1.0 INTRODUCTION

1.1 DOCUMENT PURPOSE

Pursuant to the requirements of the Bureau of Land Management (BLM) Surface Management Regulations, 43 Code of Federal Regulations (CFR) Part 3809, Freeport-McMoRan Bagdad Inc. (FMBI) has prepared this *Stockpile Extension Modification to the Mine Plan of Operations* (MPO Modification; AZA-28639). FMBI seeks approval of this MPO Modification for the extension of the existing, consolidated Plan IX Leach/South Waste Rock Stockpile (the Stockpile) at the Bagdad Mine. In addition, this MPO Modification proposes future, distributed facilities south of the Stockpile.

As depicted in Figure 1, the project area is located in western Yavapai County, immediately west of the unincorporated community of Bagdad and on the south side of the existing Bagdad Mine.

1.2 EARLIER OPERATIONS

Mining has occurred in the Bagdad area since the early 1880s, initiated with the staking of claims along Copper Creek and the formation of the Eureka Mining District in 1884. Prior to 1900, gold, silver, and lead were the primary minerals extracted (BLM, 1995a). Copper production began generally after 1900, and the first mill began production in 1928 to process ore from the underground mine. A transition to open pit mining began in 1945 (Freeport-McMoRan, 2014).

Following numerous ownership changes through first half of 20th century, the Bagdad Copper Company merged with Cyprus Mines Corporation and formed the Cyprus Bagdad Copper Company in 1973. The Phelps Dodge Corporation acquired the mine in 1999, following which the mine operated as Phelps Dodge Bagdad, Inc. Freeport-McMoRan Copper & Gold, now known as Freeport-McMoRan Inc., acquired Phelps Dodge Corporation in 2007, and the mine continues operations today as a subsidiary, FMBI.

1.3 CURRENT MINE FEATURES AND FACILITIES

The open pit copper mining operation includes mine production (drilling, blasting and stripping), material haulage, milling and flotation processes, and solution extraction/electrowinning (SX/EW) operations. Primary facilities at the Bagdad Mine include:

- Open pit
- Stockpiles of overburden, mineralized waste rock (leach facilities), and tailings material
- SX/EW plant
- Milling plant and flotation cells
- Security gate
- Maintenance shops
- Fueling stations and areas
- Acid bulk tank stations
- Explosives storage area
- Laydown yards and general storage areas
- Tailings impoundments

Currently, three existing tailings impoundments, Upper Mammoth, Mammoth and Mulholland, store the mill tailings material. Existing leach stockpiles at the Bagdad Mine allow for the extraction of copper from mineralized waste rock, including the Plan IX Leach portion of the Stockpile. The leachate (pregnant leach solution or PLS) from this portion of the Stockpile is collected at the downstream toe of the facility and gravity flows to the Alum Sump PLS Pond and Kimberly Pond catchments. The South Waste Rock portion of the Stockpile can receive mineralized waste rock, un-mineralized overburden, or relocated tailings. This portion of the Stockpile does not conduct leaching activities.

Figure 2 shows the location of the elements proposed in this MPO Modification in relation to some of the primary features of the Bagdad Mine. The approximate, planned extents of the Upper Mammoth Tailings Impoundment are also depicted (as addressed in the approved, original Mine Plan of Operations [1996 MPO]; refer to Section 1.7.1.1). No changes are proposed to the Upper Mammoth Tailings Impoundment in this MPO Modification.

1.4 EXISTING RIGHT-OF-WAY (BY OTHERS)

Currently, Arizona Public Service Company (APS) provides power to the Bagdad Mine. In order to operate more safely and efficiently, FMBI entered into an agreement with APS in 2008 to move the power line where it would be less exposed to mining activities, as originally contemplated in the 1995 Draft *Proposed Tailings and Waste Rock Storage Areas Environmental Impact Statement* (EIS; BLM, 1995a). APS applied for and was granted a right-of-way (ROW) through lands administered by the BLM in 2009, as shown in Figure 3; APS was also granted a ROW by the Arizona State Land Department (ASLD) for the segment of the power line crossing lands administered by ASLD in 2010.

1.5 OPERATOR INFORMATION

In accordance with 43 CFR 3809, the MPO Modification operator information is presented in Table 1.

Table 1 Operator Information

Project Name:	Stockpile Extension MPO Modification (proposed)
Corporation Name:	Freeport-McMoRan Bagdad Inc., a Delaware Corporation
Federal ID:	AZA-28639
Partnership Information:	Not applicable
Property Ownership and Point of Contact Information	
Full Name:	Brent Callen
Title:	Senior Environmental Engineer
Business Name:	Freeport-McMoRan Bagdad Inc.
Telephone Number:	(928) 633-3472
Street Address:	100 Main Street, Bagdad, Arizona 86321
Business Address:	PO Box 245, Bagdad, Arizona 86321
Claim Owner's Address:	Same as above
Federal Tax Identification No.:	84-1074663

Project Location	
County/State:	Yavapai County/Arizona
Claim Type:	Patented and Unpatented Lode and Mill Site Claims
Primary Commodity:	Copper
Meridian:	Gila and Salt River Baseline and Meridian
Sections:	16 and 17
Township, Range:	T14N, R9W
BLM (Public Land Ownership) Contact Information	
Name:	Bureau of Land Management, Kingman Field Office
Address:	2755 Mission Boulevard, Kingman, Arizona 86401
Telephone:	(928) 718-3700

1.6 PROJECT LOCATION AND OWNERSHIP

1.6.1 Project Location

As depicted in Figure 2, the proposed Stockpile extension and distributed facilities lie within Sections 16 and 17 of Township 14 North, Range 9 West of the Gila and Salt River Baseline and Meridian (GSRB&M).

1.6.2 Land Ownership

Figure 2 also depicts the land ownership within and surrounding the existing Bagdad Mine. The majority of the existing Bagdad Mine operations and facilities are situated on private lands. As discussed in detail in Section 1.7.1.1, the 1996 MPO and subsequent amendments have been approved by the BLM to allow the surface disturbances necessary for the Upper Mammoth Tailings Impoundment and the construction and extension of the Stockpile.

The surface disturbances approved by the 1996 MPO and subsequent modifications are depicted in Figure 3 and encompass the BLM-managed lands in Sections 8 and 9 of Township 14 North, Range 9 West of the GSRB&M.

The Stockpile extension and distributed facilities proposed in this MPO Modification will occur on a combination of private and public lands within Sections 16 and 17 of Township 14 North, Range 9 West of the GSRB&M, as depicted in Figure 4 and Figure 5. The elements of this MPO Modification are discussed in detail in Section 2.0.

1.6.3 Land Setting

The Bagdad Mine lies within the Central Highlands transition zone physiographic province, lying between the Colorado Plateau to the north and east and the Basin and Range physiographic province to the south and west. The Central Highlands physiographic province is characterized by rugged mountains of igneous, metamorphic, and sedimentary rock. The Santa Maria Mountains are located to the northeast of Bagdad and the Poachie Range lies to the southwest. The area more proximate to the Bagdad Mine is characterized by low rolling hills, lava-capped mesas, and narrow, deeply incised canyons. Elevations in

the vicinity of Bagdad Mine range from approximately 2,300 feet above mean sea level (amsl) at Burro Creek to roughly 5,100 feet amsl in the Grayback Mountains south of the mine.

The project lies within the Bill Williams River Basin (HUC6 150302)[1] of the Lower Colorado Subregion. On the north side of the Bagdad Mine, Boulder Creek generally flows westward to Burro Creek (Figure 1), which joins the Big Sandy River more than 30 river miles downgradient of the mine. As depicted in Figure 2, the drainage divide (ridgeline) between the Burro Subbasin (HUC8 15030202) and the Santa Maria Subbasin (HUC8 15030203) roughly corresponds to the southern boundary of the proposed limit of the Stockpile extension. On the regional basis, stormwater flows originating on the north side of this drainage divide are directed along this course; however, the earlier operations and creation of the open pit have altered the natural hydrology in the upper reaches of the watershed. Stormwater flow from the Stockpile and proposed Stockpile extension is captured by the open pit and does not have the potential to discharge to downgradient, receiving waters, as discussed in Section 1.7.2.

South of the drainage divide, stormwater flows are naturally directed towards Bridle Creek, which joins the Santa Maria River approximately 16 river miles south of the project area; the Santa Maria River continues for approximately 25 miles before reaching Alamo Lake (Figure 1). The confluence of the Big Sandy and Santa Maria rivers is located approximately five miles upgradient of Alamo Dam. Downgradient of Alamo Dam, the Bill Williams River continues in a westerly direction for more than 40 miles before joining the Colorado River at Parker Dam. The future, distributed facilities proposed in this MPO Modification generally lie on the south side of the drainage divide.

1.6.4 Statement of Basis (Right to Enter Property)

FMBI is a legal entity authorized to do business in the state of Arizona. FMBI holds legal interests in the areas incorporated into the MPO Modification through the ownership of patented claims, as well as the ownership of unpatented claims located on BLM-managed public lands. Appendix A presents a list of unpatented claims that intersect or lie within the areas proposed for disturbance in this MPO Modification (Table A.1) and the related, prior approvals under 43 CFR 3809 (Table A.2).

1.7 PERMITTING INFORMATION

FMBI holds the state and federal permits and authorizations necessary to mine and process metal minerals from the existing facilities at the Bagdad Mine. Table 2 lists the permits under which the Bagdad Mine currently operates; these permits are further discussed in the following sections.

[1] The US Geologic Survey (USGS) has delineated watersheds in the United States using a national standard hierarchical system based on surface hydrologic features, classified into hydrologic units (HUCs), as follows.

HUC	Level	Common Name
2-digit HUC	First-level	Region
4-digit HUC	Second-level	Subregion
6-digit HUC	Third-level	Accounting unit or Basin
8-digit HUC	Fourth-level	Cataloguing unit or Subbasin
10-digit HUC	Fifth-level	Watershed
12-digit HUC	Sixth-level	Subwatershed

Table 2 Applicable Permits and Regulatory Framework

Environmental Media/Regulatory Framework	Permit Number	Description	Issuing Agency	Status
Land Permits				
BLM Surface Management Regulations (43 CFR 3809)	AZA-28639	▪ 1996 MPO (approved 1996) ▪ 1996 MPO Amendment (approved 1997) ▪ 2004 Minor Modification (approved 2005) ▪ 2011 MPO Addendum (approved 2012)	BLM	Current
Arizona State Mine Inspector (Mined Land Reclamation Act)		Reclamation Plan (EnviroNet, Inc. 1997)	ASMI	Current
Water Permits				
Clean Water Act	AZ0022268	AZPDES Permit for discharges to Copper Creek, Mulholland Wash, and Mammoth Wash	ADEQ	Current
	AZMSG-64654 (AZ Mining MSGP-2010 Authorization Number)	AZPDES MSGP: Sector G – Metal Mining (Ore Mining and Dressing) and Sector J – Non-Metallic Mineral Mining and Dressing	ADEQ	Current; (ADEQ's 2010 Mining MSGP expires 02/01/16) SWPPP maintained on site
	Oil Pollution Prevention	CWA Section 311 – Spill Prevention Control and Countermeasure Plan	EPA	Current; SPCC Plan maintained on-site
Aquifer Protection Permit	P-105258	Area-wide Permit	ADEQ	Current, dated 08/28/2013
ADWR Permitting	Various permits	See discussion in Section 1.7.2.3	ADWR	Current
Air Permit				
Air Quality	29846	Class II Synthetic Minor Air Quality Permit	ADEQ	Current; expires 12/07/2014
Hazardous Waste Permit				
Resource Conservation and Recovery Act	HW EPA ID AZD-083717843	Small Quantity Generator	EPA	Current; no expiration date

1.7.1 Land Permits

1.7.1.1 BLM Surface Management

Mining-related surface disturbing activities conducted on lands managed by the BLM must comply with 43 CFR 3809, which requires a mine plan of operations. The *Plan of Operations for Tailings Facility Expansion and South Waste Rock Disposal Facility (Revision No. 4)* was submitted to the BLM in July 1995 and updated in February 1996 (*Plan of Operations for Upper Mammoth Tailings & South Waste Rock Disposal Facilities [Revision No. 5])* to incorporate the mitigating measures required by the Record of Decision (ROD). The ROD was issued March 5, 1996, which followed the preparation of the Draft and Final EIS (BLM, 1995a and 1995b) in accordance with the requirements of the National

Environmental Policy Act (NEPA). The February 1996 *Plan of Operations for Upper Mammoth Tailings & South Waste Rock Disposal Facilities (Revision No. 5)* is the approved, original Mine Plan of Operations (1996 MPO).

The following amendments to the 1996 MPO have been submitted to and approved by the BLM:

- *Amendment to the Existing Plan of Operations to Include Portions of the Plan 9 Dump*, dated December 1996 and approved via an Administrative Determination in February 1997. This 1997 Amendment expanded the Plan 9 (now Plan IX) facility onto additional BLM-managed lands.
- *Addendum to the Existing Plan of Operations (Revision No. 8),* dated November 2004 and approved via BLM Decision and Documentation of Land Use Plan Conformance and NEPA Adequacy (DNA) in April 2005. This 2005 Minor Modification requested approval to expand the area for material placement in the Plan IX Stockpile. The lateral, eastward expansion of the Plan IX Stockpile also converted a portion of the South Waste Rock Stockpile to a leaching facility.
- *Addendum to Plan of Operations for Plan IX Leach Stockpile and South Waste Rock Disposal Facilities*, dated and approved in November 2012. The 2012 Addendum requested approval for the expansion and consolidation of the Plan IX Leach Stockpile and the South Waste Rock Stockpile onto additional BLM-managed lands.

Approximately 671 acres of BLM-managed lands have been approved for disturbance through the approval of the 1996 MPO and subsequent amendments. BLM records document that prior MPO-related approvals were granted based on the unpatented claim boundaries listed in the 1996 MPO and subsequent amendments and comprise all of the public lands within Sections 8 and 9 of Township 14 North, Range 9 West of the GSRB&M. Figure 3 shows land ownership and the existing, BLM-permitted disturbance areas associated with the Stockpile. Figure 2 shows the existing, approved limits of disturbance for the current operation and provides general locations of existing mine facilities.

1.7.1.2 Mined Land Reclamation Plan

The Arizona State Mine Inspector (ASMI) requires that reclamation plans and associated costs must be submitted and approved for surface disturbances on private lands that are greater than five acres in extent. The ASMI also requires financial assurance for the reclamation of disturbed areas.

The Bagdad Mine maintains a mined land reclamation plan and the required financial assurance for compliance with the ASMI rules and regulations (EnviroNet Inc., 1997). In accordance with Title 11, Chapter 2, Article 5 of the Arizona Administrative Code (AAC), the mined land reclamation plan defines the post-mining land uses for the mining units at the Bagdad Mine, including rangeland, future mineral exploration and development, industrial/commercial, stormwater management, and borrow material. The reclamation plan describes the post-mining measures to be implemented for public safety, erosion control, topographic contouring, roadway reclamation, revegetation, and soils management. Annually, the Bagdad Mine reports the extent of surface disturbance, and the reclamation plan and financial assurance are updated accordingly.

1.7.2 Water Permits

1.7.2.1 Clean Water Act

The primary focus of the Clean Water Act (CWA) is to improve water quality by regulating the discharges of pollutants into waters of the US and regulating quality standards for surface waters. Compliance with Sections 404 and 401, Section 402, and Section 311 of the CWA are applicable to operations at the Bagdad Mine.

1.7.2.1.1 Section 404 and 401 of the CWA

Administered by the US Army Corps of Engineers (Corps), Section 404 of the CWA regulates the discharge of dredged or fill material into waters of the US. The Corps was a cooperating agency for the 1995 EIS and issued a 404 permit (Corps File No. 954-0194-MB) for impacts to waters of the US related to the Upper Mammoth Tailings Impoundment and the South Waste Rock Stockpile. In parallel to the 404 permits issued by the Corps, the Arizona Department of Environmental Quality (ADEQ) provided water quality certifications pursuant to Section 401 of the CWA.

