FACT SHEET

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

Permittee Name: **Mineral Ridge Gold, LLC**

Project Name: **Mineral Ridge Project**

Permit Number: **NEV0096106**

Review Type/Year/Revision: **Major Modification/Renewal 2019, Fact Sheet Revision 00**

A. <u>Location and General Description</u>

Location: The Mineral Ridge Project (Mineral Ridge) is located in the historic Silver Peak-Red Mountain Mining District within all, or portions of, Section 36, Township 1 South (T1S), Range 38 East (R38E); Section 31, T1S, R39E; Sections 1, 2, and 12, T2S, R38E; and, Section 6, T2S, R39E, Mount Diablo Baseline and Meridian (MDB&M); approximately 4.5 miles northwest (by air) of the town of Silver Peak in Esmeralda County, Nevada. Elevation at the project site ranges between 6,000 and 7,400 feet above mean sea level (amsl).

The project is located on both private land and public land administered by the BLM – Battle Mountain District, Tonopah Field Office. The mining and process facilities are situated on 54 patented claims, 110 unpatented lode claims and one unpatented mill site claim totaling 995 acres. The Permittee also controls three private land parcels located outside the main mine area: Blair town site (abandoned), the historic Silver Peak mill site, and deeded land west of Mineral Ridge. The Mineral Ridge site has the unique distinction of being the site of the first cyanide leaching facility constructed and operated in the U.S. in 1893.

Site Access: From the town of Silver Peak, proceed approximately 7.8 miles west then northwest on Coyote Rd to the junction with Rhyolite Ridge Rd. Turn north at the junction and continue for a distance of 2.5 miles to the Mineral Ridge Mine entrance gate.

Alternatively, the mine site can be reached by proceeding north from Silver Peak on Nivloc Rd (SR-265) for a distance of 2.3 miles to the junction of Eagle Canyon Rd. Proceed west on Eagle Canyon Rd for a distance of 7.6 miles to the Mineral Ridge Mine entrance gate. The Eagle Canyon Rd is not regularly maintained.

General Description: Mineral Ridge Gold, LLC (the Permittee) is a limited liability company which was created pursuant to a joint venture between Scorpio Gold (U.S.) Corporation (Scorpio Gold) and Elevon, LLC, a unit of Waterton Global Value L.P. (Waterton), for the purpose of operating Mineral Ridge. At that time, Scorpio Gold held a 70-percent majority interest in Mineral Ridge with Elevon/Waterton holding a minority interest; however, Scorpio Gold acquired the 30-percent interest in March 2019 and currently holds 100-percent interest in the Project.

Characteristics: The Mineral Ridge facility consists of both an active open pit and inactive underground mining with ore processed by a carbon-in-leach (CIL) process which produces gold-loaded carbon. Loaded carbon is shipped to an off-site refinery for extraction of gold and silver. The facility is designed and constructed and must be operated and closed without any discharge or release in excess of those standards established in regulation except for meteorological events which exceed the design storm event. The facility is permitted to process up to 1,400,000 tons of ore annually.

B. Synopsis

Background/History: Gold was first discovered in the Silver Peak – Red Mountain Mining District in 1864. The first documented mining at the Mineral Ridge site occurred in 1865, with the underground mining of gold along high-grade quartz veins. Beginning in 1865, stamp mills located in the town of Silver Peak, processed ore from the Mary and Drinkwater underground mines at the Mineral Ridge site. At peak capacity, the stamp mills processed up to 45 tons per day (tpd) of gold-bearing ores until 1871.

From 1871 until 1905, a handful of small operators actively mined the district with moderate success. In 1893, the first cyanide mill in the United States was constructed at the Mineral Ridge site to process gold ore from the Mary Mine. Beginning in 1905, the Pittsburgh-Silver Peak Gold Mining Company (Pittsburgh-Silver Peak) purchased and consolidated the various operations and claims within the Mineral Ridge site. From 1905 through 1915, Pittsburgh-Silver Peak removed 1.2 million tons of ore from the Mary and Drinkwater mines, recovering 280,000 troy ounces (tr oz) of gold. The mines closed in 1915, due to sub-economic ore grades but re-opened in 1929, under the ownership of the Black Mammoth Consolidated Mining Company (Black Mammoth). In 1929, Black Mammoth built a 50 tpd cyanide mill at the south end of the town of Silver Peak to process ore from the Mary Mine. Over the next several years a limited amount of high-grade ore was also processed through this plant.

The 1934, passage of the Gold Reserve Act resulted in an increase in the price of gold and mining activity at Mineral Ridge. A new 100 tpd mill was erected by Black Mammoth, adjacent to its 50 tpd plant in Silver Peak and later a 300 tpd cyanide mill was constructed at Mineral Ridge, near the Mary underground mine. From 1936 to 1942, Black Mammoth mined and milled 290,000 tons from workings centered on the Mary Mine and recovered 78,150 tr oz of gold. Underground mining ended in 1942, with the outbreak of World War II as all non-essential gold mines were shut down for the duration by the War Production Board. The Mineral Ridge Mine did not return to active operations following World War II and the site remained dormant until the early 1970s.

Throughout the 1970s and early 1980s, Houston Oil and Minerals (Houston), Occidental Minerals, Inc. (Occidental), and the Sunshine Mining Company

(Sunshine) each conducted geologic investigations and exploration programs on the Mary and Drinkwater claims at Mineral Ridge. Sunshine also operated the 16:1 Mine and Mill located southwest of Silver Peak. When operation of the 16:1 Mine was no longer economically viable, Sunshine leased the Mineral Ridge property with the intent of feeding the 16:1 Mill with gold ore from this area. Sunshine ultimately elected to discontinue operations in the Silver Peak area and leased the 16:1 mill to Zephyr Resources Inc. (Zephyr).

During 1989 and 1990, Zephyr operated Mineral Ridge as an open pit, trucking ore 17 miles to the 16:1 Mill. In mid-1990, Homestead Minerals Corporation (Homestead) purchased Zephyr's interests in the area and continued mining Mineral Ridge until 1992 when Homestead declared bankruptcy. From 1989 to 1992, Zephyr and Homestead mined and milled 1.4 million tons of ore and recovered 40,000 tr oz of gold.

