STATE OF ARIZONA
AQUIFER PROTECTION PERMIT NO. P-101679
PLACE ID NO. 1567, LTF 94253
SIGNIFICANT AMENDMENT

1.0 AUTHORIZATION

In compliance with the provisions of Arizona Revised Statutes (A.R.S.) Title 49, Chapter 2, Articles 1, 2, and 3, Arizona Administrative Code (A.A.C.) Title 18, Chapter 9, Articles 1 and 2, A.A.C. Title 18, Chapter 11, Article 4 and amendments thereto, and the conditions set forth in this permit, Freeport-McMoRan Sierrita Inc. is hereby authorized to operate the discharging facilities located at the Freeport-McMoRan Sierrita Mine and to operate the Pipeline Secondary Containment Ponds and Waste Rock Stockpiles at the Twin Buttes Mine. The permit also authorizes activities to close the EW Plant Area facilities and Historic Equipment Shop Area facilities at the Twin Buttes Mine. The Sierrita Property encompasses both mines and is located near Green Valley, Pima County, Arizona over groundwater of the Upper Santa Cruz Basin. Legal description is listed below.

This permit becomes effective on the date of the Water Quality Division Deputy Director's signature and shall be valid for the life of the facility (operational, closure, and post-closure periods) unless suspended or revoked pursuant to A.A.C. R18-9-A213. The permittee shall construct, operate and maintain the permitted facilities:

1. Following all the conditions of this permit including the design and operational information documented or referenced below, and
2. Such that Aquifer Water Quality Standards (AWQS) are not violated at the applicable point(s) of compliance (POC) set forth below or if an AWQS 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.

1.1. PERMITTEE INFORMATION

Facility Name:	Freeport-McMoRan Sierrita Property
Facility Address:	6200 West Duval Mine Road, Green Valley, AZ 85622 18550 South La Cañada Drive, Sahuarita, AZ 85629
County:	Pima
Annual Registration Fee Flow Rate:	10,000,000 gallons per day (gpd) or more
Permittee:	Freeport-McMoRan Sierrita Inc.
Permittee Address:	P.O. Box 527, Green Valley, AZ 85622-0527
Facility Contact:	David Rhoades, President - General Manager
Emergency Phone No.:	(520) 393-2603

Latitude/Longitude: 31° 51' 14" N / 111° 04' 13" W

Legal Description: **Sierrita Mine:** Sections 8, 9, 13, 16, 17, 19, 20, and 21, and parts of Sections 3-7, 10, 11, 14, 15, 18, and 24, in Township 18 South, Range 12 East; and Sections 17-20, 29, and parts of Sections 16, 21, 28, and 30 in Township 18 South, Range 13 East, of the Gila and Salt River Base Line and Meridian, Pima County, Arizona.

Twin Buttes Mine: 8,411 acres within portions of Sections 36 and 25 in Township 17 South, Range 12 East; Sections 28, 29, 31, 32, 33, 34 and portions of Sections 20, 21, 22, 27, and 30 in Township 17 South, Range 13 East; Portions of Sections 1 and 12 in Township 18 South, Range 12 East; Sections 5 and 6 and portions of Sections 3, 4, 7, 8, and 9 in Township 18 South, Range 13 East; all with the Gila and Salt River Base Line and Meridian, Pima County, Arizona.

1.2. AUTHORIZING SIGNATURE

_____

Randall Matas, Deputy Director
Water Quality Division
Arizona Department of Environmental Quality

Signed this _____ day of _____, 2022

THIS AMENDED PERMIT SUPERCEDES ALL PREVIOUS PERMITS

TABLE OF CONTENTS

TABLE OF TABLES

2.0 SPECIFIC CONDITIONS

[A.R.S. §§ 49-203(4), 49-241(A)]

2.1. FACILITY / SITE DESCRIPTION

[A.R.S. § 49-243(K)(8)]

Freeport-McMoRan Sierrita Inc. (Sierrita) is operating an open pit mine and mineral concentration facility which is located approximately 6 miles northwest of Green Valley, in Pima County, Arizona. Green Valley lies approximately 25 miles south of the city of Tucson, Arizona. Facilities at the Freeport-McMoRan Sierrita Inc. (Sierrita) mine, previously Phelps Dodge Sierrita, Inc., and before that Cyprus Sierrita Corporation, include conventional crushing and flotation followed by differential flotation, leaching and roasting of molybdenum disulfide, rhenium recovery, molybdenum disulfide production and packaging, molybdenum trioxide production and packaging, leach stockpiles, and solution extraction/electrowinning facilities.

Sierrita produces copper concentrate and cathode copper, along with molybdenum products and rhenium products. Copper and molybdenum are the primary products produced by Sierrita. Copper and molybdenum disulfide are produced through conventional milling and froth flotation, and pure copper is produced through solution extraction and electrowinning. Molybdenum trioxide is produced through roasting. Rhenium is also recovered in the molybdenum roasting operations.

The Sierrita Property comprises two mine sites identified as the Sierrita Mine and Twin Buttes Mine. The Sierrita Mine consists of two operating open-pits: the Sierrita-Esperanza pit and a molybdenum satellite pit; the backfilled Ocotillo open-pit, a 115,000-ton-per-day concentrator, two molybdenum roasting plants, a rhenium plant, an oxide and low-grade sulfide stockpile leaching operation. Ore production from each pit is highly variable; however, the aggregate production is limited to the capacity of the plant operation. The mine is capable of producing up to 250 million pounds of copper and, as a co-product, 25 million pounds of molybdenum, annually.

The Twin Buttes Mine includes operation of an electrowinning plant and several secondary containment ponds located along a pipeline corridor, which conveys electrolyte to the Electrowinning Plant and back to the Sierrita Solution Extraction Plant located approximately 4 miles to the southwest.

The property is also in the Pima Mining District, which extends along the eastern flank of the Sierrita Mountains and includes the Twin Buttes, Sierrita, and Mission Mines. Mining within the District began on a small scale in the 1880s and continued intermittently throughout the first half of the 20th Century. Previous owners/leasees of the mine property have included the Banner Mining Company, Anaconda Copper Mining Company, Amax Mining Company, Park Corporation, Cyprus Sierrita Corporation, and Phelps Dodge Corporation. The area-wide APP for the Twin Buttes Mine was issued by ADEQ to Phelps Dodge Sierrita, Inc. on December 14, 2007. At that time, Phelps Dodge was leasing the property from Twin Buttes Properties, Inc. (TBPI). Freeport-McMoRan Copper & Gold Inc. purchased Phelps Dodge Corporation in 2007, and subsequently purchased the Twin Buttes property from TBPI on December 30, 2009. Open-pit mining at the Twin Buttes Mine ended in 1985.

The site includes the following permitted discharging facilities:

Table 1: DISCHARGING FACILITIES			
Facility Name	**Facility No.**	**Latitude**	**Longitude**
Sierrita Mine Facilities			
Amargosa Wash Drainage Area			
Non-stormwater Impoundments-			
Duval Canal Velocity Pond	D-64	31° 52' 10" N	111° 06' 05" W
Amargosa Pond	D-05	31° 51' 55" N	111° 06' 00" W
SX-1 Tank Farm Pond	D-34	31° 51' 56" N	111° 06' 02" W
SX-1 Drain Pond	D33	31° 51' 55" N	111° 06' 05" W
Process Solution Impoundments-			
Headwall No. 1	D-02	31° 51' 49" N	111° 06' 34" W
Bailey Lake	D-03	31° 51' 52" N	111° 06' 17" W
Raffinate Pond No. 2	D-10	31° 51' 51" N	111° 06' 09" W
Drain Pond No. 2	D-15	31° 51' 53" N	111° 06' 04" W
Moly Decant Tanks and Pad Area	D-39A	31° 51' 54" N	111° 06' 11" W
B-Pond	D-07	31° 51' 52" N	111° 05' 39" W
Active Leaching Area-			
Sulfide Active Leach Area	D-17	31° 51' 19" N	111° 07' 59" W
Solution Conveyance Channels-			
Duval Canal	D-29	31° 51' 19" N	111° 04' 39" W
Amargosa Spillway	D-48	31° 51' 55" N	111° 05' 46" W
Demetrie Wash Area			
Non-stormwater Impoundments			
07 Pond	D-43	31° 52' 58" N	111° 06' 29" W
New D Pond	D-45	31° 52' 31" N	111° 05' 51" W
Copper Sulfate Pipeline Ponds 1 & 2	D-59	31° 52' 02" N	111° 05' 56" W
Tailing Pipeline Containment Structures	D-62 A-F	31° 52' 07" N to 31° 52' 12" N	111° 05' 30" W to 111° 05' 37" W
Esperanza Wash Drainage Area			
Non-stormwater Impoundments-			
SX-3 Stormwater Pond	D-11	31° 50' 49" N	111° 07' 08" W
Cat Pond 1	D-42A	31° 50' 33" N	111° 07' 53" W
Cat Pond 2	D-42B	31° 50' 34" N	111° 08' 18" W
Cat Pond 3	D-42C	31° 50' 29" N	111° 08' 25" W
Process Solution Impoundments-			
Raffinate Pond No. 3	D-04	31° 50' 53" N	111° 07' 09" W
Headwall No. 2	D-46	31° 51' 08" N	111° 06' 55" W
Headwall No. 3	D-09	31° 50' 57" N	111° 07' 16" W
Headwall No. 5	D-12	31° 50' 42" N	111° 07' 57" W
Active Leaching Area-			
Oxide (Twin Buttes and Sierrita) Active Leach Area	D-18	31° 52' 02" N	111° 06' 50" W
Solution Conveyance Channel-			

Table 1: DISCHARGING FACILITIES			
Facility Name	**Facility No.**	**Latitude**	**Longitude**
Headwall No. 2 Channel	D-08	31° 50' 59" N	111° 06' 56" W
Mill Site Area			
Non-Storm water Impoundments			
Raw Water Reservoir	D-21	31° 52' 29" N	111° 06' 35" W
Process Solution Impoundments			
Decant Ponds and Pad Area	D-20	31° 52' 22" N	111° 06' 03" W
Tailing Thickeners	D-40	31° 52' 25" N	111° 06' 11" W
Solution Conveyance Channels			
Drainage Channel West Plant Area	D-22	31° 52' 20" N	111° 05' 59" W
Thickeners Area Drainage Channel	D-41	31° 52' 16" N	111° 06' 01" W
Tailing Impoundments			
Sierrita Tailing Impoundment	D-01	31° 50' 59" N	111° 02' 57" W
Sierrita Tailing Impoundment Sediment Basins	D01 A-K	31° 49' 42" N to 31° 51' 51" N	111° 01' 28" W to 111° 01' 39" W
Waste Rock Piles			
West Waste Rock Piles	D-19	31° 51' 12" N	111° 08' 57" W
RS-3 Waste Rock Pile	D-36	31° 52' 50" N	111° 06' 35" W
RS-2 Waste Rock Pile	D-47	31° 52' 52" N	111° 09' 19" W
V Waste Rock Pile	D-56	31° 53' 12" N	111° 07' 06" W
Open Pit			
Sierrita-Esperanza Pit	D-55	31° 52' 17" N	111° 08' 01" W
Ocotillo Pit	D-60	31° 53' 00" N	111° 06' 50" W
Moly Satellite Pit	D-61	31° 53' 02" N	111° 08' 18" W
Concentrate Storage			
Non-Municipal Solid Waste Landfill			
Non-Municipal Solid Waste Landfill	D-14	31° 51' 31" N	111° 07' 35” W
Decommissioned Facilities to be addressed at Final Mine Closure			
A Pond	D-06	31° 51' 55" N	111° 05' 48” W
Old D Pond	D-13	31° 52' 22" N	111° 05' 50” W
Rhenium Ponds	D-23	31° 51' 59" N	111° 04' 25” W
Launders Facility	D-39	31° 51' 54" N	111° 06' 11” W
Twin Buttes Mine Facilities			
Pipeline Secondary Containment Ponds			
Containment Structure -03	49A	31° 52' 15.5" N	111° 05' 09.96" W
Containment Structure -04	49B	31° 52' 26.41" N	111° 05' 02.68" W
Containment Structure -05	49C	31° 52' 31.60" N	111° 04' 56.63" W
Containment Structure -06	49D	31° 52' 43.82" N	111° 04' 47.84" W
Containment Structure -07	49E	31° 52' 50.37" N	111° 46' 37.75" W
Containment Structure -08	49F	31° 52' 52.92" N	111° 03' 58.96" W
Containment Structure -10	49G	31° 52' 59.34" N	111° 03' 50.21" W
Containment Structure -11	49H	31° 53' 15.39" N	111° 03' 22.26" W
Containment Structure -12	49I	31° 53' 25.81" N	111° 03' 19.16" W
Containment Structure -14	49J	31° 54' 09.34" N	111° 035' 30.57" W
Waste Rock Storage Area-			

Table 1: DISCHARGING FACILITIES			
Facility Name	**Facility No.**	**Latitude**	**Longitude**
Waste Rock Stockpile 1	50	31° 53' 43.47" N	111° 04' 0.11" W
Waste Rock Stockpile 2	51	31° 54' 34.01" N	111° 03' 45" W
Waste Rock Stockpile 3	52	31° 54' 54.35" N	111° 02' 25.79" W
Historical Equipment Shop Area Facilities (no longer in operation)[1]			
Office Area Catchment	21	31° 54' 14.4" N	111° 01' 57.5" W
Vehicle Wash	44	31° 54' 12.4" N	111° 02' 10" W
Vehicle Wash Discharge Area	44A	31° 54' 11" N	111° 02' 9.5" W
EW Plant Area Facilities located within Waste Rock Pile 2 Footprint[2]			
Acid Tank at EW Plant	26	31° 54' 27.96"	111° 4' 0.66"
Wash Water Ponds (North & South)	27	31° 54' 29.52"	111° 3' 58.90"
Thickeners and Clarifiers	36 A-F	31° 54' 42.43"	111° 4' 7.01"
EW Wash Pump back Sump	36G	31° 54' 44.41"	111° 4' 4.31"
EW Plant	37	31° 54' 26.47"	111° 4' 3.78"
EW Plant Tank house Sump	37A	31° 54' 27.19"	111° 4' 3.63"
Thickener Cleanout Disposal Area	38	31° 54' 42.39"	111° 3' 54.14"
EW Wash Sump Overflow Ditch	38H	31° 54' 43.59"	111° 4' 0.76"
SX Plant Pumpback Sump	39	31° 54' 26.76"	111° 3' 52.24"
SX Sludge Discharge Area	42	31° 54' 22.29"	111° 3' 47.58"
Acid Tanks and Discharge Area	43	31° 54' 35.63"	111° 4' 4.62"

2.1.1. Annual Registration Fee

[A.R.S. § 49-242 and A.A.C. R18-14-104]

The annual registration fee for this permit is payable to ADEQ each year. The annual registration fee flow rate is established by the permitted flow rate identified in Section 1.1 PERMITTEE INFORMATION. If the facility is not constructed or is incapable of discharge, the permittee may be eligible for reduced fees pursuant to Table 2 of A.A.C. R18-14-104(A). Send all correspondence requesting reduced fees to the Groundwater Protection Value Stream. Please reference the permit number, LTF number, and the reason for requesting reduced fees under this rule.

2.1.2. Financial Capability

[A.R.S. § 49-243(N) and A.A.C. R18-9-A203]

The permittee has demonstrated financial capability under A.R.S. § 49-243(N) and A.A.C. R18-9-A203. The permittee shall maintain financial capability throughout the life of the facility. The Groundwater Protection Value Stream approved the closure costs of $230,489,618 and post-closure cost of $16,813,782, for a total of $247,303,400. For the Twin Buttes Facilities, the approved estimated closure and post closure costs are $7,212,146 and $58,699, respectively for a total of $7,270,845.

1 These facilities are located within the PCCZ and are no longer in service. Facility descriptions were provided in APP No. P- 101679 (2013). The Vehicle Wash and Vehicle Wash Discharge Area have been decommissioned and some initial site characterization work completed. Final closure activities will be completed at the end of mine life.

2 Descriptions of the EW Plant Area facilities were provided in the 2007 APP No. P-100498. With the exception of the EW Plant and EW Tankhouse Sump none are in service. All are located within the Twin Buttes pit PCCZ. Facility closure will consist of burial beneath the No.2 Stockpile. If the stockpile is not constructed, final closure will be completed at the end of mine life.

The permittee provided financial capability for the estimated Net Present Value (NPV) of the closure and post-closure costs in the amount of $201,268,608.

The financial capability was demonstrated through a corporate guarantee per A.A.C. R18-9-A203(C)(8).

2.2. BEST AVAILABLE DEMONSTRATED CONTROL TECHNOLOGY (BADCT)

[A.R.S. § 49-243(B) and A.A.C. R18-9-A202(A)(5)]

Facilities regulated by this permit shall be designed, constructed, operated, and maintained to meet requirements specified by A.R.S. §49-243(B) and A.A.C. R18-9-A202(A)(5).

2.2.1. Engineering Design

BADCT description for the permitted facilities is presented in Section 4.2, Table 8.

2.2.2. Site-Specific Characteristics

The passive containment created by the Sierrita-Esperanza Pit and the Twin Buttes Pit is used as an integral part of BADCT for the following facilities:

Sierrita Mine: Non-Municipal Solid Waste Landfill (D-14), Sulfide Active Leach Area (D-17), Oxide (Twin Buttes and Sierrita) Active Leach Area (D-18), West Waste Rock Piles (D-19), RS-2 Waste Rock Pile (D-47), Moly Satellite Pit (D-61) and RS-3 Waste Rock Pile (D-36), 07 Pond (D-43), New D Pond (D-45) and Raw Water Reservoir (D-21).

Twin Buttes Mine: Pipeline Secondary Containment Ponds (49A-J), Waste Rock Stockpiles 1, 2, and 3 (50, 51, 52, respectively), Office Area Catchment (21), Vehicle Wash and Vehicle Wash Discharge Area (44 and 44A), EW Plant Area Facilities (26, 27, 36 A-G, 37 and 37A, 38 and 38H, 39, 42, 43).

2.2.3. Pre-Operational Requirements

Not applicable.

2.2.4. Operational Requirements

At a minimum, permitted facilities shall be inspected for performance levels listed in Section 4.2, Table 9 REQUIRED INSPECTIONS and OPERATIONAL MONITORING*. Results of these inspections and monitoring activities shall be documented and maintained at the mine location for at least 10 years, and as required by Section 2.7.2 of this permit.

If damage is identified during an inspection that could cause or contribute to an unauthorized discharge pursuant to A.R.S. § 49-201(12), proper repairs shall be promptly performed. A summary of the repairs, including a description of the procedures and materials used shall be maintained with the inspection records noted above.

Table 2: LEAKAGE RATES FOR LCRS FACILITIES		
Facility Name (#)	**Action Leakage Rate (GPD)**	**Rapid and Large Leakage Rate (GPD)**
Raffinate Pond No. 3 (D-04)	1,132	9,947
Raffinate Pond #2 (D-10)	1,081	9,498
Drain Pond No. 2 (D-15)	124	1,089
Headwall No. 5 (D-12)	911	8,008
B-Pond (D-07)	4,089	35,932

2.3. DISCHARGE LIMITATIONS

[A.R.S. §§ 49-201(14), 49-243 and A.A.C. R18-9-A205(B)]

The permittee shall operate and maintain all permitted facilities to prevent unauthorized discharges pursuant to A.R.S. §§ 49-201(12) resulting from failure or bypassing of BADCT pollutant control technologies including liner failure, uncontrollable leakage, overtopping (e.g., exceeding the maximum storage capacity, defined as a fluid level exceeding the crest elevation of a permitted impoundment), berm breaches that result in an unexpected loss of fluid, accidental spills. The discharge limitations in this section are not applicable to any discharge caused by precipitation in excess of a single 100-year/24 hour storm event or process overflow during a power outage exceeding 24 hours in duration.

2.3.1. Leaching Facilities

The Leaching Facilities are designed and authorized for use in leaching of ore. The Leaching Facilities shall be constructed and operated in accordance with the BADCT outlined in Section 4, Table 8, and the ultimate heights shall not exceed those set forth in the approved permit application and engineering study.