The elements proposed in this MPO Modification are not anticipated to result in impacts to waters of the US. However, FMBI will work with the Corps to gain the appropriate approvals, if needed.

1.7.2.1.2 Arizona Pollutant Discharge Elimination Systems (Section 402 of the CWA)

Section 402 of the CWA requires a National Pollutant Discharge Elimination System (NPDES) permit for all existing and new sources of pollution that could discharge to waters of the US. In Arizona, the ADEQ has the authority to administer this program; ADEQ has the responsibility for the Arizona Pollutant Discharge Elimination System (AZPDES) program and permits.

Industrial activities with stormwater discharges are required to obtain an AZPDES stormwater permit. The ADEQ issued the most recent Multi-Sector General Permits (MSGPs) for certain classes of industrial activities in 2010. The Bagdad Mine maintains coverage under the MSGP for Sector G, Metal Mining (Ore Mining and Dressing), and Sector J, Non-Metallic Mineral Mining and Dressing. ADEQ's Mining MSGP was signed on December 20, 2010, and is valid for five years. The Bagdad Mine operates under MSGP authorization number AZMSG-64654 for stormwater discharges.

Under the terms of the MSGP, the Bagdad Mine maintains a Storm Water Pollution Prevention Plan (SWPPP). The SWPPP identifies pollution prevention procedures for areas of the site that could potentially discharge stormwater associated with mining activities. The SWPPP describes best management practices (BMPs) and control measures for the management of stormwater.

The portions of the mine facility that do not discharge stormwater to downgradient, receiving waters are not subject to coverage under the MSGP and are designated as non-discharging areas in the SWPPP. This includes the Stockpile and proposed Stockpile extension, the open pit, areas that drain to the open pit, the mill area, and other areas of the mine facility where stormwater is collected and used as process water, is left in the collection area and disposed through evaporation, or is contained within a hydrologic boundary.

Areas of the Bagdad Mine that have been identified to potentially discharge stormwater include:

- Mammoth stormwater basin
- Mulholland stormwater basin
- Copper Creek Flood Basin/mine shop un-mineralized overburden stockpile out slope
- Butte Creek un-mineralized overburden stockpile out slope

In addition to compliance with the MSGP for stormwater discharges, the Bagdad Mine has three discharge points (outfalls) regulated under an individual AZPDES Permit (No. AZ0022268). The following facilities are covered under the individual AZPDES permit:

- Copper Creek Flood Basin (Outfall 001)
- Mulholland Tailings Impoundment (Outfall 003)
- Mammoth Tailings Impoundment (Outfall 006)

Because the Stockpile extension area drains to the open pit, no change to the MSGP or SWPPP is anticipated for this element of the MPO Modification. Construction of distributed facilities may mandate an update to the SWPPP. The elements proposed in this MPO Modification will not affect the discharges regulated by the individual AZPDES permit.

1.7.2.1.3 Oil Pollution Prevention (Section 311 of the CWA)

Pursuant to the US Environmental Protection Agency's (EPA) oil pollution prevention regulations (40 CFR 112), the Bagdad Mine maintains a Spill Prevention, Control and Countermeasure (SPCC) Plan. The SPCC Plan documents measures for the prevention of, preparedness for, and response to oil discharges to navigable waters as required by Section 311 of the CWA. The SPCC Plan establishes procedures, methods, and equipment requirements to contain discharges of oil and prevent oil from reaching navigable waters. If necessary, the SPCC Plan will be updated to reflect the proposed MPO Modification.

As with the AZPDES permit, portions of the mine facility do not discharge and do not have the potential to discharge to downgradient, receiving waters. These areas are not subject to coverage under the SPCC Plan and include the Stockpile and proposed Stockpile extension, the open pit, and other areas of the mine facility contained within a hydrologic boundary. Nevertheless, the SPCC Plan includes oil-filled containers and equipment located within the open pit, the Stockpile, and proposed Stockpile extension on a voluntary basis to identify the associated spill prevention and containment measures, as discussed in Section 2.7.1.

1.7.2.2 Aquifer Protection Permit

The ADEQ administers the Aquifer Protection Permit (APP) program for the protection of groundwater quality; the program was promulgated in 1989. Facilities that discharge a pollutant either directly to an aquifer or to the land surface or the vadose zone require an APP if there is a reasonable probability that the pollutant may reach an aquifer. Key components of the APP requirements include: (1) demonstrating Best Available Demonstrated Control Technology (BADCT) and (2) not causing or contributing to the violation of aquifer water quality standards at the point(s) of compliance (POCs). The APP program also prescribes monitoring requirements, record keeping and reporting requirements, contingency planning, discharge limitations, compliance schedules, and closure/post-closure monitoring and maintenance

requirements. The APP remains in effect for the life of the facility, including the operational, closure, and post-closure periods (unless suspended or revoked).

Prior to the promulgation and implementation of the APP program, the Bagdad Mine operated under a Notice of Disposal (NOD). Pursuant to AAC R18-9-104 and 105, during the transition to the APP program the Bagdad Mine continued to be covered under the NOD and was in compliance with the APP program as long as the facility did not cause or contribute to a violation of aquifer water quality standards. The allowance for "permit continuance" under the regulations was applicable to the discharging facilities at the mine until the ADEQ either issued or denied an APP.

In accordance with the APP program regulations, an application for an area-wide APP for the Bagdad Mine was submitted to the ADEQ in 1993 (P-105258). A separate APP (P-101353) was issued in 1996, which included coverage for the Kimberly Pond, Mammoth and Upper Mammoth tailings impoundments, the Mammoth Tailings Seepage Collection Pond, and the South Waste Rock Stockpile. The ADEQ consolidated these permits on October 4, 2012, and all the mining-related operations at the Bagdad Mine are now covered by the area-wide APP P-105258. An amendment to the area-wide APP was signed on August 28, 2013, and is the current version of the permit. A copy of the current APP is provided in Appendix B.[1] The APP will be reviewed and updated to reflect the proposed Stockpile extension.

If specific elements meeting the definition of a discharging facility are proposed within the area indicated for distributed facilities, the APP would be reviewed and updated appropriately.

1.7.2.2.1 Best Available Demonstrated Control Technology Demonstration

The BADCT demonstration ensures that engineering controls, processes, operating methods or other alternatives, including site-specific characteristics, are employed to reduce discharges of pollutants to the greatest degree achievable before pollutants can reach the aquifer or to prevent pollutants from reaching the aquifer. The Arizona Revised Statutes (ARS) § 49-243.G state:

> *A discharging facility at an open pit mining operation shall be deemed to satisfy [the BADCT requirements of ARS 49-243.B.1] if the [ADEQ] determines that both of the following conditions are satisfied:*
>
> 1. *The mine pit creates a passive containment that is sufficient to capture the pollutants discharged and that is hydrologically isolated to the extent that it does not allow pollutant migration from the capture zone. For purposes of this paragraph, 'passive containment' means natural or engineered topographical, geological or hydrological control measures that can operate without continuous maintenance. Monitoring and inspections to confirm performance of the passive containment do not constitute maintenance.*
> 2. *The discharging facility employs additional processes, operating methods or other alternatives to minimize discharge.*

[1] Consistent with Sections 4.3.3.2.2 and 4.4.3.2 of the H-3809-1 Surface Management Handbook (BLM 2012), the MPO Modification will be appended in the future to include the current version of the APP permit.

The Bagdad Mine area-wide APP states that the open pit and the resulting passive containment capture zone will be used as an integral part of BADCT for the Stockpile and several other permitted facilities at the mine. The BADCT demonstration for the Stockpile is based upon site-specific characteristics, which include a combination of crystalline bedrock with a low hydraulic conductivity and northward sloping topography beneath the Stockpile. In addition, the presence of an inward hydraulic gradient (or cone of depression) created by the excavation of the open pit captures groundwater potentially impacted by the Stockpile. These site-specific characteristics are discussed in detail in Sections 5.1 and 5.2. Together, these site-specific characteristics comprise the "passive containment capture zone" required for BADCT demonstration and are summarized in the APP as follows:

> *Based on supporting documentation provided in the Application, the permittee has satisfactorily predicted that the Bagdad open pit mine will create a 'passive containment capture zone,' as per ARS § 49-243(G). The water balance in the numerical model for the Bagdad open pit predicts that static equilibrium will be maintained in the pit lake following closure at a maximum elevation of 2,410 feet [amsl]. Passive containment of the hydraulic capture zone will be maintained if the pit lake elevation remains below 2,750 feet amsl. The model estimates that static equilibrium in the pit lake will not be reached for approximately 500 years.*

The APP requires a review and update of the approved groundwater model every five years to compare current groundwater data to previous model predictions. The model review evaluates available data on groundwater inflow, the estimated static water level in the pit, the estimated time to reach static water level, and the potential for the water level in the pit to rise to an elevation where the pit ceases to function as a passive containment capture zone. The first review and update of the groundwater model is due to the ADEQ on March 25, 2014. The preliminary results of the review and update of the groundwater model are depicted in Figure 6. The groundwater contours shown in the figure estimate the current elevation which separates saturated from unsaturated bedrock. Beneath the Stockpile and proposed Stockpile extension (and other areas surrounding the open pit), the groundwater gradient is sloped in the direction of the open pit. Therefore, the review and update of the groundwater model continues to demonstrate the inward hydraulic gradient created by the open pit. Additionally, the Stockpile extension is proposed entirely on northward sloping topography underlain by the low hydraulic conductivity crystalline bedrock, ensuring that the Stockpile and proposed Stockpile extension will continue to convey stormwater flow and leachate to the open pit.

Figure 2 depicts the facilities regulated under the area-wide APP related to the operation of the Stockpile, and a brief description of the facilities and the applicable BADCT are provided in Table 3.

The Alum Sump PLS and Kimberly ponds are identified as process solution impoundments within the passive containment capture zone in the APP. To maintain compliance with the BADCT, these facilities are equipped with pumps, as needed, to maintain a controlled, ponded surface elevation and minimize the risk of overtopping during storm events. Should overtopping occur for catchments within the pit area, the overflow solution will be contained within the passive containment capture zone of the open pit; these areas do not have the potential to discharge stormwater to downgradient, receiving waters.

Table 3 APP Facilities for Stockpile Operation

Facility	Facility Description and BADCT
Plan IX Leach Stockpile and South Waste Rock Stockpile (collectively, the Stockpile)	The Stockpile (including both the Plan IX Leach and South Waste Rock portions of the facility) is located within the passive containment capture zone of the open pit. The Plan IX Leach portion of the Stockpile is a low-grade leach facility located on alluvial valley-fill, underlain primarily by the Precambrian crystalline bedrock, and constructed over steeply sloping natural terrain using end dumping method of construction. The leachate (pregnant leach solution or PLS) from the Stockpile is collected at the downstream toe of the facility and gravity flows to the Alum Sump PLS Pond and Kimberly Pond catchments. To minimize discharge, surface water run-on is diverted away from the facility and is ultimately captured by the open pit. The South Waste Rock Stockpile portion of the facility is a waste rock stockpile for mining overburden and is not leached.
Alum Sump Pregnant Leach Solution (PLS) Pond	The facility is a lined impoundment designed to receive leachate from the Stockpile. The impoundment has a total solution capacity of approximately 774,000 gallons, including approximately 414,000 gallons at the normal operating level, and an approximate total depth of 12 feet, including 8 feet at the normal operating level. Accumulated process solution is pumped through a high-density polyethylene (HDPE) pipeline to the SX/EW plant. The Alum Sump PLS Pond is located on private land, on a bench in the pit at an elevation of 3,200 feet amsl and is within the passive containment capture zone of the open pit. The impoundment is lined with an 80-mil HDPE geomembrane underlain with a minimum 1-foot thick compacted subgrade, constructed of select on-site alluvial material, and overlain with 2 feet (minimum) aggregate cover to protect the liner from rock fall. The geomembrane is secured by an engineered trench. A water-tight seal is located at the southwest corner of the impoundment to receive PLS from the existing bedrock seeps onto the liner embedded in non-shrink grout. A 3-foot-high berm has been constructed between the pit wall and the impoundment to prevent liner damage from rock fall. Surface water runoff is diverted away from the facility. During process upset or severe storm events, the overflow reports to the open pit.
Kimberly Pond (process solution impoundment)	The Kimberly Pond is situated on private land within the passive containment capture zone of the open pit. The facility receives leachate and stormwater runoff from the Stockpile. The base of Kimberly Pond is comprised of a 2-foot thick layer of compacted Gila conglomerate. The area is underlain by crystalline bedrock that is covered with approximately 150 feet of Kimberly tailings from earlier mine workings. The pond has an operating solution holding capacity of approximately 17.9 million gallons. The pond is protected from stormwater run-on by ditches and berms and is surrounded on all sides by leach stockpiles. Stormwater is directed to the open pit. A slope stability analysis for Kimberly Pond has determined acceptable factors of safety for both static and pseudostatic loading conditions.

1.7.2.2.2 Compliance with Aquifer Water Quality Standards

APP applicants are also required to demonstrate that discharged pollutants will not cause or contribute to a violation of aquifer water quality standards at POC(s). The APP states:

> *The permittee shall construct, operate, and maintain the permitted facilities [including the Stockpile and applicable to proposed Stockpile extension]:*
>
> 1. *Following all the conditions of this permit including the design and operational information documented or referenced [in the permit], and*

> 2. *Such that Aquifer Water Quality Standards are not violated at the applicable [POCs] set forth [in the permit], or if an [Aquifer Water Quality Standard] for a pollutant has been exceeded in an aquifer at the time of permit issuance, that no additional degradation of the aquifer relative to that pollutant, and as determined at the applicable POC, occurs as a result of the discharge from the facility.*

In accordance with these two overarching requirements of the APP, the Bagdad Mine area-wide APP specifies aquifer quality limits (AQL) and alert levels (ALs) for the individual POCs based on the aquifer water quality standards and ambient conditions.

The POCs for the Bagdad Mine area-wide APP are listed in Table 4 and are depicted in Figure 2. Quarterly and biennial monitoring is required at each POC well for physical and chemical parameters to demonstrate adherence to the AQLs established in the permit.

Table 4 Points of Compliance for the Bagdad Mine Area-wide APP

Point of Compliance ID	Latitude	Longitude	ADWR Well Registration No.
609	34° 36’ 25” N	113° 13’ 57” W	55-537609
610	34° 36’ 25” N	113° 13’ 56” W	55-537610
611	34° 35’ 51” N	113° 13’ 26” W	55-906854
020	34° 35’ 47” N	113° 16’ 57” W	55-562020
803	34° 35’ 41” N	113° 17’ 08” W	55-543803
283	34° 35’ 36” N	113° 17’ 57” W	55-55283
613	34° 35’ 17” N	113° 17’ 30” W	55-546613
810	34° 34’ 55” N	113° 17’ 31” W	55-543810

1.7.2.2.3 Summary of Additional APP Requirements

In addition to the demonstration and maintenance of BADCT, the APP defines:

- Operational requirements, which mandate quarterly and precipitation-prompted inspections and monitoring for:
  - Instability/deformation, erosion, debris, and access impairment on the Stockpile
  - Operational condition and structural integrity of pumps, valves, and structures related to the process solutions impoundments
- Discharge limitations, requiring permitted facilities to be operated and maintained to prevent unauthorized discharges resulting from failure or bypassing BADCT pollutant control technologies
- Monitoring, reporting, and recordkeeping requirements, including facility and operational monitoring, groundwater monitoring, and sampling protocols
- Contingency and emergency response plans, which define actions for exceeding ALs or AQLs for groundwater monitoring, discharge limits, operational performance levels (such as freeboard), and leakage rates

The APP defines actions to be taken in the event of violations of discharge limits (such as liner or containment structure failure, unexpected loss of fluid, and overtopping of a surface impoundment), exceedences of ALs, and violations of AQLs. Emergency response and contingency requirements for unauthorized discharges mandate FMBI's duty to respond and act immediately to correct the condition. The emergency response and contingency plan includes measures to isolate, identify, record, and report unauthorized discharges. If needed, the APP provides a process for the implementation of corrective actions (including review and approval by ADEQ for actions beyond emergency response) to accomplish any of the following goals in response to exceeding an AL or violation of an AQL, discharge limit, or other permit condition:

- Control of the source of an unauthorized discharge
- Soil cleanup
- Cleanup of affected surface waters
- Cleanup of affected parts of the aquifer
- Mitigation to limit the impact of pollutants on existing uses of the aquifer

The APP program also requires a demonstration of the technical and financial capability of the applicant to carry out the terms and conditions of the permit and the maintenance of financial assurance throughout the life of the facility, including operational, closure, and post-closure periods.

