

Trench Camp Property - Tailings Storage Facility (TSF)

Aquifer Protection Permit #P-512235
Place ID 150279, LTF 65051

The Arizona Department of Environmental Quality (ADEQ) proposes to issue an Aquifer Protection Permit for the subject facility that covers the life of the facility, including operational, closure, and post-closure periods unless suspended or revoked pursuant to A.A.C. R18-9-A213. This document gives pertinent information concerning the issuance of the permit. The requirements contained in this permit will allow the permittee to comply with the two key requirements of the Aquifer Protection Program: 1) meet Aquifer Water Quality Standards at the Point of Compliance; and 2) demonstrate Best Available Demonstrated Control Technology (BADCT). The purpose of BADCT is to employ engineering controls, processes, operating methods or other alternatives, including site-specific characteristics (i.e., local subsurface geology) to reduce discharge of pollutants to the greatest degree achievable before they reach the aquifer, or to keep pollutants from reaching the aquifer.

I. FACILITY INFORMATION

Name and Location

Name of Permittee:	Arizona Minerals Inc.
Mailing Address:	3845 Business Center Drive, Suite 115 Tucson, Arizona 85705
Facility Name and Location:	Trench Camp Property - Tailings Storage Facility (TSF) 749 Harshaw Road Patagonia, Arizona 85624 Santa Cruz County

Regulatory Status

An application for this Individual APP was received on June 5, 2017.

Facility Description

Arizona Minerals Inc. (AMI) shall construct and operate the Trench Camp Property - Tailings Storage Facility (TSF) located approximately 5 miles south of the Town of Patagonia, Arizona. AMI purchased the historic, January and Norton Mine Claims and the Trench Camp Mine claims and associated Tailings Pile/waste rock from the ASARCO Trust in early 2016. The historic Mine Claims are closed and not considered APP regulated facilities and thus exempt according to the Arizona Revised Statute (A.R.S.) § 49-201.7 and A.R.S. § 49-250.B.11. The APP application has been submitted for APP-regulated discharges associated with ADEQ's Voluntary Remediation Program (VRP) project related to eliminating discharges of mine impacted water from January Adit mine workings and tailing piles (which includes potentially acid generating (PAG) waste rock) seepage to Alum Gulch.

The Trench Camp historic tailings piles (1 through 4) are currently located within an unlined natural basin in a three pile configuration. Tailings Pile #1 contains tailings and potential acid generating (PAG) waste rock. Stockpile #2 and #4 contain only tailings and have been combined

into one pile referred to as Tailings Pile #2 and are generally divided by the 5,100 foot contour elevation. In addition Tailings Pile # 3 contains only tailings.

The Trench Camp TSF will be designed as a lined permanent storage area for the remediation of the existing tailings piles, sited above. Placement of the existing tailings piles on the lined permanent containment is part of the VRP program in Arizona under the site code 505143-2. Tailings, PAG waste rock and impacted soils beneath the existing tailings piles are to be excavated and placed in the lined Trench Camp TSF as an earthen material. PAG development rock from a planned exploration decline or shaft will also be stored in the lined TSF as a co-mingled material with the existing tailings and PAG waste rock. Additionally, it may be placed on the exterior face of the existing tailings and PAG waste rock thereby acting as rock armor, to prevent water and wind erosion prior to closure.

The Trench Camp TSF shall be constructed in three phases and will consist of a lined tailings storage facility, two stormwater retention ponds and an underdrain collection pond. The process solutions in the Trench Camp TSF will be collected through an underground collection system and gravity fed to the double lined underdrain collection pond (UCP). The UCP will be constructed downgradient of the Trench Camp TSF. The captured process solutions, precipitation that falls within the UCP and water from the January Adit (the January and Norton Mine Claims) will be piped to an Active Water Treatment Plant (WTP) for processing and discharge to Alum Gulch under AZPDES permit No AZ0026387.

Interim Phase

The existing material from Tailings Pile #1 which includes 112,800 tons of tailings, 223,600 tons of waste rock and 15,500 tons of native material for a total of approximately 352,000 tons of material will be excavated, hauled and temporally placed on Tailings pile #2 and #4 to prepare to for the construction of the Phase 1 TSF footprint. The temporary placement of Tailings Pile 1 on Tailings Piles 2 and 4 will consist of 5H:1V slopes, a 50 foot setback from the brow of the existing slope on Tailings Pile 2, and an approximate maximum height of approximately 30 ft.