In July 1993, Cornucopia Resources Ltd. (Cornucopia) leased the Mary and Drinkwater claims and conducted extensive exploration and development programs on the Mineral Ridge property through its wholly-owned subsidiary Mineral Ridge Resources Inc. (MRRI). The property was later acquired by Vista Gold Corporation (Vista) in 1998 which operated the facility for less than a year before declaring bankruptcy. Golden Phoenix Minerals Inc. (GPMI) purchased the property in 2000 from the Vista Chapter 11 bankruptcy and began mining and heap leaching operations in January, 2004. GPMI operated the mine through December, 2004 and drain down and rinsing of the leach pad continued into 2005. In January 2005, the property was placed in “Temporary Closure” under a care-and-maintenance mode.

In May 2009, Scorpio Gold entered into an agreement with GPMI to conduct due diligence and negotiate terms for an option agreement on the Mineral Ridge Project. In January 2010, Scorpio Gold entered into a binding, definitive joint venture agreement with Golden Phoenix allowing for the acquisition of up to a 100 percent interest in the Mineral Ridge Project, subject to specific terms and conditions. On 10 March 2010, Scorpio Gold completed the acquisition of 70 percent interest in the Mineral Ridge Project and will earn an additional 10 percent by putting the property into commercial production. The joint venture company has an option to acquire the remaining 20 percent for a period of 24 months following the commencement of commercial production.

In February 2011, the Permittee returned to active operations when they initiated a program to crush and re-leach coarse ore material on the heap leach pad (HLP). In June 2011, active mining of the Drinkwater Pit resumed. In May 2012, Elevon/Waterton acquired GPMI’s 30-percent interest in Mineral Ridge. In March 2019, Scorpio Gold acquired the minority interest from Elevon/Waterton and now holds 100% interest for the Project.

In May 2019, a major modification was approved by the Division for the expansion of existing pits (Mary Last Chance, Drinkwater, Brodie), development of four new pits (Custer, Custer South, Oromonte 1, and Oromonte 2), development of underground workings, construction of a mill with a CIL circuit, tailings filtration presses, and an expansion of the existing heap leach pad to accommodate conversion of the facility to a dry stack tailings facility (DSTF).

Current Facility: The Mineral Ridge Mine (as permitted) consists of eleven open pits (Mary Last Chance, Drinkwater, Gold Wedge B, Brodie Northwest, Brodie Southeast, Bluelite, Solberry, Custer, Custer South, Oromonte 1, and Oromonte 2), underground mining operations, twelve waste rock dumps, a seven cell HLP which which will be expanded to the west (Phase I) and east (Phase II) to accommodate the transition to a DSTF, process water pond with sufficient containment for the 25-year, 24-hour storm event, crushing facilities, processing facilities (including a CIL pre-leach thickener, CIL circuit, tailings thickener, and tailings filtration), and ancillary facilities which include a truck shop, laboratory, fuel tank farm, explosives storage, warehousing, and administration.

Geology: The Mineral Ridge gold deposits are located on the northeast flank of the Silver Peak Mountain Range. This range lies in the southern reaches of the Great Basin, within the Walker Lane Structural Corridor. The corridor is a 60-mile-wide region of right lateral faulting that separates the Sierra Nevada batholith to the west and southwest and the Great Basin to the east and northeast.
The rocks in the Mineral Ridge area consist of Precambrian metasediments and metamorphosed Tertiary granodiorite. These rocks have been cut by numerous shallow dipping faults, which have become host to the gold deposits. The gold is found in sheeted zones of thick quartz veins, which nearly parallel the current surface topography.

Mineralization: The gold-bearing milky quartz veins contain small amounts of sulfides, including pyrite, sphalerite, galena, and minor amounts of chalcopyrite and arsenopyrite, or their oxidation products. Gold is present as native gold or electrum and occurs as rounded, angular, and elongated inclusions in quartz. Gold is also associated with goethite, sometimes with relict pyrite, and intergroup with sphalerite, galena, and pyrite. Encapsulation of gold by quartz makes it necessary to crush the ore to a relatively smaller size before cyanide heap leaching. For the most part gold is fine-grained with a particle size less than 50 microns.

Mining: The Permittee estimates that an additional two million tons of ore from the pit expansion areas can be mined and processed in the new CIL circuit in addition to all the leached ore on the heap leach pad. When active mining resumes, the open pits will be mined using conventional open pit techniques including drilling, blasting, and loading of the ore and pit waste rock into mine haul trucks with front-end loaders and hydraulic excavators. The mined waste rock will be hauled by truck to one of 12 active Waste Rock Disposal Facilities (WRDFs) or used for haul road construction and backfill depending on characterization results. Final pit floor depths are expected at a minimum 100 feet above the water table; therefore, dewatering is not necessary.

Ore, Spent Ore, and Waste Rock Characterization: Meteoric Water Mobility Procedure (MWMP) and Acid Neutralization Potential/Acid Generation Potential (ANP/AGP) analytical tests are performed on a quarterly basis on ore, spent ore, and waste rock, pursuant to Water Pollution Control Permit (WPCP) NEV0096106. MWMP analytical results indicate that with the possible exception of arsenic, the mobilization of constituents above any Profile I reference values is unlikely. ANP/AGP characterization results indicate that all of the ore, spent ore, and waste rock lithotypes have very strong acid neutralization potential. In the unlikely event that potentially acid generating (PAG) material is encountered, the Permittee will encapsulate the PAG waste with non-PAG material, pursuant to the "Waste Rock Management Plan", to preclude acid generation.

In March 2017, an EDC was submitted for a heap leach characterization plan to determine if the heap leach pad ore was further amenable using milling processes. The plan included drilling up to 34 holes as deep as 10 feet above the surface of the liner; however, as a conservative measure in protecting the integrity of the liner, the remaining depth was agreed to be increased to 20 feet. The major modification for the addition of the CIL circuit and processing the ore from the heap leach pad was submitted in April 2018.

