

**FACT SHEET**  
**(Pursuant to Nevada Administrative Code [NAC] 445A.401)**

Permittee: **M-I L.L.C.**

Facility Name: **Mountain Springs Mine**

Permit Number: **NEV2014115**

Review Type/Year/Revision: **Renewal 2026, Fact Sheet Revision 00**

**A. Location and General Description**

**Location:** The Mountain Springs Mine (MSM) is an open pit barite mining operation and physical separation facility located in Lander County, Nevada, approximately 23 miles southwest (by air) of the town of Battle Mountain and 57 miles northeast (by air) of the town of Austin. The mine is located within the historic Mountain Spring Mining District and the Reese River Valley on the western flank of Shoshone Mountain Range. The MSM was constructed prior to the promulgation of the Nevada Division of Environmental Protection-Bureau of Mining Regulation and Reclamation (the Division) mining regulatory permitting program and has been in a care and maintenance mode since it last operated in 1986. The Permittee, M-I LLC, is authorized to process up to 850,000 tons of barite ore per year at the MSM.

The Permittee also operates the Greystone Mine (Water Pollution Control Permit [WPCP] NEV2004100), approximately 10 miles southeast of the MSM (estimated mine life approximately two years) and a finishing mill/bulk loadout/packaging facility in Battle Mountain at 2 North Second Street. This facility is not associated with either Permit.

The MSM mine and gravity separation facility is located within portions of Sections 4, 5, 6, 8, 9, and 10, Township 28 North, Range 44 East, Mount Diablo Baseline and Meridian and occupies a total of 113 acres all of which are on public land administered through the Bureau of Land Management (BLM)—Battle Mountain District, Battle Mountain Field Office.

**Site Access:** From Battle Mountain, proceed south on State Route (S.R.)-305 from the junction of on Interstate-80/ Exit 231, approximately 24.2 miles to the intersection of McCoy Mine Road, (located on the west side of S.R.-305 and marked with signage). Continue on S.R.-305 approximately 0.2 miles to the intersection of an unnamed dirt road located on the east side of the highway. Proceed east 1.5 miles on the dirt road to the MSM site.

**General Description:** Currently, the MSM consists of two pits, referred to as the North Pit (comprised of Mine Area “A”) and the South Pit (comprised of Mine Areas “B”, “C”, and “D”), a fines stockpile, screen feed stockpile, and feed stockpile. Waste rock generated during mining will be used to backfill Mine Areas “B”, “C”, and “D”. The MSM beneficiation facility consists of a crushing and screening plant, a jig plant for gravity separation, and sediment pond (a tailings/reject material impoundment). Ancillary facilities include administrative, laboratory, fueling, and maintenance areas. The facilities at MSM are designed to be operated and closed without any release or discharge from the fluid

management system except for meteorological events that exceed the design storm event.

During active operations, run-of-mine (ROM) barite ore is transported to the crushing, screening, and gravity separation facility located on site to produce a rough barite concentrate. The barite concentrate is trucked to Battle Mountain for grinding, packaging, bulk loadout, and shipment to the end user via truck or rail. No chemicals are authorized for use in the process.

## **B. Synopsis**

***Background/History:*** Most barite mined in Nevada is used by the petroleum and natural gas industry where it is used in the formulation of drilling mud for the purpose of increasing the mud's hydrostatic pressure to compensate for high-pressure zones experienced during drilling. Barite used as a drilling mud requires a specific gravity (SG) of at least 4.1 and be relatively free of iron. Specifications for barite used by the mining industry are less stringent.

Because barite is a low-cost, bulk industrial mineral commodity, distance between the source and end user plays a significant role in determining the economic feasibility of a barite deposit.

The demand for high-SG barite, suitable for use in drilling fluids, led to the discovery of several high-quality deposits in Nevada's Lander, Eureka, and Elko Counties during the 1930s and 1940s. Ironically, the 1947 discovery of the Mountain Springs barite deposit was not the result of mineral exploration, but an unintentional discovery of massive barite outcrops during a BLM-coordinated coyote round-up and eradication program.

In an effort to exploit the barite deposit, Food Machinery Corporation (FMC) leased the claims from the BLM in late 1947 and by 1951, began active mining of the Mountain Springs deposit. The high-grade barite ore was mined by conventional means and shipped to FMC's Modesto, California facility for final processing and packaging. FMC actively mined the MSM site until about 1984 when the high-grade ore body was finally depleted. Shipment of stockpiled high-grade ores to the Modesto facility continued until 1986.

From 1974 until 1986, Industrial Minerals Corporation (later re-named IMCO Services), constructed and operated a crushing, grinding, and gravity separation facility to process stockpiled low-grade barite ores FMC deemed as not feasible for processing at their Modesto facility. By 1986, all activity at the MSM site ceased. As stated above, the MSM was constructed, operated, and closed prior to the Division's mining regulatory permitting program. However, the facility had a reclamation bond in place since the early 1990s.