2.3.2. Pregnant Leach Solution Ponds and Impoundments

The PLS Ponds and Impoundments are designed and authorized to receive pregnant leach solution, stormwater, process water and process upset events.

2.3.3. Non-stormwater Impoundments

The permitted non-stormwater impoundments shall only receive stormwater runoff and run-on, and process solutions as a result of storm events or process upset events.

2.3.4. Process Solution Ponds

The process solutions ponds shall only receive process solution and stormwater.

2.3.5. Pipeline Secondary Containment Ponds (No. 49A through No. 49J)

These ponds are authorized to receive stormwater runoff and run-on, and process solutions as a result of storm events or process upsets.

2.4. POINT OF COMPLIANCE (POC)

[A.R.S. § 49-244]

The POC(s) is (are) established by the following monitoring location(s):

	Table 3: POINTS OF COMPLIANCE				
POC #	**Designation [2]**	**Cadastral Location [1]**	**ADWR Registration Number**	**Latitude**	**Longitude**
MH-14*	Hazardous / Non-Hazardous	(D-18-13) 16bcc2	55-528098	31° 51’ 48.8”	111° 01’ 28.8”
MH-15W*	Hazardous / Non-Hazardous	(D-18-13) 21cbc	55-528093	31° 50’ 44”	111° 01’ 28.5”
MH-16W*	Hazardous / Non-Hazardous	(D-18-13) 28cbb3	55-528099	31° 49’ 58.3”	111° 01’ 28.7”
MH-18	Hazardous / Non-Hazardous	(D-18-12) 20cdd	55-561874	31° 50’ 28.4”	111° 08’ 26”
MH-19	Hazardous / Non-Hazardous	(D-18-12) 21ccc	55-561878	31° 50’ 29.1”	111° 07’ 43.7”
MH-20	Hazardous / Non-Hazardous	(D-18-12) 21dda	55-561880	31° 50’ 38”	111° 06’ 47.1”
MH-23	Hazardous / Non-Hazardous	(D-18-12) 14bdd2	55-561871	31° 51’ 51.6”	111° 05’ 17.4”
MH-27	Hazardous / Non-Hazardous	(D-18-12)21add	55-203702	31° 51’ 02”	111° 06’ 54”
MH-28*	Hazardous / Non-Hazardous	(D-18-13)21bbb3	55-903648	31° 51’ 19.6”	111° 01’ 34.0”
MH-29*	Hazardous / Non-Hazardous	(D-18-12)28bba3	55-903649	31° 50’ 20.9”	111° 01’ 29.2”
POC-1	Hazardous / Non-Hazardous	Pending-	Pending	31° 55’ 25.0”	111° 01’ 57.4”
POC-2	Hazardous / Non-Hazardous	Pending-	Pending	31° 55’ 10.8”	111° 01’ 59.3”

1 Coordinates and latitude and longitude bearings are approximate.
2 Hazardous = Well used to monitor hazardous constituents. Non-Hazardous = Well used to monitor non-hazardous constituents.
3 POC-1 and POC-2 wells have not yet been installed and are contingent upon Waste Rock Stockpile 3 construction activities in the Twin Buttes Mine area. Waste rock mining activities have not occurred since 1985. POC-1 and POC-2 installation is a Compliance Schedule Item.
* East-Half POC Wells

Monitoring requirements for each POC are listed in Section 4.2, Table 11, 12.

The Director may amend this permit to designate additional POCs, if information on groundwater gradients or groundwater usage indicates the need.

2.5. MONITORING REQUIREMENTS

[A.R.S. § 49-243(K)(1), A.A.C. R18-9-A206(A)]

Unless otherwise specified in this permit, all monitoring required in this permit shall continue for the duration of the permit, regardless of the status of the facility. Unless otherwise provided, monitoring shall commence the first full monitoring period following permit issuance. All sampling, preservation and holding times shall be in accordance with currently accepted standards of professional practice. Trip blanks, equipment blanks and duplicate samples shall also be obtained, and Chain-of-Custody procedures shall be followed, in accordance with currently accepted standards of professional practice. Copies of laboratory analyses and Chain-of-Custody forms shall be maintained at the permitted facility. Upon request, these documents shall be made immediately available for review by ADEQ personnel.

2.5.1. Discharge Monitoring

None required by this permit.

2.5.2. Facility / Operational Monitoring

At a minimum, permitted facilities shall be inspected for performance levels listed in Section 4.2, Table 8. If damage is identified during an inspection that could cause or contribute to an unauthorized discharge pursuant to A.R.S. § 49-201(12), proper repairs shall be promptly performed. Results of these inspections and monitoring activities shall be documented and maintained at the facility location for at least 10 years, and as required by Section 2.7.2 of this permit.

2.5.3. Groundwater Monitoring and Sampling Protocols

Compliance groundwater monitoring is required under the terms of this permit. For all sampling methods, Static water levels shall be measured and recorded prior to sampling. Wells shall be purged of at least three borehole volumes (as calculated using the static water level) or until field parameters (pH, temperature, and conductivity) are stable, whichever represents the greater volume. If evacuation results in the well going dry, the well shall be allowed to recover to 80 percent of the original borehole volume, or for 24 hours, whichever is shorter, prior to sampling. If after 24 hours there is not sufficient water for sampling, the well shall be recorded as "dry" for the monitoring event. An explanation for reduced pumping volumes, a record of the volume pumped, and modified sampling procedures shall be reported and submitted with the Self-Monitoring Report Form (SMRF).

As an alternative method for sampling, the permittee may conduct the sampling using a low-flow purging method in accordance with accepted EPA, USGS, or DOD protocols. The well must be purged until indicator parameters stabilize. Indicator parameters shall include dissolved oxygen, turbidity, pH, temperature, and conductivity.

As a third alternative method for sampling within POC wells with very low recharge rates, the permittee may conduct the sampling using no-purge sampling techniques using HydraSleeve™ or similar type methodology. The use of HydraSleeve™ or similar type samplers shall follow accepted EPA, USGS, or DOD protocols. In addition, the HydroSleeve™ or similar type sampler shall be placed just below the water table.

2.5.3.1. Point of Compliance Well Installation

The permittee shall install each new well in accordance with all ADWR requirements. Each POC well must be constructed to monitor groundwater quality in the uppermost aquifer in accordance with the compliance schedule.

2.5.3.2. Point of Compliance Well Replacement

In the event that one or more of the designated POC wells should become unusable or inaccessible due to damage, or any other event, a replacement POC well shall be constructed and installed upon approval by the Groundwater Protection Value Stream. If the replacement well is fifty (50) feet or less from the original well, the ALs and/or AQLs calculated for the designated POC well may apply to the replacement well. The ALs and/or aquifer quality limits (AQLs) calculated for the designated POC well shall apply to the replacement well. Otherwise, the ALs and/or AQLs shall be set following the provisions in Section 2.5.3.4 and 2.5.3.5 of this permit.

2.5.3.3. Ambient Groundwater Monitoring for POC Wells

Eight (8) consecutive quarters of groundwater sampling are required to establish ambient groundwater quality. Each quarterly or monthly ambient groundwater sample shall be analyzed for the parameters listed in **Error! Reference source not found.**.

2.5.3.4. Alert Levels (ALs) for Point of Compliance (POC) Wells

ALs shall be calculated for all contaminants with an established numeric AWQS for each POC well. The AL and AQL for each parameter for which the eight rounds of ambient samples have been completed, are listed in Section 4.2, Table 11, and Table 12. Where ambient sampling is required, within 90 days of the receipt of the laboratory analyses for the final quarter or month of the ambient groundwater monitoring period for each POC well referenced in Section 2.4, Table 4 the permittee shall submit the ambient groundwater data in tabulated form to the Groundwater Protection Value Stream. Copies of all laboratory analytical reports, field notes, and the Quality Assurance/Quality Control (QA/QC) procedures used in collection and analyses of the samples for all parameters listed in Section 4.2, Table 11, and Table 12 to be established for each POC well, shall be submitted to the Groundwater Protection Value Stream. The permittee may submit a report with the calculations for each AL and AQL included in the permit for review and approval by the Groundwater Protection Value Stream, or the permittee may defer calculation of the ALs and AQLs by the Groundwater Protection Value Stream. The ALs shall be established and calculated by the following formula, or another valid statistical method submitted to Groundwater Protection Value Stream in writing and approved for this permit by the Groundwater Protection Value Stream:

$$AL = M + KS$$

Where M = mean, S= standard deviation, and K = one-sided normal tolerance interval with a 95 percent confidence level (Lieberman, G.J. (1958) Tables for One-sided Statistical Tolerance Limits: Industrial Quality Control, Vol XIV, No. 10). Obvious outliers should be excluded from the data used in the AL calculation.

The following criteria shall be met in establishing ALs in the permit:

1. The AL shall be calculated for a parameter using the analyses from a minimum of eight consecutive sample events. For wells MH-27, MH-28, and MH-29, eight consecutive monthly sample rounds were used to calculate ALs. The permittee shall not use more than eight sample rounds in the calculation of a parameter. Any data where the PQL exceeds 80 percent of the AWQS shall not be included in the AL calculation.

2. If a parameter is below the detection limit, the permittee must report the value as “less than” the numeric value for the PQL or detection limit for the parameter, not just as “non-detect”. For those parameters, the permittee shall use a value of one-half the reported detection limit for the AL calculation.

3. If the analytical results from more than 50 percent of the samples for a specific parameter are non-detect, then the AL shall be set at 80 percent of the AWQS.

4. If the calculated AL for a specific constituent and well is less than 80 percent of the AWQS, the AL shall be set at 80 percent of the AWQS for that constituent in that well.

5. Any data where the laboratory Practical Quantitation Limit (PQL) exceeds 80% of the AWQS shall not be included in the AL calculation.

2.5.3.5. Aquifer Quality Limits for POC Wells

For each of the monitored analytes for which a numeric AWQS has been adopted, the AQL shall be established as follows:

1. If the calculated AL is less than the AWQS, then the AQL shall be set equal to the AWQS.
2. If the calculated AL is greater than the AWQS, then the AQL shall be set equal to the calculated AL value, and no AL shall be set for that constituent at that monitoring point

2.5.3.6. Compliance Groundwater Quality Monitoring for POC Wells

Quarterly compliance groundwater monitoring in all other POC wells shall commence within the first calendar quarter after the effective date of this permit. For quarterly compliance monitoring, the permittee shall analyze groundwater samples for the parameters listed in Section 4.2, Table *11* .In addition to quarterly compliance groundwater monitoring, an additional list of parameters shall be monitored at each POC well every 8th quarter (biennial). For the biennial monitoring event, the parameters listed in Section 4.2, Table 12**.** shall be analyzed. The permittee may submit a written request to the Groundwater Protection Value Stream to modify, reduce or delete a monitoring parameter in the quarterly or biennial compliance groundwater monitoring tables (Section 4.2) in accordance with the following criteria:

1. The parameter in question has not been detected for at least two consecutive biennial or four consecutive quarterly monitoring events in the well. The PQL reported by the laboratory shall be less than 80 percent of the established numeric AWQS, and shall not be greater than three times the laboratory method detection limit for that parameter.

2. The permittee shall submit a written report indicating the parameter(s) proposed for modification, accompanied by supporting data, including laboratory analytical reports and quality assurance/quality control data, to the Groundwater Protection Value Stream for review.

3. Upon review, the Groundwater Protection Value Stream will determine if the modification(s) requested is justified and approved. The respective changes, if approved, will require an amendment to the permit.

2.5.3.7. Passive Containment Demonstration

Based on supporting documentation provided in the Application, the permittee has satisfactorily predicted that the Sierrita-Esperanza and Twin Buttes open-pits will create "passive containment capture zones," as per A.R.S. § 49-243(G). Passive containment, per A.R.S. § 49-243(G)(1), 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.

The water balance in the numerical model for the Twin Buttes Mine pit lakes predicts that equilibrium will be maintained in the pit lakes following closure at a level below the low point of the ridge separating the pits at 2, 607 feet elevation. The model estimates that the water levels in the Twin Buttes Mine pit lakes will be approaching equilibrium at the end of the 200 year simulation, with a West Pit Lake stage of about 2,463 feet elevation, and an East Pit Lake stage of about 2,454 feet elevation.

A post-audit of the approved groundwater flow model shall be conducted every five (5) years in accordance with Compliance Schedule Item No. 5 and Section 2.7.6. Factors to be evaluated in the post-audit include groundwater inflow, the estimated static water level in the pits, the estimated time to reach static water level, and any potential for the water level in the pit to rise to an elevation where the hydraulic gradient reverses and the pit ceases to function as a passive containment. The passive containment modeling projections shall be based solely on natural or engineered topographical, geological, or hydrological control measures that can operate without continuous maintenance (A.R.S. § 49-243(G)(1).

Every five (5) years thereafter, the permittee shall compare the current groundwater data to the previous model predictions. The assumptions about mine development and infiltration shall be reviewed in terms of the actual changes in the pit configuration, leaching areas, leach rates, sump locations, water balance, annual precipitation and storm events. The resulting compilation shall be compared to predictions provided by the groundwater flow model for the previous calibration period.

A report summarizing the original passive containment demonstration and the revisions made to the model shall be submitted to the ADEQ for review. The report shall include a table listing groundwater elevations from piezometer and monitor wells current at the time of the post-audit review and a

potentiometric contour map based on groundwater elevations used in the post-audit demonstration. ADEQ will determine whether a full model recalibration is required. If a recalibration is necessary, a report describing the model output and the revisions and/or changes to the model shall be submitted to the GPVS.

2.5.4. Surface Water Monitoring and Sampling Protocols

None required by this permit.

2.5.5. Analytical Methodology

All samples collected for compliance monitoring shall be analyzed using Arizona state-approved methods. If no state-approved method exists, then any appropriate EPA-approved method shall be used. Regardless of the method used, the detection limits must be sufficient to determine compliance with the regulatory limits of the parameters specified in this permit. If all methods have detection limits higher than the applicable limit, the permittee shall follow the applicable contingency requirements of Section 2.6 and may propose "other actions" including amending the permit to set higher limits. Analyses shall be performed by a laboratory licensed by the Arizona Department of Health Services, Office of Laboratory Licensure and Certification unless exempted under A.R.S. § 36-495.02. For results to be considered valid, all analytical work shall meet quality control standards specified in the approved methods. A list of Arizona state-certified laboratories can be obtained at the address below:

Arizona Department of Health Services
Office of Laboratory Licensure and Certification
250 North 17th Avenue
Phoenix, AZ 85007
Phone: (602) 364-0720

2.5.6. Installation and Maintenance of Monitoring Equipment

Monitoring equipment required by this permit shall be installed and maintained so that representative samples required by the permit can be collected. If new groundwater wells are determined to be necessary, the construction details shall be submitted to the Groundwater Protection Value Stream for approval prior to installation and the permit shall be amended to include any new monitoring points.

2.6. CONTINGENCY PLAN REQUIREMENTS

[A.R.S. § 49-243(K)(3), (K)(7) and A.A.C. R18-9-A204 and R18-9-A205]

2.6.1. General Contingency Plan Requirements

At least one copy of this permit and the contingency plan required under A.A.C. R18-9-A204 shall be maintained at the location where day-to-day decisions regarding the operation of the facility are made. The permittee shall be aware of and follow the contingency plan.

Any AL exceedance, or violation of an AQL, DL, or other permit condition shall be reported to ADEQ following the reporting requirements in Section 2.7.3, unless more specific reporting requirements are set forth in Section 2.6.2 through 2.6.5. An exceedance of a performance level under Section 2.6.2.1.1 or Section 2.6.2.1.2 is not subject to the reporting requirements in Section 2.7.3, but is subject to the reporting requirements set forth in Sections 2.6.2.1.1 or 2.6.2.1.2 as applicable.

Some contingency actions involve verification sampling. Verification sampling shall consist of the first follow-up sample collected from a location that previously indicated a violation or the exceedance of an AL. Collection and analysis of the verification sample shall use the same protocols and test methods to analyze for the pollutant or pollutants that exceeded an AL or violated an AQL or DL. Where verification sampling is specified in this permit, it is the option of the permittee to perform such sampling. If verification sampling is not conducted within the timeframe allotted, ADEQ and the permittee shall presume the initial sampling result to be confirmed as if verification sampling had been conducted. The permittee is responsible for

compliance with contingency plans relating to the exceedance of an AL or violation of a DL, AQL or any other permit condition. The permittee is subject to enforcement action for the failure to comply with any contingency actions in this permit.

2.6.2. Exceeding of Alert Levels and Performance Levels

2.6.2.1. Exceeding of Performance Levels Set for Operational Conditions

2.6.2.1.1. Performance Levels Set for Freeboard

In the event that freeboard performance levels required by Section 4.2, Table 9 in a surface impoundment are not maintained, the permittee shall:

1. As soon as practicable, cease or reduce discharging to the impoundment to prevent overtopping. Remove and properly dispose or recycle to other operations the excess fluid in the reservoir until the water level is restored at or below the freeboard performance level.
2. Within 5 days of discovery, evaluate the cause of the incident and adjust operational conditions or identify design improvements to the affected system as necessary to avoid future occurrences.
3. Record in the facility log, the amount of fluid removed, a description of the removal method, and the disposal arrangements. The facility log shall be maintained according to Section 2.7.2 (Operational Inspection / Log Book Recordkeeping).
4. Within 30 days of discovery, initiate repairs to the affected system, structure, or other component as necessary to avoid future occurrences, and reestablish freeboard performance level. Record any repair procedures, methods, and materials used to restore the facility to operating condition in the facility log/recordkeeping file.
5. If design improvements are necessary and if an amendment is triggered by the design improvements, submit an amendment application within 90 days of discovery.
6. The facility is no longer on alert status once the operational indicator no longer indicates that the freeboard performance level is being exceeded. The permittee shall, however, complete all tasks necessary to return the facility to its pre-alert operating condition.

2.6.2.1.2. Performance Levels, other than Freeboard

1. If an exceedance of an operational performance level (PL) listed in Section 4.2, Table 9 has been observed or noted during required inspection and operational monitoring, such that the result could cause or contribute to an unauthorized discharge under normal operating conditions, the permittee shall as soon as practicable investigate to determine the cause of the condition. The investigation shall include the following:

a. Inspection, testing, and assessment of the current condition of all treatment or pollutant discharge control systems that may have contributed to the operational performance condition.

b. Review of recent process logs, reports, and other operational control information to identify any unusual occurrences.

2. The PL exceedance, results of the investigation, and any corrective action taken shall be reported to the Groundwater Protection Value Stream, within 30 days of the discovery of the condition. Upon review of the submitted report, the Department may amend the permit to require additional monitoring, increased frequency of monitoring, or other actions.

3. The permittee shall initiate actions identified in the contingency plan referenced in Section 2.6.1 and any necessary contingency measures to resolve problems identified by the investigation which may have led to a PL being exceeded. To implement any other corrective action the permittee may choose to obtain prior approval from ADEQ according to Section 2.6.6.

2.6.2.2. Exceeding of Alert Levels Set for Discharge Monitoring

Not applicable.

2.6.2.3. Exceeding of Alert Levels in Groundwater Monitoring Wells

2.6.2.3.1. Alert Levels for Indicator Parameters

Not applicable for this permit.

2.6.2.3.2. Alert Levels for Pollutants with Numeric Aquifer Water Quality Standards

1. If an AL for a pollutant set in Section 4.2, Table 11 or Table 12. has been exceeded, the permittee may conduct verification sampling within 5 days of becoming aware of an AL being exceeded. The permittee may use the results of another sample taken between the date of the last sampling event and the date of receiving the result as verification.

2. If verification sampling confirms the AL being exceeded or if the permittee opts not to perform verification sampling, then the permittee shall increase the frequency of monitoring to monthly. In addition, the permittee shall immediately initiate an investigation of the cause of the AL being exceeded, including inspection of all discharging units and all related pollution control devices, review of any operational and maintenance practices that might have resulted in an unexpected discharge, and hydrologic review of groundwater conditions including upgradient water quality.