The 2019 major modification proposal to expand three existing pits and develop four new pits did not provide adequate characterization of the waste rock and ore and is therefore required by a schedule of compliance item in the Permit to provide additional characterization prior to mining in these areas.

Waste Rock Management: There are a total of twelve WRDFs (WD-1, WD-2, WD-4, WD-5, WD-6, WD-7, WD-8, WD-9, WD-10, WD-11, Solberry, and Bluelite) constructed at the Mineral Ridge site. With the 2019 major modification, the WRDFs will accommodate an additional 15.6 million tons of waste rock and will in general, continue to be constructed as a series of 40-foot lifts with maximum slopes of 2.5 horizontal to 1 vertical (2.5H:1V). The maximum height of the dumps will range between 80 and 300 feet, depending on the location and configuration of the WRDF.

Sediment and surface control structures are constructed at the WRDFs to manage flow, control erosion, and sedimentation from surrounding disturbed areas. Where possible, upgradient flows are diverted around disturbed areas and returned to natural drainage. Diversion structures and best management practices will be used to control surface water runoff. Springs or seeps have not been identified in the waste rock dump areas. The dumps are free-draining as a result of natural material segregation during dumping. Based on the average annual precipitation rate of 4.36 inches, the type of material placed on the dumps, and method of construction, erosion and sediment loss from the dumps is minimal.

Ore Stockpiling: At the Mineral Ridge Mine, run-of-mine (ROM) ore is hauled by truck to the stockpile and crushing area, located 200 to 300 feet north of the HLP/DSTF. Historical documents indicate that this area was constructed with "a prepared surface"; however, there are no specifications or documentation on file to indicate the degree or extent of the surface preparation.

In an effort to increase temporary ore stockpile capacity for on-site and off-site ores, an Engineering Design Change approved by the Division in June 2014 authorized the construction of a new lined ore stockpile pad (OSP) at the Mineral Ridge Mine.

The new OSP will feature a high-density polyethylene (HDPE) liner to contain and convey meteoric run-off captured by the pad. Ore will be hauled to the site and placed on the pad using conventional over-the-road tractor trailers. A front end loader will be used to consolidate the trailer dumped piles of ore, and to transfer ore from the stockpile to the crushing circuit.

The OSP was approved to be located to the west of the existing crushing plant, between the crusher and the stormwater pond; however, the new tailings filtration circuit has been approved in this location and a new location for the stockpile will be proposed prior to construction. The OSP is designed such that the geomembrane lined base is generally below existing ground grade. The pad base is designed to drain generally from east to west, and discharging to anoxic lime chambers, via a collection pipe and outlet channel. The pad base, from bottom to top, consists of prepared liner subgrade, 80-mil HDPE liner, and a 3-foot layer of overliner material.

Ore will be stacked directly on the overliner material. A 4-inch diameter perforated corrugated polyethylene (CPe) collection pipe will be placed on the top of the geomembrane along areas of grade changes where solution will drain and will be spaced across the pad to minimize hydraulic head on the liner. The lined perimeter berms will prevent run-on waters from flowing onto the pad. Access to the pad is via a ramp over the berm on the north side. The pad base flows to the outlet collection channel, where the collection pipe transitions to a solid HDPE pipe with secondary containment provided by an HDPE-lined outlet channel.

The HDPE pipe discharges into a three-chamber lime treatment vault, which is designed to gravity drain into the existing double-lined Process Pond which was constructed as part of the original HLP construction. With the potential for run-off from the stockpile to lower the pH, the lime treatment vault will serve to raise solution pH before discharging into the stormwater pond. The lime treatment vault is a 2,000-gallon capacity pre-cast concrete vault with three interior chambers. Lime will be placed in the vault by placing a 1-ton capacity bulk material bags filled with granulated lime into each chamber. The lime filled bags will be removed from the chambers and replaced as necessary. The vault will have grate lids, and the secondary containment channel HDPE liner will be battened to the vault such that any flows in excess of the hydraulic capacity of the vault will overtop the vault and will report to the pond. Secondary containment for the vault itself will be provided by a geomembrane liner installed in the excavation for the vault installation. A vertical HDPE pipe will be installed to monitor and evacuate any fluids reporting to secondary containment for the vault.

Contact water percolating through or running off the stockpiled ore will drain to the west of the OSP. The contact water will be contained by the lined pad base and perimeter berms and drain to the outlet channel toward the west. To evaluate the volume and flowrates of the contact water, run-off resulting from the 100-year, 24-hour storm event was estimated using a total precipitation of 2.4-inches falling on the OSP without ore. The expected peak flow rate from storm flows due to direct precipitation on the stockpile containment from the design storm event is 0.7 cubic feet per second (cfs).

The outlet pipes have been sized to handle the estimated flows at a flow depth of 50-percent of the pipe diameter. The design flow rate of the lime chamber is 1.6 cfs. Total run-off volume from the design storm event is approximately 19,500 gallons. This additional volume is predicted to raise Stormwater Pond water level less by than 0.5 inches, or approximately 1-percent of the 2-foot design freeboard. The additional water volume reporting to the Stormwater Pond is extremely small and is not expected to adversely impact pond function.

Crushing (ROM only): The crushing circuit will produce crushed product from the ROM feed of 80-percent passing 3/8-inch. The crushing circuit will consist of a 32-inch x 48-inch jaw crusher with a close side setting (CSS) of 4-inches that will be fed by a feeder with a maximum rock size of 24-inch, which is controlled through the grizzly. The jaw crusher will feed a 400 horsepower secondary cone crusher with a CSS of 5/8-inch. The cone crusher will work on a close loop with a double deck screen (7/8-inch and 5/8-inch apertures) to produce a final product of 80-percent passing 3/8-inch. Final crushed product will be transported north to the ball mills by a single belt conveyor and then split to feed the two ball mills equally.