In 1986, IMCO Services merged with Dresser-Magcobar to form M-I Drilling Fluids. At the time, IMCO Services was a subsidiary of the Halliburton Company, a leading supplier of drilling fluids and equipment to the oil industry. In an effort to enter the lucrative oilfield drilling fluids market, Smith International Inc. (SII), an oilfield services and technology company, purchased Dresser's 64 percent interest in M-I Drilling Fluids (M-I) in 1994.

In late 1994, M-I purchased SWACO (a mining, mineral processing, and supplier of oilfield technologies) to form M-I SWACO. M-I SWACO acquired Anchor Drilling Fluids (1996) and Summit Drilling Fluids (1997) to become the world's largest supplier of drilling fluids. In 1998, SII bought Halliburton's remaining 36 percent interest in M-I SWACO.

In 1999, SII and Schlumberger (an oilfield services company), created a joint venture (M-I SWACO LLC) which continued until 2010, when Schlumberger purchased SII. M-I LLC (the Permittee) was incorporated into Schlumberger; however it remains a separate company.

***Incorporation into the NDEP-BMRR Water Pollution Control Permitting Program:*** All mining facilities that have the potential to degrade waters of the state and not explicitly exempted pursuant to Nevada Administrative Code (NAC) 445A.387 are subject to NAC 445A.350 through 445A.447. The exempted mining facilities are limited to sand and gravel, cinder, diatomaceous earth, slate, shale, gypsum, clay, or crushed stone operations. Because of potential groundwater degradation due to acid rock drainage from waste rock disposal areas, the MSM facility has been incorporated into the Division's mine permitting program beginning with the 2014 new Permit issuance.

***Geology:*** The MSM is located on the western side of the Shoshone Range. The geology within the range is fault controlled and trends to the northeast. In the area of the MSM, the trend of the range becomes more easterly, and the distinction between valley floor and range becomes less obvious. Within the mine area there are two structural elements that are recognized: Paleozoic age folding and tectonics and the younger range front faulting that are Tertiary in age.

Complex fold patterns are observed within the exposed Slaven Chert and the barite horizons appear to be relatively undeformed, possibly due to the compression of the chert and barite and the down slope slump and soft sediment deformation within the chert.

The geology of the MSM is comprised of three main rock groups: Lower Paleozoic rocks, Tertiary volcanic rocks, and Quaternary alluvium. The Lower Paleozoic rocks are divided into the Ordovician Valmy Formation and the Devonian Slaven Chert and are part of the siliceous, western assemblage that comprises the Roberts Mountain allochthon. The ore body is hosted in the Slaven Chert.

The Valmy Formation within the Mountain Springs area varies in lithology, but it is dominantly an impure quartzite-siltite unit with associated greenstone, quartzite, and chert. The quartzite unit forms prominent ridges and topographic highs and forms an intermediate irregular ridge to the east of the mine area. The greenstones of the Valmy occur in the southwest area of the mine, and are in a northwest trending, southwest dipping band. There is very little chert within the Valmy Formation in the Mountain Springs area, but some chert exposures are present southwest of the mine area.

The Slaven Chert is in thrust contact with the Valmy Formation and is the host rock for the barite deposits within the Mountain Springs area. The unit is dominantly chert, with minor

argillite horizons present. Throughout the Mountain Springs area, the Slaven Chert is intensely deformed, and in outcrops appears highly contorted, fractured and sheared. Chert and barite are the two main lithologies that exist within the MSM. The chert is thin to medium bedded with bed thickness averaging one inch and the cherts are highly contorted and deformed. Because of this deformation, the chert tends to be intensely shattered and broken. At the contact with the barite units, the cherts are often characterized by intense limonite staining, bleaching, argillization, and brecciation. Some evidence suggests that the color change is due to alteration, possibly due to a result of the geochemical system responsible for the barite deposits.

The barite beds in the MSM area are part of the Slaven Chert stratigraphy. As exposed in the open pit, the barite is well bedded to massive, with an average thickness of about two inches. In places, the beds are up to six inches thick. The barite is fine to medium crystalline and ranges in color from light to medium gray, with occasionally dark gray occurrences. The origin of the barite deposits is unknown but could be the result of a rain of barite particles from barite enriched submarine geothermal vents or from deposition of a barite sinter associated with a seep or low flow spring.

Extrusive volcanic and volcanoclastic rocks present in the MSM area are assumed to be Tertiary (Oligocene-Miocene) in age. The rocks in this unit include the Caetano Tuff and the Bates Mountain Tuff, as well as unnamed groups of dacitic and andesitic composition and tuffaceous volcanoclastic rocks. Field evidence suggests that these volcanics were deposited/extruded onto the erosional surface of the lower Paleozoic rocks.

The Quaternary Alluvium unit consists of unconsolidated gravels, alluvium, valley fill, and stream sands and gravels. It can be broken up into two distinct ages within the MSM area, from older and more recent erosion processes. The thickness of the gravels is variable, from a thin veneer to several inches thick in stream cuts of the present drainage. The composition of the gravels varies, and depends on the source and underlying rock. Within the MSM area a very local, but significant, development of tufa, siliceous, and calcareous sinter and travertine that is Quaternary in age is present. These deposits are likely due to fault controlled hot spring activity, possible associated with volcanism.