Phase 1

Phase 1 of the Trench Camp TSF will cover approximately 680,000 square feet (ft²). 1,212,000 tons of material will be relocated to the newly constructed Trench Camp TSF. This material includes the 762,700 tons of tailings (112,800 tons from Tailings Pile #1 plus 649,900 tons of tailings from Tailings Pile 2 and 4), 223,600 tons of waste rock from Tailings Pile #1, 49,200 tons of native material (15,500 tons from Tailings Pile #1 and 33,700 tons from Tailings Pile #2 and 4), and 176,400 tons of development rock from the exploration decline.

Phase 2

Phase 2 of the Trench Camp TSF will cover approximately 580,000 ft². Approximately 1,050,000 tons of material including 213,800 tons of material from Tailings Pile #3, 12,300 tons of native material, and 823,600 tons of development rock from the exploration decline will be relocated to the Trench Camp TSF.

The total materials to be placed on the Trench Camp TSF will be 2,580,000 tons which includes 317,800 tons of contingency storage on a total area of approximately 1,260,000 square feet.

The site includes the following permitted discharging facilities:

Facility Name	Latitude	Longitude
Lined Tailings Storage Facility (TSF)	31° 27' 59.4"North	110° 43' 35.8" West
Underdrain Collection Pond (UCP)	31° 27' 59" North	110° 43' 39.2" West
AZPDES Outfall 001	31° 28' 15" North	110° 43' 43" West

II. BEST AVAILABLE DEMONSTRATED CONTROL TECHNOLOGY (BADCT)

The Trench Camp TSF shall employ individual BADCT components and the UCP will employ prescriptive BADCT components (in accordance with the Arizona Mining BADCT Guidance Manual (AMBGM)). BADCT has been determined in accordance with the AMBGM. The design of the UCP incorporates enhanced discharge control measures (such as double liner and leak collection and recovery systems) that go beyond the prescriptive components identified in the AMBGM for non-stormwater impoundments.

Tailings Impoundment (Phase 1 and 2 TSF)

The TSF will be constructed in two Phases. BADCT for each Phase is provided below:

Phase 1

Prior to placement of the tailings material, the basin area shall be cleared of any vegetation and stripped of any growth media and graded to have maximum slopes of 2.5H (horizontal):1V (vertical). A composite liner system consisting of a 12 inch thick low permeability soil layer (LPSL) having a coefficient of permeability that is less than or equal to 1.0×10^{-6} centimeters/second (cm/sec) overlain by a double-sided textured 60 mil high density polyethylene (HDPE) liner shall be placed over the graded area. The geomembrane shall be anchored in the perimeter road at a setback of 3 feet (ft.) with trenched dimensions of 3 ft. deep by 2 ft. wide. An 18 inch (in.) protective layer composed of 1 1/2 in. minus granular material shall be placed over the geomembrane. An underdrain collection system, consisting of a series of pipes shall be placed in topographic lows to collect drainage from the base of the facility and convey them to the UCP via the concrete encased underdrain outlet pipe works. At the outlet point of the underdrain pipes, valves shall be installed to control flow to the Underdrain Collection Pond. The maximum elevation of the Phase 1 TSF shall not exceed 5,110 ft.

External and internal stormwater channels shall be constructed to appropriately capture and convey stormwater from a 100-year/24-hour storm event. A geomembrane lined external stormwater detention basin having the capacity of 2.66 million gallons (8.16 ac. ft.) shall be constructed to route runoff from the east side (upstream) of Phase 1 to the underdrain collection system via a pipe located in the basin low point. After Tailings Piles 1, 2 and 4 are relocated to the Phase 1 TSF, the external stormwater detention basin pipe shall be capped and the detention basin shall be expanded as part of the Phase 2 TSF basin construction. Two internal detention basins designed to contain contact stormwater, one having a capacity of 847,214 gallons (2.6 acre feet (ac. ft.)) shall be constructed in the northwestern portion of Phase 1 TSF, and another having a capacity of 488,777 gallons (1.5 ac. ft.) shall be constructed near the northeastern portion of Phase 1 TSF.