1.7.2.2.4 Closure and Post-Closure

The APP permit requires a closure and post-closure plan which outlines the strategy to achieve clean closure at the end of mining. During operations, the closure plan must provide sufficient detail to establish the required financial assurance. When the Bagdad Mine intends to cease operations permanently, the APP requires ADEQ notification and submittal of a final closure plan for approval. The final closure plan must include site investigations, designs, and a schedule to identify and address potential contamination of soils and groundwater. Post-closure monitoring and maintenance activities are also mandated under the APP program until approval of clean closure is achieved or a post-closure plan for controls and monitoring is approved. The closure and post-closure plan for the Stockpile are discussed further in Section 6.0 of this MPO Modification.

The financial assurance required by the APP for closure activities has been established and maintained with the ADEQ, and will be updated in accordance with the APP requirements as necessary.

1.7.2.3 Arizona Department of Water Resources Permitting

The Arizona Department of Water Resources (ADWR) administers programs for the management of the drilling of groundwater wells and the use of groundwater and surface water. These programs include:

- Drilling and Water Use: A notice of intent to drill must be filed with the ADWR for the installation of groundwater production wells, piezometers, and monitoring wells.
- Appropriations of Surface Water: The use of surface water is subject to appropriation and beneficial use, as administered by the ADWR.

- Withdrawal and Use of Groundwater: Use of groundwater in Arizona is administered by the ADWR. Outside of active management areas (which includes the Bagdad Mine), the use of groundwater may be used for any reasonable and beneficial use.

The Bagdad Mine maintains compliance with the programs administered by the ADWR.

1.7.3 Air Permit

The Clean Air Act (CAA) established primary and secondary National Ambient Air Quality Standards (NAAQS). The ADEQ administers air quality permitting in Arizona, requiring sources of air pollution to obtain permits to ensure compliance with applicable federal and state air pollution control requirements and air quality standards.

The Bagdad Mine operates under an active Class II Synthetic Minor air quality permit number 29846, which covers air emissions from the Bagdad Mine facilities and associated infrastructure. The air quality permit states that the Bagdad Mine has the potential to emit more than 100 tons per year of particulate matter with an aerodynamic diameter of less than 10 microns (PM_{10}), and that the mine will operate air pollution controls and accept voluntary emissions limitations to stay below the major source threshold. This permit currently is valid through December 7, 2014. The changes proposed in this MPO Modification are not anticipated to require a change in the air emissions and air permitting (*i.e.*, no changes in production rates or equipment are anticipated by the actions described in this MPO Modification). Regardless, changes will be evaluated to determine applicability of the air quality permit requirements, and FMBI will request the appropriate modifications, if needed.

1.7.4 Hazardous Waste Permit

Management of hazardous wastes, including those generated by the minerals industry, is regulated under the Resource Conservation and Recovery Act of 1976 (RCRA). The RCRA regulations establish a comprehensive hazardous waste management system that governs the management of hazardous waste from the point of generation through final disposition. The EPA has generator standards that address on-site accumulation of hazardous waste, cradle-to-grave tracking (manifest system), labeling, and recordkeeping and reporting requirements.

The Bagdad Mine is identified as a small quantity generator and maintains compliance with the requirements under RCRA for hazardous waste management under Hazardous Waste EPA identification number AZD-083717843.

2.0 STOCKPILE EXTENSION MODIFICATION TO THE MINE PLAN OF OPERATIONS

This MPO Modification proposes an increase to the area of surface disturbance of BLM-managed land associated with the Stockpile at the Bagdad Mine. An additional 441 acres of surface disturbance to BLM-managed land will provide for the construction, operation, closure and post-closure of the proposed Stockpile extension. As discussed in Section 1.7.1.1, approximately 671 acres of BLM land has been previously approved for disturbance. Including the prior approvals, a total of 1,112 acres of BLM-managed land (671 acres of prior approvals in Sections 8 and 9 of Township 14 North, Range 9 West plus 441 acres delineated as the proposed limit of Stockpile extension) will be approved for disturbance for the construction, operation, closure and post-closure of the Stockpile and proposed Stockpile extension. The proposed Stockpile extension is depicted in Figure 4 and Figure 5 and is discussed in detail in Section 2.1.1.

In addition, this MPO Modification contemplates the installation of limited, distributed facilities on an as-needed basis in the future. The surface disturbance proposed for the limited, distributed facilities is not anticipated to exceed a cumulative total of 150 acres of the approximately 670 acres of BLM-managed lands identified in Sections 16 and 17 of Township 14 North, Range 9 West. The area for future, distributed facilities is depicted in Figure 4 and Figure 5 and is discussed in detail in Section 2.1.2. Distributed facilities may also extend into the area of the proposed Stockpile extension.

Table 5 Approximate Proposed Disturbance Areas

	BLM-Managed Land Area (acres)	Private Land Area (acres)	Total Area (acres)
Proposed limit of Stockpile extension	441	79	520
Distributed facilities	150	2	152
Total	591	81	672

Notes:

- Slight discrepancies may exist in subtotal and total values due to rounding.
- Distributed facilities may be constructed within the proposed limit of Stockpile extension; the disturbance area for such cases is accounted for within the proposed limit of Stockpile extension.
- Approved and proposed disturbances on private lands are not subject to BLM authorizations; the area of private land delineated is limited to the "islands" of private land (completely surrounded by BLM-managed land) and occurring in Sections 16 and 17 of Township 14 North, Range 9 West of the GSRB&M.
- FMBI will continue to use and maintain (if needed) existing roads in the vicinity of the Bagdad Mine for light vehicle access; existing roads are not delineated in this table.

This MPO Modification presents a conceptual or preliminary level of planning and engineering for the Stockpile extension and distributed facilities necessary for the construction, operation, monitoring, closure, and post-closure of the mine. This MPO Modification provides the basic information related to the proposed limits of disturbance, location, operations, type of waste generated, and engineering factors to evaluate the project performance. The content in this MPO Modification may be updated or appended to reflect other agency permits, final designs, or certain stipulations as more specific and detailed engineering designs or information become available. This approach is proposed in order to preclude the need for future plan amendments as the mine plan for Bagdad is advanced and refined and is consistent with Sections 4.3.3.2.2 and 4.4.3.2 of the H-3809-1 Surface Management Handbook (BLM, 2012).

2.1 PROPOSED FACILITIES AND FEATURES

2.1.1 Stockpile Extension

This MPO Modification proposes both the lateral and vertical extension of the Stockpile. Figure 4 (with an aerial photograph background) and Figure 5 (with a USGS quadrangle map background) depict the proposed limit of Stockpile extension and the existing and conceptual extents of the Stockpile. The conceptual extent of the Stockpile is based on preliminary planning and engineering estimates of the required rock storage volume and side slopes. The final design, construction, and actual configuration of the Stockpile extension may vary to accommodate adjustments or refinements to the engineering design and/or possible slope stability, safety, access, water management, or other construction, operational, closure or post-closure needs. Additionally, FMBI recognizes that as economics change in the future, a degree of flexibility in the Stockpile configuration is desirable. For these reasons, this MPO Modification identifies the proposed limit of Stockpile extension as the anticipated, maximum area of disturbance. The identification of the upper limit on the facility size to accommodate FMBI's potential future needs avoids fragmenting the approval process later with modifications and is consistent with the approach described in Section 4.3.3.2.2 of the H-3809-1 Surface Management Handbook (BLM, 2012).

The operation of the expanded Stockpile will continue in the same manner as the current Stockpile. Overburden and mineralized waste rock materials from the open pit will continue to be placed on the Stockpile by haul trucks. Leaching will occur on the western, Plan IX Leach portion of the Stockpile, and overburden/mineralized waste rock will be stored on the eastern, South Waste Rock portion of the Stockpile. Figure 4 and Figure 5 depict the maximum extent of leaching for the existing portion of the Stockpile (as established under the existing APP P-105258) and estimates the future location of this dividing line over the proposed Stockpile extension; leaching will not occur east of this line.[1] Leaching operations will continue the application of raffinate to the surface of the Plan IX Leach portion of the Stockpile and proposed Stockpile extension. Leaching operations and processing are further discussed in Section 2.2.6.

A topographic map of the Stockpile configuration at the end of mining is provided in Figure 7, and Figure 8 depicts representative cross sections of the conceptual Stockpile configuration at the end of mining. The southern boundary of the proposed limit of Stockpile extension generally corresponds to the drainage divide (ridgeline) between the Burro Subbasin (HUC8 15030202) and the Santa Maria Subbasin (HUC8 15030203), as depicted in Figure 5.[2] Stockpiled materials will not be placed south of this drainage divide. As discussed in Section 1.7.2.1.2, stormwater runoff from the existing Stockpile is currently directed to the passive containment capture zone of the open pit. Stormwater runoff from the Stockpile extension will also be directed to the passive containment capture zone of the open pit, and is further discussed in Section 2.4.

[1] The location of the maximum extent of leaching is estimated for the proposed Stockpile extension; the final location of this line will be established under APP P-105258.

[2] The southern boundary of the proposed limit of Stockpile extension corresponds to the drainage divide based on site flown topographic contours that are more refined that the HUC drainage divide produced by the USGS.

Construction of the Stockpile will generally consist of placement of mined materials in 50-foot lifts. In accordance with requirements of the Mine Safety and Health Administration (MSHA), safety berms will be constructed at the edge of each lift. Benches (generally designed to be 115-feet wide) will be constructed roughly every 250 to 300 feet of elevation for slope stability and to catch potential rockfall.

The inter-bench and overall slope angles of the Stockpile will vary depending on location and existing topography. Generally, the side slopes will be shallower toward the open pit and steeper where the Stockpile extension ties into up-sloping natural terrain. Inter-bench slopes may be up to the angle of repose,[1] which is approximately 35 to 45 degrees for the coarsely broken mineralized waste rock and overburden. However, accounting for the slope stability benches, the overall slope angle may be up to approximately 22 degrees. The geotechnical stability of the Stockpile is subject to review by the ADEQ under the requirements of the APP, including a demonstration of the stability under static and pseudostatic loading conditions, and is further discussed in Section 2.2.4.3.

In addition, the Stockpile configuration must be routinely monitored, inspected, documented, and reported under the terms of the APP. This includes visual inspections on a monthly basis (or following specified precipitation events) for deformation and instability such as surface cracking, slides, sloughs, and differential settlement. The APP also mandates appropriate action to evaluate and remedy signs of instability. Monitoring requirements are further discussed in Sections 2.6 and 3.3. Stockpile construction also accounts for concurrent reclamation, by conducting material placement in a manner such that it will not require major reshaping to meet the reclamation standards or goals.

Access to the Stockpile will vary over time, with traditional mine haul trucks delivering rock from the open pit over an extensive ramp system. Access roads will be built into the lifts, at a maximum 10 percent grade and will meet or exceed MSHA standards. MSHA standards are based on the largest vehicle traversing the roads, and require berms equal to the mid-axel height (approximately seven feet) and roadway widths to accommodate one half the vehicle width on each side. Thus, the surface width of a two-direction haul road will be a minimum of approximately 110 feet, or 3.5 times the width of the largest vehicle (approximately 31 feet). The current Stockpile has been constructed using traditional mine haul truck equipment. Additional mine equipment supporting Stockpile operations include: track dozers for safety berm construction, spreading of placed material, and ramp construction; a grader and tire dozer for haul road maintenance; and water trucks for dust suppression. The same equipment will continue to be used for the Stockpile extension.

2.1.2 Distributed Facilities

The distributed facilities proposed in this MPO Modification fulfill the need for future, support facilities that are typically associated with mining operations to meet safety, environmental, operational, closure, and post-closure requirements. As depicted in Figure 4 and Figure 5, the distributed facilities are contemplated south of the drainage divide that demarks the southern limit of the proposed Stockpile extension, although facilities may also be constructed within the area proposed for the Stockpile extension. While the area identified for limited, future, distributed facilities encompasses a total of

[1] The angle at which loosely placed rock will stand under its own weight.

approximately 670 acres of BLM-managed lands, the surface disturbance from individual distributed facilities will be minimized where practicable, and the cumulative total surface disturbance for distributed facilities is not anticipated to exceed 150 acres.

The basic description and typical configuration of possible distributed facilities are presented in Appendix C. Distributed facilities may include, but are not limited to:

- passenger vehicle/light-duty truck access roadways;
- linear features and utilities (such as, power lines, raw or process water lines, and/or gas lines);
- monitoring wells;
- communications equipment and apparatus;
- water management facilities;
- wildlife monitoring stations;
- signage, barriers, or berms;
- scientific monitoring equipment; and/or
- geotechnical/slope stability monitoring equipment.

As an example, access roads may be necessary where routes do not currently exist and would be planned for the minimum width needed for operations; access roads would follow natural terrain where practicable to minimize cut and fill. FMBI will continue to use and maintain existing roads in the vicinity of the Bagdad Mine for light vehicle access, as needed; use and maintenance of existing roads will continue and is not subject to approval under this MPO Modification.

The distributed facilities represent a preliminary level of planning. FMBI anticipates that a condition of the approval of this MPO would require the submittal of final engineering plans to the BLM prior to ground disturbing activities related to the distributed facilities. FMBI would incorporate findings, requirements, and/or mitigation, as appropriate, resulting from the environmental review under NEPA into final engineering plans.

Alternately, FMBI may request or the BLM may require a new modification to the MPO pursuant to 43 CFR 3809.430 or 3809.431, respectively. In such instance, the BLM may elect to initially review such future modification(s) to the MPO for the development of features consistent with these concepts using a DNA, and possibly accept such modifications as a minor modification pursuant to 43 CFR 3809.432(b), which states "BLM will accept a minor modification without formal approval if it is consistent with the approved plan of operations and does not constitute a substantive change that requires additional analysis under NEPA." If final engineering plans or modification requests do not fall under 43 CFR 3809.411(d)(2) or 3809.432(b), then FMBI may request or the BLM may require a review of a new modification pursuant to 43 CFR 3809.432(a), which states "BLM will review and approve a modification of your plan of operations in the same manner as it reviewed and approved your initial plan."

2.2 OPERATIONS AND PROCESSING

The following sections provide an overview of mining operations and processing that occur at the Bagdad Mine. The majority of the mining operations occur on private lands and are not elements proposed in this MPO Modification or subject to the requirements of 43 CFR 3809.

2.2.1 Mine Production

The FMBI operation includes an open pit copper mine with oxide and sulfide mineralization that is processed by SX/EW and conventional sulfide concentration methods. The mine has operated as an open pit operation since the middle of the 20th century. Conventional drilling, blasting and stripping techniques are used to generate ore for processing, mineralized waste rock for leaching, and overburden materials from the open pit. The open pit, SX/EW plant, mill and processing facilities are located on private lands.

2.2.2 Material Handling Techniques

After blasting, the materials are loaded into haul trucks for delivery to the appropriate destination. Ore is directed to the mill for processing. Leachable, mineralized waste rock is delivered to leach stockpiles around the periphery of the open pit; overburden materials are stockpiled in several locations. A computer-based truck dispatch system maximizes production by optimally routing trucks to and from the shovels and stockpiles.