Heap Leach Reclaim Feed: The existing heap leach material will be reclaimed with a front loader at a rate of approximately 180 tons per hour (tph). The reclaimed material will be fed to the 11,000-gallon Leach Pad Reclaim Mixing (LPRM) tank through a vibrating grizzly that will remove previous heap leach operation trash (plastic piping, etc.) and control the maximum particle size to ¼-inch. The mixing tank will be agitated, and process water added at a rate of approximately 500 gallons per minute (gpm) to form slurry with approximately 55-percent solids. The LPRM tank is designed to be semi-mobile and is intended to be relocated to suit the heap-pad mining process. Since the LPRM tank is located on the heap leach pad and contained by the means of the pad liner, any accidental spills will be contained and will report to the Process Water Pond.

The slurry from the LPRM tank will then be pumped to the approximately 49,200-gallon Leach Pad Reclaim Holding (LPRH) tank which has a designed retention capacity of 60 minutes, and then pumped to the Cyclone Feed Pumpbox located in the mill building. The LPRH tank will be located in a concrete containment providing 110% containment. The concrete containment will also house the tailings filtration presses.

Grinding Area: The slurry will feed the Cyclone Feed Pumpbox at a maximum design rate of 865 gpm. The grinding circuit design includes two ball mills, each with a 1,800 horsepower motor. Both mills operate in parallel with a shared discharge pumpbox (Cyclone Feed Pumpbox) and each in closed-circuit with a hydrocyclone pack (Cyclopac) that will control the grinding circuit product size. Each cyclopac will have nine cyclones of 10-inch diameter with an arrangement of seven operating and two in standby. The cyclopac overflow has a design size of 80-percent passing 200 mesh, which will then flow by gravity at a maximum design rate of approximately 2,000 gpm to the CIL trash screen of the CIL inter-stage screens. The cyclopac underflow will report to the ball mills at a solids content of 77-percent by mass. The ball mills are designed to process 2,000 tpd each at 92% availability.

The mill building will be supplied with a concrete containment and floor sump. The mill building floor and sump system is designed to have a holding capacity of 45,000-gallons. The Cyclone Feed Pumpbox, which is the largest piece of equipment by volume in the mill building, has a design capacity of 4,400-gallons. Since the grinding area is within a building, meteoric water does not occupy any of the available containment volume.

Leaching Area: The CIL Trash Screen undersize will be pumped to the 376,000-gallon, 80-foot diameter CIL Thickener. Flocculant will be added to the thickeners to aid in the settling process. The underflow density of the thickener is approximately 45-percent solids. The thickener underflow will report to a pump box from which the slurry will then be pumped to the leaching circuit. The thickener overflow will be recycled to the Process Water Pond.

There will be four 734,000-gallon CIL leach tanks (50-foot diameter, 52 feet tall) operating in series. The leach feed density will be adjusted, if necessary, in the CIL Thickener to operate at 45-percent solids. Air will be injected into the tanks through spargers, aiming to improve oxygen dissolution in slurry during the leaching of gold and silver. Slurry will arrive at the CIL circuit at a pH of 10.5 and will be adjusted as necessary to maintain high alkalinity. Cyanide concentration in the slurry will be maintained at 500 milligrams per liter (mg/L) to 1,000 mg/L sodium cyanide. The slurry will flow by gravity between the CIL tanks. Each tank is equipped with agitators to maintain its slurry solids in suspension, one inter-stage screen to prevent activated carbon from flowing co-current with the slurry, and one carbon advance pump for carbon movement counter-current with respect to the slurry flow. Interconnecting tank launders will be arranged so that any tank in the circuit may be bypassed, while the circuit continues to operate at a lower residence time or throughput. Under normal operating conditions, each CIL tank will contribute nine hours of residence time.

After the leaching process, barren slurry from the final leaching tank will flow to a carbon safety screen, which will prevent the loss of carbon in case carbon is allowed to escape the process by bypassing an inter-stage screen. The safety screen undersize slurry will report to the 376,000-gallon, 80-foot diameter Tailings Thickener. At the tailings thickener, the barren slurry will be thickened to produce an underflow product of 55- to 60-percent solids to aid with filtration. The thickener underflow will be pumped to the Filter Feed Pumpbox. The tailings thickener overflow will be recycled to the Process Water Pond.

Fresh carbon will be added to the final tank after rinsing with fresh water in the carbon sizing screen. The designed activated carbon concentration in the leaching tanks is 15 g/L. The carbon will be moved counter-current to the slurry flow by carbon transfer pumped. Dissolved gold and silver in the slurry will be adsorbed onto activated carbon and removed from the circuit at the first tank. The loaded carbon will be captured in the oversize of the Loaded Carbon Screen. The Loaded Carbon Screen will be supplied with fresh water to clean and decontaminate the carbon to remove cyanide for shipping offsite. Loaded carbon will be bagged and transported to an external facility for final gold and silver recovery. The loaded carbon screen undersize will be returned to the CIL circuit.

The existing equipment for carbon receiving, attritioning, sizing, sampling, and shipping the loaded carbon to the external facility will be reusable in the new process. Also, the existing cyanide mixing system will be utilized in the new process. The cyanide solution will be introduced to the Process Water Pond, and the cyanide concentration in the pond will be maintained as required for the CIL process.

The CIL containment area will be constructed from concrete to contain the cyanide bearing slurry and solutions in case of accidental spills. The CIL area will house the CIL Thickener, four CIL tanks, and the Tailings Thickener as major equipment. The CIL containment volume is sufficient to contain 110% of the largest vessel (734,000-gallon CIL tank) plus the 25-year, 24-hour storm event since it is an open containment.

Tailings Filtration: The tailings thickener underflow will be pumped to the Tailings Filter Feed Pumpbox. Slurry from the pumpbox will then be pumped to the two operating pressure filters. The filtrate will report to the Process Water Pond. The tailings filter cake, at a design 15-percent moisture content, will be transported by existing grasshopper stacking conveyors to the DSTF.

The existing liner will be expanded to provide continuous containment from the HLP/DSTF to the Tailings Filtration area. The expanded liner will provide containment for the grasshopper conveyors which will transport filtered tailings.

