Trench Camp Property - Tailings Storage Facility (TSF)
Aquifer Protection Permit No. P-512235
Place ID 150279, LTF No. 75937
Other Amendment

I. Introduction:

The Arizona Department of Environmental Quality (ADEQ) proposes to issue an Aquifer Protection Permit (APP) for the subject facility that covers the life of the facility, including operational, closure, and post-closure periods unless suspended or revoked pursuant to Arizona Administrative Code (A.A.C.) R18-9-A213. 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 (AWQS) at the Point of Compliance (POC); and 2) demonstrate Best Available Demonstrated Control Technology (BADCT). BADCT's purpose is to employ engineering controls, processes, operating methods or other alternatives, including site-specific characteristics (i.e., the local subsurface geology), to reduce discharge of pollutants to the greatest degree achievable before they reach the aquifer or to prevent pollutants from reaching the aquifer.

II. Permittee & Facility Location:

Hermosa Project Trench Camp Property - Tailings Storage Facility (TSF)
749 Harshaw Road
Patagonia, Arizona 85624

III. Facility Description:

Arizona Minerals Inc. (AMI) shall construct and operate the Hermosa Project 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 Statue (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) were located within an unlined natural basin in a three pile configuration. Tailings Pile #1 contained tailings and potential acid generating (PAG) waste rock. Stockpile #2 and #4 contained 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 contained only tailings. These tailings piles were moved onto the Trench Camp TSF under the terms of the APP and VRP.

The Trench Camp TSF is 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 site surface construction and from a planned exploration decline or shaft, solids from the water treatment plant (WTP), and core cuttings solids 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 stages; construction began in 2018. The TSF consists of a lined tailings storage facility, two stormwater detention 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 WTP for processing and discharge to Alum Gulch under AZPDES permit No AZ0026387.

Interim Stage

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 temporality placed on Tailings pile #2 and #4 to prepare to for the construction of the Stage 1 TSF footprint. The temporary placement of Tailing 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.

Stage 1

Stage 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.

Stage 2

Stage 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 will be relocated to the Trench Camp TSF. Approximately 3,650 cubic yards per year of filter cake from the upgraded WTP (i.e. filter cake generated from the added nanofiltration), and 12 cubic yards per year of solids from cutting of exploration core will be deposited on the 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.

IV. Amendment Description:

The purpose of this amendment is to authorize the following changes to the permit:

- Update the treatment design for the water treatment plant. Additional treatment

technology was added to the permitted plant when it was constructed, and AMI intends to add other treatment technologies to enhance the performance of the plant. Upgrades for the WTP included:

- Nanofiltration (membrane filtration) of WTP treated effluent, coupled with brine desaturation and sulfate precipitation, reject volume reduction, and sulfate reduction. Membrane filtration will also address water hardness and gypsum saturation to meet the WET test requirement under the AZPDES.
- Electroreduction (ERC) of the desaturated brine stream to reduce selenate concentrations in the final effluent stream. Precipitated selenium will be dewatered to form a solid along with the other sludge (precipitated salts) streams via the existing filter press.

- Filter cake is currently permitted in the TSF. This amendment allows for additional solids from the upgraded WTP (i.e. filter cake generated from the added nanofiltration and ERC) and solids from cutting of exploration core to be deposited in the tailings storage facility (TSF). Allowing placement of these materials on the TSF will have no effect on discharge for the TSF given the relatively small volume of the materials and the prescriptive BADCT used in the TSF construction.

- Make administrative changes to the permit.

As discussed above, addition of treatment components to the existing WTP is considered a change in treatment method and operational practice. The placement of filter cake and solids from cutting of exploration core is considered a change in operational practice. Therefore, this application was processed as an "other" amendment as per A.A.C. R18-9-A211(D)(2)(a) which states: "A change in a construction requirement, treatment method, or operational practice, if the alteration complies with the requirements of Articles 1 and 2 of this Chapter and provides equal or better performance".

