS1) ≤ 0.0023 gr/dscf			
Unclassified Sources	PM	If process rate ≤ 30 tons/hr, PM $\leq 4.10P^{0.67}$; if process rate > 30 tons/hr, PM $\leq 55.0P^{0.11} - 40$. P = the process weight rate in tons-mass per hour.	Record the hourly process rate.	Keep the records of hourly process rate.	Report excess emissions and deviations if applicable.
	Opacity	20%	Conduct weekly visible emission monitoring.	Record opacity monitoring.	Report excess emissions and deviations if applicable.
	H ₂ S	≤ 0.03 ppm	Monitor H ₂ S emissions.	Keep records of the monitoring results.	Report excess emissions and deviations if applicable.

	PM/PM ₁₀	Primary Venturi Scrubber CH-02 and Secondary Venturi Scrubber CH-03 ≤ 2.75 lb/hr	Conduct performance tests.	Keep data and test reports for continuous monitoring.	Report test results. Report excess emissions and deviations if applicable.
	VOC	Venturi Scrubber / Venturi Scrubber (alternate), Packed Scrubber 1, Packed Scrubber 2, and Natural Gas Flare ≤ 1.36 lb/hr			
Boilers, Steam Generators, Heaters, and Furnaces	PM	If heat input rate ≤ 4,200 MMBtu/hr, PM ≤ 1.02*Q ^{0.769} ; if heat input rate > 4,200 MMBtu/hr, PM ≤ 17.0*Q ^{0.432} . Q = heat input in MMBtu/hr.			Report excess emissions and deviations if applicable.
	Opacity	15%	Conduct monthly visible emission monitoring.	Record opacity monitoring.	Report excess emissions and deviations if applicable.

	SO ₂	≤ 1.0 lb/MMBtu	Keep records of the sulfur content of the fuel being fired.	Keep records of the sulfur content of the fuel being fired.	Report excess emissions and deviations if applicable.
Nonmetallic Mineral Processing Operations	PM (A.A.C. R18-2-722)	If process rate ≤ 30 tons/hr, PM ≤ 4.10P ^{0.67} ; if process rate > 30 tons/hr, PM ≤ 55.0P ^{0.11} - 40. P = the process weight rate in tons-mass per hour.	Record the hourly process rate.	Keep the records of hourly process rate.	Report excess emissions and deviations if applicable.
	Opacity (A.A.C. R18-2-722)	20%	Conduct weekly visible emission monitoring.	Record opacity monitoring.	Report excess emissions and deviations if applicable.
	Opacity (40 CFR Part 60 Subpart OOO)	12% (fugitive emissions from crushers without a capture system),	Conduct performance tests.	Keep data and test reports for continuous monitoring.	Report test results. Report excess emissions and deviations if applicable.

			7% (fugitive emissions from other sources)			
Reciprocating Internal Combustion Engines (RICEs)	Existing Emergency and Non-Emergency Engines (A.A.C. R18-2-719)	PM	If heat input rate \leq 4,200 MMBtu/hr, PM $\leq 1.02 * Q^{0.769}$; if heat input rate $>$ 4,200 MMBtu/hr, PM $\leq 17.0 * Q^{0.432}$. Q = heat input in MMBtu/hr.			Report excess emissions and deviations if applicable.
		Opacity	40%	Conduct monthly visible emission monitoring.	Record opacity monitoring.	Report excess emissions and deviations if applicable.
		SO ₂	≤ 1.0 lb/MMBtu	Keep records of the sulfur content of the fuel being fired.	Keep records of the sulfur content of the fuel being fired.	Report any daily period when the sulfur content of the fuel being fired exceeds 0.8%. Report excess emissions and deviations if applicable.