As mentioned previously, the LPRH tank will also be located within the same concrete containment housing the Tailings Filter Presses. The containment size is dictated by the LPRH tank, the largest vessel in the containment. The filtrate will report to the sump in the tailings filtration area, which will then be pumped via a pipe-in-pipe arrangement to the Process Water Pond.

The Tailings Filtration containment is designed as an open containment and therefore has been designed to accommodate the 25-year, 24-hour storm event.

Heap Leach Pad (HLP) Design, Construction and Operation: The seven-cell HLP consists of a pad base and perimeter berms lined with Linear Low-Density Polyethylene (LLDPE) liner, a solution collection system, and a process solution pond system also lined with LLDPE. The total lined area of the pad is approximately 1.7 million square feet (sq ft).

The HLP was initially permitted to a maximum height (at closure) of 140 feet above the lowest point of the liner surface, with a total ore capacity of approximately 5.5 million tons. The 2014 Permit renewal proposed a height increase from 140 above the liner surface to 190 feet, increasing ore capacity from 5.5 to 7.6 million tons.

The HLP was constructed in two phases: Phase I was constructed in 1997 and included Cells 1 through 3 and the process ponds. Phase II was constructed in 1999 and included HLP Cells 4 through 7. Each cell has its own dedicated leak collection and recovery system (LCRS). The original HLP design proposed the use of 40-mil polyvinyl chloride (PVC) liner; however, because of long-term liner performance concerns, the design was revised and the PVC liner was replaced with 60-mil LLDPE. For Phase I, the liner was underlain by a 12-inch layer of low-permeability soil with a specified permeability of no greater than 1×10^{-5} centimeters per second (cm/sec) at 95-percent compaction (ASTM Method D1557).

For the Phase II design, 60-mil LLDPE was used as the liner over a geosynthetic clay layer (GCL) to replace the 12-inch layer of low-permeability soil. For both phases, 2 feet of free-draining gravel overlies the primary liner for solution collection and liner protection.

The Phase I HLP drainage collection system consists of a network of perforated 3-inch and 4-inch diameter single wall corrugated polyethylene tubing (CPET) collection pipes, tied to perforated 8- and 10-inch diameter double-wall CPET collection headers and solid high density polyethylene (HDPE) collection headers.

The collection headers discharge into the solution collection channel, and ultimately to the process ponds.

The Phase I LCRS consists of 2-inch diameter perforated PVC pipes placed in a shallow V-ditch beneath the liner. The pipes are bedded in pea gravel and located beneath the 8- and 10-inch diameter perforated CPET drainage collection headers. The perforated PVC pipes transition to 2-inch diameter non-perforated PVC leak detection pipes at the lowest point of the respective cell reporting to the LCRS sumps installed at the north end of the HLP, between the HLP and the process pond. Risers attached to the sumps serve as observation ports. Solution collected in the sumps is pumped to the process pond. Sump overflow drains by gravity to the process pond.

The Phase II HLP drainage collection system consists of a network of perforated 3-inch and 4-inch diameter single wall CPET collection pipes, tied to perforated 10-inch diameter double-wall CPET collection headers and solid HDPE collection headers. The collection headers discharge into the solution collection channel, and ultimately to the process ponds.

The Phase II LCRS consists of a 7.5-foot wide strip of geonet placed beneath the liner at 50-foot center-to-center spacing, directly beneath the 10-inch diameter leach solution collection pipes for each cell.

A secondary layer of 12 ounce per square yard (oz/sq yd) geotextile is placed beneath the geonet strip. The strips drain into an AmerDrain™ sheet drain placed under the primary liner. The sheet drains transition to 2-inch diameter non-perforated PVC leak detection pipes installed at the north end of the HLP, between the HLP and the process pond. Risers attached to the sumps serve as observation ports. Solution collected in the sumps is pumped to the process pond.

HLP Conversion to Dry Stack Tailings Facility: With the 2019 major modification, the HLP was approved by the Division for conversion into a dry stack tailings facility (DSTF) to accommodate the new CIL circuit and Tailings Filtration process. With the conversion, leached ore on the heap leach pad and ore from the pit expansions will be processed through the CIL circuit and tailings filtration system and re-stacked onto the HLP/DSTF.

The overall expansion of the existing pad will consist of two different phases. The Phase I expansion will consist of expanding the western edge of the pad approximately 500 feet, generating an additional lined area of 417,100 square feet. This expanded area will allow for the placement of filtered tailings generated from ore offloading on the existing pad. Placement of filtered tailings in the Phase I expansion will be performed in a manner preventing the filtered tailings stack from comingling with the existing ore.

The Phase II expansion will consist of expanding the eastern edge of the pad approximately 300 feet, generating an additional lined area of 342,200 square feet. This expanded area will be used for filtered tailings placement, which will be placed alongside the existing ore surface. As the ore surface removal moves west to east, the placed filtered tailings on the eastern expansion will be moved to the west until the ore removal is complete, leaving the eastern expansion open to placement of future filtered tailings.

The expansions have both been designed in a similar manner as the existing HLP. The foundations will consist of a 12-inch thick low permeable material with a permeability coefficient equal to or less than 1×10^{-6} cm/s (Prepared subgrade) compacted to a minimum 95 percent of the maximum dry density (ASTM D1557) overlain with an 80-mil double-textured HDPE geomembrane. A 24-inch thick layer of overliner will then be placed over the geomembrane to protect it during the early loading stages of the pad and to create a flow path for any meteoric water coming into contact with the pad area.

Within the overliner layer, a piping system consisting of 4-inch diameter CPe pipes will be placed to assist with the removal of fluid within the overliner layer. Pipes within the Phase I expansion will tie in to a 10-inch diameter CPe pipe to act as a main collection pipe and transfer flow to the north or south ends of the pad where it will be directed to the existing Process Water Pond. The Phase II pipes will tie in to the existing heap leach pad drainage system.

Vertical Standpipe Installation, Operation, and Division Concerns: In 1999 and prior to the current Permittee taking ownership of Mineral Ridge, three vertical fluid collection standpipes (PB-1, PB-2, and PB-3 were installed within the HLP in response to the observed poor performance of the HLP pregnant leach solution collection system.