3. The permittee shall initiate actions identified in the contingency plan referenced in Section 2.6.1 and specific contingency measures identified in Section 2.6 to resolve any problems identified by the investigation which may have led to an AL being exceeded. To implement any other corrective action the permittee shall obtain prior approval from the Groundwater Protection Value Stream according to Section 2.6.6. Alternatively, the permittee may submit a technical demonstration, subject to written approval by the Groundwater Protection Value Stream, that although an AL is exceeded, pollutants are not reasonably expected to cause a violation of an AQL. The demonstration may propose a revised AL or monitoring frequency for approval in writing by the Groundwater Protection Value Stream.

4. Within 30 days after confirmation of an AL being exceeded, the permittee shall submit the laboratory results to the Water Quality Groundwater Protection Value Stream, along with a summary of the findings of the investigation, the cause of the AL being exceeded, and actions taken to resolve the problem.

5. Upon review of the submitted report, the Department may amend the permit to require additional monitoring, increased frequency of monitoring, or other actions.
6. The increased monitoring required as a result of ALs being exceeded may be reduced to the regularly scheduled frequency, if the results of three consecutive monthly sampling events demonstrate that no parameters exceed the AL.

2.6.2.4. Exceedance of Action Leakage Rate for Process Solution Impoundments

At a minimum, the permittee shall initiate the following actions within 3 days of becoming aware of an exceedance of an action leakage rate for a facility listed in Section 2.2.4, Table 2. All information shall be recorded in a log book as described in Section 2.7.2.

The permittee shall:

1. Drain and/or pump out all fluid collected in the leak collection and recovery system (LCRS) to reduce head on the liner system;
2. Quantify and record the amount of fluid pumped from the leak collection and recovery system on a weekly basis until the leakage rate is no longer exceeded;
3. Assess the potential for migration of liquids out of the containment system;
4. Assess the current condition of the liner system; and
5. Take appropriate corrective action to mitigate the cause(s) of the exceedance.

2.6.2.5. Rapid and Large Leakage Exceedance in the Process Solution Impoundments

Additional response actions based on rapid and large leakage rate (RLL) for a facility listed in Section 2.2.4, Table 2 shall include the following:

1. Notify the Water Quality Compliance within 24 hours of becoming aware of the exceedance,
2. Reduce the hydraulic head on the liner including emptying of the portion of the impoundment over the affected liner,
3. Conduct visual inspection to identify areas of leakage,
4. Repair all identified areas of leakage within 90 days of discovery,
5. Initiate closure, temporary cessation, or partial closure of the impoundment if identified areas of leakage cannot be repaired within 90 days of discovery,
6. After repairs have been made, monitor the leakage rate on a weekly basis while the impoundment is being filled, and for a period of 3 months after filling.
7. Within 30 days of a confirmed RLL exceedance, the permittee shall submit a written report to the Groundwater Protection Value Stream. The written report shall include a description of the exceedance and its potential causes, the period of exceedance and the anticipated time period during which the exceedance is expected to continue, and a description of any actions taken or planned to be taken to eliminate or prevent recurrence of the exceedance and to mitigate the impacts of the exceedance. Upon approval of the Groundwater Protection Value Stream, the permittee shall initiate the actions necessary to mitigate the impacts of the exceedance.

2.6.2.6. TSF Slope Conditions

The permittee shall monitor the Sierrita TSF for general slope conditions as per Section 4.2, Table 9 to identify unusual scour or degradation of materials, sloughing, rolling rocks or visible seepage. If the TSF exhibits any signs that require maintenance, the permittee shall take the following actions:

1. After discovery prevent vehicle and/or foot traffic in the area.
2. Notify the design engineer of record (EOR).
3. If necessary, perform remedial actions approved by the EOR.
4. Monitor the area for signs of decreasing slope stability.

2.6.3. Discharge Limit Violation

2.6.3.1. Liner Failure, Containment Structure Failure, or Unexpected Loss of Fluid

In the event of liner failure, containment structure failure, or unexpected loss of fluid as described in Section 2.3, the permittee shall take the following actions:

1. As soon as practicable, cease all discharges as necessary to prevent any further releases to the environment, including removal of any fluid remaining in the impoundment as necessary, and capture and containment of all escaped fluids.
2. Within 24 hours of discovery, notify Groundwater Protection Value Stream. This satisfies the 5-day reporting requirement outlined in Section 2.7.3(1) of this permit.
3. Within 24 hours of discovery of a failure, as practicable, estimate the quantity released and collect representative samples of the fluid remaining in affected impoundments and drainage structures. Analyze sample(s) according to Section 4, Table 10. In the 30-day report required under Section 2.7.3(2), include a copy of the analytical results and forward the report to Groundwater Protection Value Stream. The permittee may extend the 24 hours deadline if the sample could not be collected due to safety concerns, laboratory holding time, and accessibility.
4. Within 15 days of discovery, initiate an evaluation to determine the cause for the incident. Identify the circumstances that resulted in the failure and assess the condition of the discharging facility and liner system. Implement corrective actions as necessary to resolve the problems identified in the evaluation. Initiate repairs to any failed liner, system, structure, or other component as needed to restore proper functioning of the discharging facility. The permittee shall not resume discharge to the facility until repairs of any failed liner or structure are performed.
5. Repair procedures, methods, and materials used to restore the system(s) to proper operating condition shall be described in the facility log/recordkeeping file and available for ADEQ review. Record in the facility log/recordkeeping file the amount of fluid released, a description of any removal method and volume of any fluid removed from the impoundment and/or captured from the release area. The facility log/recordkeeping file shall be maintained according to Section 2.7.2 (Operation Inspection / Log/Recordkeeping File).
6. Within 30 days of discovery of the incident, submit a report to Groundwater Protection Value Stream as specified in Section 2.7.3(2). Include a description of the actions performed in Subsections 1 through 4 listed above. Upon review of the report, ADEQ may request additional monitoring or remedial actions.

7. Within 60 days of discovery, assess the impacts to soil and/or groundwater resulting from the incident. If soil or groundwater is impacted such that it could or did cause or contribute to an exceedance of an AQL at the applicable point of compliance, submit to ADEQ, for approval, a corrective action plan to address such impacts, including identification of remedial actions and a schedule for completion of activities. At the approval of ADEQ, the permittee shall implement the approved plan.
8. Within 30 days of completion of corrective actions, submit to Groundwater Protection Value Stream, a written report as specified in Section 2.6.6 (Corrective Actions).
9. Upon review of the report, ADEQ may amend the permit to require additional monitoring, increased frequency of monitoring, amendments to permit conditions, or other actions.

2.6.3.2. Overtopping of a Surface Impoundment

If overtopping of fluid from a permitted surface impoundment occurs, and results in a discharge pursuant to A.R.S. § 49-201(12), the permittee shall:

1. As soon as practicable, cease all discharges to the surface impoundment to prevent any further releases to the environment.
2. Within 24 hours of discovery, notify Groundwater Protection Value Stream. This satisfies the 5-day reporting requirement outlined in Section 2.7.3(1) of this permit.
3. Within 24 hours, as practicable, collect representative samples of the fluid contained in the surface impoundment. If a sample cannot be taken within 24 hours, notify ADEQ within the 24-hr period, and provide justifications. Samples shall be analyzed for the parameters specified in Section 4, Table 10**.** Within 30 days of the incident, submit a copy of the analytical results to Groundwater Protection Value Stream.
4. As soon as practicable, remove and properly dispose of excess water in the impoundment until the water level is restored at or below the appropriate freeboard as described in Section 4.1, Table 9. Record in the facility log/recordkeeping file the amount of fluid released, a description of the removal method and volume of any fluid removed from the impoundment and/or captured from the release area. The facility log/recordkeeping file shall be maintained according to Section 2.7.2 (Operation Inspection/LogBook/Recordkeeping File).
5. Within 30 days of discovery, evaluate the cause of the overtopping and identify the circumstances that resulted in the incident. Implement corrective actions and adjust operational conditions as necessary to resolve the problems identified in the evaluation. Repair any systems as necessary to prevent future occurrences of overtopping.
6. Within 30 days of discovery of overtopping, submit a report to ADEQ as specified in Section 2.7.3(2) (Permit Violation and Alert Level Status Reporting). Include a description of the actions performed in Subsections 1 through 5 listed above. Upon review of the report, ADEQ may request additional monitoring or remedial actions.
7. Within 60 days of discovery, and based on sampling in Item No. 3 above, assess the impacts to the subsoil and/or groundwater resulting from the incident.
8. If soil or groundwater is impacted such that it could cause or contribute to an exceedance of an AQL at the applicable point of compliance, submit to ADEQ for approval, a corrective action plan to address such impacts, including identification of remedial actions and/or monitoring, and a schedule for completion of activities. At the direction of ADEQ, the permittee shall implement the approved plan.

9. Within 30 days of completion of corrective actions, submit to ADEQ, a written report as specified in Section 2.6.6 (Corrective Actions). Upon review of the report, ADEQ may amend the permit to require additional monitoring, increased frequency of monitoring, amendments to permit conditions, or other actions.

2.6.3.3. Inflows of Unexpected Materials to a Surface Impoundment

The types of materials that are expected to be placed in the permitted surface impoundments are specified in Section 2.3 (Discharge Limitations). If any unexpected materials flow to a permitted surface impoundment, the permittee shall:

1. As soon as practicable, cease all unexpected inflows to the surface impoundment(s).

2. Within 24-hours of discovery, notify Groundwater Protection Value Stream. This satisfies the 5-day reporting requirement outlined in Section 2.7.3(1) of this permit.

3. Within 5 days of the incident, identify the source of the material and determine the cause for the inflow. Characterize the unexpected material and contents of the affected impoundment, and evaluate the volume and concentration of the material to determine if it is compatible with the surface impoundment liner. Based on the evaluation of the incident, repair any systems or equipment and/or adjust operations, as necessary to prevent future occurrences of inflows of unexpected materials.

4. Within 30 days of an inflow of unexpected materials, submit a report to ADEQ as specified in Section 2.7.3(2) (Permit Violation and Alert Level Status Reporting). Include a description of the actions performed in Subsections 1 through 3 listed above.

5. Upon review of the report, ADEQ may amend the permit to require additional monitoring, increased frequency of monitoring, amendments to permit conditions, or other actions including remediation.

2.6.4. Aquifer Quality Limit Exceedances

1. If an AQL set in Section 4.2 (Table 11 and Table 12) has been exceeded, the permittee may conduct verification sampling for those pollutant(s) that were above their respective AQL(s) within 5 days of becoming aware of the exceedance. The permittee may use results of another sample taken between the date of the last sampling event and the date of receiving the result as verification.
2. If verification sampling does not confirm an AQL exceedance, no further action is needed under this Section.
3. If verification sampling confirms that an AQL was exceeded for any parameter or if the permittee opts not to perform verification sampling, then, the permittee shall increase the frequency of monitoring for those parameters to monthly (for quarterly compliance monitoring) or to quarterly (for biennial compliance monitoring).

Table 4: ACCELERATED MONITORING - AQUIFER QUALITY LIMIT VIOLATION

Specified Monitoring Frequency	Monitoring Frequency for AQL Violation
Daily	Daily
Weekly	Daily
Monthly	Weekly
Quarterly	Monthly
Semi-annually	Quarterly
Annually	Quarterly

In addition, the permittee shall immediately initiate an evaluation for the cause of the violation, including inspection of all discharging units and all related pollution control devices, and review of any operational and maintenance practices that might have resulted in unexpected discharge.

The permittee also shall submit a report according to Section 2.7.3, which includes a summary of the findings of the investigation, the cause of the violation, and actions taken to resolve the problem. A verified exceedance of an AQL will be considered a violation unless the permittee demonstrates within 30 days that the exceedance was not caused or contributed to by pollutants discharged from the facility. Unless the permittee has demonstrated that the exceedance was not caused or contributed to by pollutants discharged from the facility, the permittee shall consider and ADEQ may require corrective action that may include control of the source of discharge, cleanup of affected soil, surface water, or groundwater, and mitigation of the impact of pollutants on existing uses of the aquifer. Corrective actions shall either be specifically identified in this permit, included in the contingency plan referenced in Section 2.6.1, or separately approved according to Section 2.6.6.

Upon review of the submitted report, the Department may amend the permit to require additional monitoring, increased frequency of monitoring, amendments to permit conditions or other actions.

The permittee shall notify any downstream or downgradient users who may be directly affected by the discharge.

The increased monitoring for those pollutant(s) required as a result of an AQL exceedance may be reduced to the original sampling frequency for each respective pollutant, if the results of three sequential sampling events demonstrate that the parameter(s) does not exceed their respective AQL(s).

2.6.5. Emergency Response and Contingency Requirements for Unauthorized Discharges

[A.R.S. § 49-201(12) AND PURSUANT TO A.R.S. § 49-241]

2.6.5.1. Duty to Respond

The permittee shall act immediately to correct any condition resulting from a discharge pursuant to A.R.S. § 49-201(12) if that condition could pose an imminent and substantial endangerment to public health or the environment.

2.6.5.2. Discharge of Hazardous Substances or Toxic Pollutants

In the event of any unauthorized discharge pursuant to A.R.S. § 49-201(12) of suspected hazardous substances (A.R.S. § 49-201(19)) or toxic pollutants (A.R.S. § 49-243(I)) on the facility site, the permittee shall promptly isolate the area and attempt to identify the discharged material. The permittee shall record information, including name, nature of exposure and follow-up medical treatment, if necessary, on persons who may have been exposed during the incident. The permittee shall notify the Groundwater Protection Value Stream within 24 hours of discovering the discharge of hazardous material which (a) has the potential to cause an AWQS or AQL exceedance, or (b) could pose an endangerment to public health or the environment.

2.6.5.3. Discharge of Non-Hazardous Materials

In the event of any unauthorized discharge pursuant to A.R.S. § 49-201(12) of non-hazardous materials from the facility, the permittee shall promptly attempt to cease the discharge and isolate the discharged material. Discharged material shall be removed and the site cleaned up as soon as possible. The permittee shall notify the Groundwater Protection Value Stream within 24 hours of discovering the discharge of non-hazardous material which has the potential to cause an AQL exceedance, or could pose an endangerment to public health or the environment.

2.6.5.4. Reporting Requirements

The permittee shall submit a written report for any unauthorized discharges reported under Sections 2.6.5.2 and 2.6.5.3 to the Groundwater Protection Value Stream within 30 days of the discharge or as required by subsequent ADEQ action. The report shall summarize the event, including any human exposure, and facility response activities and include all information specified in Section 2.7.3. If a notice is issued by ADEQ subsequent to the discharge notification, any additional information requested in the notice shall also be submitted within the time frame specified in the notice. Upon review of the submitted report, ADEQ may require additional monitoring or corrective actions.

2.6.6. Corrective Actions

Specific contingency measures identified in Section 2.6 and actions identified in the contingency plan referenced in Section 2.6.1 have already been approved by ADEQ and do not require written approval to implement.

With the exception of emergency response actions taken under Section 2.6.5, the permittee shall obtain written approval from the Groundwater Protection Value Stream prior to implementing a corrective action to accomplish any of the following goals in response to exceedance of an AL, AQL, DL, or other permit condition:

1. Control of the source of an unauthorized discharge;
2. Soil cleanup;
3. Cleanup of affected surface waters;
4. Cleanup of affected parts of the aquifer;
5. Mitigation to limit the impact of pollutants on existing uses of the aquifer.

Within 30 days of completion of any corrective action, the operator shall submit to the Groundwater Protection Value Stream, a written report describing the causes, impacts, and actions taken to resolve the problem.

2.7. REPORTING AND RECORDKEEPING REQUIREMENTS

[A.R.S. § 49-243(K)(2) and A.A.C. R18-9-A206(B) and R18-9-A207]

2.7.1. Self-Monitoring Report Form

1. The permittee shall complete the Self-Monitoring Reporting Forms (SMRFs) provided by ADEQ, and submit the completed report through the myDEQ online reporting system. The permittee shall use the format devised by ADEQ.
2. The permittee shall complete the SMRF to the extent that the information reported may be entered on the form. If no information is required during a reporting period, the permittee shall enter "not required" on the form, include an explanation, and submit the form to the Groundwater Protection Value Stream.
3. The groundwater monitoring tables contained in Section 4.2, Table 11 and Table 12 of this permit list the parameters to be monitored and the frequency for reporting results for groundwater compliance monitoring. The parameters listed in the identified tables from Section 4.2 are the only parameters for which SMRF reporting is required.

The parameters listed in the above-identified tables from Section 4.0 are the only parameters for which SMRF reporting is required.

2.7.2. Operation Inspection / Log Book Recordkeeping

A signed copy of this permit shall be maintained at all times at the location where day-to-day decisions regarding the operation of the facility are made. A log book (paper copies, forms, or electronic data) of the inspections and measurements required by this permit shall be maintained at the location where day-to-day decisions are made regarding the operation of the facility. The log book shall be retained for ten years from the date of each inspection, and upon request, the permit and the log book shall be made immediately available for review by ADEQ personnel. The information in the log book shall include, but not be limited to, the following information as applicable:

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

2.7.3. Permit Violation and Alert Level Status Reporting

1. The permittee shall notify the Groundwater Protection Value Stream within 5 days (except as provided in Section 2.6.5) of becoming aware of an AL exceedance, or violation of any permit condition, AQL, or DL for which notification requirements are not specified in Sections 2.6.2 through 2.6.5.
2. The permittee shall submit a written report to the Groundwater Protection Value Stream within 30 days of becoming aware of the violation of any permit condition, AQL, or DL. The report shall document all of the following:
    a. Identification and description of the permit condition for which there has been a violation and a description of the cause;
    b. The period of violation including exact date(s) and time(s), if known, and the anticipated time period during which the violation is expected to continue;
    c. Any corrective action taken or planned to mitigate the effects of the violation, or to eliminate or prevent a recurrence of the violation;
    d. Any monitoring activity or other information which indicates that any pollutants would be reasonably expected to cause a violation of an AWQS;
    e. Proposed changes to the monitoring which include changes in constituents or increased frequency of monitoring; and
    f. Description of any malfunction or failure of pollution control devices or other equipment or processes.

2.7.4. Operational, Other or Miscellaneous Reporting

The permittee shall, upon completion of the biennial sampling described in Section 4.2, Table 12, submit a monitoring summary report to the Groundwater Protection Value Stream. This report shall be due at the same time as the SMRF form for the biennial sampling event per Section 3.0, Compliance Schedule Item (CSI) No. 1 and Section 2.7.8. The report shall include, but not be limited to the following:

1. A description of any deviations from standard sampling protocols during the reporting period.
2. A summary of all exceedances of ALs, AQLs, or operational performance levels that occurred during the reporting period.
3. Graphical time versus concentration plots of field pH, sulfate, total dissolved solids, and any parameter which exceeded an applicable AL or AQL in the past eight quarters at each POC well, and tabulated sampling data for all wells required to be sampled by this permit during the last eight quarters.
4. An updated table of all monitor wells and piezometers in the Discharge Impact Area including, but not limited to, location of well, depth to water, and depth of well.
5. A summary of any groundwater monitor wells replaced in the reporting period including, but not limited to, location of well, depth of well, depth to water, and screened interval.
6. A list of any new sumps, impoundments, or vehicle washes constructed within the PCCZ, unless exempt or covered by a general APP.
7. The report shall also include an evaluation of the performance of the interceptor wellfield to provide hydrologic capture to prevent exceedance of an AWQS at any applicable point of compliance.

2.7.5. Sierra Tailings Impoundment Reporting

The permittee shall submit a biennial technical report to the Groundwater Protection Value Stream that is prepared, signed and sealed by the Engineer of Record. This report shall be due as specified in Section 3.0, Compliance Schedule Item (CSI) No. 7. The report shall include the following:

1. A summary of STI Buttress construction activities for the reporting period including maps and construction completion documents such as as-built documentation and construction quality control summary
2. A summary of construction activities planned for the upcoming 2 year period.
3. Interpretation and evaluation of the inspections and monitoring data including maps and graphs
4. Description of any updates to the STI stability model and updates to the credible failure modes analysis.