<p>New Emergen cy Engines (40 CFR Part 60 Subpart III)</p>	<p>PM, NO_x, Opacity</p>	<p>For model year ≥ 2007, if Engine Power < 37 kW, the certification emission standards in 40 CFR 1039.104, 40 CFR 1039.105, 40 CFR 1039.107, 40 CFR 1039.115, and Table 2 of 40 CFR 60 Subpart III, for 2008 model year and later engines; if Engine Power ≥ 37 kW and ≤ 2,237 kW, the Tier 2 or Tier 3 emission standards for new nonroad CI engines in 40 CFR 1039 Appendix I, for all pollutants and the smoke standards as specified in 40 CFR 1039.105 beginning in model year 2007.</p>	<p>Purchase the engine certified to the emission standards, or keep a maintenance plan and records of conducted maintenance and conduct performance tests.</p>	<p>If the emergency engine does not meet the standards applicable to non-emergency engines in the applicable model year, keep records of the operation of the engine in emergency and non-emergency service recorded through the non-resettable hour meter, and record the time of operation of the engine and the reason the engine was in operation during that time. If applicable keep the maintenance</p>	<p>For an emergency engine > 100 hp that operates for the purposes specified in Condition VI.B.4.f(4), submit an annual report according to the requirements in 40 CFR 60.4214(d)(1) through 60.4214(d)(3). Report test results. Report excess emissions and deviations if applicable.</p>
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		<p>For model year \geq 2011 and engine power $>$ 2,237 kW, Tier 2 emission standards in 40 CFR 1039 Appendix I for all pollutants and the smoke standards in 40 CFR 1039.105.</p> <p>For fire pump engines, emission standards in Table 4 of 40 CFR 60 Subpart IIII, for all pollutants.</p>		<p>plan, records of conducted maintenance and tests results.</p>	
<p>New Emergency Engines (40 CFR Part 60 Subpart JJJJ)</p>	<p>CO</p>	<p>610 g/kW-hr (Engine Power \leq 25 hp and \geq July 1, 2011)</p> <p>519 g/kW-hr (rich burn, 25 hp $<$ Engine Power $<$ 130 hp and \geq January 1, 2009)</p>	<p>Purchase the engine certified to the emission standards.</p> <p>If engine is certified but not operate and maintain in accordance with</p>	<p>If certified engine, keep records of conducted maintenance. If non-certified engine, keep a maintenance plan and records of conducted</p>	<p>Report test results, excess emissions and deviations if applicable.</p>

			the manufacturer's instructions and 100 hp ≤ Engine Power ≤ 500 hp, conduct performance test.	maintenance. If non-certified engine and 100 hp ≤ Engine Power ≤ 500 hp, keep test results.	
		<p>387 g/hp-hr (except gasoline and rich burn engines, 25 hp < Engine Power < 130 hp and ≥ January 1, 2009)</p> <p>4.0 g/hp-hr (except gasoline and rich burn engines, Engine Power ≥ 130 hp and ≥ January 1, 2009)</p>	<p>Purchase the engine certified to the emission standards.</p> <p>If engine is certified but not operate and maintain in accordance with the manufacturer's instructions and 100 hp ≤ Engine Power ≤ 500 hp, conduct</p>	<p>If certified engine, keep records of conducted maintenance. If non-certified engine, keep a maintenance plan and records of conducted maintenance, and for 25 hp < Engine Power ≤ 500 hp keep test results.</p>	<p>Report test results, excess emissions and deviations if applicable.</p>

			<p>performance test.</p> <p>Or purchasing a non-certified engine, for 25 hp < Engine Power ≤ 500 hp, keep a maintenance plan and records of conducted maintenance and conduct performance test.</p>		
NO _x and Hydrocarbons (HC)	<p>8.0 g/kW-hr (Engine Power ≤ 25 hp and ≥ July 1, 2011)</p> <p>13.4 g/kW-hr (rich burn, 25 hp < Engine Power < 130 hp and ≥ January 1, 2009)</p>	<p>Purchase the engine certified to the emission standards.</p> <p>If engine is certified but not operate and maintain in</p>	<p>If certified engine, keep records of conducted maintenance. If non-certified engine, keep a maintenance plan and records of</p>	<p>Report test results, excess emissions and deviations if applicable.</p>	

		accordance with the manufacturer's instructions and 100 hp ≤ Engine Power ≤ 500 hp, conduct performance test.	conducted maintenance. If non-certified engine and 100 hp ≤ Engine Power ≤ 500 hp, keep test results.	
	10 g/hp-hr (except gasoline and rich burn engines, 25 hp < Engine Power < 130 hp and ≥ January 1, 2009)	Purchase the engine certified to the emission standards. If engine is certified but not operate and maintain in accordance with the manufacturer's	If certified engine, keep records of conducted maintenance. If non-certified engine, keep a maintenance plan and records of conducted maintenance, and for 25 hp < Engine Power ≤	Report test results, excess emissions and deviations if applicable.
NO _x	2.0 g/hp-hr (except gasoline and rich burn engines, Engine Power ≥ 130 hp and ≥ January 1, 2009)			