Phase 2

The Phase 2 TSF shall be constructed in a manner similar to that of Phase 1 TSF. The permittee may use geosynthetic clay liner (GCL) in lieu of the LPSL if field conditions allow its use and it is approved by the design engineer. The maximum elevation of the Phase 2 TSF shall match up with the Phase 1 TSF elevation and shall not exceed 5,110 ft. During the Phase 2 construction, the 2.6 ac. ft. internal detention basin located at the northwestern portion will be expanded to contain a volume of 3,258,514 gallons (10 ac. ft.) of contact stormwater, and another 260,681 gallons (0.8 ac. ft.) internal detention basin will be constructed in the eastern portion of the Phase 2 TSF. The 1.5 ac. ft. internal detention basin located at the northeastern portion of the Phase I TSF will be covered by materials deposited in this phase.

A geomembrane lined external stormwater detention basin having the capacity of 3.2 million gallons (9.82 ac. ft.) to detain upstream unimpacted runoff on the east side of Phase 2 shall be constructed. The unimpacted runoff captured in this detention pond shall be pumped around the TSF until closure is substantially complete.

A minimum of 4 piezometers shall be placed immediately adjacent to the geomembrane surface within the protective layer next to an underdrain collection pipe within the TSF to measure hydraulic head on the liner system, at the locations and as per the design submitted in the application. The phreatic surface in these piezometers shall be maintained below 1.5 feet

2.2.1.2 Underdrain Collection Pond (UCP)

The UCP shall be located downstream of Phase 1 TSF. Valves placed at the inlet end to the UCP from the Phase I TSF, shall remain completely open unless it needs be pumped completely dry for repairs. The UCP crest shall be approximately 200 ft. wide by 345 ft. long and 42 ft. deep. The pond shall be designed with a 25 ft. wide perimeter access road around the crest, which widens to 50 ft. on the southern edge where the pumps shall be sited for pump maintenance that may be required. The UCP shall be constructed to maintain a minimum of 2 feet of freeboard from the spillway invert to contain flows from the 100-yr/24-hr storm event, and the maximum operational volume of 2,200,000 gallons. The UCP shall be sized to contain 8,900,000 gallons up to the spillway elevation while maintaining a minimum of 7 feet of total freeboard. The pond slopes shall be 2H:1V, and the bottom of the pond shall be graded at 1% to a low point in the corner of the pond. At the low point, two parallel sloping decant structures shall be constructed for housing submersible pumps to reclaim fluids for treatment at the Water Treatment Plant (WTP).

The liner system for the UCP consists of geonet placed between two 60 mil HDPE double sided textured geomembrane layers overlying 6 inches of low permeability soil layer. The HDPE liner shall be secured in an engineered anchor trench around the impoundment perimeter. A leak collection and removal system (LCRS) shall be installed between the two HDPE liners. The LCRS shall be equipped with a level control to activate a pump, and the outflow shall be measured with a flow totalizer. A record of these measurements shall be maintained in a log book maintained at the site.

A minimum of 2 piezometers shall be placed along the maximum section of the UCP, at the locations and as per the design submitted in the application. The phreatic surface in these piezometers shall be maintained below 1.5 feet.

2.2.1.3 Water Treatment Plant (WTP)

The WTP is designed for treating underdrain seepage and storm water runoff from the TSF and water from the January Adit mine workings. The flow rate from the UCP and the January Adit mine workings are anticipated to fluctuate up to a maximum of 120 gallons per minute (gpm) from each source, with a maximum combined flow from both sources not to exceed 120 gpm.

The WTP process consists of pH adjustment to 10.5 followed by liquid/solids separation. This process includes various tanks including: an equalization tank, a reaction tank, a clarifier, a pH adjustment tank, a thickening tank, a filtrate tank, and a filter press.

Treated water will be used for on-going mine exploration, construction soil conditioning, and future milling and mining operations. Periodic, short-term discharge of treated water or a portion of treated water to Alum Gulch may be necessary during periods of exploration or mine development. Releases from the WTP will be authorized under an AZPDES permit.