2.7.6. Passive Containment Capture Zone Demonstration Reporting

The results of the post-audit (see Section 2.5.3.7) shall be submitted to the Groundwater Protection Value Stream for review in a report that summarizes the original passive containment demonstration for both the Sierrita Mine and the Twin Buttes mine and any updates or revisions made to the model in accordance with Compliance Schedule Item 5 and Section 2.5.3.7. Each post-audit report shall include a revised table listing the groundwater elevations for the data points used to demonstrate the configuration of the hydraulic containment, flow vector analysis (including plan and cross-sectional figures at inflection points), and a potentiometric contour map based on groundwater elevations used in the post-audit demonstration. The Groundwater Protection Value Stream will determine whether a full model recalibration is required. If a recalibration is necessary, a report describing the model output and the revisions and/or changes to the model shall be submitted to the Groundwater Protection Value Stream. The permittee shall compare the current groundwater data to the previous model predictions and a report on the comparison shall be submitted to the Groundwater Protection Value Stream for review.

2.7.7. Reporting Location

All Self-Monitoring Report Forms (SMRFs) and contingency reporting shall be submitted through the myDEQ portal accessible on the ADEQ website at: http://www.azdeq.gov/welcome-mydeq

All other documents required by this permit shall be emailed to groundwaterpermits@azdeq.gov or mailed to the address below:

The Arizona Department of Environmental Quality
Groundwater Protection Value Stream
Mail Code 5415B-3
1110 West Washington Street
Phoenix, Arizona 85007
Phone (602) 771-4571

2.7.8. Reporting Deadline

The following table lists the quarterly SMRF report due dates:

Table 5: QUARTERLY REPORTING DEADLINES	
Monitoring Conducted During Quarter:	**Quarterly Report Due By:**
January-March	April 30
April-June	July 30
July-September	October 30
October-December	January 30

The following table lists the biennial report due date:

Table 6:BIENNIAL REPORTING DEADLINES	
Monitoring Conducted During Biennial Period:	**Biennial Report due by:**
January-December of the following year	January 30, 2022, and every two years thereafter

2.7.9. Changes to Facility Information in Section 1.0

The Groundwater Protection Value Stream shall be notified within ten days of any change of facility information including Facility Name, Permittee Name, Mailing or Street Address, Facility Contact Person, or Emergency Telephone Number.

2.8. Temporary Cessation

[A.R.S. § 49-243(K)(8) and A.A.C. R18-9-A209(A)]

The permittee shall give written notice to the Groundwater Protection Value Stream before ceasing operation of the facility for a period of 60 days or greater. The permittee shall take the following measures upon temporary cessation:

1. Submittal of Self-Monitoring Report Forms (SMRFs) is still required; report "temporary cessation" in the comment section.

At the time of notification the permittee shall submit for ADEQ approval a plan for maintenance of discharge control systems and for monitoring during the period of temporary cessation. Immediately following ADEQ approval, the permittee shall implement the approved plan. If necessary, ADEQ shall amend permit conditions to incorporate conditions to address temporary cessation. During the period of temporary cessation, the permittee shall provide written notice to the Groundwater Protection Value Stream of the operational status of the facility every three years. If the permittee intends to permanently cease operation of any facility, the permittee shall submit closure notification, as set forth in Section 2.9 below.

2.9. Closure

[A.R.S. §§ 49-243(K)(6), 49-252 and A.A.C. R18-9-A209(B)]

For a facility addressed under this permit, the permittee shall give written notice of closure to the Groundwater Protection Value Stream of the intent to cease operation without resuming activity for which the facility was designed or operated. Submittal of SMRFs is still required; report "closure in process" in the comment section.

2.9.1. Closure Plan

Within 90 days following notification of closure, the permittee shall submit for approval to the Groundwater Protection Value Stream, a closure plan which meets the requirements of A.R.S. § 49-252 and A.A.C. R18-9-A209(B)(3).

If the closure plan achieves clean-closure immediately, ADEQ shall issue a letter of approval to the permittee. If the closure plan contains a schedule for bringing the facility to a clean-closure configuration at a future date, ADEQ may incorporate any part of the schedule as an amendment to this permit.

2.9.2. Closure Completion

Upon completion of closure activities, the permittee shall give written notice to the Groundwater Protection Value Stream indicating that the approved closure plan has been implemented fully and providing supporting documentation to demonstrate that clean-closure has been achieved (soil sample results, verification sampling results, groundwater data, as applicable). If clean-closure has been achieved, ADEQ shall issue a letter of approval to the permittee at that time. If any of the following conditions apply, the permittee shall follow the terms of post-closure stated in this permit:

1. Clean-closure cannot be achieved at the time of closure notification or within one year thereafter under a diligent schedule of closure actions;
2. Further action is necessary to keep the facility in compliance with the AWQS at the applicable POC or, for any pollutant for which the AWQS was exceeded at the time this permit was issued, further action is necessary to prevent the facility from further degrading the aquifer at the applicable POC with respect to that pollutant.
3. Continued action is required to verify that the closure design has eliminated discharge to the extent intended.

4. Remedial, mitigative or corrective actions or controls are necessary to comply with A.R.S. § 49-201(30) and Title 49, Chapter 2, Article 3;
5. Further action is necessary to meet property use restrictions.
6. SMRF submittals are still required until Clean Closure is issued.

2.10. Post-Closure

[A.R.S. §§ 49-243(K)(6), 49-252 and A.A.C. R18-9 A209(C)]

Post-closure requirements shall be established based on a review of facility closure actions and will be subject to review and approval by the Groundwater Protection Value Stream.

In the event clean-closure cannot be achieved pursuant to A.R.S. § 49-252, the permittee shall submit for approval to the Groundwater Protection Value Stream a post-closure plan that addresses post-closure maintenance and monitoring actions at the facility. The post-closure plan shall meet all requirements of A.R.S. §§ 49-201(30) and 49-252 and A.A.C. R18-9-A209(C). Upon approval of the post-closure plan, this permit shall be amended or a new permit shall be issued to incorporate all post-closure controls and monitoring activities of the post-closure plan.

2.10.1. Post-Closure Plan

A specific post-closure plan may be required upon the review of the closure plan.

2.10.2. Post-Closure Completion

Not required at the time of permit issuance.

3.0 COMPLIANCE SCHEDULE

[A.R.S. § 49-243(K)(5) and A.A.C. R18-9-A208]

Unless otherwise indicated, for each compliance schedule item listed below, the permittee shall submit the required information to the Groundwater Protection Value Stream.

Table 7:COMPLIANCE SCHEDULE ITEMS

No.	Description	Due By:	Permit Amendment Required?
1	In accordance with Section 2.7.4, submit a monitoring summary report for the biennial sampling conducted for well and parameters listed Section 4.2, Table 12.	January 30, 2022, and every two years thereafter.	No
2	The permittee shall submit a demonstration that the financial assurance mechanism listed in Section 2.1, Financial Capability, is being maintained as per A.R.S. 49-243.N.4 and A.A.C. R18-9-A203(H) for all estimated closure and post-closure costs including updated costs submitted under Section 3.0, No. 3 below. The demonstration shall include a statement that the closure and post-closure strategy has not changed, the discharging facilities listed in the permit have not been altered in a manner that would affect the closure and post-closure costs, and discharging facilities have not been added. The demonstration shall also include information in support of a corporate guarantee as required in A.A.C. R18-9-A203(C)(8).	On July 1, 2024 and every 2 years thereafter.	No
3	The permittee shall submit updated cost estimates for facility closure and post-closure, as per A.A.C. R18-9-A201(B)(5) and A.R.S. 49-243.N.2.a.	On July 1, 2028 and every 6 years thereafter.	Yes
4	Submit as-built documentation for construction of the compacted tailings liner in the Duval Canal Impoundment.	Within 90 days of completion of construction	No
5	Submit a post-audit report of the approved groundwater flow model which demonstrates that the Sierrita-Esperanza and Twin Buttes open pits create passive containment capture zones in accordance with Sections 2.5.3.7 and 2.7.6.	December 31, 2022 and every five (5) years thereafter.	No

Table 7:COMPLIANCE SCHEDULE ITEMS			
No.	**Description**	**Due By:**	**Permit Amendment Required?**
6	Sierrita plans to raise the STI crest elevation in phases beginning with the Phase 1 elevation of 3,510 feet amsl. The Phase 2 maximum crest elevation is 3,585 feet amsl and Phase 3 maximum elevation is 3,710 feet amsl. Phase 1 and 2 buttress design has been evaluated for stability and meets ADEQ BADCT minimum factor of safety under static and dynamic conditions. The Phase 1 and 2 buttress has been constructed. The permittee shall submit a demonstration that the design of STI and supporting structures in critical cross sections 8 and 10, as depicted in the November 20, 2018 permit amendment application, meet ADEQ BADCT minimum factor of safety under static and dynamic conditions.	Ninety (90) days prior to raising the STI crest elevation above 3,585 feet amsl	No
7	The permittee shall submit a biennial report for the Sierrita Tailings Impoundment as described in Section 2.7.5.	By June 30, 2024 and every two years thereafter	No
8	POC Well Installation, POC Wells POC-1 and POC-2. The wells shall be installed in accordance with all ADWR requirements. A work plan including the location of the well and the well design shall be submitted to ADEQ thirty (30) days prior to installation for approval by GPVS. The well shall be appropriately screened (within IO feet above the water table and 50 feet below the water table for an unconfined aquifer, or no more than 60 feet in length within a confined aquifer) within the uppermost aquifer.	Prior to constructing the portion of Waste Rock Stockpile 3 that is located outside of the PCCZ.	Yes
9	POC Well installation Report. Geologic and well construction logs shall be submitted to ADEQ. The logs shall include the ADWR well registration number, and the "as-built" cadastral and latitude and longitude coordinates for the well.	Within forty-five (45) days of well installation	No
10	Ambient Water Quality Monitoring in all POC Wells. The wells shall be sampled for ambient water quality for eight consecutive quarters. The samples shall be analyzed for all of the parameters listed in Table 10.	The first sampling event shall be completed within thirty (30) days of well installation. Ambient monitoring shall be completed prior to constructing the portion of Waste Rock Stockpile 3 that is located outside of the PCCZ.	No

Table 7:COMPLIANCE SCHEDULE ITEMS			
No.	**Description**	**Due By:**	**Permit Amendment Required?**
11	The permittee shall submit notification to the GPVS of the status of construction activities for Waste Rock Stockpile 2. This report shall include the current configuration of the stockpile, the status of the EW Plant facilities, and the schedule of anticipated future construction activities. The reporting requirements will be complete upon notification from the applicant that all of the EW Plant Area facilities have been covered by Waste Rock Stockpile 2. If Waste Rock Stockpile 2 is not constructed the EW Plant Area facilities will be closed in place at the end of mine life in accordance with APP requirements. The permittee shall submit notification to the Groundwater Protection Value Stream of the status of closure activities for Historic Equipment Shop Area facilities. These facilities will be closed in place if and when the area is either impacted by the expansion of the Twin Butte Pit, developed for other purposes, or at the end of mine life in accordance with APP requirements.	Within 30 days of the effective date of permit amendment LTF 56791, and annually thereafter.	No
12	Submit a Minor Amendment to include Alert Levels (AL) and Aquifer Quality Limits (AQL) for all POC Wells Submit copies of all laboratory analytical reports, field notes, the QA/QC data used in collection and analysis of the samples, and a report including the statistical calculations of the ALs and AQLs to ADEQ GPVS.	Within three (3) months following completion of the ambient sampling period.	Yes

4.0 TABLES OF MONITORING REQUIREMENTS

4.1. PERMITTED FACILITIES AND BADCT

Table 8:PERMITTED FACILITIES AND BADCT
SIERRITA MINE
AMARGOSA WASH DRAINAGE AREA
Non-stormwater Impoundments
Duval Canal Velocity Pond (D-64): Individual BADCT: Facility is an unlined flow-through structure over-excavated and backfilled with on-site borrow material that was moisture conditioned and compacted to 95 percent maximum dry density. The facility is an energy dissipation and sediment pond that receives stormwater runoff from the crushing and conveying area. Accumulated fluids drain into Duval Canal.
Amargosa Pond (D-05): Individual BADCT: Facility is an existing, single-lined impoundment with an 80-mil HDPE liner underlain by a 12-inch-thick layer of compacted on-site native material. The HDPE liner is secured in an engineered anchor trench. The competent, andesite bedrock underlying the facility has relatively low hydraulic conductivity ranging from 10-4 cm/sec to 10-6 cm/sec. The impoundment has a fluid storage capacity of 49 acre-feet with a depth of 25 feet and is sufficient to contain stormwater run-on from a 100-year, 24-hour storm event. The impoundment provides containment for stormwater runoff and during upset conditions from Headwall No. 1, Bailey Lake, Raffinate Pond No. 2, and Drain Pond No. 2. Upstream, Interceptor No. 1 – a primary cutoff trench equipped with a sump and pump-back system captures any subsurface flow and pumps it back to Raffinate Pond No. 2. Downstream, Interceptor No. 2, a secondary cutoff trench equipped with a sump and pump-back system, captures any seepage from Amargosa Pond and subsurface flow not captured by the primary cutoff trench. The facility is designed to overflow through a 6-inch thick concrete-lined Amargosa spillway into Duval Canal.
SX-1 Tank Farm Pond (D-34): Individual BADCT: Facility is an existing, single-lined impoundment with an 80-mil geomembrane overlying a 3-inch thick gunite layer. The geomembrane is secured in an engineered anchor trench. The competent bedrock underlying the facility has relatively low hydraulic conductivity ranging from 10-5 cm/sec to 10-7 cm/sec. The impoundment has a storage capacity of 0.12 acre-feet with a depth of 5 feet. The impoundment provides containment for stormwater runoff and surface flows during upset conditions from the upgradient SX-1 Tank Farm Secondary Containment. Accumulated fluid is pumped back into the SX-1 circuit. The facility is designed to overflow into Amargosa Pond.
SX-1 Drain Pond (D-33):

Table 8:PERMITTED FACILITIES AND BADCT
Prescriptive BADCT: Facility is a double-lined impoundment using 60-mil HDPE liners incorporating an LCRS. The bottom liner is underlain by a minimum of 6-inch thick layer of compacted 3/8-inch minus sand and gravel layer over a 1-inch minus gravel sub-grade. The competent andesite bedrock underlying the facility has relatively low hydraulic conductivity ranging from 10-4 cm/sec to 10-7 cm/sec. The HDPE liners are secured in an engineered anchor trench. The impoundment has a fluid storage capacity of 0.2 acre-feet with an approximate depth of 7 feet. The impoundment provides containment for any washdown and runoff from SX-1 Plant. Upstream, stormwater is diverted via roadway, away from facility. The facility is designed to overflow through an 8-inch HDPE pipe, installed 12 inches below the embankment crest, to SX-2 Drain Pond. This facility was previously operated as a process solution pond, and therefore the closure strategy /requirements for this pond will remain the same as that for a process solution pond.
Process Solution Impoundments
Headwall No. 1 (D-02): Individual BADCT: Facility is an existing unlined impoundment created behind an earthen dam across Amargosa Wash which is underlain by the existing land surface comprised of Quaternary alluvium and Demetrie volcanics. The impoundment has a fluid storage capacity of 3 acre-feet with a maximum depth of 22 feet. The impoundment provides containment for leachate (PLS) from the oxide leach area. Accumulated PLS is directed through an HDPE lined discharge channel and gravity fed to Bailey Lake. The facility is designed to overflow into Bailey Lake.METHODS (both upstream and downstream methods as applicable) USED FOR THIS FACILITY (such as, fluid is pumped back into the process, or to another impoundment, etc.) The impoundment has sufficient capacity to contain stormwater run-on from a 100-year, 24-hour storm event with a minimum of 2 feet of freeboard. Portable pumps and electric generators provide backup in case of a power failure.
Bailey Lake (D-03): Individual BADCT: Facility is an existing unlined impoundment constructed behind an earthen dam immediately below the Headwall No. 1 in Amargosa Wash. The subgrade, consisting of on-site native material, is compacted to 95 percent maximum dry density and is underlain by Quaternary alluvium and Demetrie volcanics. The impoundment has a fluid storage capacity of 135 acre-feet with a maximum depth of 42.1 feet. The impoundment provides containment for overflow and any subsurface flow from the upgradient Headwall No. 1. Accumulated fluid is pumped to SX Plant Nos. 1 and 2. Facility upgrade includes an interceptor trench, excavated into bedrock. The trench, equipped with a sump and pump-back system, is located immediately downgradient to capture any seepage from Bailey Lake. The facility is designed to overflow through a concrete-lined spillway into Amargosa Pond.
Raffinate Pond No. 2 (D-10): Individual BADCT: Facility is an existing double-lined impoundment using 60-mil HDPE liners incorporating an LCRS. The bottom liner is underlain by a geotextile cushion underlain by a 6-inch thick layer of compacted native material. The facility overlies shallow bedrock that has a low permeability ranging from 10-4 cm/sec to 10-6 cm/sec. The liners are secured in an engineered anchor trench around the impoundment perimeter. The impoundment has a fluid storage capacity of 6 acre-feet with a maximum depth of 16 feet. Surface water runoff is diverted away from the facility. The impoundment provides temporary containment for copper depleted leachate solution from SX Plant Nos. 1 and 2 and small amounts of leachate from the Freeport-

Table 8:PERMITTED FACILITIES AND BADCT
McMoRan Exploration Corporation Office in Oro Valley and Technology Center in Tucson. Accumulated fluid is pumped to the leach stockpiles. The facility is designed to overflow through a HDPE-lined spillway into Amargosa Pond.
Drain Pond No. 2 (D-15): Individual BADCT: Facility is an existing double-lined impoundment using 60-mil HDPE liners incorporating an LCRS. The bottom liner is underlain by a geotextile cushion over 6-inch layer of compacted fine-grained material. The facility overlies shallow bedrock which has a low permeability ranging from 10-5 cm/sec to 10-7 cm/sec. The liners are secured in an engineered anchor trench around the impoundment perimeter. The impoundment has a fluid storage capacity of 1 acre-foot with a maximum depth of 10 feet. The impoundment provides temporary containment for organics used at SX Plant Nos. 1 and 2 and during upset conditions from Tank Farm 2 and any washdown and runoff from the SX-1 Plant. Discharges from the SX-1 LCRS are directed to Drain Pond No. 2. Accumulated fluid is pumped to Raffinate Pond No.2, SX Strip Solution Tanks, or Headwall No.1. Downstream, Interceptor No. 1 trench is excavated into bedrock to capture any subsurface flow. The trench is equipped with a sump and pump to discharge captured fluid, via an HDPE pipeline, into Raffinate Pond No. 2. The facility is designed to overflow through a concrete-lined spillway into Amargosa Pond.
Moly Decant Tanks and Pad Area (D-39A): Individual BADCT: Facility consists of four partially below-ground steel-reinforced concrete walls with an adjacent steel-reinforced concrete drying pad. The adjacent drying pad is approximately 60 feet by 110 feet. The facility is underlain by crystalline (andesite) bedrock with relatively low permeability of 10-4 cm/sec to 10-7 cm/sec. Each Moly Decant Tank is 50 feet by 26 feet and 3-4 feet deep. The impoundments provide containment of overflow from the molybdenum processing thickeners. Any excess fluid is pumped to Bailey Lake. The concrete pad is used to further dry the molybdenum concentrate. Once dry, concentrate is moved to the molybdenum roaster. Downgradient, two interceptor trenches, equipped with pump-back systems, capture any potential discharge and pump it back into the SX circuit.
B-Pond (D-07): Prescriptive BADCT: Facility is a double-lined process solution pond with side slopes of 2.5H:1V and a LCRS. The primary/upper HDPE liner is 80-mil and a secondary/lower 60-mil HDPE liner separated by a geonet drainage layer with a saturated hydraulic conductivity of 10-2 cm/sec or greater at a 3 percent slope. The liner system also includes an underdrain system that consists of a geocomposite of two (2) six (6) ounce geotextiles laminated to a 300-mil geonet. The geocomposite will direct the intercepted flows into an 8-inch N-12 corrugated, perforated, high density polyethylene (HDPE) pipe buried in a trench filled with appropriate sized drain rock. The dedicated LCRS pump, flow meter and piezometer tube are designed to discharge solution back into B-Pond. Capacity at the spillway is estimated at approximately 49 acre-feet or less at a depth of 20 feet. The facility is designed to overflow into Duval Canal through a concrete-lined spillway. The B-Pond spillway is designed to handle discharge flow of 1,762 cubic feet per second (cfs). Storm water diversion ditches located along the north and south sides of B-Pond direct storm water run-on away from flowing into B-Pond and discharge it on the eastern side of B-Pond.
Stockpile Leaching Area
Sulfide Active Leach Area (D-17): Individual BADCT: Facility is an existing sulfide leach stockpile, constructed using the end dumping method over moderate-to-steeply sloping topography which minimizes the potential for discharge. The natural channels within the leach stockpile footprint are underlain by relatively low hydraulic conductivity bedrock. The facility covers a surface area of approximately 446 acres. The leachate is collected at the headwalls located immediately downgradient of the facility. Containment of overflow and run-on from a 100-year, 24-hour storm event is provided by Amargosa Pond and SW-3 Pond. The facility shall not exceed the aerial footprint shown in the Geotechnical Review of the Ultimate Rock Stockpile Plan at Sierrita