		<p>VOC</p>	<p>1.0 g/hp-hr (except gasoline and rich burn engines, Engine Power \geq 130 hp and \geq January 1, 2009)</p>	<p>instructions and 100 hp \leq Engine Power \leq 500 hp, conduct performance test.</p> <p>Or purchasing a non-certified engine, for 25 hp $<$ Engine Power \leq 500 hp, keep a maintenance plan and records of conducted maintenance and conduct performance test.</p>	<p>500 hp keep test results.</p>	
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	New Non-Emergency Engines (40 CFR Part 60 Subpart III)	PM, NO _x , CO	Comply with emission standards for new nonroad CI engines in 40 CFR 1039.101, 40 CFR 1039.102, 40 CFR 1039.104, 40 CFR 1039.105, 40 CFR 1039.107, and 40 CFR 1039.115, and 40 CFR 1039 Appendix I, as applicable.	<p>Purchase the engine certified to the emission standards.</p> <p>If not complying with manufacturer's emission-related written instructions, keep a maintenance plan and records of conducted maintenance and conduct performance test.</p>	<p>If not complying with manufacturer's emission-related written instructions, keep a maintenance plan and records of conducted maintenance and performance test results.</p>	Report test results, excess emissions and deviations if applicable.
Fugitive Dust	Opacity	40%	Conduct weekly visible emission survey.	Record opacity monitoring results.	Report excess emissions and	

					deviations if applicable.
Abrasive Blasting	Opacity	20%	If applicable, conduct visible emission survey.	Record the date, duration and pollution control measures of any abrasive blasting project and opacity monitoring results.	Report excess emissions and deviations if applicable.
Spray Painting	Opacity	20%	If applicable, conduct visible emission survey.	Maintain records of the date, duration, quantity of paint used, any applicable material safety data sheets, and pollution control measures of any spray painting project and opacity	Report excess emissions and deviations if applicable.

				monitoring results.	
Demolition/Renovation	Asbestos	N/A	N/A	Maintain records of all asbestos related demolition or renovation projects including the "NESHAP Notification for Renovation and Demolition Activities" form and all supporting documents.	N/A

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X. LEARNING SITES EVALUATION

In accordance with ADEQ's Environmental Permits and Approvals near Learning Sites Policy, the Department is required to conduct 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 in 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.

The renewal of this permit will not result in an increase in emissions above permitting exemption thresholds and thus, it is exempt from a learning sites evaluation.

XI. ENVIRONMENTAL JUSTICE ANALYSIS

The Environmental Protection Agency (EPA) defines Environmental Justice (EJ) to include the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. The goal of completing an EJ assessment in permitting is to provide an opportunity for overburdened populations or communities to allow for meaningful participation in the permitting process. Overburdened is used to describe the minority, low-income, tribal and indigenous populations or communities that potentially experience disproportionate environmental harms and risks due to exposures or cumulative impacts or greater vulnerability to environmental hazards.

The renewal of this permit will not result in an increase in emissions above permitting exemption thresholds and thus, it is exempt from an environmental justice analysis.

XII. HYDROGEN SULFIDE (H₂S) AMBIENT AIR IMPACT ANALYSIS

A. General

FMBI performed a ambient air impact analysis for H₂S to demonstrate that the expected ambient air impact from permitted sources within the facility complies with A.A.C. R18-2-730.H. It was conducted in accordance with the EPA's Guideline on Air Quality Models (40 CFR Part 51 Appendix W)¹ and

¹ US. EPA. 2017. Guidelines on Air Quality Models.
https://www.epa.gov/sites/default/files/2020-09/documents/appw_17.pdf

the Air Dispersion Modeling Guidelines for Arizona Air Quality Permits, November 1, 2019 (ADEQ's Modeling Guidelines).²

B. Model Selection

The American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD) model is the EPA-preferred model for estimating impacts at receptors located in simple terrain and complex terrain (within 50 km of a source) due to emissions from industrial sources. FMBI used AERMOD for the ambient impact analysis.