2.2.3 Mine Production Rate

The mine production rate is currently around 220,000 tons per day of combined mill ore, mineralized waste rock, and overburden. Currently, the production rate is approximately 80,000 tons per day of ore and 140,000 tons per day of mineralized waste rock and overburden; however, the ratio of ore to waste rock/overburden varies over the life of the mine, generally with an increase in the amount of ore and a reduction in waste rock and overburden generation towards the end of mine life.

2.2.4 Rock Management

2.2.4.1 Rock Characterization

The materials generated from the open pit are placed in three categories: ore, mineralized waste rock, and un-mineralized overburden. Ore material is characterized by assay determinations from blasthole drill cuttings and supplemented by visual geologic characterizations. Material with an assay grade above the copper minimum is directed to the mill for processing (ore); the remaining material is directed to stockpiles as mineralized waste rock. The ore cutoff grade which distinguishes ore from mineralized waste rock varies based on economics. Un-mineralized overburden material generally consists of Gila conglomerate and basalt and may be placed in separate stockpiles to be used for future reclamation needs. For the Stockpile extension, ore and waste rock determinations will continue to be completed as in current operations. Given the generally uniform characteristics of the materials directed to the Stockpile, placement is determined primarily by access routes and haul distance.

2.2.4.1.1 Ore Material

The ore and associated minerals are generally grouped according to their origin; those formed by ascending ore-forming solutions (hypogene minerals) and those formed by the action of descending solutions (supergene minerals). Hypogene alteration and mineralization of the quartz monzonite at Bagdad resulted in the formation of quartz, orthoclase, albitic plagioclase, leafy biotite, sericite, pyrite, chalcopyrite, and molybdenite. Supergene enrichment formed a chalcocite blanket before accumulation of the Gila conglomerate; the dominant northeast faults were important in controlling deposition of the chalcocite. The geology of the area is further discussed in Section 5.1.

2.2.4.1.2 Mineralized Waste Rock

Mined materials that do not contain mineralization above the cutoff grade are directed to stockpiles. Generally, the mineralized waste rock includes portions of the quartz monzonite porphyry and minor quantities of porphyritic veins, dikes, and plugs along faults, fractures, fissures, and the surrounding Precambrian granitic and metamorphic rocks. Mineralized waste rock placed on the Stockpile may or may not be leached to recover residual copper. The eastern, South Waste Rock Stockpile portion of the facility currently is not permitted for leaching activities. Previously, the materials placed on the eastern portion of the Stockpile have included relocated mill tailings, mineralized waste rock, and un-mineralized overburden.

2.2.4.1.3 Un-mineralized Overburden

The un-mineralized overburden predominantly consists of Gila conglomerate and basalt. Because of its silt and clay content and un-mineralized character, the Gila conglomerate makes ideal cover material and is readily revegetated. Calcium carbonate cementation of the Gila conglomerate is substantial, helping to neutralize acid when placed in contact or mixed with rocks of an acidic nature. Gila conglomerate material may be used for surfacing the coarse rock ramps and stockpile levels to minimize tire wear and other maintenance costs. Due to its origin, and chemical and physical make up, Gila conglomerate and the basalt are inert and non-acid generating (due to a lack of mineralization); these materials do not pose a risk to the environment.

2.2.4.2 Acid-generating Potential

The mineralized waste rock and other materials (un-mineralized overburden) to be placed on the proposed Stockpile extension are the same materials that have been placed on the Stockpile in the past. A series of analyses was performed to determine the acid-generating potential of the various rock types in the vicinity of the open pit, as documented in the Draft EIS (BLM, 1995a). The majority of the rock types are not acid-producing, with the exception of the quartz monzonite porphyry, which generally is characterized as ore material and directed to the mill for processing. The *Closure Plan – South Waste Rock Disposal Facility* (Titan Environmental Corporation, 1995) also assessed the acid-generating potential for the mineralized waste rock and other materials. Based on acid base accounting with a strong digestion, there is a 78% probability that the rocks tested were net neutralizing, and when a weak digestion was used (in order to simulate pyrite content) there is a 98% probability that rocks are net-neutralizing. Rocks with negative net neutralizing potential that were subjected to humidity test cells produced ultimate leachates above a pH of 5 (the minimum to allow vegetation to germinate) with only one exception.. The text, tables, and detailed analysis of the acid-generating potential of materials to be placed in the Stockpile, and proposed Stockpile extension, from the 1995 Closure Plan are reproduced in Appendix D.

The identification, handling, and control of potentially acid-forming materials is managed through the establishment of the passive containment capture zone, demonstration of BADCT compliance, and monitoring requirements mandated by the APP.

2.2.4.3 Geotechnical Stability

The geotechnical stability of the Stockpile is subject to review by the ADEQ under the requirements of the APP, including a demonstration of the stability under static and pseudostatic loading conditions.

Pursuant to the stability design guidance in Appendix E of the *Arizona Mining BADCT Guidance Manual* (ADEQ, 2005), SRK Consulting completed a stability analysis for the Plan IX Leach portion of the Stockpile in 2009. Geotechnically, the mineralized waste rock that will be placed on the proposed Stockpile extension is the same as the material previously placed. Further, the Stockpile extension will be built at the same slope angles as the existing stockpile facility. Thus, the 2009 stability analysis is still valid and demonstrates that the Stockpile extension will be stable. Additionally, the existing Stockpile has been in place in a similar configuration for more than 30 years (on private lands) and has exhibited no major slope failures, further verifying the geotechnical evaluation results.

The ADEQ stability design guidance requires factors of safety of 1.5 for static conditions and 1.1 for pseudostatic loading conditions. The geotechnical model for the stability analysis assumed (SRK, 2009):

- The mineralized waste rock generally consists of coarse-grained, angular gravel and rock fragments with a median grain size (D50) of about 10.5 inches.
- Shear strength parameters for the mineralized waste rock were back-calculated based on observation and measurement of small scale failures, including:
    - internal friction angle (φ) of 34 degrees
    - cohesion (c) of 20 pounds per square foot
- The foundation materials consist of a limited thickness of alluvium, colluvium and/or residual soil and crystalline bedrock which outcrops at the surface, and was assigned strength parameters for the geotechnical model of
    - friction angle (φ) of 45 degrees
    - cohesion (c) of 1,500 pounds per square foot
- The leach facility was assumed to be free-draining (high permeability with no excess pore pressure buildup), in accordance with the facility design and nature of the granular, mineralized waste rock

In addition, the stability analysis considered pseudostatic loading conditions, using a horizontal acceleration in the geotechnical model. A site-specific seismic peak ground acceleration of 0.058 g was assumed based on USGS seismic risk mapping for a 10 percent probability of occurrence in 50 years.

2.2.5 Milling and Flotation Processing

Blasted ore from the open pit that is directed to the mill undergoes primary, secondary, and tertiary crushing to reduce the ore size, increasing the surface area to facilitate the release of minerals. The crushed ore is fed to the concentrator where it is mixed with water in mills to achieve further size reduction. Reagents are added to the resulting slurry, which is conveyed to flotation cells. Air is bubbled through the flotation cell where the reagents and air create a froth to which select minerals attach and float to the surface; the froth is skimmed from the surface and collected as a concentrate. Waste particles sink to the bottom of the flotation cell and are sent to a thickening tank prior to deposition in the tailings impoundments.

2.2.6 Leaching

Stockpile leaching starts with the application of raffinate, a dilute sulfuric acid solution, to the stockpiled materials via a network of corrosion-resistant pipelines arranged on the surface of each lift. Figure 9 depicts a schematic of the typical distribution system piping layout for raffinate delivery on the surface of

each lift. Generally, raffinate is pumped via a HDPE main header pipeline, typically ranging in diameter from 12 to 36 inches; the typical HDPE pipeline has a standard dimension ratio[1] of 11, providing a general pressure rating of approximately 160 pounds per square inch. As the height of the Stockpile increases, the header pipeline(s) may require different materials to accommodate a higher pressure rating. On top of each lift, the distribution system piping progressively steps down in size, teeing to delivery headers and then to feed lines, typically 4 inches in diameter. The feed lines typically extend about 400 feet to distribute raffinate to a series of roughly parallel, 18-millimeter diameter polycarbonate drip lines. The drip lines are typically spaced about two feet apart and extend about 200 feet from the feed line. Emitters on the drip lines apply the raffinate to the surface of the lift and typically are spaced at approximately 18 inches. A distribution line completes the loop, tying the ends of the drip lines back to the delivery header. Multiple loops of feed lines, polycarbonate drip lines, and distribution lines typically are installed across the surface of each lift of the Stockpile. Valves and fittings are used as appropriate to connect pipelines, and are typically stainless steel (for the large diameter main and header pipelines) or polypropylene (for feed and delivery lines). The layout, materials, and sizes of the actual raffinate distribution system may vary from this description.

Ancillary facilities requiring electrical power (such as booster pumps, filters, or meters) will be installed as required. For example, booster pumps may be needed as the Stockpile increases in height. Booster pumps may be anticipated along pipeline routes to the top of the Stockpile at 200- to 400-foot vertical intervals. Alternately, pumping may be accomplished by increasing the capacity and size of existing pumps located on private land. Pumps would be electric with power delivered by generator or temporary power line (which would be anticipated to parallel the main header pipeline and/or haul road). Booster pumps would likely be located on the north or northwest side of the Stockpile, between the SX/EW and leaching location.

Raffinate is applied to the surface of each lift via the drip line emitters; the raffinate percolates downward through the stockpiled materials and dissolves soluble minerals. The raffinate increases in metals concentration as it flows to the bottom of the Stockpile. The resulting fluid, PLS, reaches the bottom of the Stockpile where it perches on top of the natural, crystalline bedrock. Perching occurs because the leach application rate is several orders of magnitude higher than the hydraulic conductivity of the underlying crystalline bedrock (refer to Section 5.2.1). Perched PLS then follows the natural grade, northward, to leach collection facilities (Kimberly Pond and the Alum Sump PLS Pond) at the toe of the Stockpile. The Kimberly and the Alum Sump PLS ponds are located on private land. From the leach collection facilities, the PLS is pumped to the SX/EW plant in pipelines. The SX/EW plant recovers the metals from the PLS, producing copper cathodes. The process water is recycled as raffinate that is returned to the Stockpile to restart the process. Leaching facilities, including the Plan IX portion of the Stockpile, are subject to regulation by the APP as described in Section 1.7.2.2.

2.3 AIR QUALITY MANAGEMENT (MINE DUST CONTROL)

The fugitive dust emissions from open areas, roadways, storage piles, and material handling areas, including the Stockpile, proposed Stockpile extension, and haul roads, are regulated under the current Bagdad Mine air quality permit. The air quality permit requires:

[1] Standard dimension ratio is the ratio of the nominal outside diameter of a pipe to its nominal wall thickness.

- Opacity of emission from fugitive dust non-point sources must not exceed 40 percent; and
- Opacity of emission from fugitive dust point sources must not exceed 20 percent.

In addition, the air quality permit requires that FMBI use reasonable precautions to prevent excessive amounts of particulate matter from becoming airborne, such as watering or applying approved dust suppressants or adhesive soil stabilizers to control visible emissions from haul roads and storage piles.

While water generally is applied for dust control, dust suppressants or adhesive soil stabilizers may be used on the Stockpile and proposed Stockpile extension. Dust suppressant products are designed to form a hard crust that can withstand vehicle traffic on unpaved roads or elevated winds on bulk storage piles. Surfactants are non-petroleum based organics which, when added to water, reduce surface tension for better water penetration into subsurface soil layers before or during active earthmoving. Adhesive soil stabilizers may include synthetic polymer or organic dust suppressants to bind soil particles together and generally can be used to form a firm, stabilizing crust. Typical dust suppressant products may include the following, or similar, products:

- Chem-Loc 101 (surfactant)
- Enviro RoadMoisture 2.5 (surfactant)
- Durasoil (synthetic organic)
- Jet-Dry (surfactant)
- Haul Road Dust Control (surfactant)
- EnviroKleen (synthetic polymer)

The air quality permit requires monthly, visual surveys of emissions by a certified observer and specifies sampling and reporting requirements. In addition, posted truck speeds are limited to 35 miles per hour, and trucks typically travel at substantially lower speeds, particularly when loaded and/or traveling uphill.

2.4 WATER MANAGEMENT PLAN

The existing Bagdad Mine has been engineered to minimize water use, control erosion and sedimentation, and manage surface water and groundwater. Surface water and groundwater quality and quantity will continue to be protected throughout the period of proposed activity and following closure, in accordance with the requirements of the APP, MSGP, and other applicable federal and state permits and regulations.

In general, the existing water management system practices will continue within the proposed limit of Stockpile extension. PLS collection system facilities (including Kimberly and the Alum Sump PLS ponds, discussed in Section 2.2.6) will continue to collect and convey process solutions to the Bagdad Mine process water management system and the SX/EW plant.

Stormwater on the Stockpile is allowed to infiltrate or is directed to the open pit. As discussed in Section 1.7.2.1.2, much of the Bagdad Mine is contained within a hydrologic boundary and does not discharge stormwater to downgradient, receiving waters. In these areas, stormwater is collected and used as process water or is left in the collection area and disposed through evaporation. As discussed in Section 2.1.1, the Stockpile extension is proposed at the top of the Burro Subbasin, and stormwater flows are directed northward to the open pit. Stormwater management facilities may be constructed and maintained at the toe of the Stockpile to prevent erosion and direct flows to collection facilities, but stormwater runoff from

the Stockpile and Stockpile extension does not have the potential to reach downgradient, receiving waters. Stormwater runoff from the Stockpile and proposed Stockpile extension will be captured by the passive containment capture zone.

In addition to the mine features associated with water management, the APP includes specific plans, controls, and monitoring of surface water and groundwater. The requirements of the APP are discussed in Section 1.7.2.2.

The management of surface water across the Bagdad Mine will continue to include the implementation of structural and non-structural controls and BMPs for pollution prevention. Controls will be selected for specific activities and potential pollutants will be identified, as outlined and required in the SWPPP, with consideration of the following:

- Preventing stormwater from coming into contact with polluting materials is generally more effective and less costly than trying to remove pollutants from stormwater.
- Using control measures in combination is more effective than using control measures in isolation for minimizing pollutants in the facility's stormwater discharge.
- Attenuating high discharge flows using control measures such as open vegetated swales and natural depressions to reduce in-channel impacts of erosive flows.
- Conserving and/or restoring riparian buffers will help protect streams from stormwater runoff and improve water quality.
- Using containment to intercept stormwater flows before they leave the site, such as directing flows to non-discharging areas (such as the open pit), or installing runoff containment.

Currently, the Bagdad Mine has access to sufficient water supplies to cover water use. The primary water demands at the mine include milling, dust control on roadways, and use as a constituent of the leach solution. No additional demand for water is expected as part of this MPO Modification; leach application rates would not change, and dust control needs and roadways lengths do not change appreciably.

2.4.1 Stormwater Management for the Proposed Stockpile Extension

Stormwater management for the proposed Stockpile extension will address runoff from 1) surfaces and benches and 2) upgradient, native ground.

Stormwater runoff from the surfaces and benches on the proposed Stockpile extension will be managed using the same techniques currently employed on the Stockpile, as described in the *Closure Plan – South Waste Rock Disposal Facility* (Titan Environmental Corporation, 1995). The proposed Stockpile extension will be graded to drain surface runoff towards the open pit by allowing stormwater to flow along roads and perimeter ditches to the west, east, and north. Stormwater retention structures are not anticipated on BLM-managed lands during operations or reclamation. Ditches and other conveyance structures will be designed to carry runoff generated from the 100-year, 24-hour design storm event (estimated as 4.8 inches of precipitation [Titan Environmental Corporation, 1995]).