As of January 2014, two of the standpipes (PB-1 and PB-3) are currently exposed, while the third standpipe (PB-2) remains in place but is covered with ore. Each standpipe consists of a 30-inch diameter steel pipe installed vertically in the ore with the bottom portion of the pipe perforated with an end cap placed at the end of the pipe. At no time does the standpipe penetrate the 2-foot drain gravel layer above the LLDPE liner.

PB-1, the northernmost standpipe within the HLP, has been dry since it was installed in 1999. The exact location of PB-2, the centrally located standpipe, is unknown. Site personnel recall that this standpipe was observed to be dry prior to being covered with ore in 2004. PB-3, the southernmost standpipe, is 20 feet in length and has a pump installed to prevent the accumulation and ponding of pregnant leach solution within the southern toe of the HLP. A 15-horsepower (HP) submersible pump and level switch have been installed in the bottom of the standpipe. The pump discharges through a 3-inch diameter HDPE pipe and then transitions to a 6-inch diameter HDPE pipe, routed across the HLP surface to the solution ponds. A flowmeter installed on the discharge line is used to monitor volumetric flow which averages 5 gpm. Observed solution depth in standpipe PB-3 is typically between 2 and 2.5 feet. The minimum design criterion for a single-lined HLP requires that a hydraulic head of 1 foot or less must be maintained at all times. Otherwise a system for hydraulic relief must be installed and operational.

An EDC approved by the Division on 30 August 2012, authorized the installation of a fourth vertical standpipe (PB-4) within the HLP. Standpipe PB-4 is similar in design to PB-3, and includes a dedicated pump installed within the standpipe. The pump is designed to discharge to a 6-inch HDPE discharge line that ties-in to the existing 6-inch discharge line from PB-3. Double check valve assemblies installed in the discharge line are intended to prevent direct pumping of solution from PB-3 to PB-4 and vice versa.

PB-4 consists of a 30-inch diameter steel pipe installed vertically in the ore, such that the bottom of the pipe is above the existing 2-foot thick layer of overliner material (gravel) placed over the geomembrane. The bottom 8 feet of the standpipe is perforated and non-woven geotextile is wrapped around the perforated portion of the pipe to provide a filter and prevent drainage layer and ore materials from filling the standpipe.

The drainage layer material is placed around the pipe for the full length to the pipe. A steel end cap has also been installed on the bottom of the standpipe as well. As subsequent lifts or ore are place on the pad, the standpipe can be extended vertically. A submersible sump pump is installed in the bottom of PB-4. The pump requires a minimum pumping capacity of 500 gpm to overcome the 50 feet of head. Once the ore exceeds an elevation of 7,210 feet amsl, additional pumping capacity may be required.

Since PB-4 first came online, the standpipe has remained dry with occasional minor accumulations of pregnant leach solution observed in the pipe. According to the Permittee, a new standpipe location is being investigated, however in the interim; the Permittee is of the opinion that the PB-3 pump back system can adequately manage any solution that has accumulated within the southern toe of the HLP.

The standpipes will be kept in place during the conversion of the HLP to a DSTF.

DSTF Slope Stability: Slope stability studies were conducted under static and pseudostatic conditions in support of the conversion of the pad to a DSTF. Stabilities were analyzed for three cross sections representing the most critical conditions along the ultimate facility geometries. In general, these locations correspond to the steepest existing ground and the longest facility slopes.

Stability evaluations were completed for both static and pseudostatic conditions using the computer modeling program SLIDE 7 by Rocscience (SLIDE). SLIDE is a two dimensional slope stability program used to model circular and noncircular failure surfaces in soil or rock slopes using limit equilibrium methods. Spencer's procedure was utilized within the stability model.

Spencer's method calculates the shear strengths that would be required to just maintain equilibrium along the selected failure plane, and then determines a safety factor by dividing the available shear strength by the driving shear stress. The SLIDE program automatically iterates through a variety of potential failure surfaces, calculates the safety factor for static and pseudo-static conditions for each surface. Minimum acceptable factors of safety for static and pseudostatic conditions were established as 1.3 and 1.05 respectively.

Testing was performed on filtered tailings to further define the material strength and deformation properties. The results indicated that the material is stronger than assumed in the model. The conservative stability analysis resulted in factors of safety of 1.4 and 1.06 for static and pseudostatic conditions respectively.

Sediment Collection Structures: In 2011, the Permittee initiated a program to improve HLP performance. Among the improvements was the removal of two Sediment Collection Structures (SCS), referred to on site as the "Frog Ponds" or "Exit Dams".

The SCS appear to have been constructed to prevent sediments from the HLP from flowing into the Process Ponds. Engineering designs for the SCS only appeared on the original design drawings for the HLP, have not appeared on any subsequent drawings or were discussed in any design report documentation.

The SCS consist of two HDPE lined berms about 18 inches in height installed across both of the pond inlet channels. The berms were constructed by placing sand bags across the channel, and extrusion welding a piece of 60-mil HDPE over the sand bags and to the channel geomembrane liner. The 10-inch diameter solid HDPE solution collection pipes are installed in the pond inlet channels and penetrate each of the berms.

Continued operation of the sediment control structures has resulted in the accumulation of a small volume of pregnant solution behind the berms. To preclude wildlife exposure from this solution, the Permittee installed plastic netting over this area for each SCS.

To reduce sediment flow into the process ponds, the Permittee has welded new 60-mil HDPE overliner retention berm at the toe of the overliner and HLP. With this new retention berm installed, the sediment control structures were no longer required, and as a result the Permittee submitted an EDC in August 2011 (approved by the Division on 30 August 2011) to remove the structures to eliminate the accumulation of pregnant leach solution, and allow the solution to flow unimpeded into the process ponds.

Removal of the sediment control structures consisted of cutting the existing 60-mil HDPE liner above the weld that attaches SCS liner to the solution channel liner and the sand bags. Following removal, the solution channel liner was inspected and any damaged areas found were repaired. Any new liner patches and seams were welded and tested.