The AERMOD modeling system consists of three major components: AERMAP, used to process terrain data and develop elevations for receptors; AERMET, used to process the meteorological data; and the AERMOD dispersion model, used to estimate the ambient pollutant concentrations. FMBI used AERMOD version 23132.

C. Emission Sources

FMBI has the following three permitted sources that have the potential to emit H₂S:

- Process #044-1: Bagdad Concentrator Bulk and Molybdenum Flotation Equipment;
- Process #044-2: Second Concentrator Bulk and Molybdenum Flotation Equipment (AOS1);
- Process #055-3: Second Concentrator NaHS System Scrubber (AOS1).

The second concentrator NaHS system scrubber was modeled as a point source, whereas the concentrator bulk and molybdenum flotation equipment were modeled as volume sources. Release parameters (stack height, stack diameter, gas temperature, and volumetric flow rate) for the scrubber were derived from vendor specifications or engineering estimations. The volume source parameters, including initial lateral

² Arizona Department of Environmental Quality. 2019. Air Quality Modeling Guidelines for Arizona Air Quality Permits. http://static.azdeq.gov/aqd/modeling_guidance.pdf

dimension, initial vertical dimension and release height, were estimated based on the horizontal and vertical dimensions of the volume source, following the guidance from ADEQ and the AERMOD User's Guide. Emission rates used in the model were consistent with the FMBI Class II Permit Renewal Application submitted to ADEQ in May 2024.

D. Meteorological Data

FMBI used the ADEQ-processed Prescott meteorological dataset for the modeling analysis. ADEQ utilized AERMET meteorological preprocessor (v23132) to process 2017-2021 surface data from the U.S. National Climatic Data Center (NCDC) for the Prescott Municipal Airport, and upper air radiosonde data from the Flagstaff station within the NWS Rawinsonde Network. ADEQ also used the EPA's AERSURFACE tool (v20060) to calculate surface characteristic parameters (albedo, Bowen ratio, and surface roughness) required by AERMET.

E. Ambient Air Boundary and Receptor Network

FMBI established the ambient air boundary, aligning it with the mine operational boundary. Consistent with ADEQ guidance, receptors were placed 25 meters apart along the ambient air boundary; 100 meters apart to 1 km; and 500 meters apart to roughly 3 km. FMBI used the AERMAP terrain processor to process the USGS National Elevation Data (NED) to generate the receptor elevations and hill heights.

F. Building Downwash

This analysis did not consider building downwash due to the substantial distance from the modeled point source to the ambient air boundary. Furthermore, AERMOD does not factor downwash into volume sources.

G. Results

The maximum modeled 1-hour concentration of H₂S was 20.15 µg/m³. To estimate the maximum concentration over a 30-minute averaging period - as specified in A.A.C. R18-2-730.H - the modeled concentration was multiplied by an averaging time factor of 1.15.³ This yielded a 30-minute

³ The averaging time multiplying factor was calculated using Equation D-2 in the USEPA's Workbook of Screening Techniques for Assessing Impacts of Toxic Air Pollutants, available online at:

concentration of 23.15 $\mu\text{g}/\text{m}^3$, which is below the state standard of 0.03 ppmv (equivalent to 41.82 $\mu\text{g}/\text{m}^3$). Therefore, it is concluded that FMBI complies with A.A.C. R18-2-730.H.

Regardless, the facility will monitor H_2S emissions at the nearest occupied place outside of the mine operational boundary to the Bagdad Concentrator Bulk and Molybdenum Flotation Equipment (Process #044-1) using an analyzer on a quarterly basis to demonstrate continuous compliance. It was determined that the nearest occupied place is the Bagdad Community Health Center.