III. COMPLIANCE WITH AQUIFER WATER QUALITY STANDARDS

Monitoring and Reporting Requirements

Ambient Groundwater

Eight monthly rounds of groundwater quality samples will be obtained from POC-2 to establish existing ambient groundwater quality conditions for evaluating any changes in water quality. Previously provided samples show only one instance of an exceedance of an Aquifer Water Quality Standard (AWQS). A sample taken February 7, 2017 measured Cadmium at a concentration of 0.0051 mg/L; Cadmium has an AWQS of 0.005 mg/L.

The permittee shall conduct Compliance Groundwater monitoring 300 feet downgradient of the AZPDES Outfall-001 (MW3) as per Section 4.2, Table 4.2.4.

Point of Compliance (POC) [A.R.S. § 49-244]

The POC for this facility is located as follows:

POC #	POC Location	Latitude	Longitude	ADWR #
POC-1	Conceptual location downgradient of the TSF	31° 28' 15.21"	110° 43' 42.45"	TBD
POC-2	200 feet downgradient of the AZPDES Outfall-001 (MW3)	31° 28' 18.91"	110° 43' 48.83"	55-920120
POC-3	Conceptual location approximately one mile to the north-northwest and downgradient of the WTP outfall	31° 29' 1.7"	110° 44' 16.4"	TBD

Groundwater monitoring is required under this permit at POC-2. Groundwater monitoring is not required at POC-1 and 3, unless as contingency monitoring. The Director may amend this permit

to require installation of a monitor well and initiation of groundwater monitoring at the POC or to designate additional points of compliance if information on groundwater gradients or groundwater usage indicates the need.

Compliance Discharge Monitoring

Compliance discharge monitoring shall be conducted for quality and daily flow for the discharge from the WTP to the AZPDES Outfall 001 per Section 4.2, Table 4.2.2 of the permit.

IV. HYDROGEOLOGIC SETTING

The project area is located in the Patagonia Mountains of southern Arizona within the Basin and Range physiographic province. The province is typified by north-northwest trending normal faults. The fault-bounded mountains, typically with large intrusive cores, are separated by deep basins filled with Tertiary and Quaternary sediments ("basin fill"). The core of the Patagonia Mountain range is a Laramide-age granodiorite pluton that has been dated at 60-65 million years. A geologic cross section of the property depicts Mesozoic volcanics underlain by Paleozoic sedimentary units. A lead-zinc-silver deposit called the "Hermosa Taylor Deposit" is hosted in these sedimentary units at the property. A major structural feature in the project area is the Harshaw Creek Fault, a north-northwest trending left-lateral strike slip fault that has more than 4 miles of displacement at its southern end and is late Cretaceous in age.

Groundwater flows in bedrock fractures at the site. There is little to no alluvium present. Depth to groundwater ranges from 17.1 feet below ground surface at MW-3 near the January Adit at the northwest portion of the project area, to 338 feet below ground surface at HDS-345. In general, depths to water decrease to the north as the land surface elevation decreases. Groundwater flow is generally to the north, with localized northeast and northwest flows, depending on the location. The hydraulic gradient ranges from 0.025 at the southern part of the site to approximately 0.013 at the northeastern part of the site.

POLLUTANT MANAGEMENT AREA (PMA) / DISCHARGE IMPACT AREA (DIA)

Arizona Revised Statutes (A.R.S.) § 49-244(1) defines the pollutant management area (PMA) as "the limit projected in the horizontal plane of the area on which pollutants are or will be placed." The PMA forms a close boundary to the edges of the TSF, underdrain collection pond, and WTP outfall, following Alum Gulch downgradient (north-northwest) for approximately one mile. The DIA is approximately an outline of the PMA, except it extends approximately 1,500 ft further down Alum Gulch than the PMA.

V. STORM WATER/SURFACE WATER CONSIDERATIONS

The Trench Camp TSF is not located within the 100-year flood plain based upon Flood Insurance Rate Map (FIRM) prepared by the Federal Emergency Management Agency (FEMA). The TSF, underdrain collection pond, and associated stormwater controls were designed for a 100-year/24 hour storm event.