Two ore bodies are present at MSM, a southern principal and a smaller northern ore body, which are each cut by numerous faults, with the principal ore body separated from the northern ore body by at least one or two faults of major displacement. The faulting trends to the northeast and dips fairly steeply to the north, and likely represents the bifurcation of a major range-front fault as it changes strike direction. Geological and mineralogical evidence suggests that the two ore bodies are not continuous with each other. Fieldwork suggests that the principal ore body is an east-west synclinal-anticlinal couplet with a northeast-southeast strike. The northern ore body appears to be a complex anticlinal fold that originally existed stratigraphically above the principal ore body.

**Hydrology:** The MSM is located along the western slope of the Shoshone Range in Hydrographic Area (HA) 59, Lower Reese River Valley. Surface water flow in the basin is

from the east and west basin boundaries towards the Reese River in the center of the basin, and then north, towards Battle Mountain, where the Reese River joins the Humboldt River.

Regional groundwater elevations derived from well logs within the MSM area indicate that groundwater elevation ranges from 4,976 to 5,060 feet above mean sea level (amsl). Regional groundwater elevations decrease towards the west and north with elevations of 4,600 to 4,700 feet amsl along the west side of S.R.-305, indicating that the direction of regional groundwater flow is west towards the Reese River and then north towards Battle Mountain.

Groundwater elevation within the alluvial deposits is perched and ranges from 5,080 in the east (plant area) to 5,074 feet amsl west of the plant (conveyor/stockpile areas). The groundwater elevation within the bedrock deposits is approximately 40 feet lower at 5,030 feet amsl. One water supply well (WSW) and three monitoring wells (MW-2, MW-3, and MW-4) located at the MSM site were drilled in 1975 and 1976. All wells were completed in bedrock deposits consisting of a surficial layer of clay and gravel to depths of 5 to 30 feet below ground surface (bgs) underlain by fractured limestone, chert, and sandstone. MW-3 is currently unusable due to a blockage within the casing.

Fault zones composed of fractured limestone, chert, and clay were encountered in WSW and MW-2. Static water levels were reported at 64 feet bgs in WSW and MW-3 and 94 feet bgs in MW-2. Static water levels were measured in three of the wells (WSW, MW-2 and MW-4) in November 2020. When compared to the original static water levels obtained in 1975 and 1976, static water level elevations generally declined until October 2013 and then increased from October 2013 to March 2014. In November 2020, static water levels in MW-1 and 2 (located upgradient from the Sediment Pond) ranged from 64 to 94 feet bgs with groundwater elevations ranging from 5,009 to 5,020 feet amsl. Located downgradient from the Sediment Pond, the static groundwater level in MW-4 was 81 feet bgs and groundwater elevation was 4,919 feet amsl in November 2020. Groundwater gradient in the areas of the Process Facility, Sediment Pond, and pits is from east to west.

Groundwater depth and elevation in the vicinity of the North and South pits was last measured in 1984. At the time, groundwater depth ranged from 80 to 190 feet bgs and groundwater in the vicinity of the North Pit (Mine Area "A"), occurred at elevations that ranged between 5,010 and 5,020 feet amsl. Groundwater elevation in the vicinity of the South Pit (Mine Areas "B" through "D") ranged from 4,967 to 5,024 feet amsl.

Refer to the subsection "**Receiving Water Characteristics**", for a discussion on groundwater and surface water quality.

**Ore, Waste Rock, and Tailings Characterization:** Characterization of exposed pit walls, waste rock dumps, ore stockpiles, and jig tailings samples were performed during 2013 and 2014. Samples were collected and analyzed for Acid Neutralization Potential/Acid Generation Potential (ANP/AGP), Static Net Acid Generation (NAG), and Meteoric Water Mobility Procedure (MWMP)-Profile I parameters.

The Division only considers waste rock to be non-acid generating without kinetic testing if there is 20 percent excess neutralizing capacity (i.e., Neutralization Potential Ratio [NPR]>1.2). Based on the ANP/AGP results submitted with the application, all of the MSM samples failed to meet the Division's NPR since all values were consistently less than 1.2. The Division requires that all samples failing to meet these criteria require kinetic testing to determine the acid generating potential.

When interpreting ANP/AGP data, the presence of barite in a particular mineral sample must be taken into account. Barite often undergoes incomplete dissolution and extraction in hot water, hydrochloric acid, and nitric acid extractions with most sulfur from barite reporting as non-extractable sulfur and nitric acid extractable sulfur. Because the nitric acid extractable sulfur fraction is considered acid generating, the presence of barite in a sample typically results in an overestimate of sulfide sulfur and acid generation. Consequently, the ANP/AGP test results might not accurately indicate the potential for acid generation from barite-containing material. Realizing this, the Division has developed a specific guidance document for determining acid generation potential from barite ores, tailings, and waste rock, using the Static NAG test discussed below.