Stormwater generated from the native ground lying upgradient of the proposed Stockpile extension will be allowed to follow existing, natural drainage pathways northward to the interface with the Stockpile. At the interface on the south side of the proposed Stockpile extension, stormwater flows may be detained

temporarily. Detained, or ponded, stormwater will drain under the proposed Stockpile extension and the existing Stockpile and will be captured in the Alum Sump PLS Pond and Kimberly Pond catchments; stormwater that is not captured in these catchments would flow to the open pit. Stormwater runoff from the Stockpile and proposed Stockpile extension does not have the potential to reach downgradient, receiving waters and will be captured by the passive containment capture zone.

Stormwater detention at the interface with native ground on the south side of the proposed Stockpile extension will occur at locations where natural drainage pathways are intercepted. The volume of stormwater generated and detained will decrease with Stockpile expansion, as the area contributing runoff decreases. The largest volume of stormwater generated from the upgradient, native ground occurs under current conditions.

A mass balance calculation was performed to estimate the maximum volume of stormwater detained and the time for the detained stormwater to drain beneath the Stockpile. The input to the detained area was estimated from the 100-year, 24-hour storm event (4.8 inches) for the largest subwatershed on the upgradient (south) side of the existing Stockpile using the SCS curve number method. Outflows (drainage of the detained stormwater under the Stockpile) were calculated based on Darcy's Law, modified for the large grain size and steep hydraulic gradients.

The approach predicts the maximum volume of stormwater detained to be approximately 1.7 acre-feet, with an approximate surface area of 0.2 acres at a maximum depth of approximately 8 feet. The areas of detained stormwater are estimated to essentially be dry within 48 hours after the storm event. Using the conceptual extent of Stockpile extension, the maximum volume of stormwater runoff generated from the upgradient, native ground would reduce to less than 0.05 acre-feet.

2.4.2 Stormwater Management for Distributed Facilities

The distributed facilities are anticipated to have a minimal, temporary water demand associated with construction. As individual distributed facilities are defined and planned, the SWPPP will be updated and the appropriate stormwater management controls and BMPs will be implemented as necessary.

2.5 SOLID WASTE MANAGEMENT

Because most maintenance, office, and managerial functions will not occur within the Stockpile or distributed facilities area, additional solid waste generation is anticipated to be negligible. Solid waste generated will be removed from the site and handled in accordance with applicable regulatory requirements and the FMBI waste management policy.

2.6 QUALITY ASSURANCE PLAN

In addition to water and rock management plans, FMBI maintains a number of quality assurance plans (QAPs) that contribute to the environmental quality of the operation and provide for environmental and safety monitoring and mitigation. The QAPs are summarized in Table 6.

Table 6 Quality Assurance Plans

Plan Type	Description
Code of Safe Practice	Mandates all employees and contract employees adhere to proven, safe practices that are common to FMBI operations
Water Quality Monitoring Plans	Plans for monitoring the quality of groundwater pursuant to APP requirements
Water Sample Collection QAP	Procedures for assuring the quality of water samples collected for monitoring the quality of groundwater
Ore and Waste Rock Control Sampling QAP	Procedures for assuring the quality of samples used to determine the content of copper at the working face
Laboratory Analytical Protocols	Procedures used to determine the quality of data generated by analyzing rock samples for ore and waste rock control
Equipment Preventative Maintenance Schedule	Schedule for conducting regular servicing for each piece of equipment used at FMBI
Environmental Management System	Identifies, monitors, and controls environmental aspects and manages compliance with internal procedures and regulatory obligations

The dimensions and configuration of the Stockpile are controlled and monitored through a combination of ground surveys and aerial mapping. FMBI survey crews use survey-grade GPS units to place coded stakes on the ground and measure and record the extent of disturbance. Equipment operators and crews are directed by shift supervisors where to place or move material. After placement, the survey crews verify the appropriate placement of materials. The same procedures will be extended to the proposed Stockpile extension. Upon closure, the Stockpile and proposed Stockpile extension will be reconfigured to accommodate a soil cover on the horizontal surfaces, and minor re-contouring will be performed to establish final stormwater routing. Similar methods of ground surveys and aerial mapping will be conducted to ensure that the final configuration adheres to the closure design.

Additionally, the Stockpile configuration must be monitored, inspected, documented, and reported under the terms of the APP. The current APP monitoring requirements for stability differ between the leached and non-leached portions of the Stockpile. For the Plan IX Leach portion of the Stockpile, visual inspections, and appropriate action, if necessary, are required on a quarterly basis or following precipitation events measuring at least 1 inch in a 24 hour period for:

- instability, including surface cracks, slides, sloughs or unusual differential settlement;
- excessive erosion in conveyances and diversions;
- excessive accumulation of debris in conveyances and diversions; and
- impairment of access.

For the eastern, South Waste Rock Stockpile portion of the facility, the APP mandates monthly visual inspections and appropriate action, if necessary, if there is evidence of dump or stockpile deformation, including surface cracks, slides, sloughs, or differential settlement affecting slope stability.

A log book of the inspections and measurements required by the APP must be maintained at the location where day-to-day decisions are made regarding the operation of the facility. The log book must be

retained for ten years from the date of each inspection, and upon request, the APP permit and the log book must be made immediately available for review by ADEQ. The information in the log book shall include, but not be limited to, the following information, as applicable:

- Name of inspector;
- Date and shift inspection was conducted;
- Condition of applicable facility components;
- Any damage or malfunction, and the date and time any repairs were performed;
- Documentation of sampling date and time;
- Any other information required by the APP to be entered in the log book, and
- Monitoring records for each measurement shall comply with AAC R18-9-A206(B)(2).

In addition, FMBI maintains certification under the International Organization for Standardization (ISO) 14001. Through the application of this standard, FMBI has established and maintains an Environmental Management System (EMS) that provides the framework within which the company evaluates its environmental impacts and performance. The EMS allows the company to assess environmental risks and issues within its operational structure in order to minimize and mitigate environmental impacts from its activities. Furthermore, the EMS helps demonstrate FMBI's due diligence in complying with environmental regulations, and includes a number of plans, processes, and tools.

2.7 SPILL CONTINGENCY PLANS

FMBI maintains a number of spill contingency plans applicable to the Bagdad Mine, which detail procedures for prevention, response, and mitigation of releases to ensure protection of the environment. These plans work in tandem with the QAPs presented above and with state and federal permits and the requirements to protect surface water and groundwater. Briefly, the spill contingency plans include a SPCC Plan and an Emergency Preparedness, Contingency, and Response Plan (EPCR). Spill prevention and response procedures are also detailed in the SWPPP, and response protocols are mandated under APP P-105258 for unauthorized discharges, including immediate corrective actions to limit the discharge, oral and written regulatory notification, and a corrective action report detailing the actions taken to mitigate the discharge.

2.7.1 Spill Prevention, Control, and Countermeasure Plan

FMBI maintains a SPCC Plan pursuant to the requirements of 40 CFR Part 112, Oil Pollution Prevention. Under the rule, facilities that could reasonably be expected to discharge oil to navigable waters in quantities that may be harmful must develop and implement SPCC plans. As established in Section 1.7.2, there is no potential for discharge from the Stockpile, proposed Stockpile extension, or other areas within the passive containment capture zone established by the open pit. Nevertheless, the SPCC Plan includes oil-filled containers and equipment located within the open pit, the Stockpile and proposed Stockpile extension on a voluntary basis to identify the associated spill prevention and containment measures. Notably, the open pit provides secondary or tertiary containment as well as equivalent environmental protection in order to address other SPCC Plan requirements.

The SPCC Plan documents the required containment and countermeasures that will prevent oil discharges. The SPCC Plan also requires the implementation and regular review and revision of the plan,

employee training to carry out the plan to achieve the goal of preventing, preparing for, and responding to oil discharges. In addition, the SPCC Plan includes response procedures for a petroleum related product, instructions for the application of sorbent materials and other clean up measures, proper disposal of recovered materials, and notification procedures and requirements.

In addition to the proposed Stockpile extension being covered under the SPCC Plan on a voluntary basis, no modification to the SPCC would be required because no oil-filled containers or tanks are proposed and the same mobile equipment currently in use on the Stockpile will be used for the construction, operation, closure and post-closure of the proposed Stockpile extension.

If necessary, the SPCC Plan will be updated to reflect the final engineering of individual features of the distributed facilities proposed in this MPO Modification.

2.7.2 Emergency Preparedness, Contingency, and Response Plan

The EPCR Plan complies with 40 CFR Part 265 Subpart C – Preparedness and Prevention, 40 CFR Part 355 Subpart B – Emergency Planning, and 40 CFR Part 365 Subpart C – Emergency Release Notification. The intent of the EPCR Plan is to minimize the hazards to human health and the environment from fires, explosions, or unplanned sudden or non-sudden releases to the air, soil, or surface and groundwater associated with the transportation, storage, and use of hazardous materials and wastes at the Bagdad Mine. The EPCR Plan consists of:

- Description of facilities
- Description of hazardous materials
- Emergency response organization and responsibilities
- Emergency response equipment and capabilities
- Coordination with external response organizations
- Emergency response procedures
- Evacuation plans
- Training programs
- Emergency contact information

2.8 SCHEDULE OF OPERATIONS

The proposed Stockpile extension has an anticipated operational life of approximately 40 years. Features proposed within the area identified for distributed facilities would be anticipated for use over the same term, with the potential for continued use to support reclamation, closure and post-closure. FMBI plans to develop the proposed facilities in accordance with the following schedule:

- Anticipated completion of federal approvals – end of 2015
- Deposition within the Stockpile extension – ongoing after issuance of federal and state approvals
- Reclamation and closure of the Stockpile and distributed facilities – 2050 or later

The above schedule is subject to change depending on mine production rates, which are influenced by market conditions, development of new technologies, changes in state or federal regulations, and various other factors throughout the life of the operation.

2.9 SAFETY AND SECURITY

Operations at the Bagdad Mine are regulated by safety regulations promulgated by MSHA (primarily 30 CFR Parts 47, 48, 56, 58 and 62), which set the standard for safety training, personal protective equipment, mining-related work, and health standards governing occupational exposure to regulated substances and noise.

In addition, FMBI has implemented supplementary safety programs to reflect corporate policies and site-specific considerations. Through MSHA training, all employees are trained to observe and report suspicious or unusual activity that threatens safety or security. Gates are located on all access roads to the mine and are maintained, closed, and locked with access available only to mine personnel. Perimeter gates found damaged are immediately repaired.

FMBI maintains a contract with Williamson Valley/Bagdad Fire-Rescue, which has trained staff and mobile fire suppression equipment available to respond to fires or other emergencies, when requested.

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3.0 MONITORING PLAN

3.1 WATER QUALITY MONITORING

The area-wide APP P-105258 provides comprehensive regulation of the Bagdad Mine for the prevention of water pollution. The Bagdad Mine will continue to monitor groundwater quality in accordance with the terms, conditions, and requirements of the APP program. The requirements of the APP are discussed in Section 1.7.2.2, and a copy of the current APP is provided in Appendix B, which details the required monitoring.[1] The APP also mandates specific courses of action to be followed in the event of an adverse measurement or result.

As described in Section 1.7.2.1.2, the Stockpile and proposed Stockpile extension are situated such that stormwater is directed toward the open pit; therefore, the Stockpile and proposed Stockpile extension do not discharge to downgradient surface waters.

3.2 AIR QUALITY MONITORING

The Bagdad Mine will continue to monitor air quality in accordance with the terms, conditions, and requirements of the air quality permit, as described in Section 2.3. The air quality permit also mandates specific courses of action to be followed in the event of an adverse measurement or sample result.

3.3 SLOPE STABILITY

The Bagdad Mine will continue to monitor slope stability in accordance with the terms, conditions, and requirements of the APP program, as summarized in Section 2.6 of this MPO Modification and detailed in Appendix B.

3.4 CLOSURE AND POST-CLOSURE MONITORING

Monitoring and maintenance activities for the Stockpile and proposed Stockpile extension will be prescribed under the closure and post-closure requirements of the APP program. Required monitoring will initiate during reclamation and continue until clean closure is achieved and approved. These activities are described in Sections 1.7.2.2.4 and 6.1.6, and will be fully documented in the final closure plan.

Closure and post-closure monitoring for the distributed facilities are discussed in Section 6.2.

[1] Consistent with Sections 4.3.3.2.2 and 4.4.3.2 of the H-3809-1 Surface Management Handbook (BLM 2012), the monitoring plan outlined in this MPO Modification will be updated or appended so as to reflect other agency permits, final designs, or certain stipulations as more specific and detailed engineering designs or information become available.

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4.0 INTERIM MANAGEMENT PLAN

This Section contains the Bagdad Mine's measures, procedures, plans, and provisions to prevent unnecessary or undue degradation of federal lands in the event of either a temporary closure; suspension of mining, production, or other operations; or placement into standby status.

The Bagdad Mine is currently in "operating" status and does not intend to move into permanent closure until the economic reserves, and associated operations, are exhausted. Nonetheless, the details of a plan in the event that an unforeseen circumstance or a substantial economic change would cause FMBI to place the mine (or any component parts thereof) on standby status include:

i. *Measures to stabilize excavations and workings*: This is accomplished in part by maintaining and utilizing key equipment for dust control and road maintenance, preventing stormwater erosion or runoff, and operation of a dewatering system (see Sections 2.3 and 2.4 of this MPO Modification).
ii. *Measures to isolate or control toxic or deleterious materials*: See Sections 1.7, 2.2, 2.4, 2.5, 2.6, and 2.7 of this MPO Modification.
iii. *Provisions for the storage or removal of equipment, supplies, and structures*: FMBI personnel would remain on-site to conduct inspections and maintenance activities.
iv. *Measures to maintain the project area in a safe and clean condition:* Considering personnel would remain on-site even during reduced, suspended, or standby status, compliance with MSHA's safety regulations also continue, including regular inspections by MSHA. Security measures described in Section 2.9 would remain in effect. In addition, existing environmental monitoring programs would be maintained and include, but are not limited to, ongoing inspections of equipment prior to the beginning of each shift, water quality sampling and reporting under the APP program, and management of stormwater to prevent runoff of pollutants.
v. *Plans for monitoring site conditions during periods of non-operation*: Monitoring, as described in Sections 2.6 and 3.0 of this MPO Modification, will continue even during reduced, suspended, or standby status.
vi. *A schedule of anticipated periods of temporary closure during which you would implement the interim management plan, including provisions for notifying the BLM of unplanned or extended temporary closures:* Scheduled temporary suspensions of operations are not expected, therefore a schedule for suspending operations cannot be generated. However, in the event of an unplanned or extended temporary suspension of operations, the BLM will be notified directly.

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5.0 BASELINE ENVIRONMENTAL INFORMATION

This section summarizes the baseline environmental information that has been collected within the Bagdad Mine area pertinent to the MPO Modification. The following sections include discussions of geologic resources, water resources, biological resources, and cultural resources.

5.1 GEOLOGIC RESOURCES

5.1.1 Area Geology

As described in Section 1.6.3, the Bagdad Mine lies in the Central Highlands transition zone physiographic province between the Colorado Plateau to the north and east and the Basin and Range physiographic province to the south and west. The Central Highlands physiographic province is characterized by rugged mountains of diverse geologic character, including igneous, metamorphic, and sedimentary rocks. Figure 10 displays the surficial geology underlying the elements proposed in this MPO Modification, and Table 7 describes the predominant rock units and their relative ages. This figure and the geologic information presented herein is based primarily upon the work done by Anderson, *et al.* (1955).