Table 8:PERMITTED FACILITIES AND BADCT
Mine (Revised 21 August 2009) that forms an integral part of the APP application. The ultimate crest elevation of the facility shall not exceed 4,900 feet amsl. Dilute sulfuric acid, raffinate and makeup water, which includes but is not limited to wash water generated from the mine vehicle wash facilities, is applied to the facility, and leachate is collected in the downgradient Headwall Nos. 3 and 5.
Solution Conveyance Channels
Duval Canal (D-29): Individual BADCT: Facility is an existing canal (conveyance channel), initially lined with an 80-mil HDPE geomembrane extending from Sierrita Mill to Demetrie Wash Crossing. Recent upgrade includes installation of an 80-mil HDPE liner along the remaining segment from Demetrie Wash Crossing to Duval Canal Impoundment. The liner is anchored in an engineered trench. The canal is approximately 4.25 miles long, 10 feet wide, and 6 feet deep and has side slopes at 1.3H:1V. The canal has a design capacity of 3,100 cubic feet per second and an average gradient of 3.4 percent. The facility receives process solutions and surface runoff from the Plant Site, including, but not limited to, overflow from Amargosa Pond, B Pond, bleed from the lime scrubber, dust control water from crushing and conveying, vehicle wash water effluent and seepage collected and pumped from B and C Sumps. Solution conveyed by the Duval Canal discharges to the Duval Canal Impoundment located at the western edge of the Sierrita Tailings Impoundment.
Amargosa Spillway (D-48): Individual BADCT: Facility is an existing single-lined spillway (conveyance channel) with an 80-mil HDPE geomembrane overlying a 6-inch bedding layer of compacted native material. The liner is anchored in an engineered trench. The conveyance channel is approximately 860 feet long, 15 feet wide at the base, 29 feet wide at the crest, 3 to 5 feet deep, with an average slope of 1 percent, has a design capacity of 1,762 cubic feet per second. A 26-feet x 18-feet x 2-feet deep stilling basin is designed at the confluence of the spillway and the Amargosa Pond concrete overflow. The spillway receives overflow from Amargosa Pond during upset conditions or stormwater runoff from the upgradient areas. Containment of surface flow and runoff from a 100-year, 24-hour storm event is provided by B Pond and the Duval Canal Impoundment, which is an extension of the Sierrita tailings Impoundment. The inlet to the Duval Canal Impoundment is concrete, but the rest of structure is HDPE lined.
DEMETRIE WASH AREA
Non-stormwater Impoundments
07 Pond (D-43): Individual BADCT: Facility is an existing, single-lined impoundment with an 80-mil HDPE liner underlain by alluvium and shallow, igneous intrusive bedrock with relatively low permeability ranging from 10-4 cm/sec to 10-6 cm/sec. The HDPE liner is secured in an engineered anchor trench. The impoundment has a storage capacity of 37.2 acre-feet with a depth of 28.5 feet. The impoundment provides containment for potentially impacted runoff from the Ocotillo Waste Rock Pile and stormwater from native upgradient hills to the east. Accumulated fluid is pumped to the Raw Water Reservoir. Accumulated fluid is pumped via HDPE pipeline below the Ocotillo Waste Rock Pile and discharged back into the process and used as makeup water or used as dust control on roads on-site. Upstream, a 750 foot long interceptor trench, lined with an 80-mil HDPE geomembrane and equipped with a sump and pump system captures any stormwater from the upgradient watershed and discharges at the east end of 07 Pond. The facility is designed to contain stormwater runoff from a 100-year, 24-hour storm event. Facility shall maintain a minimum of 2 feet of freeboard. The facility is closed through burial under the RS-3 Waste Rock Pile. The facility is located within the PCCZ and any impacted groundwater will report to the Sierrita-Esperanza Pit. Sierrita shall notify the Groundwater Protection Value Stream when the facility has been buried per Section 2.9.2 Closure Completion.

Table 8:PERMITTED FACILITIES AND BADCT
New D Pond (D-45): Individual BADCT: Facility is an existing, single-lined impoundment with an 80-mil HDPE geomembrane underlain by 12-inch-thick compacted layer of native material. The HDPE liner is secured in an engineered anchor trench. The facility overlies shallow andesite and granodiorite with relatively low permeability of 10-6 cm/sec. The pond has a storage capacity of 14 acre-feet with a depth of 8 feet. The impoundment provides containment for runoff from the closed CLEAR Plant and Copper Sulfate areas. Accumulated fluid collected in the pond is gravity fed via 10-inch diameter HDPE pipeline into the Duval Canal. Upstream, a 300-foot long diversion channel, lined with a 60-mil HDPE geomembrane underlain by a 12-inch-thick layer of compacted native material, diverts any stormwater to a reinforced shotcrete-lined sediment basin. Subsurface flow is captured by a French Drain System constructed below the pond liner (Ref. Diagram of French Drain at New D Pond, dated June 14, 2007) and discharges solutions through a 4-inch HDPE pipe into the New D Pond's 10-inch diameter outlet pipeline that reports to the Duval Canal. The pond is designed as a surge pond and is normally dry. The bottom of the pond slopes toward a perforated HDPE drainpipe, which protrudes 2 feet above the bottom of the pond in the southwest corner. The side slopes have a grade of 3H:1V. Although normally dry, the facility is designed to contain surface flows and runoff from a 100-year, 24-hour storm event. The facility shall be operated with a minimum of 2 feet of freeboard. Note: The French Drain System replaces the Upstream Intercept Structure No. 1 and Downstream Intercept Structure No. 3 shown on the drawing titled, General Site Construction Plan (for) D Pond, Drawing No. C101, Rev. 1, referenced in the 1995 APP application.
Copper Sulfate Pipeline Ponds 1 & 2 (D-59): Prescriptive BADCT: Facilities are single-lined impoundments with a 60-mil HDPE liner underlain by a 12-inch-thick layer of 3/8-inch minus native material compacted to 95 percent maximum dry density. The HDPE liners are secured in an engineered anchor trench. The facilities are approximately 73 feet long, 67 feet wide, 7 feet deep, with sides sloping at 3H:1V. Each impoundment has a fluid storage capacity of 15,000 gallons. The impoundments provide secondary containment during an upset condition for the Copper Sulfate Plant area. Accumulated fluid is pumped into the SX/Copper Sulfate circuit. The facilities shall be operated with a minimum of 2 feet of freeboard.
Tailing Pipeline Containment Structures (D-62 A-F): Individual BADCT: Facilities consist of six secondary containment structures over-excavated to a depth of 8 inches, moisture conditioned, and backfilled and compacted to 95 percent maximum dry density within plus or minus 3 percent of optimum moisture content. Containment structures A and B have a combined fluid storage capacity of 1.462 million gallons. Containment structures C-F have a combined fluid storage capacity of 1.815 million gallons. The structures provide containment in the event that the reclaim pipeline or tailing slurry pipeline should have a breach.
ESPERANZA WASH DRAINAGE AREA
Non-stormwater Impoundments
SX-3 Stormwater Pond (D-11): Individual BADCT: Facility is an existing, single-lined impoundment with an 80-mil HDPE liner underlain by a compacted alluvium material overlying shallow andesite bedrock with relatively low permeability ranging from 10-5 cm/sec to 10-7 cm/sec. The HDPE liner is secured in an engineered anchor trench. The impoundment has a fluid storage capacity of 52 acre-feet, with a depth of 17 feet. The impoundment provides containment of stormwater runoff from upgradient, native terrain, during upset conditions at Headwall No.3, Raffinate Pond No.3 and surface runoff from the Headwall No. 2 and stockpile complex areas. Any solutions impounded in the pond are pumped out by a floating barge pump back to Raffinate Pond No. 3 or, if needed, to Amargosa Pond. An additional pump may be used to transport solutions to Amargosa Pond if needed. Upstream, Interceptor No. 3, an HDPE-lined interceptor trench keyed into bedrock, captures any subsurface flow which may have bypassed the primary interceptor trench upgradient of Headwall

Table 8:PERMITTED FACILITIES AND BADCT
No. 3 and pumps it back to Raffinate Pond No.3. The trench contains a subsurface drain consisting of gravel size material wrapped in geotextile extending the length of the trench diverting any subsurface flow and directing it to the sump which pumps it back to Raffinate Pond No.3. The facility is designed to contain stormwater runoff from a 100-year, 24-hour storm event. .The facility shall be operated with a minimum of 2 feet of freeboard.
Cat Pond 1 (D-42A): Individual BADCT: Facility is an existing, single-lined impoundment with an 80-mil HDPE liner underlain by a 12-inch-thick layer of 3/8-inch minus native material compacted to 95 percent maximum dry density. The HDPE liner is secured in an engineered anchor trench. The facility overlies more competent bedrock with relatively low permeability of 10-5 cm/sec. The impoundment has a fluid storage capacity of 25.2 acre-feet, with a depth of 27 feet. The sides of the pond have a slope of 3H:1V. The impoundment provides containment for drainage from the upgradient native terrain, the waste rock piles, and during upset conditions from Headwall No. 5. Upgradient and to the west, a single-lined channel with an 80-mil HDPE liner underlain by a 12-inch-thick layer of bedding material discharges stormwater from the upgradient watershed into Cat Pond 1. The channel is 8 feet wide at the base, approximately 11.5 feet wide at the crest with 3H:1V side slopes. The channel is approximately 1,400 feet long with an average grade at 1 percent. This facility is designed to contain flows from a 100-year, 24-hour storm event. In the event of overflow, discharge would flow into a single-lined spillway with an 80-mil HDPE liner underlain by a 12-inch-thick layer of native material. The spillway consists of a 40-foot long riprap apron for energy dissipation. The spillway is 10 feet wide at the base with 3H:1V side slopes. Accumulated fluid is pumped back into the process and used as makeup water or used for dust control on roads on-site. The facility shall be operated with a minimum of 2 feet of freeboard.
Cat Pond 2 (D-42B): Individual BADCT: Facility is an existing, single-lined impoundment with an 80-mil HDPE liner underlain by a 12-inch-thick layer of 3/8-inch minus native material compacted to 95 percent maximum dry density. The HDPE liner is secured in an engineered anchor trench. The facility overlies more competent bedrock with relatively low permeability of 10^{-5} cm/sec. The impoundment has a fluid storage capacity of 60.1 acre-feet, with a depth of 40 feet. The sides of the pond have a slope of 3H:1V. The impoundment provides containment for drainage from the upgradient native terrain and the waste rock piles. Upgradient and to the west, a single-lined channel with an 80-mil HDPE geomembrane underlain by a 12-inch-thick layer of compacted native material, discharges stormwater from the upgradient watershed into Cat Pond 2. The channel is 20 feet wide at the base, approximately 34 feet wide at the crest with 3H:1V side slopes. The channel is approximately 1,800 feet long with an average grade of 1 percent. The facility is designed to contain a 100-year, 24-hour storm event. In the event of overflow, discharge would flow into a single-lined spillway with an 80-mil HDPE geomembrane underlain by a 12-inch-thick layer of compacted bedding material and a 50-feet long riprap apron for energy dissipation. The spillway is 20 feet wide at the base with 3H:1V side slopes. Accumulated fluid is pumped back into the process and used as makeup water or used for dust control on roads on-site. The facility shall be operated with a minimum of 2 feet of freeboard.

Table 8:PERMITTED FACILITIES AND BADCT
Cat Pond 3 (D-42C): Individual BADCT: Facility is an existing, single-lined impoundment with and 80-mil HDPE geomembrane liner underlain by a 12-ounce non-woven geotextile. The geotextile and the liner are secured in an engineered anchor trench. The impoundment has an operational fluid storage capacity of 53.9 acre-feet, and a depth of 34 feet. The sides of the pond have a slope of 3H:1V. The impoundment provides containment for drainage from the upgradient native terrain and the waste rock piles. Upgradient and to the west, a single-lined channel with an 80-mil HDPE geomembrane underlain by a 12-inch-thick layer of compacted native material, discharges stormwater from the upgradient watershed into Cat Pond 3. The channel is 20 feet wide at the base, approximately 34 feet wide at the crest with 3H:1V side slopes. The channel is approximately 1,800 feet long with an average grade of 1 percent. The facility is designed to contain a 100-year, 24-hour storm event. In the event of overflow, discharge would flow into a single-lined spillway with an 80-mil HDPE geomembrane underlain by a 12-inch-thick layer of compacted bedding material and a 50-feet long riprap apron for energy dissipation. The spillway is 20 feet wide at the base with 3H:1V side slopes. Accumulated fluid is pumped back into the process and used as makeup water or used for dust control on roads on-site.
Process Solution Impoundments
Raffinate Pond No. 3 (D-04): Individual BADCT: Facility is an existing double-lined impoundment with 60-mil HDPE liners incorporating an LCRS. The bottom liner is underlain by a geotextile cushion underlain by 6 inches of 3/4-inch minus native material compacted to 95% of maximum dry density. The facility is underlain by andesite with relatively low permeability ranging from 10^{-5} cm/sec to 10^{-7} cm/sec. The liners are secured in an engineered anchor trench around the impoundment perimeter. The impoundment has a fluid storage capacity of 16 acre-feet with a maximum depth of 22 feet. The pond has side slopes of 2.5H:1V. The impoundment provides containment for stormwater runoff and during upset conditions at SX-3 Stormwater Pond, Headwall #3, Headwall #5, and subsurface flows pumped from Interceptor No. 3. The facility is designed to overflow through lined spillway into SX-3 Stormwater Pond.
Headwall No. 2 (D-46): Individual BADCT: Facility is an existing, partially lined impoundment created behind an earthen dam. The headwall is lined with an 80-mil HDPE on the upstream face of the dam and is keyed into bedrock. The facility is underlain by Demetrie Volcanics. The impoundment provides containment of leachate (PLS) from the oxide and sulfide leach areas. The facility is designed to discharge accumulated fluid via 10-inch diameter HDPE pipeline into Raffinate Pond No. 3. The facility is designed to overflow through Headwall No.2 Channel into SX-3 Stormwater Pond.
Headwall No. 3 (D-09): Individual BADCT: Facility is an existing, partially lined impoundment created behind an earthen dam. The upstream face of the dam is lined with two face-to face 80-mil HDPE liners, keyed into bedrock, underlain by a 12-inch-thick layer of compacted native material. The excavation for the impoundment is lined with bentonite-amended soil having a permeability of less than 10^{-6} cm/sec. The facility is underlain by andesite bedrock with relatively low permeability of 10^{-5} cm/sec to 10^{-7} cm/sec. The HDPE geomembrane is secured in an engineered anchor trench around the perimeter. The impoundment has a fluid storage capacity of 15 acre-feet, with a maximum depth of 21 feet. The impoundment provides containment for stormwater from relatively undisturbed terrain above the dam site and leachate (PLS) from the Sierrita Oxide and Sulfide Active Leach Areas. Accumulated fluid is pumped through two 24-inch HDPE pipelines installed near the bottom of the impoundment to a concrete vault and then to Raffinate Pond No. 3. Upstream, an 80-mil HDPE double lined interceptor trench captures subsurface flows and directs the collected fluid to the Headwall No. 3 Reservoir. The facility is designed to accommodate flow from a 25-year, 24-hour storm event. The facility is designed to overflow through a concrete-lined spillway into Stormwater No. 3 Pond.

Table 8:PERMITTED FACILITIES AND BADCT
Headwall No. 5 (D-12): Individual BADCT: Facility is an existing double-lined impoundment created behind an earthen dam. The facility is double-lined with two layers of 80-mil HDPE with an LCRS. The LCRS consists of a 200-mil thick geonet placed between the two liners to collect and remove solutions from between the two liners. Any solutions that drain into the LCRS will be carried to a single two-foot deep, gravel filled sump. The liner is secured into an engineered anchor trench. The facility is underlain by bedrock with relatively low permeability of 10^{-5} cm/sec. The impoundment has a fluid storage capacity of 11.44 acre-feet with a maximum depth of 20 feet. The impoundment receives potentially impacted stormwater commingled with PLS from the leach area. Accumulated fluid is pumped to Headwall No.3 by a self-activated floating barge pump. To the East, a diversion channel diverts any runoff around the reservoir to the natural drainage channel downstream of the headwall. The trapezoidal channel has a 12-foot wide base and 1H:1V side slopes. Downgradient, a cutoff trench intercepts any subsurface flow or seepage through the dam. Headwall No. 5 has a concrete spillway that ties into a single-lined channel with an 80-mil HDPE liner underlain by a 12-inch thick layer of bedding material that discharges into Cat Pond 1.
Stockpile Leaching Area:
Oxide (Twin Buttes and Sierrita) Active Leach Area (D-18): Individual BADCT: Facility is an existing oxide leach stockpile, constructed using the end dumping method over moderate-to-steeply sloping topography which minimizes the potential for discharge. Stormwater overflow and run-on is contained in Amargosa Pond and SW-3 Pond. The natural channels, within the leach stockpile footprint, are underlain by bedrock with relatively low permeability of 10^{-5} to 10^{-9} cm/sec. The facility covers a surface area of approximately 580 acres. The leachate is collected at the headwalls (Headwall No. 1 and/or Headwall No. 3) located immediately downgradient of the facility. Containment of overflow and run-on from a 100-year, 24-hour storm event is provided by Amargosa Pond and SW-3 Pond. The facility shall not exceed the aerial footprint shown in the Geotechnical Review of the Ultimate Rock Stockpile Plan at Sierrita Mine (Revised 21 August 2009) that forms an integral part of this APP. The ultimate crest elevation of the facility shall not exceed 4,900 feet amsl.
Solution Conveyance Channel:
Headwall No. 2 Channel (D-08): Individual BADCT: Facility is an existing single-lined conveyance channel with a 60-mil HDPE geomembrane underlain by a 6-inch layer of compacted native bedding material. The facility is underlain by andesite with relatively low permeability ranging from 10^{-4} cm/sec to 10^{-6} cm/sec. The HDPE liner is anchored in an engineered trench. The conveyance channel is approximately 2,500 feet long, 10 feet wide at the base, 2.5 feet deep with 2H:1V slopes, having an average gradient of 1.2 percent. The channel has a design capacity of 420.6 cubic feet per second. The channel provides conveyance for stormwater from native upgradient terrain and during upset conditions from Headwall No. 2 and an upgradient booster station. Accumulated fluid is discharged at the east end of SX-3 Stormwater Pond.
MILL SITE AREA
Non-stormwater Impoundments:
Raw Water Reservoir (D-21): Individual BADCT: Facility is an existing, single-lined impoundment with a 3-foot thick compacted bentonite-amended soil liner with a hydraulic conductivity of approximately 2 x 10^{-8} cm/sec. The impoundment has a fluid storage capacity of 25 acre-feet, with a depth of 50 feet. The impoundment provides containment for plant make-up water that includes but is not limited to water pumped from the interceptor wellfield east of the tailing