The Static NAG test differs from the ABA test in that it provides a direct empirical measurement of acid production and neutralization produced by the intense oxidation of the sample using hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>). The NAG test may provide a better estimate of field acid generation than the ANP/AGP method, which determines acid generation potential on sulfide content only, particularly in the case of complex mineral matrices containing barite or other semi-soluble sulfate minerals that can skew ANP/AGP results.

Samples with NAG pH values greater than 4.5 Standard Units (SU) are predicted to be non-acid generating. Net acid generation is only measured for samples with NAG pH values less than 4.5 SU. NAG results greater than one kilogram (kg) H<sub>2</sub>SO<sub>4</sub> per ton indicate the sample will generate some acidity in excess of available alkalinity. However, by convention, any NAG value below 10 equivalent kg H<sub>2</sub>SO<sub>4</sub> per ton of material has a limited potential for acid generation and the results are considered inconclusive because a blank hydrogen peroxide solution (the reagent in the NAG test) can generate a NAG value up to 10 equivalent kg H<sub>2</sub>SO<sub>4</sub> per ton.

In an attempt to further define the acid generation potential for the MSM ore, waste rock, and tailings, the Permittee also performed characterization tests utilizing the NAG determination method. The NAG test results indicated that the MSM ore, waste rock, and tailings material are non-acid generating, with NAG pH values greater than 4 and NAG values of zero. This is because the material is heavily oxidized and sulfide minerals such as pyrite are not present.

In addition, a comparison of NAG values versus the net-neutralization (NNP) values from the ANP/AGP tests, show a poor correlation and suggest that the presence of barite in the samples overestimates sulfide sulfur and acid generation. The MSM samples tested did not generate an acidic leachate or leach metals in the MWMP tests, indicating that the accumulation of secondary mineral phases as a result of pyrite oxidation has not occurred during weathering of the MSM waste rock and ore material.

Although potentially acid generating (PAG) material appears to be absent from the MSM waste rock, a Waste Rock Management Plan (WRMP) has been developed to ensure that the threat of acid mine drainage (ARD) from waste rock is mitigated. Pursuant to the WRMP, MSM ore, waste rock, and tailings samples with demonstrated NAG pH values less than 4.5, paste pH values less than 6.5, or NPR less than 1.2, will be subject to humidity cell testing (HCT) also referred to as kinetic testing.

**Mining and Backfilling:** The Permittee proposes to mine barite ore and waste rock within the limits of the North Pit (Mine Area “A”) and South Pit (Mine Areas “B”, “C”, and “D”) to an elevation above the groundwater table. As of September 2014, all pits were dry.

The North Pit was previously mined to an elevation of approximately 5,090 feet amsl with a high wall extending to an elevation of approximately 5,195 feet amsl. The South Pit was previously mined to an elevation of approximately 5,100 feet amsl with a high wall extending to an elevation of approximately 5,325 feet amsl. As stated above, groundwater depth and elevation in the vicinity of the North and South pits was last measured in 1984 and at the time, groundwater depth ranged from 80 to 190 feet bgs. Groundwater elevation beneath the North Pit ranged between 5,010 and 5,020 feet amsl and between 4,967 and 5,024 feet amsl beneath the South Pit.

Because of the thirty-year time lapse in groundwater elevation and water quality measurements, an SOC item requires the Permittee to install an in-pit groundwater monitoring well within the South Pit to determine groundwater elevation and water quality prior to the backfilling of waste rock and to determine the minimum allowable elevation for the placement of PAG material as backfill. In addition, the in-pit well will also serve to monitor groundwater elevation and water quality during and following the completion of the backfilling activities and for closure purposes.

Mining operations have been intermittent since 2015 within the southern-most portion of Mine Area “D” and involved the removal of 540,000 tons of material (approximately 400,000 tons barite ore and 140,000 tons waste rock). Front-end-loaders mine and load the ore into haul trucks for transport to the MSM mill site. Refer to the subsection **Mineral Processing**, for a discussion on the beneficiation operations.

No new waste rock dumps were created during mining activities as all waste rock material will be used as backfill for South Pit Mine Areas “B”, “C”, and “D.” The Permittee will install a groundwater monitoring well within the South Pit to collect groundwater elevation and water quality data beneath the pit floor prior to the placement of any backfill material. Monitoring will continue on a quarterly basis during active placement and following the completion of all backfilling activities.

Waste rock from Mine Area “D”, intended for use as backfill, will be temporarily stockpiled within a portion of Mine Area “C”. As stated previously, characterization results indicate the waste rock to be predominantly non-PAG, however any waste rock encountered containing pyritic and carbonaceous mineralization through visual inspection or identified as PAG through routine quarterly waste rock sample characterization, will be segregated and placed

in a combined PAG/non-PAG stockpile area surrounded by berms for temporary storage until mining in Mine Area “D” is completed.