V. Regulatory Status:

The most recent inspection dated March 12, 2019 indicated that the facility was found to be in compliance with the APP and Arizona rules and statutes.

VI. Best Available Demonstrated Control Technology (BADCT):

The Trench Camp TSF 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.

Stage1 of the project has been completed. As described under the Amendment Description section above, this amendment permits additional filter cake and core cuttings to be placed on the TSF as described below. Also presented, are modifications made to the WTP.

Stage 2

The Stage 2 TSF shall be constructed in a manner similar to that of Stage 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 Stage 2 TSF shall match up with the Stage 1 TSF elevation and shall not exceed 5,110 ft. During the Stage 2 construction, the 2.6 ac. ft. internal detention basin located at the northwestern portion was 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 Stage 2 TSF. The 1.5 ac. ft. internal detention basin located at the northeastern portion of the Stage I TSF has been covered by materials deposited in this stage.

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 Stage 2 has been 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 have been installed 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

The permittee is allowed to place additional materials including solids from the WTP and core cutting. The placement of the solids shall be in accordance with the recommendations and following all quality control and quality assurance procedures (QA/QC) made in the Attachment B of the application dated May 29, 2020.

Solids from WTP

Filter cake from the existing WTP is currently stored on the TSF. The proposed upgrades to the WTP will result in additional filter cake solids at approximately 3,650 cubic yards per year. The solids shall be hauled to the TSF in approximately 20 cubic yard increments.

The anticipated material properties are as follows based on a control sample obtained November 20th, 2019:

- 100 percent passing (by dry weight) the no. 200 sieve.
- Non-plastic soil.
- Moisture content will be 363% (based on dry weight of solids) upon arrival to the TSF.

Upon placement on the TSF, the WTP filter cake shall be spread and dried to reduce the material moisture content. The filter cake shall then be mixed with tailings, on site native borrow material and/or development rock at a minimum ratio of 3:1 (tailings/on site native borrow/development rock to filter cake). After mixing, the material shall be moisture conditioned to within 2 percent below and 3 percent above the optimum moisture content. The material shall be placed in 12-inch maximum loose lifts and compacted to 90 percent of the maximum dry density as determined by ASTM D698.

Core-cutting solids

Approximately 12 cubic yards per year of core cutting solids will be placed on the TSF. This material simply consists of rock fragments generated from cutting of core. Upon placement in the TSF, the core cutting material shall be spread and dried to reduce the material moisture content. The core cutting material shall then be mixed with tailings, on site native borrow material and/or development rock at a minimum ratio of 3:1 (tailings/on site native borrow/development rock to core cutting material). After mixing, the material shall be moisture conditioned to within 2 percent below and 3 percent above the optimum moisture content. The material shall be placed in 12-inch maximum loose lifts and compacted to 90 percent of the maximum dry density as determined by ASTM D698.

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 elements including: an equalization tank, a multiflo tank (consisting of reaction, flocculation, and clarifier compartments), an ultrafiltration unit, a pH adjustment tank, a Moving Bed Biofilm Reactor (for treatment of residual ammonia), an electro-reduction circuit (for selenite removal), a thickening tank, a filtrate tank, and a filter press.

Treated water may 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 are authorized under an AZPDES permit.

VII. Compliance with Aquifer Water Quality Standards (AWQS):

The permittee shall conduct Compliance Groundwater monitoring 300 feet downgradient of the AZPDES Outfall-001 (MW3) as per Section 4.2, Table 4.2.3.

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.

Other Monitoring:

Table 4.2.1 – Facility Inspections includes seepage monitoring of the piezometer wells at the Tailings Storage Facility (TSF) and the Underdrain Collection Pond (UCP) and shall be monitored for water levels and presence/absence of fluids.

Facility Inspections also includes:

TSF: Tailings height, and structural integrity.

UCP: Freeboard, anchor trench integrity, embankment integrity, liner integrity, pumping system integrity, sediment control.