Within the area of the Stockpile and proposed Stockpile extension, the Mountain Spring Fault is readily identified in Figure 10. The north-striking Mountain Spring fault is a normal, west-dipping structure, with dips ranging from 70 to 75 degrees. The Mountain Spring Fault distinguishes between the predominance of the Bridle formation to the west and the Hillside mica schist to the east. This ancient fault structure is a Precambrian shear zone that apparently underwent several miles of right-lateral displacement. No evidence exists of recent movement or seismic activity along this fault, and no hydrologic or ground stability factors have been attributed to this fault that might impact the Stockpile or proposed Stockpile extension (FMBI, 1996a). No Quaternary or more recent faults have been mapped in the Bagdad area (SRK, 2009).

Both the Bridle formation and Hillside mica schist are identified as members of the Yavapai series, which are grouped along with the Butte Falls tuff, as the oldest of the metamorphic, Precambrian bedrock. The Bridle formation consists of metamorphosed igneous (andesitic and basaltic lava flows) and sedimentary (tuffaceous beds and terrigenous sediments) rocks. The Bridle formation is more than 3,000 feet thick. The Hillside mica schist is a unit consisting of metamorphosed sandstone and shale, with a total thickness of 3,000 to 4,000 feet.

This metamorphic terrain has been tightly folded on a large scale, resulting in structural and stratigraphic layering, dipping steeply to the northwest and trending northeastward. The structure of the Yavapai series is that of a syncline, with the western limb overturned in the southern part of the area. The folded structures were faulted and intruded by igneous rocks along the faulting, indicating folding and faulting of the Yavapai series occurred before the Precambrian intrusive activity.

Precambrian intrusions of the Yavapai series occurred by igneous rocks of diverse composition. The oldest of the igneous rocks is rhyolite – including the King Peak and Dick rhyolites – with observed occurrences underlying the Stockpile and proposed Stockpile extension (Figure 10). The rhyolite and the

rocks of the Yavapai series were then intruded by widespread masses of gabbro and related quartz diorite and diabase. A belt of intruded alaskite porphyry is also seen in Figure 10, representing the formation of mixed alaskite-gabbro rocks. East of the Mountain Spring Fault, the widespread Lawler Peak and Cheney Gulch granites also represent igneous intrusion; the granites were then intruded by dikes and masses of aplite-pegmatite during the closing episodes of the Precambrian age. Collectively, and as depicted in Figure 10, the surficial geology underlying the Stockpile and proposed Stockpile extension are almost exclusively representative of Precambrian, crystalline bedrock.

Across the Bagdad area, surficial expressions of rhyolitic tuffs of the late Cretaceous or early Tertiary overlie the Precambrian formations. The tuffs were intruded by rhyolitic dikes (and with small representation as dikes in the area of the Stockpile and proposed Stockpile extension), which were later intruded by stocks and plugs of quartz monzonite. The largest quartz monzonite stock in the area forms the primary ore body of the Bagdad Mine, appropriately centered at the open pit, north of the Stockpile.

During the more recent Quaternary epoch, Gila conglomerate and basaltic flows filled deep valleys. Basaltic flows (including the Sanders basalt) cap many of the mesas located north and east of open pit. Surficial mapping of Gila conglomerate occurs on the side slopes of many of these mesas. In some areas surrounding the Bagdad Mine, the basalt is separated from the underlying Gila conglomerate by a bed of rhyolite tuff. These rock types are generally mapped beyond the extents shown in Figure 10, but can overlie the quartz monzonite stock and mineralized zones of the Bagdad Mine.

As discussed in Section 2.2.4, materials generated from the open pit are placed in three categories: ore, mineralized waste rock, and un-mineralized overburden.

Table 7 Description and Relative Ages of Select Rock Units in the Bagdad Area

Age	Structure/ Unit	Description
Quaternary	Sanders basalt (QTs)	Holocrystalline subophitic olivine basalt flows, usually coarsely vesicular
Quaternary/ Late Tertiary	Gila conglomerate (QTg)	Valley-fill deposit of nonvolcanic sediment and rhyolitic tuff, largely composed of poorly indurated boulder to pebble gravel of local source, with interbeds of compacted sandstone and siltstone
Tertiary/ Late Cretaceous	Quartz monzonite porphyry (TKqmp)	Hydrothermally altered; contains orthoclase, plagioclase, and quartz phenocrysts; occurs as dikes and plugs
	Diorite porphyry (TKdp)	Occurs as dikes and plugs; includes some quartz diorite porphyry
	Quartz monzonite (TKqm)	Occurs as stocks and plugs, including the copper-bearing stock at Bagdad

Age	Structure/ Unit	Description
Precambrian	Aplite pegmatite (ap)	Occurs as dikes and masses
	Cheney Gulch granite (cg)	Fine-grained biotite granite that intrudes the Hillside mica schist and the gabbro; dikes intrude Lawler Peak granite
	Lawler Peak granite (lg)	Porphyritic muscovite-biotite granite with large orthoclase phenocrysts; occurs in smaller masses associated with rocks of the Yavapai series
	Alaskite porphyry	alp – alaskite porphyry with fine phanerocrystalline groundmass fal – alaskite porphyry with microcrystalline groundmass lal – alaskite porphyry and Lawler Peak granite cal – mixture of alaskite porphyry and older volcanic rocks
	Diabase (db)	Related to gabbro
	Gabbro (gb)	Gabbro, locally schistose
	Gabbro and Lawler Peak granite (gl)	Gabbro and Lawler Peak granite, mixed; typically dark with grains ranging in size from fine to coarse. Biotite is a common accessory mineral.
	Dick rhyolite (dr)	Quartz phenocrysts in a microcrystalline groundmass; forms intrusive masses
	King Peak rhyolite (kpr)	Non-porphyritic, forms intrusive masses
Precambrian – Yavapai series	Hillside mica schist (hms)	Includes quartz mica schist and muscovite quartzite
	Butte Falls tuff (bft)	Largely quartz-bearing tuffaceous sedimentary rocks recrystallized to schist; believed by Anderson *et al.* (1955) to represent tuffs and tuffaceous sediments that accumulated after the outpouring of the mafic lava of the Bridle formation.
	Bridle formation (bv)	Metamorphosed andesite and basalt flows with intercalated tuffs and sediments

Source: Anderson 1955 and SRK 2010

5.1.2 Mineral Occurrence

Various exploration programs have evaluated the areas proposed for disturbance in this MPO Modification for economic mineral occurrence. These data support the conclusion that the existing extent of the Stockpile lies at least one-half mile beyond the limit of economic mineralization exposed in the Bagdad Mine; the assay data from the Stockpile area averages less than 50 percent of the minimum grade currently being mined. The results of these exploration drilling programs document that the potential for economic mineral deposits in the area of the proposed Stockpile extension is low. Lists of FMBI's mill site claims underlying the Stockpile and proposed Stockpile extension are set forth in Appendix A.

The installation of individual distributed facilities will not impede access to geological resources should they be found in the future (which is unlikely).

5.2 WATER RESOURCES

5.2.1 Groundwater

Aquifers occurring in the region (in the Burro and Santa Maria subbasins and beyond [Figure 1]) generally consist of hydraulically connected basin fill aquifers (Gila conglomerate), recent (Quaternary) stream alluvium, and fractured or porous igneous (volcanic) rock. Much of the area is underlain by

consolidated, crystalline bedrock with limited potential for groundwater development. The regional groundwater flow direction is generally from northeast to southwest with variations in localized patterns. Groundwater recharges primarily from streambed infiltration and mountain front precipitation.

Groundwater flow proximate to Bagdad Mine is controlled primarily by geologic structure and formation hydraulic properties. In the area of the proposed Stockpile extension and future distributed facilities, the metamorphosed formation of the underlying Precambrian, crystalline bedrock has little primary porosity, corresponding to a low hydraulic conductivity. The faults present in the crystalline bedrock generally have been filled by the igneous intrusions (discussed in Section 5.1.1) and post-faulting mineralization, reducing the ability of faults to transmit groundwater due to filling of pore space. Therefore, the ability for the Precambrian, crystalline bedrock underlying the proposed Stockpile extension to transmit groundwater is restricted. Demonstration of the low hydraulic conductivity of the crystalline bedrock is one of the key points in the attaining compliance with the BADCT requirements of the APP (Section 1.7.2.2).

Figure 6 depicts the equipotential groundwater elevation contours and general groundwater gradient. The information presented in Figure 6 is based on the underlying geology and the preliminary results from the groundwater model review and update currently underway, as required by the APP P-105258 (refer also to Section 1.7.2.2). As shown by the figure, the Stockpile and proposed Stockpile extension lie within the inward hydraulic gradient created by the open pit. An inward hydraulic gradient is typical in a hard rock mining environment, where the dewatering of saturated bedrock around the open pit occurs in response to the excavation and removal of materials from the open pit. The inward hydraulic gradient is another key point in the demonstration of BADCT compliance and the passive containment capture zone under the APP (Section 1.7.2.2).

5.2.2 Surface Water

The regional surface water hydrology is outlined in Section 1.6.3 and displayed in Figure 1. According to the ADWR *Arizona Water Atlas, Volume 4 – Upper Colorado River Planning Area* (2009), Boulder Creek, Burro Creek, and a short reach of Bridle Creek (immediately upgradient of its confluence with the Santa Maria River) are considered intermittent streams. Portions of the Big Sandy, Santa Maria, and Bill Williams rivers and the portion of Burro Creek immediately upgradient of its confluence with the Big Sandy River are perennial streams.

The drainages in the project area are ephemeral, flowing solely in direct response to precipitation. The Stockpile and Stockpile extension are located within the same hydrologic basin (Burro Subbasin [HUC8 15030202]) as the Bagdad open pit (Figure 2). The natural topography underlying the Stockpile and proposed Stockpile extension slopes northward, toward the open pit. The Stockpile was constructed over the upper reaches of several ephemeral drainages; stormwater flows are generally directed to the open pit. Where necessary, stormwater is captured on the upgradient side of the Stockpile and routed through a series of underdrains to process ponds, stormwater impoundments, and/or the open pit. The northward sloping natural topography underlying the Stockpile and Stockpile extension is the third key point in the demonstration of BADCT compliance and the passive containment capture zone under the APP (Section 1.7.2.2).

South of the ridgeline that divides Burro Subbasin (HUC8 15030202) and Santa Maria Subbasin (HUC8 15030203), ephemeral drainages are generally directed southward toward Bridle Creek. Prior to ground disturbing activities within the area delineated for distributed facilities, FMBI will identify and incorporate the appropriate stormwater controls or management strategies into the design of the feature proposed, including updating the SWPPP, as appropriate.

5.3 BIOLOGICAL RESOURCES

Several biological flora and fauna surveys have been conducted in the area of Bagdad Mine. Existing vegetation and wildlife studies are summarized in the following sections.

5.3.1 Vegetation

Classification of biotic resource communities in the southwestern United States has been extensively researched and documented in previous studies (Brown *et al.*, 1979, 1980). The project area is comprised almost entirely of interior chaparral, with a small area of Arizona upland/Sonoran desertscrub mapped in the southeastern corner of the area proposed for future distributed facilities (Figure 11). Informal, on-site surveys of the project and surrounding area are consistent with these classifications. Riparian vegetation or habitat does not occur in the project area.

According to the 1995 Draft EIS (BLM), vegetation typical of the interior chaparral includes dominants such as one-seed juniper (*Juniperus monosperma*) and shrub live oak (*Quercus turbinella*). Common shrubs include the wait-a-minute bush (*Mimosa buincifera*), sumac (*Rhus* spp.), and crucifixion thorn (*Canotia holacantha*). Banana yucca (*Yucca baccata*) is also common. The understory is typically composed of three awn (*Aristida* spp.), gramas (*Bouteloua* spp.), filaree (*Erodium cicutarium*), penstemon (*Penstemon* spp.), and broom snakeweed (*Gutierrezia sarothrae*).

5.3.2 Wildlife

5.3.2.1 Mammals

Wildlife in the proposed project area is typical of Arizona upland and interior chaparral habitat types. Large mammals, including mule deer (*Odocoileus hemionus*), javelina (*Dicotyles tajacu*), and mountain lions (*Felis concolor*), are known to occur in the Bagdad area. Other large mammals associated with the habitat types in the greater Bagdad region include gray fox (*Urocyon cinereoargenteus*), kit fox (*Vulpes macrotis*), and coyote (*Canis latrans*). Smaller mammals such as the desert cottontail (*Sylvilagus audubonii*), cactus mouse (*Peromyscus eremicus*), ground squirrels (*Ammospermophilus* spp.), kangaroo rats (*Dipodomys* spp.), and pocket mice (*Perognathus* spp.) are expected to occur in the proposed project area (BLM, 1995a).

Wild burros are known to occur in the Burro Creek area (BLM, 1993), west of the Bagdad Mine. The Big Sandy Herd Management Area includes lands along the Big Sandy River and Burro Creek, as depicted in Figure 11. The Wild and Free-Roaming Horse and Burro Act of 1971 authorizes BLM management of wild burros and wild horses on public lands.

5.3.2.2 Birds

Birds associated with areas of interior chaparral vegetation include scrub jays (*Aphelocoma* spp.), the black-chinned sparrow (*Spizella atrogularis*), canyon wren (*Catherpes mexicanus*), and towhees (*Pipilo* spp.). Species common to Arizona upland habitats of the Sonoran Desert which may occur in the area include the cactus wren (*Campylorhynchus brunneicapillus*), Gambel's quail (*Lophortyx gambelii*), Gila woodpecker (*Melanerpes uropygialis*), doves (*Zenaida* spp.), thrashers (*Toxostoma* spp.), roadrunner (*Geococcyx californianus*), verdin (*Auriparus flaviceps*), and gilded flicker (*Colaptes auratus*). Raptors including American kestrel (*Falco sparverius*), common black hawk (*Buteogallus anthracinus*), red-tailed hawk (*Buteo jamaicensis*), turkey vulture (*Cathartes aura*), and zone-tailed hawk (*Buteo albonotatus*) have also been observed in the proximity of the proposed project area. Bald eagles (*Haliaeetus leucocephalus*) are also known to nest on the adjacent Burro Creek drainage (BLM, 1995a).

5.3.2.3 Reptiles and Amphibians

Reptiles associated with areas of interior chaparral include the western rattlesnake (*Crotalus viridis*), glossy snake (*Arizona elegans*), Sonora mountain kingsnake (*Lampropeltis pyromelana*), fence lizards (*Sceloporus occidentalis*), and Arizona night lizard (*Xantusia arizonae*). In Arizona upland habitat, glossy snake, western shovelnose snake (*Chionactis occipitalis*), western diamondback rattlesnake (*Crotalus atrox*), sidewinder (*Crotalus cerastes*), desert tortoise (*Gopherus agassizii*), Gila monster (*Heloderma suspectum*), horned lizards (*Phrynosoma* spp.), whiptails (*Cnemidophorus* spp.), chuckwalla (*Sauromalus obesus*), desert spiny lizard (*Sceloporus magister*), and brush and tree lizards (*Urosaurus graciosus* and *U. ornatus*) may be expected to occur (BLM, 1995a).

5.3.3 Special Status Species

Collectively, "special status species" include those listed as endangered or threatened under either federal or state law, candidate species for protection under federal law, or other species of interest. An analysis of the state and federal special status species – including range, habitat, and potential for occurrence – can be found in Appendix E. The potential for special status species or their habitat to occur in the project area is assessed herein using the following summary descriptions:

- **None:** no suitable habitat is present or the species is not found within the elevation range of the Project site
- **Unlikely:** no documentation; low or marginal habitat quality; outside, but close to, currently known geographic or elevational distribution; species may pass/migrate through the project area
- **Possible:** no documentation but suitable habitat within range occurs
- **Present:** species have been documented to occur

Special status species include those species which are afforded special protection under federal guidelines in accordance with the Endangered Species Act of 1973 (ESA). Table 8 presents 24 species (one amphibian, five birds, eleven fish, one invertebrate, two mammals, one plant, three reptiles) which state and/or federal agencies consider to have a possible presence in Yavapai County and are listed or proposed for listing under the ESA as threatened, endangered, or candidate species. The table includes the compilation of species listed by the US Fish and Wildlife Service (USFWS) Environmental Conservation

Online System (2014), the USFWS Arizona Ecological Services Office (2013), and the Arizona Department of Game and Fish (AGFD; 2013).