Mine Area “D” will be mined to an estimated final pit floor depth of 50 feet bgs (approximately 50 feet above the 1984 groundwater elevation). Depending on the current groundwater elevation and the distance between the pit floor and static groundwater table, a minimum 10-foot thick layer of non-PAG waste rock will be backfilled within the Mine Area “D” to provide an additional buffer distance above the groundwater table, prior to the backfilling of any PAG material.

Stockpiled PAG waste rock material generated during the mining of Mine Areas “C” (see below) and “D” will be backfilled into the Mine Area “D” Pit on top of the previously placed non-PAG waste rock. The PAG waste rock material will be encapsulated with a minimum 10-foot thick cover layer of non-PAG material.

Following the completion of mining in Mine Area “D”, the Permittee will commence the second phase of mining. Approximately 940,000 tons of material (approximately 600,000 tons of barite ore and 340,000 tons waste rock) will be removed from Mine Area “C.” Although the waste rock is predominantly non-PAG, any waste rock encountered containing pyritic and carbonaceous mineralization through visual inspection or identified as PAG through routine quarterly waste rock sample characterization, will be segregated and placed into the combined PAG/non-PAG stockpile area discussed previously for future final placement as encapsulated backfill within Mine Area “D” Pit following the completion of mining.

Upon completion of mining to a depth of 70 feet bgs (approximately 15 feet above the 1984 groundwater elevation) within Mine Area “C”, a minimum of 20-foot thick layer of non-PAG material will be backfilled within the Mine Area “C” Pit. Because of the close proximity to groundwater, the placement of PAG material as backfill in Mine Area “C” Pit is not authorized.

Mine Area “B” will be the last phase of mining and have a final pit floor elevation of 50 feet bgs (approximately 30 feet above the 1984 groundwater elevation). Approximately 535,000 tons of material (355,000 tons of barite ore and 180,000 tons of waste rock) will be removed during mining. As is the case of previously mined pits, any PAG material encountered will be segregated into a temporary PAG/non-PAG stockpile for future backfilling and encapsulation in the Mine Area “B” pit.

Upon completion of mining in Mine Area “B” and depending on the current groundwater elevation and the distance between the pit floor and static groundwater table, a minimum 10-foot thick layer of non-PAG waste rock will be backfilled within the Mine Area “D” to provide an additional buffer distance above the groundwater table, prior to the backfilling of any PAG material.

Mine Area “A” lies approximately 500 feet north of Area B and will be an independent excavation. Waste rock from Mine Area “A” will be used to complete backfilling of Mine

Area “B” and as cover material/growth media for reclamation. As is the case of previously mined pits, any PAG material encountered will be segregated into a temporary PAG/non-PAG stockpile for future backfilling and encapsulation in the Mine Area “B” pit. Mine Area “A” will not be backfilled.

**Mineral Processing:** The MSM Mineral Processing Circuit is comprised of a Crushing and Screening Circuit, a Gravity Concentration Circuit, and a Final Concentrating Circuit, capable of processing up to 5,000 tons per day and limited to process up to 850,000 tons per year of ore. Conservative estimates by the Permittee indicate that up to 350 tons per day of fine sediment could be deposited in the Sediment Pond (aka Tailings Pond), which equates to about 7 percent of the total amount of barite ore processed daily. Fresh water only is utilized in the gravity and final concentration processes with most of the water recycled.

The Crushing and Screening Circuit is still in the design phase, however it will consist of one jaw crusher, at least one cone crusher, and at least one three-deck screen. The material sizes are still undetermined but will be crushed and separated to sizes that best beneficiates the concentration in the Jig Circuit, typically minus 5/8-inch particle size. Crushed and screened material is delivered to the Jig Circuit via front-end-loader and a conveyor system into the Holding/Surge Bin located above the jigs.

The holding bin feeds the jigs where the product and waste are separated. Barite concentrate and waste are delivered from the jigs to separate de-watering screw classifiers. Product and waste are moved by belt conveyors to separate stockpiles. Waste product is either returned to the pit or stockpiled on the existing rougher tails dump. Concentrated product is stockpiled on-site until it is moved by truck to the finishing mill/bulk loadout/packaging facility in Battle Mountain.

Jigs are a mechanical gravity separation process using only water and a pulsating motion to derive a gravity-concentrated product. No chemicals are used in the process. The MSM Jig Plant consists of eight, three-cell jigs on two separate decks or levels within the plant, however the Permittee intends to utilize only four of these jigs on the upper deck. Screw classifiers and cyclones are used to dewater the fines. No thickeners are used in the process system. Water burdened with fines is pumped to the sediment pond. Fines are settled out and the upper clear water is re-circulated back into the process circuit.

Under normal operating conditions, the MSM Process Facility is expected to require up to 2,000 gallons per minute (gpm) of fresh water. Fresh water for the process will be provided by WSW. The average makeup water supply required is estimated at 206 gpm. The well feeds into a single 8-inch diameter line. A flow meter and totalizer measures flow rate and total flow, a gate valve near the Outside Fresh Water Tank (OFWT) can manually divert water into any of the tanks depending on make-up water needs. In the event leaks occur, all water drains into the Sediment Pond and Process Facility Basin. This is discussed further under the section **Stormwater Management**.