Process Pond: The double-lined and leak detected process pond is located 100 feet north of the HLP/DSTF. The pond was designed and constructed with an internal berm, approximately 5 feet above the pond floor to divide the pond into a pregnant pond (388,300 gallons) and a barren pond (750,800 gallons) for previous leaching operations. The volume above the internal berm provided for the combined emergency storage of HLP draindown and stormwater (approximately 5,905,000 gallons) accumulations resulting from the 25-year, 24-hour storm event plus process solution resulting from a 24-hour draindown period.

With the new CIL process, the pond will function as one Process Water Pond and has a total capacity of 4.1 million gallons and will receive overflow from the thickeners, filtrate from the tailings filtration process, and meteoric water from the HLP/DSTF.

The primary and secondary pond liners are 80-mil and 60-mil HDPE synthetic liners, respectively. The geonet layer between the liners drains toward a gravel-filled sump located in a corner of each of the ponds. Perforated four-inch diameter pipes extend from the base of each sump and daylight at the surface where routine monitoring and evacuation is required.

Process Facility Design, Construction and Operation: The previous HLP process facility is located inside a 95-foot by 34-foot steel building, located approximately 200 feet north of the HLP and 200 feet west of the process pond. The facility is designed and constructed with a concrete floor surrounded by a concrete curb and will not be used for the new CIL process. Reagent vessels located outside and within containment include a caustic tank, dilute nitric acid tank, and cyanide tank. All concrete containment areas have a watertight seal and are protected with epoxy or equivalent. The floor is sloped to floor drains that direct any escaped process solution to a central sump and ultimately to the barren pond.

Diversion Structures: Diversion structures are located near the east and west toes of the HLP/DSTF. The v-shaped structures have been designed, constructed, and must be maintained to divert runoff resulting from the 100-year, 24-hour storm event away from the pad.

Ancillary and Support Facilities: Ancillary and support facilities include an administration building, a laydown area, a "shifter's" building, a warehouse building with an adjoining analytical laboratory, a drive-through truck shop capable of accommodating medium size mining equipment, a wash pad, and fueling station.

The administration building is located approximately 35 feet east of the main entrance gate; the laydown area is north of the administration building. The “shifter’s” building and warehouse/analytical laboratory building are located west of the process pond and approximately 50 feet north of the Process Facility. The truck shop, wash pad, and fueling station are located approximately 500 feet north of the process pond and 700 feet northeast of the warehouse/analytical laboratory.

The original fueling station was located approximately 110 feet north of the truck shop. The fueling station was constructed in the early to mid-1990s and was used to store and dispense fuels, solvents, oils, engine coolant, hydraulic fluids, transfer hoses, and various fluid transfer devices.

Because of the containment issues and soil contamination, the Permittee agreed to permanently close the original fueling station (including the removal of all tanks and containers), remove petroleum contaminated soil pursuant to the approved final plan for permanent closure (FPPC), and construct a new fueling station, adjacent to and north of the wash pad and a new oil station to be located on the north side of the truck shop. A final closure report documenting the Permittee’s closure activities of the removed fueling station was approved by the Division on 15 July 2010.

An EDC, approved by the Division on 5 May 2010, authorized construction of a new fuel and lubricant storage/dispensing station at the Mineral Ridge Mine site. Two 10,000-gallon, double-wall steel tanks, each with 110-percent containment capacity, have been constructed. Tank 1 stores “red” diesel and Tank 2 stores 7,000 gallons of “clear” diesel and 3,000 gallons of unleaded gasoline in separate compartments. Each tank has its own dedicated fuel dispensing system.

The tanks are installed on an 8-inch thick reinforced concrete pad, approximately 40 feet by 32 feet, and graded to drain to the existing wash pad. The wash pad drains to the existing settling pool and overflows to the oil skimmer. A 4-inch high rounded berm surrounds the pad and all concrete joints are sealed with Synko-Flex (or equivalent) water stop material.

A new oil station consisting of three, double-wall steel tanks (Tanks 3, 4, and 5), each with containment in excess of 110-percent capacity, have also been constructed. Tank 3 has a capacity of 1,000 gallons and is utilized for motor oil storage. Tank 4 also has a capacity of 1,000 gallons and is utilized for hydraulic fluid storage. Tank 5 has a capacity of 500 gallons and is utilized for used oil storage. Each tank has its own dedicated delivery system inside the truck shop.

The tanks are installed on an 8-inch thick reinforced concrete pad, approximately 16 feet by 14 feet. A 4-inch high rounded berm surrounds the new pad and all concrete joints are sealed with Synko-Flex (or equivalent) water stop material.

Potable Water Treatment Plant: An EDC, approved by the Division in December 2016, authorized construction of a potable water treatment plant required by the Bureau of Safe Drinking Water (BSDW). A sanitary survey was conducted by the BSDW on 5 May 2015 of Mineral Ridge Mine's potable water system. The system was classified as a Non-Transient, Non-Community Public Water System. The survey identified multiple non-compliant regulations associated with NAC 445A for potable water systems. One of the non-compliant issues involved the lack of potable water that meets the Safe Drinking Water Rule for Primary and Secondary Standards. Due to the water quality in PW-2, the public water system required a treatment system to reduce the concentration of Total Dissolved Solids, manganese, sulfate, and iron to meet drinking water standards.

The new water treatment facility requires several pretreatment systems followed by a reverse osmosis filter system to remove the impurities from the well water to meet Safe Drinking Water Standards. Currently, PW-2 discharges into a 125,000-gallon capacity steel bolted water storage tank. The new treatment system design involved tapping into the existing non-potable water pipeline that exits the water storage tank as the raw water feed to the proposed water treatment system. The raw water feed will enter the pretreatment system, which is made up of three filters. The pretreatment systems include a multimedia filter, greensand filter, and granular activated carbon filter. The purpose of the pre-treatment filters is to remove iron and manganese from the water prior to the reverse osmosis (RO) filter. If these impurities are not removed, they can prematurely clog the RO filter reducing the filter's life expectancy. Once the raw water pretreatment filters and the RO filter remove the manganese and iron, water will pass through a series of RO filters and then into three 600-gallon poly tanks. Each of the pretreatment filters and the RO filters will generate a wastewater stream that will need to be contained and managed.