Table 8:PERMITTED FACILITIES AND BADCT
impoundment, reclaim water from the tailings, fresh water from Canoa wellfield and Esperanza wellfield and periodically stormwater from 07 Pond and Cat Pond 1, Cat Pond 2 and Cat Pond 3. The stormwater runoff is diverted away from the impoundment.
Process Solution Impoundment:
Decant Ponds and Pad Area (D-20): Individual BADCT: Facility consists of reinforced concrete lined basins (6-inch thick concrete. with polyethylene tape-sealed joints and PVC liner on the side walls) covered by gunite. The pad covers 400 feet by 276 feet in area. The facility provides containment of overflow from the copper-moly thickeners and used for settling and recovery of solids. Reclaimed fluids are pumped to the reclaim circuit and the Tailing Thickeners.
Tailing Thickeners (D-40): Individual BADCT: Facility consists of four circular walls, each with a diameter of 508 feet, and a maximum depth of 23 feet. The walls are constructed with concrete, the floor with 3 feet of compacted soil-bentonite admix with an average hydraulic conductivity of $2.2x10^{-8}$ cm/sec and average moisture content of 8.9%. The thickener area is underlain by Tertiary intrusives. The Thickeners allow for the recovery and recycling of makeup water prior to transfer of the tailing material to the Tailing Impoundment.
Solution Conveyance Channels:
Drainage Channel West Plant Area (D-22): Individual BADCT: Facility is an existing single-lined conveyance channel with 60-mil HDPE geomembrane underlain by compacted native material overlying Tertiary intrusives. The liner is secured in an engineered anchor trench. The channel is approximately 3,800 feet long, 15-30 feet wide and 4-6 feet deep. The channel provides conveyance for stormwater runoff and accommodates fluids during upset conditions from the West Plant area. The facility is designed to flow into Duval Canal.
Thickeners Area Drainage Channel (D-41): Individual BADCT: Facility is an existing single-lined conveyance channel with 60-mil HDPE geomembrane liner underlain by compacted native material overlying Tertiary intrusives. The liner is secured in an engineered anchor trench. The channel provides containment for stormwater runoff and during upset conditions of process flows in the Sierrita Mill tailing thickener area. It is 15 feet in width, with an average depth of 4 feet. The facility is designed to flow into Duval Canal.
TAILING IMPOUNDMENTS
Sierrita Tailing Impoundment (D-01):

Table 8:PERMITTED FACILITIES AND BADCT
Individual BADCT: Facility is an existing tailing impoundment, where tailing in the slurry form is deposited using conventional upstream method of tailing deposition. The slimes, a finer fraction of the tailing material, provide a relatively low permeability coating of the floor surface to minimize infiltration. The tailing impoundment covers a surface area of approximately 4,431 acres, with a 2,500 feet long divider dam separating the pond into north and south sections. Diversion channels to the west and upgradient are designed to divert surface run-on from a 100-year, 24-hour storm event. The runoff from the embankment is captured by the catchment basins. Water accumulates toward the west side of the impoundment in the reclaim pond where it is recovered and pumped to the Raw Water Reservoir for use in the milling process. Piezometers and inclinometers are installed along the impoundment dam for monitoring phreatic surface and to ensure dam stability. The facility shall be operated with a minimum of 4 feet of freeboard. The maximum crest elevation of the tailing dam shall not exceed 3,710 feet amsl. The facility is operated with a beach width (distance from the embankment crest to the nearest edge of the pond) no less than 2,000 feet. The facility shall not exceed the aerial footprint shown in the application. Effluent from the wastewater system is discharged to the tailings impoundment at a maximum rate of 10,000 gallons per day. The facility also receives process solutions and surface runoff from the Plant Site, including, but not limited to, overflow from Amargosa Pond, B Pond, bleed from the lime scrubber, dust control water from crushing and conveying, vehicle wash water effluent and seepage collected and pumped from B and C Sumps. These solutions and sediments are delivered via the Duval Canal to the Duval Canal Impoundment, which is lined with compacted fine tailings material and operated as part of the Sierrita Tailing Impoundment. After allowing sediment to settle, a barge-mounted pump conveys solutions from the Duval Canal Impoundment to the Reclaim Water System and/or the upper surface of the Sierrita Tailing Impoundment. With completion of the Phase 1 and Phase 2 buttress constructed on the south embankment, the Sierrita Tailing Impoundment meets the Arizona Mining BADCT minimum factors of safety for static and dynamic conditions for STI maximum crest elevation of 3,585 feet amsl. Further raises of the crest elevation above 3,585 feet amsl, up to a maximum elevation of 3,710 feet amsl, will only follow additional analyses to confirm sufficient safety factors are present as required by Compliance Schedule Item 6. Accumulated sediment shall be removed from the Duval canal impoundment as needed to maintain design capacity using heavy equipment equipped with GPS sensors to determine cut depth. Immediately following removal of accumulated sediment, the liner will be inspected to ensure no penetration of the liner has occurred.
Sierrita Tailing Impoundment Sediment Basins (D-01 A-K): Individual BADCT: Facility consists of eleven unlined sediment ponds of varying storage capacities, underlain by alluvial deposits consisting of sand and gravel with caliche layers near the ground surface. Caliche layers provide a zone of permeability relatively lower than the underlying alluvium. Hydraulic conductivity of the tailing sediments ranges from1.5 x 10 -6 to 1.2 x 10 -3 cm/sec with a geometric mean value of 7.7 x 10 -6 cm/s. The sediment ponds provide containment for surface water runoff from the face of tailing dam along with the tailings that have been discharged off the tailing impoundment and deposited into these ponds. Accumulated fluid is allowed to evaporate. In the event that infiltration of impacted water from sediment ponds occurs, it would be captured by a series of interceptor wells located along the east side of the tailing impoundment. Water is pumped from the wells to the Raw Water Reservoir for use in the milling process.
WASTE ROCK PILES
West Waste Rock Piles (D-19):

Table 8:PERMITTED FACILITIES AND BADCT
Individual BADCT: Most of the facility is located within the passive containment capture zone of the Sierrita-Esperanza Pit. Facilities are waste rock piles constructed using the end dumping method over moderate-to-steeply sloping topography which minimizes the potential for discharge. The facility covers a surface area of approximately 1,285 acres Runoff that is contained in Tinaja Wash is captured by Headwall No.5, Cat Ponds 1, 2 and 3. Upstream stormwater run-on will be allowed to contact and penetrate the waste rock pile but downstream discharge will be directed to Cat Pond 3. Runoff that is contained in Tinaja Wash is captured by Headwall No. 5, Cat Ponds 1, 2 and 3.The facility shall not exceed the maximum crest elevation of 4,900 feet amsl. The facility shall not exceed the aerial footprint shown on Figure 2.1 of the APP Amendment application dated August 30, 2016.
RS-3 Waste Rock Pile (D-36): Individual BADCT: The western half of this facility is located within the passive containment capture zone of the Sierrita-Esperanza Pit and the eastern half is located within the passive containment capture zone of the Twin Buttes Open Pit. Facility is a waste rock pile constructed using the end dumping method over moderate-to-steeply sloping topography which minimizes the potential for discharge. The facility covers a total surface area of approximately 910 acres. Stormwater runon is diverted upstream of the pile through a diversion channel that will route Demetrie Wash around the pile. Runoff along the north- and east-facing slopes of the facility will be diverted to stormwater detention features located near the toe of the pile. The facility shall not exceed the maximum crest elevation of 4,600 feet amsl. The facility shall not exceed the aerial footprint shown on Figure 2.1 of the APP Amendment application dated August 30, 2016. . The facility shall not exceed the aerial footprint shown on Figure 2.1 of the APP Amendment application dated August 30, 2016.
RS-2 Waste Rock Pile (D-47): Individual BADCT: The facility is located within the passive containment capture zone of the Sierrita-Esperanza Pit. Facility is a waste rock pile constructed using the end dumping method over moderate-to-steeply sloping topography which minimizes the potential for discharge. The facility covers a surface area of approximately 693 acres. Stormwater run-on is diverted upstream of the pile through a diversion channel that will route Demetrie Wash around the pile. Runoff along the west- and north- facing slopes of the facility will be diverted to stormwater detention features located near the toe of the pile. Runoff from the southern portion of the rock pile will enter the pit. The facility shall not exceed the maximum crest elevation of 4,800 feet amsl. The facility shall not exceed the aerial footprint shown on Figure 2.1 of the APP Amendment application dated August 30, 2016.
"V" Waste Rock Pile (D-56): Individual BADCT: Facility is waste rock pile underlain by Quaternary alluvium and Tertiary intrusives. The facility covers a surface area of approximately 30 acres. Runoff from the facility follows the natural drainage. Downgradient, monitor well MH-21 provides warning of any potential discharge to the groundwater. The facility shall not exceed the maximum crest elevation of 4,350 feet. The facility shall not exceed the aerial footprint shown in the Geotechnical Review of the Ultimate Rock Stockpile Plan at Sierrita Mine (Revised 21 August 2009) that forms an integral part of this APP.
OPEN PITS
Sierrita-Esperanza Pit (D-55): Individual BADCT: Facility is an open pit approximately 9,200 by 12,600 feet in plan area, and is currently mined for copper ore. The top elevation of the pit is approximately 4,100 feet amsl and the bottom is approximately 2,550 feet amsl. The pit is underlain by Tertiary intrusive rocks with a permeability ranging from 1x 10^{-6} cm/sec to 7x10^{-4} cm/sec and quartz monzonite with a permeability of 5x10^{-6} cm/sec. The Sierrita and Esperanza pits were mined into one large pit causing a passive containment. The pit creates a passive containment with a capture zone defined by the 3800 foot potentiometric contour. The impoundment has a fluid storage capacity of 500 million gallons of solution. The passive containment provides containment for water

Table 8:PERMITTED FACILITIES AND BADCT
conservation and receives surface stormwater and overflow from SX-3 Stormwater Pond and Amargosa Pond. Accumulated fluid is pumped to SX Plant and the reclaim water system.
Ocotillo Pit (D-60): Individual BADCT: This facility has been backfilled with waste rock from the mining operation and receives only direct precipitation falling directly onto the backfilled Ocotillo Pit.
Moly Satellite Pit (D-61): Individual BADCT: Facility consists of a series of push-backs located immediately north of the Sierrita-Esperanza Pit. These push-backs are the beginning of a pit being mined for molybdenum ore. The facility is underlain by Ruby Star quartz monzonite porphyry and Harris Ranch quartz monzonite. Accumulated fluid is pumped out and conveyed to the Sierrita-Esperanza Pit solution storage area. Sierrita plans to backfill this pit with waste rock, which will minimize the potential for discharge.
NON-MUNICIPAL SOLID WASTE LANDFILL
Non-Municipal Solid Waste Landfill (D-14): Individual BADCT: Facility is an unlined, relatively deep conical depression in waste rock formed from the end –dumping of run of mine material on top of native bedrock. The facility overlies shallow competent bedrock which has a low permeability ranging from 0.004 feet/day (1.4×10^{-6} cm/s) to 0.51 feet/day (1.8×10^{-4} cm/s). Surface water run-on is controlled by berms around the facility.
Facilities to be Closed Under Compliance Schedule and/or to cease operation without intent to resume activities
A Pond (D-06): Facility has been decommissioned and no longer exists. The test results of soil samples have been submitted to the Groundwater Protection Value Stream for review and comments. No further action is required.
Old D Pond (D-13): Facility has ceased operation without intent to resume activity for which it was designed. All of the sample results for total metals and SPLP submitted to the Groundwater Protection Value Stream are within the SRL requirements and AWQS. This site is scheduled for reclamation. Final closure for the facility will be completed during mine closure.
Rhenium Ponds (D-23): Facility ceased operation in 1998. The test results of soil samples have been submitted to the Groundwater Protection Value Stream for review and comment. Final closure for the facility will be completed during mine closure.
Launders Facility (D-39): The facility has ceased operation without intent to resume activity for which it was designed. Final closure for the facility will be completed during mine closure.
TWIN BUTTES MINE
Pipeline Secondary Containment Ponds (No. 49A to J): The facilities are a series of ten ponds and trenches that provide secondary containment for three pipelines that travel overland between Solution Extraction (SX) and Electrowinning (EW) facilities. The pipes are dual-walled over most sections of the pipelines, and single walled in other sections where the pipeline crosses many of the HDPE lined sumps and collection trenches. The pipelines convey pump-fed strong electrolyte, pump-fed spent

Table 8:PERMITTED FACILITIES AND BADCT

electrolyte and pump-fed solutions that are collected in the SX Drain Sump between the Sierrita SX facilities and the Twin Buttes EW facilities. The facilities provide secondary containment for process solution along the pipeline corridor in the event that the inner pipeline experiences a breach or upset condition. Accumulated solutions are pumped back into the SX circuit.

Pond Name	Storage Capacity (gallons)	Average Pond Depth (feet)
CS – 03	47,311	5.45
CS – 04	28,536	4.55
CS – 05	32,216	2.90
CS – 06	78,218	6.64
CS – 07	55,240	2.68
CS – 08	138,328	5.70
CS – 10	203,486	5.54
CS – 11	291,032	6.40
CS – 12	144,723	6.36
CS – 13	265,046	6.10

The secondary containment ponds and trenches are lined with an 80-mil HDPE liner and secured in an engineered anchor trench. The ponds shall be operated\.\ a minimum of I foot of freeboard.

Vehicle Wash (No. 44) and Vehicle Wash Discharge Area (No. 44A):

Vehicle Wash facility, which is no longer in operation, consisted of a wash rack, concrete pad and utilities for washing trucks and vehicles. The rinse water was collected into the Vehicle Wash Discharge Area. These facilities are located within the Passive Containment Capture Zone (PCCZ), have been decommissioned and some initial site characterization work has been completed. Final facility closure activities will be completed at the end of mine life.

Office Area Catchment (No. 21):

The facility, which is no longer in operation, is approximately 15 acres in size and is bermed to contain inflows of surface water run-off and prevent discharge out of the facility. During operation, the main inflow was from the diversion canal that originated from the Former Mill Area. The facility is no longer in service. This facility is within the PCCZ. Final facility closure activities will be completed at the end of mine life.

Waste Rock Stockpile 1 (No. 50):

Waste Rock Stockpile I will be located west of the Twin Buttes Pit or over parts of the existing W-4 Stacker Dump, 44 Dump, 30-1 Dump, and Oxide Ore Stockpiles. These existing stockpiles were constructed prior to 1986 and are classified as closed (exempt) facilities. Stormwater runoff from Waste Rock Stockpile I will be directed to stormwater impoundments SW-I and SW-2. This facility is within the PCCZ.

Waste Rock Stockpile I will be constructed with three horizontal to one vertical (3H: I side slopes (Figures 4-7 and 4-10). Section 4.3 of the main application document incorrectly states that the slopes for all three Waste Rock Stockpiles will be 3V: I. Waste Rock Stockpile I will have a total capacity of 160.4 million cubic yards and maximum permitted height of 644-feet. A slope stability analysis was performed for Waste Rock Stockpile I,

Table 8:PERMITTED FACILITIES AND BADCT
which included the Factor of Safety (FOS) for static and pseudostatic conditions, and found acceptable. Waste Rock Stockpile I has been designed with adequate stormwater controls. All surface water controls are designed to covey 1 I 00-year 24-hour storm event.
Waste Rock Stockpile 2 (No. 51): Waste Rock Stockpile 2 will be located in the EW Plant Area, northwest of the Twin Buttes Pit. All of the permitted facilities in the EW Plant Area, including the EW Plant, are located within the footprint of the new waste rock stockpile and will be closed and covered as the stockpile is constructed. Stormwater runoff from Waste Rock Stockpile 2 will be directed to stormwater impoundment SW-3. Stormwater run-on will be controlled and routed around the stockpile by a single diversion channel. This facility is within the PCCZ. Waste Rock Stockpile 2 will be constructed with 3H: IV side slopes (Figures 4-8 and I 0). Waste Rock Stockpile 2 will have a total capacity of 142.2 million cubic yards and maximum permitted height of 489-feet. A slope stability analysis was performed for Waste Rock Stockpile 2, which included the Factor of Safety (FOS) for static and pseudostatic conditions, and found acceptable. Waste Rock Stockpile 2 has been designed with adequate stormwater controls. All surface water controls are designed to convey 1 I 00-year 24-hour storm event. Although remedial activities and confirmation sampling results have yet to be provided to ADEQ, regarding final closure of the Twin But facilities (SX/EW Plant, thickeners/clarifiers, tank house, etc.) formerly located on 1 proposed Waste Rock Stockpile 2 site, the demonstration of compliance (BADCT Section 1.2.5) has been met based on the PCCZ formed by the Twin Buttes Pit.
Waste Rock Stockpile 3 (No. 52): Waste Rock Stockpile 3 will be located north of the Twin Buttes Pit, between Waste Rock Stockpile 2 and the Number 3 Tailings Dam, a closed facility. The stockpile will cover several buildings located east of the EW Plant Area. Stormwater runoff from Waste Rock Stockpile 3 will be directed to stormwater impoundment SW-4 and SW-5. Stormwater run-on will be controlled by an upgradient stormwater impoundment. This facility is partially within the PCCZ. Waste Rock Stockpile 3 will also be constructed with 3H: IV side slopes (Figures 4-9 c 4-11). Waste Rock Stockpile 3 will have a total capacity of 207 .2 million cubic yards and maximum permitted height of 655-feet. A slope stability analysis was perfomed for Waste Rock Stockpile 3, which included the Factor of Safety (FOS) for static and pseudostatic conditions, and found acceptable. Waste Rock Stockpile 3 has been designed with adequate stormwater controls. All surface water controls are designed to convey 1 I 00-year 24-hour storm event.

Notes:

A. The primary discharge control technologies (DCTs) for each discharging facility are presented; however, additional discharge controls are discussed in the APP application and subsequent submittals and correspondence referenced in Section 5.0 of this APP.

B. Prescriptive BADCT design involves a prescribed engineering approach that utilizes pre-approved discharge control technologies or engineering equivalents to meet the requirements of A.R.S 49-243(B)(1).
Individual BADCT design involves general principals of engineering design, and is based upon alternative discharge control measures considered, the technical and economic advantages and disadvantages of each alternative, and justification for the selection of the best alternative to meet the requirements of A.R.S. 49-243(B)(1).

C. Definitions/Abbreviations:
BADCT – Best Available Demonstrated Control Technology
HDPE – High Density Polyethylene
PVC – Poly Vinyl Chloride
LCRS – Leakage Collection and Recovery System

ALR – Action Leakage Rate
RLL – Rapid and Large Leakage
PLS – Pregnant Leachate Solution
amsl – above mean sea level
N/A – Not Applicable

4.2. COMPLIANCE AND OPERATIONAL MONITORING

Table 9 REQUIRED INSPECTIONS and OPERATIONAL MONITORING*	
Facility Name (#)	**Operational Requirements**
SIERRITA MINE	
AMARGOSA WASH DRAINAGE AREA - Non-stormwater Impoundments; Lined	
Non-stormwater Impoundments - Ponds, Sumps, and Associated Conveyance Systems: Amargosa Pond (D-05) SX-1 Tank Farm Pond (D-34) SX-1 Drain Pond (D-33)	**Quarterly and following precipitation events measuring at least 1 inch in a 24-hour period:** (Precipitation depth to be measured based on readings obtained from the mine weather station used for such measurements) Visually inspect and take appropriate action if any evidence of: - perforated, cut, tear or damaged liner and impairment of anchor trench integrity; - impairment of embankment integrity as applicable; - excessive erosion in conveyances and diversions; - excess accumulation of debris in conveyances and diversions; and - impairment of access. As applicable at pump locations, inspect pumps, valves and structures for pump operation and structural integrity. **Annually:** Remove accumulated residues, sediments, debris, and vegetation from the impoundments as needed to maintain the integrity of the liner and at least 80 percent of the design capacity. **<u>Specific Requirement</u>** Remove accumulated fluid - the process solution or impacted stormwater due to process upsets and/or storm event, from the impoundment as soon as practical, but no later than 30 days after cessation of the upset or storm event, or 60 days for Amargosa Pond.