Fresh water is pumped to the OFWT or the Inside Gland Tank (IGT), also referred to by the Permittee as Tank #446. Supernatant from the Sediment Pond can also be pumped to OFWT

on an as-needed basis. OFWT has a capacity of 70,462 gallons and provides up to 71 gpm to the IGT and up to 135 gpm to the Inside Recycle and Surge Tank (IRST), also referred to by the Permittee as Tank #440. The IGT has a capacity of 50,044 gallons and provides 1 gpm of water to the office and lab building and 5 gpm for use as road dust control. The IRST has a capacity of 130,869 gallons and provides 2,000 gpm to the Jig Circuit.

The Jig Circuit discharges 1,250 gpm of sediment and water to the Tailings Classifier and 750 gpm to the Product Classifiers. Product water and the tails water/sediment mixture provide 2,000 gpm to the Cyclone Bank. A Cyclone Bank underflow of 200 gpm of sediments and water is discharged into the Pulp Box and then into the Sediment Pond, referred to in earlier documents as the Tailings Pond. The Cyclone Bank recycles up to 1,800 gpm to the IRST. The Sediment Pond also recycles an undetermined quantity of clean water to the OFWT.

***Sediment Pond:*** The MSM Sediment Pond was designed and constructed in 1975 pursuant to NDWR Dam Permit J-143. The approved design included a 1,600-foot long earth fill embankment dam abutted into two small hills with a crest elevation of 5,100 feet amsl; however the embankment was only constructed to an elevation of 5,090 feet. The Sediment Pond embankment has a maximum height of 70 feet above the basin floor. A spillway was constructed at an elevation of 5,080 feet amsl. The embankment dam also has an intake structure consisting of a vertical 36-inch diameter culvert extending from the base of the sediment pond at an elevation of 5,080 feet amsl to an outlet consisting of a horizontal 36-inch-diameter culvert extending past the toe of the dam. This inlet structure has been sealed and is no longer used.

The embankment design contains a clay layer with a compacted permeability of  $3.8 \times 10^{-7}$  cm/sec and clay-lined trench excavated into bedrock, overlain by compacted base material and followed by a protective layer of riprap along the upstream side of the dam. A 10-foot thick layer of fine gravel composed primarily of chert covers the downstream side of the compacted base material. An upstream, three-foot thick layer of compacted clay extends 200 to 250 feet into the sediment pond and a trench drain, excavated 10 feet below the base of the dam and initially constructed as a cutoff drain.

The trench drain connects into a gravel drainage blanket located below the compacted base material along the downstream side of the embankment. The gravel drain connects to a rock toe drain along the downstream toe of the embankment. Corrugated metal drainage pipes emanate from the trench drain, extend through the drainage blankets and rock toe drain and extend below the toe of the dam. Two of these drains have been converted into leak detection sumps identified as LDS-1 and LDS-2. This is discussed further under the section ***Sediment Pond Embankment Leak Detection System.***

The Sediment Pond embankment was expanded along the downstream side in 1978 using graded chert gravel. From field observations and aerial photo measurements it was determined that the crest expansion did not occur but the horizontal, downstream expansion did occur with a measured downstream expansion of up to 80 feet, with a the lateral expansion overlapping onto the gravel toe drains. This lateral downstream expansion will

result in increased slope stability as the expansion created a buttress to the dam. This expansion was planned at the design stage as shown in the embankment design documents where future toe reinforcement and buttress with chert materials is specified.

Because of the age of the Sediment Pond and concerns over embankment integrity and competency, the Division requested that the Permittee perform a thorough inspection and conduct stability analysis. The stability analysis performed in 2013 and 2014 resulted in higher safety factors than the original design because the actual dam is 10 feet lower and approximately 45 feet wider than the originally designed facility. A safety factor of 3.28 for static conditions and 2.23 for seismic loading were calculated using the as-built dam construction. These safety factors are acceptable values and indicate that the dam can operate without stability concerns.

***Sediment Pond Embankment Leak Detection System:*** Leak detection for the sediment pond and embankment is provided by a trench drain, drainage blanket, and rock toe drain with two, 6-inch diameter CMP drainage pipes that will discharge into concrete sumps that have a capacity of 250 gallons. The trench drain is excavated six feet into bedrock or a maximum depth of 10 feet below the base of the dam.

The trench drain consists of a 6-inch diameter, asbestos-coated, asphalt bonded, perforated CMP, encased in a 12-inch thick gravel bed, which is in turn embedded in a drainage blanket. The trench drain connects into a gravel drainage blanket located beneath the compacted base material along the downstream side of the embankment. The gravel drain connects to a rock toe drain along the downstream toe of the embankment.

Two, 6-inch diameter perforated CMPs exit the trench drain, extend through the drainage blankets and rock toe drain and extend below the toe of the dam. As stated previously, the Permittee converted these two drains into leak detection sumps by adding a 3-foot by 3-foot by 4-foot deep concrete vault at the end of each pipe. These leak detection sumps will be monitored in accordance with the monitoring plan.