XIII. LIST OF ABBREVIATIONS

A.A.C.	Arizona Administrative Code
ADEQ	Arizona Department of Environmental Quality
AERMOD	AMS/EPA Regulatory Model
AERMET	AERMOD Meteorological Preprocessor
AMS	American Meteorological Society
ANFO	Ammonium nitrate prill and fuel oil mixture
AOS	Alternate Operating Scenario
CFR	Code of Federal Regulations
CLP	Concentrate Leach Plant
CO	Carbon Monoxide
CO _{2e}	CO ₂ equivalent basis
EPA	Environmental Protection Agency
EW	Electrowinning
FMBI	Freeport-McMoRan Bagdad Inc.
g	Gram
GHG	Greenhouse Gases
H ₂ S	Hydrogen Sulfide
HAP	Hazardous Air Pollutant
hr	Hour
hp	Horsepower
ICE	Internal Combustion Engine
kW	Kilowatt
lb	Pound
MPR	Minor Permit Revision

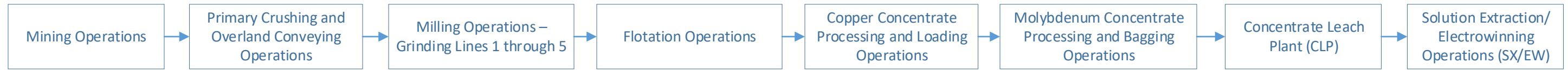
NCDC	National Climatic Data Center
NED	National Elevation Data
NOC	Notice of Correction
NO _x	Nitrogen Oxides
NSPS	New Source Performance Standards
NSR	New Source Review
PET	Permitting Exemption Threshold
PLS	Pregnant Leach Solution
PLV	Pressure Leach Vessel
PM ₁₀	Particulate Matter no larger than 10 µm nominal aerodynamic diameter
PM _{2.5}	Particulate Matter no larger than 2.5 µm nominal aerodynamic diameter
PSD	Prevention of Significant Deterioration
PTE	Potential to Emit
SO ₂	Sulfur Dioxide
SPR	Significant Permit Revision
TPY	Tons per Year
VOC	Volatile Organic Compound
yr	Year

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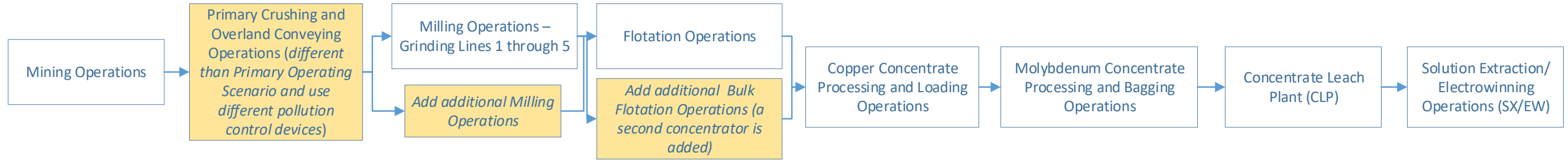
Appendix A

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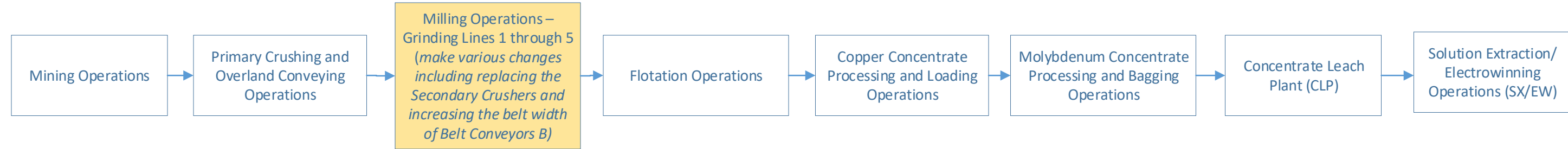
Primary Operating Scenario (in operation right now)



Alternate Operating Scenario 1 (AOS1, will be implemented at a later date)



Alternate Operating Scenario 3 (AOS3, will be implemented at a later date)



Alternate Operating Scenario 5 (AOS5, will be used when primary crusher malfunctions or is inoperative)