Table 9 REQUIRED INSPECTIONS and OPERATIONAL MONITORING*	
Facility Name (#)	**Operational Requirements**
AMARGOSA WASH DRAINAGE AREA – Process Solution Impoundments; Double-lined	
Process Solution Impoundments - Ponds, Sumps, and Associated Conveyance Systems: Raffinate Pond No. 2 (D-10) Drain Pond No. 2 (D-15) B-Pond (D-07)	**Daily:** Visually inspect and take appropriate action if any evidence of : - blocked overflow pipes/spillway structures or loss of fluid containment in the pond for any reason. **Weekly:** Measure flow rate in the LCRS; confirm that it is less than specified Action Leakage Rate (ALR) (See BADCT Table 3 and Section 2.6.2.4) and less than specified rate for Rapid and Large Leakage (RLL) (See BADCT Table 3 and Section 2.6.2.5); and take appropriate action if exceedance is observed in the ALR or RLL. **Quarterly:** Visually inspect and take appropriate action if any evidence of: - perforated, cut, tear or damaged liner and impairment of anchor trench integrity; - impairment of embankment integrity as applicable; - excessive erosion in conveyances and diversions; - excess accumulation of debris in conveyances and diversions; and - impairment of access. As applicable at pump locations, inspect pumps, valves and structures for pump operation and structural integrity. **Annually:** **Drain Pond No. 2 (D-15)**- Remove accumulated residues, sediments, debris, and vegetation from the impoundments as needed to maintain the integrity of the liner and at least 80 percent of the design capacity. **Raffinate Pond No. 2 (D-10)** Remove accumulated residues, sediments, debris, and vegetation from the impoundment as needed to maintain the integrity of the liner and to ensure the capacity of the Duval Canal Impoundment used in conjunction with Raffinate Pond No. 2 satisfies the specified design capacity.

Table 9 REQUIRED INSPECTIONS and OPERATIONAL MONITORING*	
Facility Name (#)	**Operational Requirements**
AMARGOSA WASH DRAINAGE AREA – Process Solution Impoundments; Unlined	
Process Solution Impoundments - Ponds, Sumps, and Associated Conveyance Systems: Headwall No. 1 (D-02) Bailey Lake (D-03) Moly Decant Tanks and Pad Area (D-39A)	**Quarterly:** Visually inspect and take appropriate action if any evidence of: - impairment of embankment integrity as applicable; - excessive erosion in conveyances and diversions; - excess accumulation of debris in conveyances and diversions; and - impairment of access. As applicable at pump locations, inspect pumps, valves and structures for pump operation and structural integrity. **<u>Moly Decant Tanks & Pad Areas:</u>** **Quarterly:** Visually inspect and take appropriate action if there is any evidence of seepage or cracks that affect the structural integrity of the concrete tanks or pad area. **Annually:** **Headwall No. 1 (D-02) and Bailey Lake (D-03)** Remove accumulated residues, sediments, debris, and vegetation from the impoundments as needed to maintain the integrity of the liner in Headwall No. 1 and to ensure the capacity of the Duval Canal Impoundment used in conjunction with the Headwall No. 1 and Bailey Lake satisfies the specified design capacity design. (Does not apply to Moly Decant Tanks & Pad Area.)
AMARGOSA WASH DRAINAGE AREA – Stockpile Leaching	
Oxide (Twin Buttes and Sierrita) Active Leach Area (D-18)	**Monthly:** Visually inspect and take appropriate action if any evidence of: - stockpile deformations, including surface cracks, slides, sloughs, or differential settlement affecting slope stability.

Table 9 REQUIRED INSPECTIONS and OPERATIONAL MONITORING*	
Facility Name (#)	**Operational Requirements**
AMARGOSA WASH DRAINAGE AREA – Solution Conveyance Channels	
Duval Canal – Lined (D-29) Amargosa Spillway – Lined (D-48) Duval Canal Velocity Pond (D-64) - Unlined	**Quarterly and following precipitation events measuring at least 1 inch in a 24-hour period:** (Precipitation depth to be measured based on readings obtained from the mine weather station used for such measurements) Visually inspect and take appropriate action if any evidence of: - perforated, cut, tear or damaged liner and impairment of anchor trench integrity (lined conveyances); - impairment of embankment integrity as applicable; - excessive erosion in conveyances and diversions; - excess accumulation of debris in conveyances and diversions; and - impairment of access. **Annually:** Remove accumulated residues, sediments, debris, and vegetation from the impoundments as needed to maintain the integrity of the liner and at least 80 percent of the design capacity.
DEMETRIE WASH DRAINAGE AREA – Non-Stormwater Impoundments	
New D Pond – Lined (D-45) Copper Sulfate Ponds 1&2 – Lined (D-59) Tailing Pipeline Containment Structures – Unlined (D-62 A-F)	**Monthly:** Visually inspect and maintain a minimum 2 feet freeboard for the following impoundments: 07-Pond, New D Pond, and Copper Sulfate Ponds 1&2. **Quarterly and following precipitation events measuring at least 1 inch in a 24-hour period:** (Precipitation depth to be measured based on readings obtained from the mine weather station used for such measurements) Visually inspect and take appropriate action if any evidence of: - perforated, cut, tear or damaged liner and impairment of anchor trench integrity (lined ponds); - surface cracks at concrete-lined structures and impoundments; - impairment of embankment integrity as applicable; - excessive erosion in conveyances and diversions; - excess accumulation of debris in conveyances and diversions; and - impairment of access. As applicable at pump locations, inspect pumps, valves and structures for pump operation and structural integrity.

Table 9 REQUIRED INSPECTIONS and OPERATIONAL MONITORING*	
Facility Name (#)	**Operational Requirements**
	Annually: Remove accumulated residues, sediments, debris, and vegetation from the impoundments as needed to maintain the integrity of the liner and at least 80 percent of the design capacity. **Specific Requirement** Remove accumulated fluid - the process solution or impacted stormwater due to process upsets and/or storm event, from the impoundment as soon as practical, but no later than 30 days after cessation of the upset or storm event.
ESPERANZA WASH DRAINAGE AREA - Non-stormwater Impoundments; Lined	
Non-stormwater Impoundments - Ponds, Sumps, and Associated Conveyance Systems: SX-3 Stormwater Pond (D-11) Cat Pond 1 (D-42A) Cat Pond 2 (D-42B) Cat Pond 3 (D-42C)	**Monthly:** Visually inspect and maintain 2 feet freeboard for the following impoundments: SX-3 Stormwater Pond, Cat Pond 1, and Cat Pond 2. **Quarterly and following precipitation events measuring at least 1 inch in a 24-hour period:** (Precipitation depth to be measured based on readings obtained from the mine weather station used for such measurements) Visually inspect and take appropriate action if any evidence of: - perforated, cut, tear or damaged liner and impairment of anchor trench integrity; - impairment of embankment integrity as applicable; - excessive erosion in conveyances and diversions; - excess accumulation of debris in conveyances and diversions; and - impairment of access. As applicable at pump locations, inspect pumps, valves and structures for pump operation and structural integrity. **Annually:** Remove accumulated residues, sediments, debris, and vegetation from the impoundments as needed to maintain the integrity of the liner and at least 80 percent of the design capacity. **Specific Requirement** Remove accumulated fluid - the process solution or impacted stormwater due to process upsets and/or storm event, from the impoundment as soon as practical, but no later than 30 days after cessation of the upset or storm event.

Table 9 REQUIRED INSPECTIONS and OPERATIONAL MONITORING*	
Facility Name (#)	**Operational Requirements**
ESPERANZA WASH DRAINAGE AREA – Process Solution Impoundments	
Process Solution Impoundments - Ponds, Sumps, and Associated Conveyance Systems: Raffinate Pond No. 3 - Double Lined (D-04) Headwall No.2 - Partially Lined (D-46) Headwall No. 3 –Partially Lined (D-09) Headwall No. 5 – Double Lined (D-12)	**Daily:** Visually inspect and take appropriate action if any evidence of : - blocked overflow pipes/spillway structures. **Weekly – Raffinate Pond No. 3:** For Raffinate Pond No. 3 and Headwall No. 5, measure flow rate in the LCRS; confirm that it is less than specified Action Leakage Rate (ALR) (See BADCT Table 3, Section 2.6.2.4) and less than specified rate for Rapid and Large Leakage (RLL) (See BADCT Table 3, Section 2.6.2.5); and take appropriate action if exceedance is observed in the ALR or RLL. **Quarterly:** Visually inspect and take appropriate action if any evidence of: - perforated, cut, tear or damaged liner and impairment of anchor trench integrity; - impairment of embankment integrity as applicable; - excessive erosion in conveyances and diversions; - excess accumulation of debris in conveyances and diversions; and - impairment of access. As applicable at pump locations, inspect pumps, valves and structures for pump operation and structural integrity. **Annually:** Remove excess sediments/sludge from the impoundments: Raffinate Pond No. 3, Headwall No. 2 and Headwall No. 3 as needed to ensure that the capacity of the SX-3 Stormwater Pond used in conjunction with the ponds (Raffinate Pond No. 3, Headwall No. 2 and Headwall No.3) volumes satisfies the specified design capacity, conveyances and diversions as needed to maintain at least 80 percent of designed capacity. Remove accumulated residues, debris, and vegetation from the impoundments as needed to maintain the integrity of the liner.
ESPERANZA WASH DRAINAGE AREA – Stockpile Leaching	
Sulfide Active Leach Area (D-17)	**Monthly:** Visually inspect and take appropriate action if any evidence of: - stockpile deformations, including surface cracks, slides, sloughs, or differential settlement affecting slope stability.

Table 9 REQUIRED INSPECTIONS and OPERATIONAL MONITORING*	
Facility Name (#)	**Operational Requirements**
ESPERANZA WASH DRAINAGE AREA – Solution Conveyance Channel	
Headwall No. 2 Channel - Lined (D-08)	**Quarterly and following precipitation events measuring at least 1 inch in a 24-hour period:** (Precipitation depth to be measured based on readings obtained from the mine weather station used for such measurements) Visually inspect and take appropriate action if any evidence of: - perforated, cut, tear or damaged liner and impairment of anchor trench integrity; - impairment of embankment integrity as applicable; - excessive erosion in conveyances and diversions; - excess accumulation of debris in conveyances and diversions; and - impairment of access. As applicable at pump locations, inspect pumps, valves and structures for pump operation and structural integrity. **Annually:** Remove excess sediments/sludge from the impoundments, conveyances and diversions as needed to maintain at least 80 percent of designed capacity. Remove accumulated residues, debris, and vegetation from the impoundments as needed to maintain the integrity of the liner.
MILL SITE - Non-stormwater Impoundments and Concentrate Storage; Lined	
Raw Water Reservoir – Bentonite Liner (D-21)	**Quarterly and following precipitation events measuring at least 1 inch in a 24-hour period:** (Precipitation depth to be measured based on readings obtained from the mine weather station used for such measurements) Visually inspect and take appropriate action if any evidence of: - perforated, cut, tear or damaged liner and impairment of anchor trench integrity (Rhenium Plant Sump) - desiccation, gaps or gouges in bentonite amended soil liner (Raw Water Reservoir after clean out) - surface cracks at concrete-lined impoundment (Copper Concentrate Storage) - impairment of embankment integrity as applicable; - excessive erosion in conveyances and diversions; - excess accumulation of debris in conveyances and diversions; and - impairment of access. As applicable at pump locations, inspect pumps, valves and structures for pump operation and structural integrity.

Table 9 REQUIRED INSPECTIONS and OPERATIONAL MONITORING*	
Facility Name (#)	**Operational Requirements**
	Annually: **Raw Water Reservoir** Remove excess sediments/sludge from the impoundment, conveyances and diversions as needed to ensure that the capacity of the Duval Canal Impoundment used in conjunction with the Raw Water Reservoir satisfies the specified design capacity. Remove accumulated residues, debris, and vegetation from the impoundments as needed to maintain the integrity of the liner.
MILL SITE – Process Solution Impoundments; Lined	
Tailing Thickeners (D-40) Decant Ponds and Pad Areas (D-20)	**Tailings Thickeners** **Quarterly:** Visually inspect thickeners and take appropriate action if any evidence of: - seepage through surface cracks of concrete-lined walls. **After Cleanout:** Visually inspect thickeners and take appropriate action if any evidence of: - desiccation, gaps or gouges in bentonite-amended soil liner during the clean out cycle; **Decant Ponds & Pad Areas:** **Quarterly:** Visually inspect & take appropriate action if there is any evidence of: - seepage or cracks that affect the structural integrity of the concrete tanks or pad area.
MILL SITE – Solution Conveyance Channels	
Drainage Channel West Plant Area – Lined (D-22) Thickeners Area Drainage Channel – Lined (D-41)	**Quarterly and following precipitation events measuring at least 1 inch in a 24-hour period:** (Precipitation depth to be measured based on readings obtained from the mine weather station used for such measurements) Visually inspect and take appropriate action if any evidence of: - perforated, cut, tear or damaged liner and impairment of anchor trench integrity; - impairment of embankment integrity as applicable; - excessive erosion in conveyances and diversions; - excess accumulation of debris in conveyances and diversions; and - impairment of access. **Annually:** Remove excess sediments/sludge from the impoundments, conveyances and diversions as needed to maintain at least 80 percent of designed capacity. Remove accumulated residues, debris, and vegetation from the impoundments as needed to maintain the integrity of the liner.

Table 9 REQUIRED INSPECTIONS and OPERATIONAL MONITORING*	
Facility Name (#)	**Operational Requirements**
TAILINGS IMPOUNDMENTS	
Sierrita Tailing Impoundment (D-01) Sierrita Tailing Impoundment Sediment Basins (D-01A-K) Two (2) sediment basins at the south end of the STI	**Sierrita Tailings Impoundment** **Daily:** Visually inspect and maintain the following applicable beach distance and freeboard: - Beach distance - no less than 2,000 feet - Freeboard - 4 feet (2 feet in Duval Canal Impoundment) Visually inspect and take appropriate action if any evidence of: - tailing dam deformation, including surface cracks, slides, sloughs, seeps, erosion features or differential settlement affecting dam stability. **Quarterly:** Monitor piezometers and inclinometers along the tailing dam to maintain phreatic surface within safe operating limits and to ensure dam safety. **Sierrita Tailing Impoundment Interceptor Wells** **Monthly:** At pump locations: - Inspect pumps, valves, and structures for pump operation, and structural integrity. **Sierrita Tailing Impoundment Sediment Basins** **Weekly:** Visually inspect and maintain- 1 foot of freeboard in the Sediment Basins. **Quarterly:** Visually inspect and take appropriate action if any evidence of: - impairment of embankment integrity; - impairment of access. As applicable at pump locations, inspect pumps and structures for pump operation and structural integrity. **Annually:** Remove excess sediments/sludge from the Sediment Basins as needed to maintain at least 80 percent of designed capacity.

Table 9 REQUIRED INSPECTIONS and OPERATIONAL MONITORING*	
Facility Name (#)	**Operational Requirements**
WASTE ROCK PILES	
West Waste Rock Piles (D-19) RS-3 Waste Rock Pile (D-36) RS-2 Waste Rock Pile (D-47)	**Monthly:** Visually inspect and take appropriate action if any evidence of: - stockpile deformation, including surface cracks, slides, sloughs, or differential settlement affecting slope stability.
OPEN PITS	
Sierrita-Esperanza Pit (D-55)	**Quarterly and following precipitation events measuring at least 1 inch in a 24-hour period:** Visually inspect and maintain the fluid level in the pit below the maximum operating elevation of 3,700 feet amsl. **Quarterly:** At pump locations, inspect pumps and pump structures for pump operation and structural integrity. Visually inspect and take appropriate action if any evidence of: - impairment of embankment integrity as applicable; - impairment of access.
Non-Municipal Solid Waste Landfill	
Non-Municipal Solid Waste Landfill (D-14)	**Quarterly and following precipitation events measuring at least 1/2 inch in a 24-hour period:** Visually inspect berms around the perimeter of the landfill for signs of erosion/damage; perform maintenance on an as-needed basis. The landfill has obtained authorization for disposal of solid waste pursuant to the Disposal General Permit: Non-Municipal Solid Waste Landfills at Mining Operations (A.A.C. R18-13-802). The General Permit and associated Authority to Operate include inspection and operational requirements.

Table 9 REQUIRED INSPECTIONS and OPERATIONAL MONITORING*	
Facility Name (#)	**Operational Requirements**
TWIN BUTTES MINE	
Non-Stormwater Impoundments	
Pipeline Secondary Containment Ponds (No. 49, A – J)	**Quarterly and following a breach in the pipeline or precipitation events measuring at least 1-inch in a 24-hour period:** **(**Precipitation to be measured based on readings obtained from the mine weather station used for such measurements) Visually inspect and maintain a minimum of 1 foot of freeboard in the impoundments. Visually inspect and take appropriate action if any evidence of: - perforated, cut, tear or damaged liner and impairment of anchor trench integrity; - impairment of embankment integrity as applicable; - excessive erosion in conveyances and diversions; - excess accumulation of debris in conveyances and diversions; and - impairment of access. At pump locations, inspect pumps, valves and structures for pump operation and structural integrity, as applicable. **Annually:** Remove excess sediments/sludge from the impoundments, conveyances and diversions as needed to maintain at least 80 percent of designed capacity. **Specific Requirement:** Remove accumulated fluid - the process solution or impacted stormwater due to process upsets and/or storm event, from the impoundments as soon as practical, but no later than thirty (30) days after cessation of the upset or storm event.
Waste Rock Stockpiles	
Waste Rock Stockpiles	**Monthly(When Constructed):** Visually inspect and take appropriate action if any evidence of: - deformation, including surface cracks, slides, sloughs, or differential settlement affecting slope stability.

*- Results to be kept on-site in the logbook and not reported on SMRFs.

Table 10- Table of Parameters for Ambient Groundwater Monitoring for Point of Compliance (POC) Wells*		
Depth to Water Level (feet)	Potassium [1]	Nickel [1]
Water Level Elevation (feet amsl)	Sodium [1]	Selenium [1]
Temperature – field (ºF)	Iron [1]	Thallium [1]
pH – Field & Lab (S.U.)	Aluminum [1]	Zinc [1]
Field Specific Conductance (µmhos/cm)	Antimony [1]	Free Cyanide
Total Dissolved Solids – Lab	Arsenic [1]	Adjusted Gross Alpha Particle Activity (pCi/L) [2]
Total Alkalinity	Barium [1]	Radium 226 (pCi/L)
Bicarbonate	Beryllium [1]	Radium 228 (pCi/L)
Carbonate	Cadmium [1]	Uranium-Isotopes(pCi/L) [3]
Hydroxide	Chromium [1]	Carbon Disulfide
Sulfate	Cobalt [1]	Benzene
Chloride	Copper [1]	Toluene
Fluoride	Lead [1]	Ethylbenzene
Nitrate + Nitrite	Manganese [1]	Total Xylenes
Calcium	Mercury [1]	Uranium
Magnesium [1]	Molybdenum [1]	

* This table is being provided in the event that it becomes necessary to install additional POC wells

1 Metals must be analyzed as dissolved metals.

2 The adjusted gross alpha particle activity is the gross alpha particle activity, including radium 226, and any other alpha emitters, if present in the water sample, minus radon and total uranium (the sum of uranium 238, uranium 235 and uranium 234 isotopes). The gross alpha analytical procedure (evaporation technique: EPA Method 900.0) drives off radon gas in the water samples. Therefore, the Adjusted Gross Alpha should be calculated using the following formula: (Laboratory Reported Gross Alpha MINUS Sum of the Uranium Isotopes).

3 Uranium Isotope activity results must be used for calculating Adjusted Gross Alpha.

All concentrations are in milligrams per liter (mg/L), unless otherwise specified.

Table 11:QUARTERLY GROUNDWATER MONITORING **(in mg/L[3] unless otherwise noted)[4]**								
PARAMETER	**MH-14**		**MH-15W**		**MH-16W**		**MH-18**	
	AQL[5]	**AL[6]**	**AQL**	**AL**	**AQL**	**AL**	**AQL**	**AL**
Depth to Water (in feet)	Monitor[7]	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Water Level Elevation (in feet amsl[8])	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Field pH (S.U.)	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Field Specific Conductance (µmhos/cm)	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Temperature – field (ºF)	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Cadmium	0.005	0.004	0.005	0.004	0.005	0.004	0.005	0.004
Cobalt	NR[9]	NR	NR	NR	NR	NR	Monitor	Monitor
Copper	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Molybdenum	NR	NR	NR	NR	NR	NR	Monitor	Monitor
Fluoride	4.0	3.2	4.0	3.2	4.0	3.2	4.0	3.2
Nitrate + Nitrite	10	8	10	8	10	8	10	8
Sulfate	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Total Dissolved Solids	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Beryllium	0.004	0.0032	0.004	0.0032	0.004	0.0032	0.004	0.0032
Nickel	0.10	0.08	0.10	0.08	0.10	0.08	0.10	0.08
Selenium	0.05	0.04	0.05	0.04	0.05	0.04	0.05	0.04
Magnesium	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Antimony	0.006	0.0048	0.006	0.0048	0.006	0.0048	0.006	0.0048
Arsenic	0.05	0.04	0.05	0.04	0.05	0.04	0.05	0.04
Chromium	0.10	0.08	0.10	0.08	0.10	0.08	0.10	0.08
Lead	0.05	0.04	0.05	0.04	0.05	0.04	0.05	0.04
Thallium	0.002	0.0016	0.002	0.0016	0.002	0.0016	0.002	0.0016
Table *11* indicates the parameters for monitoring on a quarterly basis. The Self-Monitoring Report Form shall be completed for this quarterly sampling for every quarterly sampling event. On a biennial basis, the additional parameters listed in **Error! Reference source not found.** shall be analyzed, and reported on the Self-Monitoring Report Form for biennial sampling.								