If fluid is present, samples will be collected and analyzed for Profile I parameters. If fluid is present, fluid will be pumped from the leak detection sump using a portable transfer pump until flow ceases. Fluid will be transferred to a tanker truck and transported to the IRST. If flow continues, a permanent pumpback system shall be designed to pump fluid in the leak detection sump back to the Process Facility.

The surface drainage course beneath the Sediment Pond (Sediment Pond Surface Drainage) drains into an unnamed drainage. This drainage course will be monitored monthly at the spillway for seepage and flow rate. If fluid is present, samples will be collected quarterly and analyzed for Profile I and uranium parameters. The Sediment Pond Pump discharge rate will be measured continuously, flow measurements will be compiled quarterly, and the discharge will be sampled quarterly and analyzed for Profile I and uranium parameters.

***Fuel Storage and Dispensing:*** The Fuel Storage and Dispensing Rack is located west of the MSM Process Facility and consists of a concrete enclosure with two diesel aboveground

storage tanks (ASTs) and one gasoline AST. The Permittee is proposing to install a used oil AST with a capacity of 5,000 gallons prior to plant operation.

The Diesel ASTs have a capacity of 20,000 and 12,000 gallons and the gasoline AST contains 1,000 gallons. The concrete enclosure has side walls that are a minimum of 2.33 feet in height and can contain 33,500 gallons. This is greater than 110 percent of the largest AST (22,000 gallons) and meets secondary containment regulations. Normally closed solenoid valves will be installed on the discharge pipelines from the ASTs and secondary containment will be provided for the discharge pipelines outside of the concrete enclosure and the dispensers.

**Stormwater Management:** Peak flows resulting from the 100-year, 24-hour storm event are controlled by existing man-made structures such as roads and berms or the natural topography of the surrounding area. The plant site is upstream of the sediment pond and all precipitation runoff at the plant site will report to the Sediment Pond. Upstream from the plant, there is a small 2-acre watershed limited by the cut slope surrounding the plant site. Given the low precipitation for the 100, 25, and 10 year, 24-hour storms, the 2-acre watershed will not generate a significant amount of stormwater runoff. Existing drainage conditions provide a slope away from the plant and divert water to the Sediment Pond are adequate to prevent run-on entering the Process Facility site from the 2-acre watershed.

Based on the U.S. Army Corps of Engineers Hydrologic Engineering Center-Hydraulic Modeling System (HEC-HMS) predictive surface water modelling for the 100-year, 24-hour storm event, flows of 368 cubic feet per second (cfs) were predicted for the Sediment Pond and Process Facility Basin and 89 cfs was predicted for the Interior Basin. Flows from these basins are controlled by the Sediment Pond. The total volume of water calculated to flow into the Sediment Pond is 26.8 acre-feet. Using an area of 18 acres within the Sediment Pond at an elevation of 5,078 feet amsl, 1.6 feet of water height is required to contain flows from the 100-year, 24-hour storm event.

An existing berm, located along the top of the cut slope above the Process Plant site, diverts stormwater flow. A trapezoidal diversion structure is proposed for construction to improve the diversion of this flow further around the plant site. The earthen structure will have cross section width 10 feet, a 3H:1V side slope, and a 2-foot berm depending on the actual topographical conditions and utilize as much of the existing berm where possible. The diversion structure will have a nominal 2-percent slope towards the Sediment Pond. A flow rate of 288 cfs is predicted for the Pit Basin for a total volume of 14.4 cubic feet.

### C. Receiving Water Characteristics

**Groundwater:** As stated above, there are four wells (WSW, MW-2, MW-3, and MW-4) located at the MSM that were drilled between 1975 and 1976. All wells were completed in bedrock deposits consisting of a surficial layer of clay and gravel to depths of 5 to 30 feet bgs underlain by fractured limestone, chert, and sandstone. MW-3 is currently unusable due to blockage and will eventually be rehabilitated. Completion data is as follows:

**Table 1—Water Supply and Monitoring Well Completion Data.**

Well ID	Depth (feet bgs)	Casing	Screened		Surface Seal		Gravel Pack (feet bgs)	Depth to Groundwater Oct. 2013 (feet bgs)	Pump
		Diameter/Type (inches/material)	From	To	Depth	Type			
WSW	850	12.75 / Steel	230	530	0 to 50	Cement	50 to 530	58.48	Yes
MW-2	600	8.625 / Steel	277	600	0 to 8	Cement	50 to 499	81.55	No
MW-3	530	8.625 / Steel	290	530	0 to 50	Cement	50 to 530	N/A	Yes
MW-4	250	12.75 / Steel	100	250	0 to 50	Cement	50 to 250	89.34	Yes
MW-5	140	8 / Steel	78	138	0 to 50	Cement	50 to 140	85.9	Yes

Fault zones composed of fractured limestone, chert, and clay were encountered in WSW and MW-2. Static water levels were reported at 64 feet bgs in WSW and MW-3 and 94 feet bgs in MW-2. Static water levels were measured in three of the wells (WSW, MW-2 and MW-4) in November 2020. When compared to the original static water levels obtained in 1975 and 1976, static water level elevations generally declined until October 2013 and then increased from October 2013 to March 2014. In November 2020, static water levels in MW-1 and 2 (located upgradient from the Sediment Pond) ranged from 64 to 94 feet bgs with groundwater elevations ranging from 5,009 to 5,020 feet amsl. Located downgradient from the Sediment Pond, the static groundwater level in MW-4 was 81 feet bgs and groundwater elevation was 4,919 feet amsl in November 2020. Groundwater gradient in the areas of the Process Facility, Sediment Pond, and pits is from east to west.