VI. COMPLIANCE SCHEDULE

No.	Description	Due by:	Permit Amendment Required?
3.1	The permittee shall not operate the facilities described in this permit until the financial assurance mechanism for the approved amount of \$7,939,380.00 has been received and reviewed by ADEQ.	Prior to operating the facility	No
3.2	The permittee shall submit a signed, dated and sealed Engineer's Certificate of completion of the Trench Camp TSF BADCT components per Section 2.2.3. The certification shall indicate that the facilities were constructed in accordance with plans approved by ADEQ and QA/QC documentation completed for liner and subgrade preparation.	Within 90 days after completion of construction	No
3.3	The permittee shall submit a signed, dated and sealed Engineer's Certificate of completion for the Underdrain Collection Pond BADCT components per Section 2.2.3. The certification shall indicate that the facility was constructed in accordance with plans approved by ADEQ and QA/QC documentation completed for liner and subgrade preparation.	Within 90 days after completion of construction	No
3.4	Permittee shall initiate Ambient Groundwater Quality Monitoring at POC-2 well in accordance with Section 2.4 and Section 2.5.3.2. The permittee shall submit the Ambient Groundwater Monitoring Report with a Permit Amendment application, along with copies of all laboratory analytical reports, field notes, QA/QC procedures used in collection and analysis of the samples, and a report including the statistical calculations of the ALs, and AQLs per Section 2.7.4.2. Begin monitoring under Table 4.2.4. To receive the SMRFs for POC-2 monitoring contact the ADEQ Data Unit.	Within 90 days of receipt of the laboratory analytical analysis of the final ambient sampling round.	Yes
3.5	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, and an updated financial assurance demonstration for the updated cost estimate as per A.A.C. R18-9-A203.	Every 6 years from the date of permit signature, for the duration of the permit.	No
3.6	If the permittee wishes to deposit a greater quantity of material, or to increase the crest elevation above 5,110 feet amsl, then the permittee shall apply for a permit amendment.	Within six months of determination to increase tailings crest elevation	Yes

VII. OTHER REQUIREMENTS FOR ISSUING THIS PERMIT

Technical Capability

The Arizona Minerals Inc. has demonstrated the technical competence necessary to carry out the terms and conditions of the permit in accordance with A.R.S. § 49-243(N) and A.A.C. R18-9-A202(B).

ADEQ requires that appropriate documents be sealed by an Arizona registered geologist or professional engineer. This requirement is a part of an ongoing demonstration of technical capability. The permittee is expected to maintain technical capability throughout the life of the facility.

Financial Capability

The permittee has demonstrated financial capability under A.R.S. § 49-243(N) and A.A.C. R18-9-A203. The Permittee shall be required to maintain financial capability throughout the life of the facility. The closure costs are \$2,130,908, and post-closure costs are \$5,808,472, for a total of \$7,939,380. The financial assurance mechanism shall be demonstrated through A.A.C. R18-9-A203(C)(2).

Zoning Requirements

Mining activity of greater than five contiguous acres is exempt from zoning requirements pursuant to A.R.S. § 11-812.

VIII. ADMINISTRATIVE INFORMATION

The public notice is the vehicle for informing all interested parties and members of the general public of the contents of a draft permit or other significant action with respect to a permit or application. The aquifer protection program rules require that permits be public noticed in a newspaper of general circulation within the area affected by the facility or activity and provide a minimum of 30 calendar days for interested parties to respond in writing to ADEQ. The basic intent of this requirement is to ensure that all interested parties have an opportunity to comment on significant actions of the permitting agency with respect to a permit application or permit.

Public Comment Period (A.A.C. R18-9-109(A))

The Department shall accept written comments from the public before a new permit is issued or a significant permit amendment is made. The written public comment period begins on the publication date of the public notice and extends for 30 calendar days. After the closing of the public comment period, ADEQ is required to respond to all significant comments at the time a final permit decision is reached or at the same time a final permit is actually issued.

Public Hearing (A.A.C R18-9-109(B))

A public hearing may be requested in writing by any interested party. The request should state the nature of the issues proposed to be raised during the hearing. A public hearing will be held if the Director determines there is a significant amount of interest expressed during the 30-day public comment period, or if significant new issues arise that were not considered during the permitting process.

IX. ADDITIONAL INFORMATION

Additional information relating to this permit may be obtained from:

Arizona Department of Environmental Quality
Water Quality Division – Groundwater Protection Value Stream – APP Unit 1
Attn: Monica Phillips
1110 West Washington Street, Mail Code 5600D-3
Phoenix, Arizona 85007
Phone: (602) 771-2253

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