The pretreatment filters will each require a backwash cycle of 6.6 gpm in order to clean the filters. The duration of each backwash cycle has been designed for 20 minutes approximately once every 2-3 days. When the differential pressure through any of the pretreatment filters reaches 10 pounds per square inch (psi), the treatment system will automatically shut down and conduct a backwash of all three pretreatment filters.

The RO filter system has been designed for a feed rate of 3000 gallons per day (gpd) with a 50% recovery rate. The raw water feed is anticipated to contain a total dissolved solids (TDS) concentration of 1500 mg/l. Once the raw water is filtered, the TDS in the finished water will contain an approximate TDS of 36 mg/l. With a 50% designed recovery rate, the wastewater stream will be 1500 gpd with a TDS of 2966 mg/l. Assuming a very conservative wastewater stream of

1470 gpd from the RO filters, the total daily wastewater stream from the four filter systems will average 1668 gpd.

The wastewater streams will be discharged into a 1000-gallon precast concrete rejection sump containing redundant submersible effluent pumps. Each pump is capable of pumping 25 gpm at 27 feet of total dynamic head. When the sump reaches a predetermined level, one of the submersible pumps will pump the wastewater up and into the synthetically lined 1.3-million gallon fresh water pond. Since the estimated wastewater discharge has been estimated to be 1668 gpd from the treatment system, it has been assumed the same volume will be pumped into the synthetically lined freshwater pond daily. This equates to a 0.13% influx of a concentrated wastewater containing 198 gpd of backwash effluent from the three pretreatment filters and 1500 gpd of 2966 mg/l TDS from the RO filter. Since the freshwater pond is the supply source for the process water in the mining operations, issues from the wastewater stream daily influx are not anticipated.

C. Site Hydrology/Hydrogeology and Background Groundwater Quality

The Mineral Ridge Project is located within the Clayton Valley Hydrographic Sub-basin (HA-143). A majority of the groundwater recharge within this basin is due to precipitation, the project site typically receives between 4 and 5 inches annually. Groundwater at the Mineral Ridge Project site flows eastward from the Silver Peak Range to the alluvial basin of Clayton Valley.

During mineral exploration at the Mineral Ridge site (ca. 1994), a perched groundwater zone was identified at borehole #MR95385 at a depth between 540 and 565 feet bgs. For a short period, groundwater flowed from the borehole at a rate of 20 gpm. As drilling continued, the perched zone dried up until more significant water was encountered at approximately 900 feet bgs. A production well (PW-1), located approximately 2,000 feet south and upgradient of the HLP and process pond was installed. Completion data indicated a well collar elevation of 7,045 feet amsl and a completed depth of 1,855 feet bgs. The current depth to groundwater at production well PW-1 is approximately 1,025 feet bgs. Since 2010, PW-1 has been losing production capacity and is currently capable of producing up to 50 gpm of water.

Characterization results from PW-1 show that the groundwater meets the Profile I reference values for most constituents, the only exception being the naturally elevated TDS, sulfate, iron, and manganese concentrations which have continued to remain above the Profile I reference values.

Because of concerns regarding the ability of PW-1 to maintain adequate production capacity, the Permittee proposed installation of a second production well in June 2012 as an EDC. The EDC, approved by the Division 18 June 2012, authorizes the design construction, operation and closure of a second production well (PW-2), to be located approximately 1,200 feet southwest of the administration building.

Production well PW-2 was drilled to a total depth of 2,150 feet bgs and constructed with a perforated section from approximately 1,859 to 2,119 feet bgs. The static water level was measured at 833 feet bgs. An airlift test resulted in a production rate of approximately 65 gpm and a draw down below the static water level of 700 feet over a two-hour time period. Use of this well began in 2013. Water level measurements taken between 2013 and 2017 have ranged from between 884 and 1,900 feet bgs.

A submersible pump pumps water to the surface (estimated pump rate between 100 and 200 gpm) and a 6-inch diameter, standard design ratio-17 (SDR-17) HDPE pipeline conveys water from the PW-2 wellhead to the Freshwater Storage Tank, located approximately 660 feet southeast of the administration building and 90 feet east of the Freshwater Storage Pond. Total pipe run is estimated at 2,220 feet.

For a more detailed discussion of the Mineral Ridge Project site hydrogeology can be found in the document titled *"Baseline Hydrologic Characterization of the Mary Drinkwater Project, Esmeralda County, Nevada" (Hydro-Search, 1996)*.

Surface Waters: Six surface drainages (Great Gulch, Custer Gulch, Echo Canyon, Eagle Canyon, Eagle Nest Canyon, and New York Canyon) have been identified within a 1-mile radius of the Mineral Ridge Project site. Each of these drainages is ephemeral, flowing east into Clayton Valley. Evaporation exceeds precipitation during most of the year in the area and when flows are present they are of short duration.

Two springs (Tarantula Spring and Borgo Spring) are located within a one-mile radius of the Mineral Ridge Project site. When flowing, the measured flow rates are less than 1 gpm. Water quality results from Tarantula Spring indicate regular exceedances of the Profile I reference values for TDS, sulfate, and magnesium. Borgo Spring has remained dry.

For a more detailed discussion of site hydrogeology, refer to the document *"Baseline Hydrologic Characterization of the Mary Drinkwater Project, Esmeralda County, Nevada" (Hydro-Search, 1996).*

D. <u>Procedures for Public Comment</u>

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 Effluent Limitations, Schedule of Compliance, Special Conditions

See Section I of the Permit.

G. Rationale for Permit Requirements

The facility is located in an area where annual evaporation is greater than annual precipitation. Therefore, it must operate under a standard of performance which authorizes no discharge(s) except for those accumulations resulting from a storm event beyond that required by design for containment.

The primary method for identification of escaping process solution will be placed on required routine monitoring of leak detection systems as well as routinely sampling downgradient monitoring well(s) and surface water. 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: Michelle Griffin
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