Groundwater quality characterization results indicate good water quality with circum-neutral pH and total dissolved solids concentrations ranging from 610 to 860 milligrams per liter (mg/L). All parameters analyzed met the Division’s Profile I reference values with the exception of manganese. Manganese concentrations in WSW and MW-4 ranged from 0.16 to 0.22, slightly above the 0.1 mg/L reference value.

**Surface Water:** Four main drainages exist on the western slope of the Shoshone Range within 5 miles of the MSM that drain into the Reese River. Redrock Canyon, south of the MSM, likely has ephemeral flow but is mapped as reaching the Reese River. Harry Canyon and Mill Creek drainages, located north of the MSM, dissipate before reaching the Reese River. Trout Creek, located further north, is mapped as reaching the Reese River. Within a distance of one mile, several smaller drainages, originating mainly to the south and east of the mine may intermittently have water, but likely dissipate before reaching the Reese River. An unnamed drainage, located approximately 600 feet north of the Sediment Pond and downgradient from the Sediment Pond Spillway, is mapped as reaching the Reese River. Two springs are identified on the United States Geological Survey (USGS) topographic map, Mound Springs, located 1.5 miles west of the south end of the open pit, and Redrock Spring, located approximately 4 miles southeast of the MSM.

**D. Procedures for Public Comment**

The Notice of the Division's intent to issue a Permit authorizing the facility to construct, operate and close, subject to the conditions within the Permit, is being published on the Division website: <https://ndep.nv.gov/posts/category/land>. The Notice is being mailed to interested persons on the Bureau of Mining Regulation and Reclamation mailing list. Anyone wishing to comment on the proposed Permit can do so in writing within a period of 30 days following the date the public notice is posted to the Division website. The comment period can be extended at the discretion of the Administrator. All written comments received during the comment period will be retained and considered in the final determination.

A public hearing on the proposed determination can be requested by the applicant, any affected State or intrastate agency, or any interested agency, person or group of persons. The request must be filed within the comment period and must indicate the interest of the person filing the request and the reasons why a hearing is warranted.

Any public hearing determined by the Administrator to be held must be conducted in the geographical area of the proposed discharge or any other area the Administrator determines to be appropriate. All public hearings must be conducted in accordance with NAC 445A.403 through NAC 445A.406.

**E. Proposed Determination**

The Division has made the tentative determination to issue the renewed Permit.

**F. Proposed Permit Limitations, Schedule of Compliance, Monitoring, and Special Conditions**

Refer to WPCP NEV2014115, Sections I.B. (Schedule of Compliance Items).

**G. Rationale for Permit Requirements**

The facility is located in an area where annual evaporation is greater than annual precipitation. It must operate under a standard of performance, which authorizes no discharge except for excess accumulations, which are a result of a storm event beyond that required by design for containment.

The primary identification of escaped process fluids is based on the periodic inspection of leak detection systems, monitoring wells, and visual inspections. Monitoring will be in accordance with permit conditions and requirements. Specific monitoring requirements can be found in the Water Pollution Control Permit.

**H. Federal Migratory Bird Treaty Act**

Under the Federal Migratory Bird Treaty Act, 16 U.S. Code 701-718, it is unlawful to kill

migratory birds without license or permit, and no permits are issued to take migratory birds using toxic ponds. The Federal list of migratory birds (50 Code of Federal Regulations 10, 15 April 1985) includes nearly every bird species found in the State of Nevada. The U.S. Fish and Wildlife Service (the Service) is authorized to enforce the prevention of migratory bird mortalities at ponds and tailings impoundments. Compliance with State permits may not be adequate to ensure protection of migratory birds for compliance with provisions of Federal statutes to protect wildlife.

Open waters attract migratory waterfowl and other avian species. High mortality rates of birds have resulted from contact with toxic ponds at operations utilizing toxic substances. The Service is aware of two approaches that are available to prevent migratory bird mortality: 1) physical isolation of toxic water bodies through barriers (e.g., by covering with netting), and 2) chemical detoxification. These approaches may be facilitated by minimizing the extent of the toxic water. Methods which attempt to make uncovered ponds unattractive to wildlife are not always effective. Contact the U.S. Fish and Wildlife Service at 1340 Financial Boulevard, Suite 234, Reno, Nevada 89502-7147, (775) 861-6300, for additional information.

Prepared by: TJ Mohammed  
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