Table 8 Federally Listed Threatened or Endangered Species in Yavapai County

Species Common Name	Scientific Name	Taxon	ESA Status	Potential for Occurrence
Chiricahua leopard frog	*Lithobates (Rana) chiricahuensis*	Amphibian	LT	None
California condor	*Gymnogyps californianus*	Bird	LE, XN	None
Mexican spotted owl	*Strix occidentalis lucida*	Bird	LT	None
Southwestern willow flycatcher	*Empidonax traillii extimus*	Bird	LE	None
Western yellow-billed cuckoo	*Coccyzus americanus occidentalis (western population)*	Bird	PT	None
Yuma clapper rail	*Rallus longirostris yumanensis*	Bird	LE	None
Colorado pikeminnow	*Ptychocheilus lucius*	Fish	LE, XN	None
Desert pupfish	*Cyprinodon macularius*	Fish	LE	None
Gila chub	*Gila intermedia*	Fish	LE	None
Gila topminnow	*Poeciliopsis occidentalis*	Fish	LE	None
Gila trout	*Oncorhynchus gilae*	Fish	LT	None
Headwater chub	*Gila nigra*	Fish	C	None
Loach minnow	*Tiaroga cobitis*	Fish	LE	None
Razorback sucker	*Xyrauchen texanus*	Fish	LE	None
Roundtail chub	*Gila robusta*	Fish	C	None
Spikedace	*Meda fulgida*	Fish	LE	None
Woundfin	*Plagopterus argentissimus*	Fish	LE, XN	None
Page springsnail	*Pyrgulpsis morrisoni*	Invertebrate	C	None
Black-footed ferret	*Mustela nigripes*	Mammal	LE, XN	None
Hualapai Mexican vole	*Microtos mexicanus hualapaiensis*	Mammal	LE	Unlikely
Arizona cliffrose	*Purshia subintegra*	Plant	LE	None
Narrow-headed gartersnake	*Thamnophis rufipunctatus*	Reptile	PT	None
Northern Mexican gartersnake	*Thamnophis eques megalops*	Reptile	PT	None
Sonoran desert tortoise	*Gopherus morafkai*	Reptile	C	Possible

Status Key:

- LE Listed endangered
- LT Listed threatened
- PT Proposed threatened
- C Candidate – Species for which USFWS has sufficient information on biological vulnerability and threats to support proposals to list as endangered or threatened under ESA. However, proposed rules have not yet been issued because such actions are precluded at present by other listing activity.
- LE, XN Experimental/ nonessential population of a listed endangered species

Of the federally listed threatened or endangered species, the Hualapai Mexican vole would have an unlikely potential to occur in the project area. Also, the Sonoran desert tortoise is a candidate species and has a "possible" potential to occur in the project area, indicating the presence of suitable habitat. Sonoran desert tortoise habitat includes primarily rocky slopes and bajadas within Sonoran desertscrub communities and may include caliche caves in washes for shelter (AGFD, 2010). Take, possession, or harassment of wild desert tortoises is prohibited by state law. The AGFD has developed guidelines to reduce potential impacts on desert tortoises; *the Guidelines for Handling Sonoran Desert Tortoises*

Encountered on Development Projects (AGFD, 2007) is included in Appendix F, and construction of the elements proposed in this MPO Modification will adhere to these guidelines.

Critical habitat is an area designated for a threatened or endangered species under the ESA. A designation of critical habitat indicates that the area contains physical or biological features essential to the conservation of the species and may require special management considerations or protection. There is no designated critical habitat within the project vicinity.

In addition to species listed under the ESA, the AGFD, BLM, and USFWS maintain lists of sensitive species. Table 9 presents 21 species (seven birds, nine mammals, four plants, and one reptile) which have been designated as species of concern, sensitive, or wildlife of special concern by these agencies and have some potential for occurrence in the project area. Appendix E presents the analysis of range and habitat needs and conclusions regarding the potential for occurrence indicated in the summary table below.

Table 9 Special Status Species with Possible Presence in Project Area

Species Common Name	Scientific Name	Taxon	Status			Potential for Occurrence
			ESA	BLM	AZ	
American peregrine falcon	*Falco peregrinus anatum*	Bird	SC, R	S	WSC	Unlikely
American redstart	*Setophaga ruticilla*	Bird			WSC	Unlikely
Bald eagle	*Haliaeetus leucocephalus*	Bird	SC, R	S	WSC	Unlikely
Ferruginous hawk	*Buteo regalis*	Bird	SC	S	WSC	Unlikely
Golden eagle	*Aquilia chrysaetos*	Bird		S		Unlikely
Northern goshawk	*Accipiter gentilis atricapillus*	Bird	SC	S	S	Unlikely
Western burrowing owl	*Athene cunicularia hypugaea*	Bird	SC		S	Unlikely
Allen's lappet-browed bat	*Idionycteris phyllotis*	Mammal	SC	S		Unlikely
Big free-tailed bat	*Nyctinomops macrotis*	Mammal	SC			Unlikely
California leaf-nosed bat	*Macrotus californicus*	Mammal	SC	S	WSC	Unlikely
Cave myotis	*Myotis velifer incautus; brevis*	Mammal		S	S	Unlikely
Fringed myotis	*Myotis thysanodes*	Mammal		S	S	Possible
Long-legged myotis	*Myotis volans interior*	Mammal		S	S	Unlikely
Pale Townsend's big-eared bat	*Corynorhinus townsendii pallescens*	Mammal	SC	S		Possible
Spotted bat	*Euderma maculatum*	Mammal		T	S	Possible
Western small-footed myotis	*Myotis ciliolabrum*	Mammal	SC			Unlikely
Flannel bush	*Fremontodendron californicum*	Plant		S	SR	Possible
Mogollon fleabane	*Erigeron anchana*	Plant	SC			Possible
Pima Indian mallow	*Abutilon parishii*	Plant	SC	S	SR	Unlikely
Tonto Basin agave	*Agave delamateri*	Plant	SC		HS	Unlikely
Banded Gila monster	*Heloderma suspectum cinctum*	Reptile	SC			Unlikely

Status key:

- SC Species of Concern (USFWS)
- R Recovery (USFWS)
- T Threatened (BLM)
- S Sensitive (BLM or AGFD)
- WSC Wildlife of Special Concern (AGFD)
- SR Salvage restricted (Arizona Department of Agriculture)
- HS Highly sensitive (Arizona Department of Agriculture)

5.4 CULTURAL RESOURCES

The National Historic Preservation Act (NHPA) of 1966, as amended, and implementing regulations (36 CFR 800) provide statutory protection and guidelines for the evaluation of cultural resources. Cultural resources that meet the significance criteria are classified as eligible for nomination to the National Register of Historic Places (NRHP) and are termed "historic property(s)." Numerous archaeological investigations have been conducted throughout the area of potential effect and surrounding lands. As part of this MPO Modification, a Class III survey was conducted, and a report was submitted to the BLM for review in December 2013.

The 2013 Class III survey for the Stockpile extension totaled approximately 1,273 acres including 1,151 acres of BLM-managed lands and about 122 acres of patented mine claims owned by FMBI. Because of steep terrain, only 661 acres (including 622 acres of BLM-managed lands) could be intensively surveyed with regulatory spaced transects; however, an additional 182 acres were spot checked (including 133 acres of BLM-managed lands). The results of the Class III survey identified one previously recorded archaeological site, 23 new archaeological and historic sites, and 125 isolated occurrences. Four of the sites are prehistoric Ceramic period sites, 17 are historic Euro-American sites, and 3 have both prehistoric and historic components.

The Class III survey report recommends that three sites be considered eligible for listing on the NRHP for their potential to yield important information about the prehistory and history of the region.

5.5 PROTECTION OF SURVEY MONUMENTS

To the extent possible, FMBI will protect survey monuments, reference monuments, bearing trees, and other survey reference points during ground disturbing activities. Should it be necessary to remove a survey point during operations, FMBI will notify the appropriate BLM officer and adhere to the written requirements for the restoration or reestablishment of the survey point.

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6.0 RECLAMATION PLAN

The goals of the reclamation and closure plan are to promote a viable post-mining land use, reduce impacts to surface water and groundwater, and promote post-mining public safety. Reclamation activities are proposed to mitigate the disturbed areas and achieve compliance with state and federal regulations for mine reclamation and water quality protection. Generally, reclamation and closure intend to provide for the establishment of a self-sustaining ecosystem consistent with the life zone of the surrounding area, with consideration of the site-specific conditions that will exist at the Bagdad Mine at the time of closure. Monitoring and maintenance activities prescribed under the post-closure requirements of the APP program will follow reclamation and continue until clean closure is achieved and approved by the ADEQ.

Consistent with Sections 4.3.3.2.2 and 4.4.3.2 of the H-3809-1 Surface Management Handbook (BLM 2012), the reclamation plan outlined in this MPO Modification will be updated or appended so as to reflect other agency permits, final designs, or certain stipulations as more specific and detailed engineering designs or information become available. While the general aspects of the proposed reclamation are outlined herein, the ADEQ closure strategy under APP P-105258 will continue to provide the detailed description of closure and reclamation requirements. Overall, reclamation of the features proposed in this MPO Modification will address the applicable elements of 40 CFR 3809.401(b)(3), as discussed herein.

In general, reclamation requirements for drill hole plugging, riparian management, and removal or stabilization of structures are not anticipated to apply to the elements proposed in this MPO Modification.

- Drill-hole plugging – The areas proposed for expansion are not known to contain drill holes. If existing drill holes are encountered on BLM lands, they will be plugged in accordance with BLM guidance, as set forth in the BLM Solid Materials Reclamation Handbook H-3042-1 (1992) and ADWR Well Abandonment Handbook (2008). If boreholes or wells are advanced in the future, their construction and closure would be mandated under APP P-105258 and would follow the same BLM guidelines.
- Riparian management – Riparian areas are not known to occur in the project area.
- Removal or stabilization of buildings, structures, and support facilities – Buildings or structures are not proposed in this MPO modification and are not known to exist in the project area. Removal or stabilization of support facilities is addressed below in Section 6.2.

6.1 STOCKPILE AND STOCKPILE EXTENSION

Reclamation and closure of the Stockpile and proposed Stockpile extension will include:

- Strategic regrading and contouring of the facility to control and divert surface water runoff from the Stockpile in order to minimize erosion and infiltration
- Covering the flat top surfaces and benches of the facility to limit precipitation infiltration and enhance revegetation
- Revegetating the covered surface to control erosion and minimize infiltration
- Construction of surface water run-off control and diversions channels with provision of appropriate erosion protection within the channels
- Maintenance and construction of underdrains for stormwater management

The relatively flat top and benches (constructed roughly every 250 to 300 feet of elevation for slope stability and to catch potential rockfall) of the Stockpile will be covered with approximately two feet of Gila conglomerate cover to minimize infiltration of stormwater. The covered areas will be prepared as a seedbed and revegetated with an appropriate seed mix. Revegetation of the surfaces will decrease runoff velocity, increase the erosion resistance of the cover, and further reduce infiltration through evapotranspiration. The relatively steep side slopes will facilitate stormwater runoff and minimize the potential for infiltration. Therefore, the side slopes will not be covered and revegetated. A portion of the area included within the proposed limit of Stockpile extension has been delineated to accommodate potential reclamation needs and disturbances such as slope reduction, grading, and/or gradual raveling of the Stockpile faces. Requirements for plan content related to reclamation of the proposed Stockpile extension (pursuant to 43 CFR 3809.401(b)(3)) are addressed in the following sections.

6.1.1 Regrading and Reshaping

The basic configuration and geometry of the Stockpile and proposed Stockpile extension is not proposed to change substantially during reclamation and closure; contouring the slopes and constructing the benches will be performed during development and operation of the Stockpile and generally will conform to the parameters for slope grade and bench spacing discussed in Section 2.1.1. A topographic map of the Stockpile configuration is provided in Figure 7, and Figure 8 depicts representative cross sections of the conceptual Stockpile configuration. During reclamation, crown chaining will be conducted on slope crests, where needed, to create a smooth transition from benches to slopes. In addition, two feet of soil cover material will be placed on the flat tops and benches of the Stockpile and proposed Stockpile extension.

Soil cover material is anticipated to be hauled from a borrow source of Gila conglomerate on the Sanders Mesa (Figure 2), as anticipated and reported in the *Closure Cost Estimate for BLM Lands Located at Bagdad* (EMC^2, 2012). Approximately 2.4 million cubic yards of soil cover material will be needed for the Stockpile and proposed Stockpile extension (based on a roughly estimated area of flat top surfaces and benches of approximately 730 acres and two feet of soil cover material); approximately half this amount, or roughly 1.2 million cubic yards of soil cover material, will be needed for BLM-managed lands (corresponding to roughly 370 acres of flat top surfaces and benches). Equipment for regrading and reshaping would generally be anticipated to involve the same equipment supporting Stockpile operations, including but not limited to:

- Traditional mine haul trucks (100-ton capacity CAT 777 or similar)
- Track and/or tire bulldozers (D8-D10 or similar)
- Front-end loaders (CAT 992 or similar)
- Motor graders (CAT 14M or similar)
- Water wagons (typically 8,000 gallon capacity)

Permanent, rock-armored water diversion channels will be constructed on the Stockpile and proposed Stockpile extension, generally aligned with the planned haul roads. Minor grading would be performed to direct water to the diversion channels.

6.1.2 Wildlife Habitat Rehabilitation

Covering the flat tops and benches with Gila conglomerate soil cover material and seeding with native vegetation should allow most of the disturbed area to reestablish suitable wildlife habitat. The rocky outslopes of the Stockpile and proposed Stockpile extension will provide new habitat and refuge for many types of small fauna.

6.1.3 Topsoil Handling

Generally, soil cover material will consist of Gila conglomerate. Gila conglomerate is suitable for use as a cover material due to its generally well-graded texture, the presence of both clay and silt sized particles (for water retention), and larger rock particle sizes, which enhance erosional stability. The Gila conglomerate is un-mineralized, with net acid neutralizing potential. As discussed in Section 2.2.4.1.3, calcium carbonate cementation of the Gila conglomerate is substantial, helping to neutralize acid when placed in contact or mixed with rocks of an acidic nature. Gila conglomerate is available at the quantities required within the Bagdad Mine. Additionally, Gila conglomerate has been shown through modeling to reduce the amount of stormwater infiltration into the underlying stockpile material. Due to the fact that little of the material will be actual topsoil, the Gila conglomerate does not have a high potential to harbor noxious weed seed, which reduces the risk of weed invasion of the cover.

Preliminarily, the material is proposed to be obtained from a borrow source on private lands near Sanders Mesa, on the northeast edge of the open pit. The average haul distance from the borrow source to the Stockpile is approximately 5.9 miles, one-way (EMC^2, 2012). The haul will be directly from the borrow site to placement on the proposed Stockpile extension.

6.1.4 Revegetation

The flat top and benches of the Stockpile and proposed Stockpile extension will be revegetated with an approved seed mix. Revegetation will occur after soil cover placement and at the appropriate time of the year for optimum seed germination and plant growth. Generally, the initial seedbed preparation will include ripping or discing the surface along the contours followed by the application of fertilizer or other soil amendment(s), if needed. Prior to implementation, studies and soil testing will be conducted, as needed, to optimize the potential for successful revegetation. A diverse plant community will be targeted through the definition of seed mixtures and application rates specified in the final APP closure plan.