[3] mg/L = milligrams per liter
[4] Metals will be analyzed as dissolved metals.
[5] AQL = Aquifer Quality Limit
[6] AL = Alert Level
[7] Monitoring required, but no AQL or AL will be established in the permit.
[8] Amsl = above mean sea level
[9] NR = Analysis is not required

Table 11: QUARTERLY GROUNDWATER MONITORING *(Continued)*						
PARAMETER	**MH-19**		**MH-20**		**MH-29**	
	AQL	**AL**	**AQL**	**AL**	**AQL**	**AL**
Depth to Water (in feet)	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Water Level Elevation (in feet amsl)	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Field pH (S.U.)	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Field Specific Conductance (µmhos/cm)	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Temperature – field (ºF)	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Cadmium	0.005	0.004	0.005	0.004	0.005	0.004
Cobalt	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Copper	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Molybdenum	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Fluoride	4.0	3.2	4.0	3.2	4.0	3.2
Nitrate + Nitrite	10.0	8.3	10.0	8.0	10.0	8.0
Sulfate	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Total Dissolved Solids	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Beryllium	0.004	0.0032	0.004	0.0032	0.004	0.0032
Nickel	0.10	0.08	0.10	0.08	0.10	0.08
Selenium	0.05	0.04	0.05	0.04	0.05	0.04
Magnesium	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Antimony	0.006	0.0048	0.006	0.0048	0.006	0.0048
Arsenic	0.05	0.04	0.05	0.04	0.05	0.04
Chromium	0.10	0.08	0.10	0.08	0.10	0.08
Lead	0.05	0.04	0.05	0.04	0.05	0.04
Thallium	0.002	0.0016	0.002	0.0016	0.002	0.0016

Table 11: QUARTERLY GROUNDWATER MONITORING (Continued)						
PARAMETER	**MH-23**		**MH-27**		**MH-28**	
	AQL	**AL**	**AQL**	**AL**	**AQL**	**AL**
Depth to Water (in feet)	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Water Level Elevation (in feet amsl)	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Field pH (S.U.)	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Field Specific Conductance (µmhos/cm)	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Temperature – field (ºF)	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Cadmium	0.005	0.004	0.005	0.004	0.005	0.004
Cobalt	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Copper	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Molybdenum	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Fluoride	4.0	3.2	4.0	3.2	4.0	3.2
Nitrate + Nitrite	10.0	8.0	10.0	8.0	10.0	8.0
Sulfate	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Total Dissolved Solids	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Beryllium	0.004	0.0032	0.004	0.0032	0.004	0.0032
Nickel	0.10	0.08	0.10	0.08	0.10	0.08
Selenium	0.05	0.04	0.05	0.04	0.05	0.04
Magnesium	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Antimony	0.006	0.0048	0.006	0.0048	0.006	0.0048
Arsenic	0.05	0.04	0.05	0.04	0.05	0.04
Chromium	0.10	0.08	0.10	0.08	0.10	0.08
Lead	0.05	0.04	0.05	0.04	0.05	0.04
Thallium	0.002	0.0016	0.002	0.0016	0.002	0.0016

Table 12 QUARTERLY GROUNDWATER MONITORING				
PARAMETER	**Twin Buttes POC-1**		**Twin Buttes POC-2**	
	AQL	**AL**	**AQL**	**AL**
Depth to Water (in feet)	Monitor	Monitor	Monitor	Monitor
Water Level Elevation (in feet amsl)	Monitor	Monitor	Monitor	Monitor
Field pH (S.U.)	Monitor	Monitor	Monitor	Monitor
Field Specific Conductance (µmhos/cm)	Monitor	Monitor	Monitor	Monitor
Temperature (ºF)	Monitor	Monitor	Monitor	Monitor
Antimony	Reserved[10]	Reserved	Reserved	Reserved
Arsenic	Reserved	Reserved	Reserved	Reserved
Beryllium	Reserved	Reserved	Reserved	Reserved
Cadmium	Reserved	Reserved	Reserved	Reserved
Chromium	Reserved	Reserved	Reserved	Reserved
Cobalt	Monitor	Monitor	Monitor	Monitor
Copper	Monitor	Monitor	Monitor	Monitor
Fluoride	Reserved	Reserved	Reserved	Reserved
Lead	Reserved	Reserved	Reserved	Reserved
Magnesium	Monitor	Monitor	Monitor	Monitor
Molybdenum	Monitor	Monitor	Monitor	Monitor
Nickel	Reserved	Reserved	Reserved	Reserved
Nitrate + Nitrite	Reserved	Reserved	Reserved	Reserved
Selenium	Reserved	Reserved	Reserved	Reserved
Sulfate	Monitor	Monitor	Monitor	Monitor
Thallium	Reserved	Reserved	Reserved	Reserved
Total Dissolved Solids	Monitor	Monitor	Monitor	Monitor

[10] Reserved = Eight (8) quarters of ambient monitoring required.

Table 12 BIENNIAL GROUNDWATER MONITORING[11][12]								
PARAMETER	**MH-14**		**MH-15W**		**MH-16W**		**MH-18**	
	AQL[13]	**AL[14]**	**AQL**	**AL**	**AQL**	**AL**	**AQL**	**AL**
Total Alkalinity	Monitor[15]	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Carbonate	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Bicarbonate	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Hydroxide	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Chloride	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Sodium	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Potassium	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Calcium	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Aluminum	NR[16]	NR	NR	NR	NR	NR	Monitor	Monitor
Barium	2.0	1.6	2.0	1.6	2.0	1.6	2.0	1.6
Iron	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Mercury	0.002	0.0016	0.002	0.0016	0.002	0.0016	0.002	0.0016
Manganese	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Zinc	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Adjusted Gross Alpha Particle Activity (pCi/L)	15	13	32	NA[17]	15	12	15	12
Radium 226+Radium 228 (pCi/L)	5	4	5	4	5	4	5	4
Uranium	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Uranium-isotopes (pCi/L)[18][19]	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor

[11] In mg/L unless otherwise noted. All concentrations in parts per million (ppm) unless otherwise specified. Metals will be analyzed as dissolved metals

12 This table lists the parameters for monitoring on a biennial basis (i.e. every 8th quarter). The Self-Monitoring Report Form shall be completed for this biennial sampling for every biennial sampling event. The biennial sampling shall be conducted concurrently with a quarterly sampling event, so that analysis shall be conducted for both the biennial and quarterly parameters listed in Table 11 and Table 12, respectively. See also permit Section 2.5.3.5 and 2.7.8.

13 AQL = Aquifer Quality Limit

14 AL = Alert Level

15 Monitor = Analysis required but no AQL or AL established in permit

16 NR = Analysis not required

17 NA = AL not applicable. AQL exceeds AWQS at time of permit issuance.

18 If the gross alpha particle activity is greater than the AL or AQL, then calculate adjusted gross alpha particle activity. The adjusted gross alpha particle activity is the gross alpha particle activity, including radium 226, and any other alpha emitters, if present in the water sample, minus radon and total uranium (the sum of the uranium 238, uranium 235 and uranium 234 isotopes). The gross alpha analytical procedure (evaporation technique: EPA Method 900.0) drives off radon gas in the water samples. Therefore, the Adjusted Gross Alpha should be calculated using the following formula: (Laboratory Reported Gross Alpha MINUS Sum of the Uranium Isotopes).

19 Uranium Isotope activity results must be used for calculating Adjusted Gross Alpha.

Table 12 BIENNIAL GROUNDWATER MONITORING[11][12]								
PARAMETER	**MH-14**		**MH-15W**		**MH-16W**		**MH-18**	
	AQL[13]	**AL[14]**	**AQL**	**AL**	**AQL**	**AL**	**AQL**	**AL**
Benzene	0.005	0.004	0.005	0.004	0.005	0.004	0.005	0.004
Toluene	1.0	0.800	1.0	0.800	1.0	0.800	1.0	0.800
Ethylbenzene	0.70	0.560	0.70	0.560	0.70	0.560	0.70	0.560
Total Xylenes	10	8	10	8	10	8	10	8
Free Cyanide	0.2	0.16	0.2	0.16	0.2	0.16	0.2	0.16
Carbon Disulfide	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor

Table 12 BIENNIAL GROUNDWATER MONITORING (Continued)						
PARAMETER	**MH-19**		**MH-20**		**MH-29**	
	AQL	**AL**	**AQL**	**AL**	**AQL**	**AL**
Total Alkalinity	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Carbonate	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Bicarbonate	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Hydroxide	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Chloride	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Sodium	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Potassium	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Calcium	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Aluminum	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Barium	2.0	1.6	2.0	1.6	2.0	1.6
Iron	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Mercury	0.002	0.0016	0.002	0.0016	0.002	0.0016
Manganese	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Zinc	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Adjusted Gross Alpha Particle Activity (pCi/L)	15	12	15	12	15	12
Radium 226+Radium 228 (pCi/L)	5	4	5	4	5	4
Uranium	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Uranium-isotopes (pCi/L)	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Benzene	0.005	0.004	0.005	0.004	0.005	0.004
Toluene	1.0	0.800	1.0	0.800	1.0	0.800
Ethylbenzene	0.700	0.560	0.700	0.560	0.700	0.560
Total Xylenes	10	8	10	8	10	8
Free Cyanide	0.20	0.16	0.20	0.16	0.20	0.16
Carbon Disulfide	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor

Table 12 BIENNIAL GROUNDWATER MONITORING (Continued)						
PARAMETER	**MH-23**		**MH-27**		**MH-28**	
	AQL	**AL**	**AQL**	**AL**	**AQL**	**AL**
Total Alkalinity	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Carbonate	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Bicarbonate	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Hydroxide	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Chloride	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Sodium	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Potassium	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Calcium	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Aluminum	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Barium	2.0	1.6	2.0	1.6	2.0	1.6
Iron	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Mercury	0.002	0.0016	0.002	0.0016	0.002	0.0016
Manganese	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Zinc	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Adjusted Gross Alpha Particle Activity (pCi/L)	15	12	15	12	15	12
Radium 226+Radium 228 (pCi/L)	5	4	5	4	5	4
Uranium	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Uranium-isotopes (pCi/L)[2021]	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor
Benzene	0.005	0.004	0.005	0.004	0.005	0.004
Toluene	1.000	0.800	1.000	0.800	1.000	0.800
Ethylbenzene	0.700	0.560	0.700	0.560	0.700	0.560
Total Xylenes	10	8	10	8	10	8
Free Cyanide	0.20	0.16	0.20	0.16	0.20	0.16
Carbon Disulfide	Monitor	Monitor	Monitor	Monitor	Monitor	Monitor

[20] If the gross alpha particle activity is greater than 15 pCi/L, then calculate adjusted gross alpha particle activity. The adjusted gross alpha particle activity is the gross alpha particle activity, including radium 226, and any other alpha emitters, if present in the water sample, minus radon and total uranium (the sum of the uranium 238, uranium 235 and uranium 234 isotopes). The gross alpha analytical procedure (evaporation technique: EPA Method 900.0) drives off radon gas in the water samples. Therefore, the Adjusted Gross Alpha should be calculated using the following formula: (Laboratory Reported Gross Alpha MINUS Sum of the Uranium Isotopes).
[21] Uranium Isotope activity results must be used for calculating Adjusted Gross Alpha.

Table 12 BIENNIAL GROUNDWATER MONITORING REQUIREMENTS				
PARAMETER	**Twin Buttes POC-1**		**Twin Buttes POC-2**	
	AQL	**AL**	**AQL**	**AL**
Depth to Water (in feet)	Monitor	Monitor	Monitor	Monitor
Water Level Elevation (in feet amsl)	Monitor	Monitor	Monitor	Monitor
Field pH (S.U.)	Monitor	Monitor	Monitor	Monitor
Field Specific Conductance (µmhos/cm)	Monitor	Monitor	Monitor	Monitor
Temperature (ºF)	Monitor	Monitor	Monitor	Monitor
Total Dissolved Solids	Monitor	Monitor	Monitor	Monitor
Total Alkalinity	Monitor	Monitor	Monitor	Monitor
Carbonate	Monitor	Monitor	Monitor	Monitor
Bicarbonate	Monitor	Monitor	Monitor	Monitor
Hydroxide	Monitor	Monitor	Monitor	Monitor
Chloride	Monitor	Monitor	Monitor	Monitor
Sulfate	Monitor	Monitor	Monitor	Monitor
Sodium	Monitor	Monitor	Monitor	Monitor
Potassium	Monitor	Monitor	Monitor	Monitor
Calcium	Monitor	Monitor	Monitor	Monitor
Magnesium	Monitor	Monitor	Monitor	Monitor
Nitrate + Nitrite	Reserved	Reserved	Reserved	Reserved
Fluoride	Reserved	Reserved	Reserved	Reserved
Aluminum	Monitor	Monitor	Monitor	Monitor
Antimony	Reserved	Reserved	Reserved	Reserved
Arsenic	Reserved	Reserved	Reserved	Reserved
Beryllium	Reserved	Reserved	Reserved	Reserved
Barium	Reserved	Reserved	Reserved	Reserved
Cadmium	Reserved	Reserved	Reserved	Reserved
Chromium	Reserved	Reserved	Reserved	Reserved
Cobalt	Monitor	Monitor	Monitor	Monitor
Iron	Monitor	Monitor	Monitor	Monitor
Lead	Reserved	Reserved	Reserved	Reserved
Mercury	Reserved	Reserved	Reserved	Reserved
Nickel	Reserved	Reserved	Reserved	Reserved
Selenium	Reserved	Reserved	Reserved	Reserved
Thallium	Reserved	Reserved	Reserved	Reserved
Copper	Monitor	Monitor	Monitor	Monitor
Manganese	Monitor	Monitor	Monitor	Monitor
Molybdenum	Monitor	Monitor	Monitor	Monitor
Zinc	Monitor	Monitor	Monitor	Monitor
Adjusted Gross Alpha Particle Activity (in pCi/L)	Reserved	Reserved	Reserved	Reserved
Radium 226 + Radium 228 (pCi/L)	Reserved	Reserved	Reserved	Reserved
Uranium (in mg/L)	Monitor	Monitor	Monitor	Monitor

5.0 REFERENCES AND PERTINENT INFORMATION

The terms and conditions set forth in this permit have been developed based upon the information contained in the following, which are on file with the Department:

APP Application, dated:	April 28, 2022
Contingency Plan, dated:	August 26, 2019

6.0 NOTIFICATION PROVISIONS

6.1. Annual Registration Fees

The permittee is notified of the obligation to pay an Annual Registration Fee to ADEQ. The Annual Registration Fee is based on the amount of daily influent or discharge of pollutants in gallons per day (gpd) as established by A.R.S. § 49-242.

6.2. Duty to Comply

[A.R.S. §§ 49-221 through 263]

The permittee is notified of the obligation to comply with all conditions of this permit and all applicable provisions of Title 49, Chapter 2, Articles 1, 2 and 3 of the Arizona Revised Statutes, Title 18, Chapter 9, Articles 1 through 4, and Title 18, Chapter 11, Article 4 of the Arizona Administrative Code. Any permit non-compliance constitutes a violation and is grounds for an enforcement action pursuant to Title 49, Chapter 2, Article 4 or permit amendment, suspension, or revocation.

6.3. Duty to Provide Information

[A.R.S. §§ 49-243(K)(2) and 49-243(K)(8)]

The permittee shall furnish to the Director, or an authorized representative, within a time specified, any information which the Director may request to determine whether cause exists for amending or terminating this permit, or to determine compliance with this permit. The permittee shall also furnish to the Director, upon request, copies of records required to be kept by this permit.

6.4. Compliance with Aquifer Water Quality Standards

[A.R.S. §§ 49-243(B)(2) and 49-243(B)(3)]

The permittee shall not cause or contribute to a violation of an Aquifer Water Quality Standard (AWQS) at the applicable point of compliance (POC) for the facility. Where, at the time of issuance of the permit, an aquifer already exceeds an AWQS for a pollutant, the permittee shall not discharge that pollutant so as to further degrade, at the applicable point of compliance for the facility, the water quality of any aquifer for that pollutant.

6.5. Technical and Financial Capability

[A.R.S. §§ 49-243(K)(8) and 49-243(N) and A.A.C. R18-9-A202(B) and R18-9-A203(E) and (F)]

The permittee shall have and maintain the technical and financial capability necessary to fully carry out the terms and conditions of this permit. Any bond, insurance policy, trust fund, or other financial assurance mechanism provided as a demonstration of financial capability in the permit application, pursuant to A.A.C. R18-9-A203(C), shall be in effect prior to any discharge authorized by this permit and shall remain in effect for the duration of the permit.

6.6. Reporting of Bankruptcy or Environmental Enforcement

[A.A.C. R18-9-A207(C)]

The permittee shall notify the Director within five days after the occurrence of any one of the following:

1. the filing of bankruptcy by the permittee; or
2. the entry of any order or judgment not issued by the Director against the permittee for the enforcement of any environmental protection statute or rule.

6.7. Monitoring and Records

[A.R.S. § 49-243(K)(8) and A.A.C. R18-9-A206]

The permittee shall conduct any monitoring activity necessary to assure compliance with this permit, with the applicable water quality standards established pursuant to A.R.S. §§ 49-221 and 49-223 and §§ 49-241 through 49-252.

6.8. Inspection and Entry

[A.R.S. §§ 49-1009, 49-203(B), and 49-243(K)(8)]

In accordance with A.R.S. §§ 41-1009 and 49-203(B), the permittee shall allow the Director, or an authorized representative, upon the presentation of credentials and other documents as may be required by law, to enter and inspect the facility as reasonably necessary to ensure compliance with Title 49, Chapter 2, Article 3 of the Arizona Revised Statutes, and Title 18, Chapter 9, Articles 1 through 4 of the Arizona Administrative Code and the terms and conditions of this permit.

6.9. Duty to Modify

[A.R.S. § 49-243(K)(8) and A.A.C. R18-9-A211]

The permittee shall apply for and receive a written amendment before deviating from any of the designs or operational practices authorized by this permit.

6.10. Permit Action: Amendment, Transfer, Suspension, and Revocation

[A.R.S. §§ 49-201, 49-241 through 251, A.A.C. R18-9-A211, R18-9-A212 and R18-9-A213]

This permit may be amended, transferred, suspended, or revoked for cause, under the rules of the Department. The permittee shall notify the Groundwater Protection Value Stream in writing within 15 days after any change in the owner or operator of the facility. The notification shall state the permit number, the name of the facility, the date of property transfer, and the name, address, and phone number where the new owner or operator can be reached. The operator shall advise the new owner or operators of the terms of this permit and the need for permit transfer in accordance with the rules.

7.0 ADDITIONAL PERMIT CONDITIONS

7.1. Other Information

[A.R.S. § 49-243(K)(8)]

Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Director, the permittee shall promptly submit the correct facts or information.

7.2. Severability

[A.R.S. §§ 49-201, 49-241 through 251, A.A.C. R18-9-A211, R18-9-A212 and R18-9-A213]

The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby. The filing of a request by the permittee for a permit action does not stay or suspend the effectiveness of any existing permit condition.

7.3. Permit Transfer

This permit may not be transferred to any other person except after notice to and approval of the transfer by the Department. No transfer shall be approved until the applicant complies with all transfer requirements as specified in A.A.C. R18-9-A212(B) and (C).