6.1.5 Isolation and Control of Acid-forming, Toxic or Deleterious Materials

The Stockpile and proposed Stockpile extension (including relatively minor quantities of potentially acid-generating rock materials) are located within the hydrologic control of the passive containment capture zone of the open pit. Stormwater coming into contact with such materials will eventually drain to the open pit. Additionally, the closure of the Stockpile will cover stockpiled materials beneath the acid-neutralizing Gila conglomerate material. Further, revegetation and the water holding capacity of the Gila conglomerate will reduce the quantity of water available to contact stockpiled materials. Together, these factors serve to isolate and control potentially acid-forming, toxic, or deleterious materials.

6.1.6 Post-Closure Management

The closed facilities will be monitored and maintained in order to ensure the establishment of vegetation, review the integrity of surface water control structures, and evaluate cover erosion and geotechnical stability. Preliminarily, semi-annual vegetation monitoring and erosion control maintenance may be required for up to 5 years after closure, and monitoring and maintenance of stormwater controls may be required for up to 30 years (EMC^2, 2012).

6.2 DISTRIBUTED FACILITIES

Reclamation of surface disturbances for distributed facilities will be addressed at closure, as required by the ASMI and the mined land reclamation plan. Generally, the strategy for reclamation, closure, and post-closure monitoring will include:

- Removal of temporary instrumentation and equipment, utilities, and access roads
- Reclamation of disturbed surfaces by ripping and/or covering and reseeding

Some stormwater management and/or other dewatering facilities may remain post-closure. Utility poles, if present, may also be left in place as bird perches to support the post-mining land use.

6.3 RECLAMATION COST ESTIMATE

FMBI maintains financial assurances for the Bagdad Mine with state and federal agencies in accordance with the applicable permits. FMBI will submit an estimate of the cost to reclaim the features and facilities proposed in this MPO Modification in accordance with 43 CFR 3809.552 at the time specified by the BLM.

7.0 PREVENTION OF UNNECESSARY AND UNDUE DEGRADATION

Pursuant to 43 CFR 3809.415, FMBI will prevent unnecessary or undue degradation of public lands by:

(a) Complying with §3809.420, as applicable; the terms and conditions of the approved plan of operations; and other federal and state laws related to environmental protection and protection of cultural resources; and
(b) Assuring that operations are "reasonably incident" to prospecting, mining, or processing operations and uses.

The surface disturbances proposed in this MPO Modification do not include areas protected under specific laws such as the California Desert Conservation Area, Wild and Scenic Rivers, BLM-administered portions of the National Wilderness System, or BLM-administered National Monuments and National Conservation Areas.

7.1 PERFORMANCE STANDARDS

The construction, operation, closure, and post-closure of the features proposed in this MPO Modification will prevent unnecessary or undue degradation of public lands by complying with the performance standards found in 43 CFR 3809.420.[1] Table 10 summarizes the performance standards required under the current regulations and identifies where they are addressed in this document.

Table 10 Performance Standards

Performance Standard	Location in MPO Modification	
Technology and practices	Section 2.0	Stockpile Extension Modification to the Mine Plan of Operations
Sequence of operations	Section 2.8	Schedule of Operations
Land-use plans	Section 1.7.1.1 Section 6.0	BLM Surface Management Reclamation Plan
Mitigation	Section 2.4 Section 2.6 Section 5.0	Water Management Plan Quality Assurance Plan Baseline Environmental
Concurrent reclamation	Section 2.1.1 Section 6.0	Stockpile Extension Reclamation Plan
Compliance with other laws	Section 1.7	Permitting Information

[1] Since the Stockpile extension proposes to expand the existing Stockpile as a single, contiguous facility, FMBI has proposed a determination that the proposed extension is an "existing facility" under 43 CFR 3809.433(b) and has requested that 43 CFR 3809.420(b)(12)(ii), as follows, not apply to the proposed Stockpile extension.

(12) Leaching operations and impoundments.
(ii) You must construct a low-permeability liner or containment system that will minimize the release of leaching solutions to the environment. You must monitor to detect potential releases of contaminants from heaps, process ponds, tailings impoundments, and other structures and remediate environmental impacts if leakage occurs.

Table 10 Performance Standards

Performance Standard	Location in MPO Modification
Access roads	Section 2.1 Proposed Facilities and Features
Mining wastes	Section 2.2.4 Rock Management
Reclamation	Section 6.0 Reclamation Plan
Air quality	Section 1.7.3 Air Permit Section 2.3 Air Quality Management (Mine Dust Control)
Water quality	Section 1.7.2 Water Permits Section 2.4 Water Management Plan
Solid wastes	Section 2.5 Solid Waste Management
Fisheries, wildlife, and plant habitat	Section 5.3 Biological Resources Section 6.0 Reclamation Plan
Cultural and paleontological resources	Section 5.4 Cultural Resources
Protection of survey monuments	Section 5.5 Protection of Survey Monuments
Fire	Section 2.9 Safety and Security
Acid-forming, toxic, or other deleterious materials	Section 1.7.2.2 Aquifer Protection Permit Section 2.1 Proposed Facilities and Features Section 2.2.4 Rock Management Section 6.0 Reclamation Plan
Leaching operations and impoundments	Section 1.7.2.2 Permitting Information Section 2.1 Proposed Facilities and Features Section 2.2.4 Rock Management Section 6.0 Reclamation Plan
Maintenance and public safety	Section 2.9 Safety and Security

7.2 REASONABLY INCIDENT

Pursuant to 43 CFR 3809.415(b), FMBI will prevent unnecessary or undue degradation of public lands by assuring that operations are designed to be reasonably incident to the mining operations that will be carried out on lands managed by the BLM and private lands. Reasonably incident is defined in 43 CFR 3715.0-5 as activities, methods, and equipment by a person of ordinary prudence to prospect, mine or process a valuable mineral deposit (copper) using methods, structures and equipment appropriate to the geologic terrain, mineral deposit and stage of development. This means that there will be no activities, expenditure of labor or resources, or construction of structures that are not for the express purpose of defining, developing, mining, and processing the copper deposit on public and private lands.

The specific activities on public lands in which FMBI will be engaged are further described in Section 2.0 of this MPO Modification. As described, all aspects of the proposed operation and occupancy of public lands will involve mining. The disturbance to public lands will be only that which is required for the Stockpile extension and individual distributed facilities that are necessary to support ongoing operations and reclamation, and therefore would be considered reasonably incident.

8.0 USE AND OCCUPANCY

The purpose of the BLM regulations for use and occupancy of public lands under the Mining Laws is clarified under 43 CFR 7315.0-1, which states that the BLM will limit "use or occupancy to that which is reasonably incident" to the development of locatable mineral minerals.

43 CFR 3715.0-5 defines "occupancy" as:

> …full or part-time residence on the public lands. It also means activities that involve residence; the construction, presence, or maintenance of temporary or permanent structures that may be used for such purposes; or the use of a watchman or caretaker for the purpose of monitoring activities. Residence or structures include, but are not limited to, barriers to access, fences, tents, motor homes, trailers, cabins, houses, buildings, and storage of equipment or supplies.

The uses of public lands proposed herein are reasonably incident, as detailed in Section 7.2. Pursuant to 43 CFR 3715.1, the provision of 43 CFR 3715.4, 3715.5 and 3715.7 apply along with the applicable regulations in 43 CFR part 3800.

- *§3715.4 What if I have an existing use or occupancy?*
  BLM has approved a Plan of Operations and subsequent modifications and amendments and conducts routine site visits and inspections. FMBI's existing use and occupancy of public lands meet the applicable requirements of 43 CFR 3715 *et. seq.*
- *§3715.5 What standards apply to my use or occupancy?*
  The existing and proposed uses and occupancies of public lands administered by the BLM are reasonably incident; the existing and proposed uses and occupancies conform to all applicable federal and state environmental standards. FMBI has the required permits for current operations and will obtain necessary permits and/or permit amendments before initiating the uses proposed in this MPO Modification.
- *§3715.7 How will BLM inspect my use or occupancy and enforce this subpart?*
  The BLM routinely inspects the equipment, workings, uses, and occupancies located on public lands.

In accordance with 43 CFR 3715.2, 3715.2-1, and 3715.3-2, the following discussion is provided to the BLM for review and concurrence. The proposed Stockpile extension may include occupancy of public lands through the temporary storage of equipment or supplies on lifts during Stockpile construction and operation; structures, barriers to access, fences, or residences are not anticipated for the proposed Stockpile extension. As individual distributed facilities may be identified in the future (refer to Section 2.1.2), FMBI will evaluate the application of this section, prepare a written description of the proposed occupancy (if any), and provide supplemental items and/or materials that may be needed to support the specific request.

FMBI has completed substantial, regular work leading to the extraction and beneficiation of minerals at the Bagdad Mine. Additionally, any proposed occupancy will be temporary in nature; no features proposed under this MPO Modification would be anticipated to remain permanently (other than the reclaimed Stockpile itself). Similarly, any feature proposed in this MPO Modification would be

anticipated to meet the conditions specified in 43 CFR 3715.2 for occupancy, as demonstrated in Table 11 and summarized in the following sections. Any feature proposed under this MPO Modification would also be anticipated to meet one or more of the additional characteristics needed for a demonstration of occupancy, as listed in Table 12, pursuant to 43 CFR 3715.2-1. Finally, the requirements of 43 CFR 3715.3-2 are addressed in Table 13.

Table 11 Activities for Occupancy Demonstration

43 CFR 3715.2	Demonstration for Occupancy	Refer to Section
(a)	Be reasonably incident	Section 7.2 Reasonably Incident
(b)	Constitute substantially regular work	Section 8.1 Substantially Regular Work
(c)	Be reasonably calculated to lead to the extraction and beneficiation of minerals	Section 8.2 Reasonably Calculated to Lead to Extraction and Beneficiation of Minerals
(d)	Involve observable on-the-ground activity that BLM may verify under §3715.7, and	Section 8.3 Observable Activities
(e)	Use appropriate equipment that is presently operable, subject to the need for reasonable assembly, maintenance, repair or fabrication of replacement parts.	Section 8.4 Appropriate and Operable Equipment Section 8.5 Public Safety and Protection from Theft and Loss

Table 12 Additional Characteristics for Occupancy Demonstration

43 CFR 3715.2-1	Additional Characteristic(s) for Occupancy	Refer to Section
(a)	Protecting exposed, concentrated or otherwise accessible valuable minerals from theft or loss;	Section 8.5 Public Safety and Protection from Theft and Loss
(b)	Protecting from theft or loss appropriate, operable equipment which is regularly used, is not readily portable, and cannot be protected by means other than occupancy;	Section 8.5 Public Safety and Protection from Theft and Loss
(c)	Protecting the public from appropriate, operable equipment which is regularly used, is not readily portable, and if left unattended, creates a hazard to public safety;	Section 8.5 Public Safety and Protection from Theft and Loss
(d)	Protecting the public from surface uses, workings, or improvements which, if left unattended, create a hazard to public safety; or	Section 8.5 Public Safety and Protection from Theft and Loss
(e)	Being located in an area so isolated or lacking in physical access as to require the mining claimant, operator, or workers to remain on site in order to work a full shift of a usual and customary length. A full shift is ordinarily 8 hours and does not include travel time to the site from a community or area in which housing may be obtained.	Not anticipated to be applicable.

Table 13 Information Required for Occupancy Request

43 CFR 3715.3-2	Information Required for Occupancy Request	Refer to:
(a)	How the proposed occupancy is reasonably incident;	Section 7.2 Reasonably Incident
(b)	How the proposed occupancy meets the conditions specified in §3715.2 and §3715.2-1;	Table 11 Activities for Occupancy Demonstration Table 12 Additional Characteristics for Occupancy Demonstration
(c)	Where you will place temporary or permanent structures for occupancy;	Occupancy (temporary storage of equipment or supplies on lifts during Stockpile construction and operation) would occur within the proposed limit of Stockpile extension (Figure 4 and Figure 5).
(d)	The location of and reason you need enclosures, fences, gates, and signs intended to exclude the general public;	Enclosures, fences, gates, and signs are not anticipated. However, if such features become necessary, they would enhance public safety and protect materials from theft and loss, as discussed in Section 8.5.
(e)	The location of reasonable public passage or access routes through or around the area to adjacent public lands; and	Existing public access routes south of the proposed limit of Stockpile extension would be maintained, as depicted in Figure 3. Existing dirt roads within the proposed limit of Stockpile extension are dead ends; public passage/connectivity would not be obstructed through the construction of the Stockpile extension.
(f)	The estimated period of use of the structures, enclosures, fences, gates, and signs, as well as the schedule for removal and reclamation when operations end.	Section 2.8 Schedule of Operations

Future, potential occupancy requested under this MPO Modification related to the final engineering of individual distributed facilities would be accompanied by a written description of the proposed occupancy, if applicable. In such case, the items and materials required by 43 CFR 3715.3-2 and listed in Table 13 will be provided. FMBI would not begin occupancy related to the distributed facilities until the BLM approves this MPO Modification and:

- BLM reviews and authorizes the final engineering of individual features under 43 CFR 3809 and 3715, as applicable, and
- The federal, state and local mining, reclamation, and waste disposal permits, approvals, or other authorizations for the particular use or occupancy have been obtained.

8.1 SUBSTANTIALLY REGULAR WORK

Upon approval of this MPO Modification, FMBI will begin the operations as described in Section 2.0 related to the construction, operation, and reclamation of the proposed Stockpile extension. Activities will include hauling, unloading, leaching, and stockpiling of mineralized waste rock and overburden, as described in Section 2.1.1. According to the schedule of operations presented in Section 2.8, the work will be continuous, depending on prevailing economic conditions, potential interruptions, and other

factors. Mining is anticipated to continue through approximately 2054. Post-mining activities on public lands will include reclamation, as described in the state-approved reclamation plan (Closure Plan) and outlined in Section 6.0 of this MPO Modification.

8.2 REASONABLY CALCULATED TO LEAD TO EXTRACTION AND BENEFICIATION OF MINERALS

FMBI has determined, through exploration activities, that the mineral resources to be mined are economically recoverable. As this proposed MPO Modification includes the extension of an existing leach stockpile, there is a reasonable expectation that it will result in the extraction and beneficiation of copper. Recovery of minerals in accordance with this MPO Modification constitutes a major investment in equipment and resources and would not be undertaken without this expectation.

8.3 OBSERVABLE ACTIVITIES

In accordance with 43 CFR 3715.7, BLM field staff will be able to physically verify the activities described in this MPO Modification upon approval and commencement of the construction of the new and expanded facilities. The BLM will be allowed access to the site for a review of the activities on public lands.

8.4 APPROPRIATE AND OPERABLE EQUIPMENT

FMBI uses operable equipment at the Bagdad Mine that is appropriate, both in terms of physical requirements and cost effectiveness, for the job. Equipment is routinely maintained according to manufacturer's suggestions and industry standards. The appropriate equipment is presently operable and located at the mine site adjacent to the public lands proposed for mining in this MPO Modification. A description of equipment that will be used in the implementation of this MPO Modification is provided in Section 2.1.1. Mining activities are planned for two shifts per day, 365 days per year.

8.5 PUBLIC SAFETY AND PROTECTION FROM THEFT AND LOSS

Occupancy of public lands will protect valuable minerals from theft, protect the equipment from theft or loss, protect the public from this equipment, and protect the public from hazardous situations on public land. Existing security procedures protect the current operations by restricting public access to private lands at the mine site, including facilities and equipment. On private land, gates are located on access roads to the mine and are maintained, closed, and locked with access available only to mine personnel. Perimeter gates on private land found damaged are immediately repaired. This is for both the protection of the public and the mine assets. FMBI does not allow the public to cross the mine property to access public lands. In addition, FMBI has implemented supplementary safety programs to reflect corporate policies and site-specific considerations. All employees are trained to observe and report suspicious or unusual activity that threatens safety or security.

Mine employees and visitors to the mine are required to comply with a mine safety plan and must wear the required safety equipment. Visitors to the site are required to check in prior to entrance through the main gate, which includes a manned checkpoint. A safety briefing is provided to visitors prior to entrance onto the mine site.

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