FACT SHEET

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

Permittee Name: **Nevada Gold Mines LLC**

Project Name: **Fortitude/Reona (Phoenix) Project**

Permit Number: **NEV0087061**
Review Type/Year/Revision: **Renewal 2021, Fact Sheet Revision 00**

A. Location and General Description

Location: The **Fortitude/Reona (Phoenix) Project** is located in Lander County on private land (approximately 5,027 acres) and public land (approximately 3,315 acres) administered by the U.S. Bureau of Land Management (BLM) Battle Mountain District-Mt. Lewis Field Office. The Project is located in the historic Battle Mountain Mining District, within all or portions of Sections 15, 16, 20-29, and 32- 36, Township 31 North (T31N), Range 43 East (R43E); and Sections 1-11 and 14- 22, T30N, R43E, Mount Diablo Baseline and Meridian, approximately 13 miles south of the town of Battle Mountain, Nevada.

Site Access: From central Battle Mountain, proceed south approximately 12 miles on State Route (S.R.)-305 to Buffalo Valley Road. Turn west on Buffalo Valley Road and proceed to the mine site, a distance of approximately 6 miles.

General Description: The Fortitude/Reona (Phoenix) Project is authorized to process up to 20,000,000 tons of ore annually. The facilities at the Phoenix Project site are required to be designed, constructed, operated, and closed without any release or discharge from the fluid management system except for meteorological events which exceed the design storm event.

The Phoenix Project consists of the following:

1. Two open pit mines (Phoenix and Iron Canyon Pits) with an average mining rate of approximately 110,000 tons per day (tpd);
2. Five active waste rock disposal facilities (Natomas, Philadelphia Canyon, Box Canyon, Bonanza In-Pit and Fortitude In-Pit);
3. Five inactive and reclaimed waste rock disposal facilities (North Fortitude, Butte Canyon, East Iron Canyon, North Iron Canyon, and South Iron Canyon);
4. A multi-stage 48,000 tpd and 20,000,000 ton per year (tpy) gold, silver, and copper ore beneficiation facility comprised of the following:
    a. A crushing and grinding circuit for size reduction.
    b. A gravity separation facility and a dedicated cyanide leaching facility for gold and silver.

c. A three-stage flotation circuit for concentrating copper, gold, and silver, followed by filtration for shipment and subsequent off-site processing.
d. A cyanide vat leaching circuit followed by carbon-in-pulp (CIP) circuit for beneficiating the remaining ore fraction and production of a precious metal doré through carbon stripping, electrowinning, and retorting that will be transported off site for further refining.

5. Run-of-mine (ROM) gold and silver heap leaching operation. Heap leach ore is delivered as ROM or crushed to the Reona Gold Heap Leach Pad (HLP);
6. ROM copper heap leaching operation (Phoenix Copper Leach Project) consisting of two ROM copper HLPs (Phoenix and Reona) and a solvent extraction and electrowinning (SX-EW) facility;
7. A synthetic-lined tailings storage facility (TSF) constructed over the existing, historic copper tailings facility;
8. Lined process ponds; leak detection, collection and recovery systems; stormwater diversion structures, and groundwater monitoring systems;
9. Ancillary infrastructure including, but not limited to maintenance shops and warehousing, administration buildings, bulk fuel and reagent storage, covered concentrate stockpile facility, training facility, wash bay, electrical substation, explosives storage, equipment ready lines, potable water and septic systems; and
10. An on-site Petroleum-Contaminated Soil (PCS) management facility, approved by the Nevada Division of Environmental Protection—Bureau of Mining Regulation and Reclamation (the Division) in August 2011.

B. <u>Synopsis</u>

Background/History: During the early 1860's, prospectors searching for silver discovered several small porphyry and vein-type copper deposits in Copper, Cottonwood and Galena Canyons and the Copper Basin areas of northwest Lander County. The areas were incorporated as the Battle Mountain Mining District in 1866, and within two years, the district listed over 30 mines, two smelters and a mill facility to recover copper and other base metals and minor amounts of silver and gold.

In 1909, several large placer deposits (referred to as the "Dahl Placers" after James Dahl) were discovered at the mouth of Copper Canyon, near the historic Natomas Camp site. The discovery of the placer gold deposit began a shift from labor-intensive underground copper mining to placer gold mining. Recognizing this, in 1916 the newly formed Copper Canyon Mining Company began acquiring base and precious metal claims in the Copper Canyon and Copper Basin areas and operated several small placer mines in both areas until 1955. The company also operated a small mill to recover copper, gold, and silver at Copper Canyon from 1941 until the company folded in 1957.

Between 1949 and 1955, the Copper Canyon area was also the site of a land dredging operation. The Natomas Gold Dredging Company disassembled and moved their large dredge, the *"Natomas"*, from Manhattan in Nye County, Nevada, to work the historic Dahl Placers. Although operation of the dredge was short lived, it did manage to show profitability for several years.

In 1967, Duval Corporation (Duval) acquired claims at Copper Basin and Copper Canyon from American Smelting and Refining Company (ASARCO). Duval implemented a modernization program to increase copper and byproduct gold recovery from the combined milling and leaching operations at the Copper Canyon Mill. Due to falling copper prices, the mill was converted from copper concentrate production to a gold cyanide leaching, CIP adsorption facility in 1978, and continued operation into the early 1990's by Battle Mountain Gold Company (BMGC) when it was replaced by the heap leaching of low-grade disseminated gold ores.

Water Pollution Control Permit (WPCP) NEV0087061 (Permit) was first issued in September 1992 in conjunction with a Schedule of Compliance (SOC) item to address reclamation and closure of the Duval pre-regulation Copper Basin mining operations and authorize mining of the Fortitude Pit gold ore and operation of the Fortitude Mill by BMGC in August of 1985.

The Permit authorized mining of the Fortitude Pit and beneficiation in the Fortitude Mill. The pit ceased production in early 1993 and the mill ceased operations in March 1993. In October 1993, the Permit was modified as the Reona Project to allow expanded open pit mining and gold-cyanide heap leaching operations. The Reona Gold HLP received lower grade ore from the South Canyon, Bonanza, and Sunshine open pits.

A Major Modification of the Permit, referred to in previous submittals as the "Phoenix Expansion" or "Phoenix Project", was approved by the Division in January 2001. This Major Modification authorized expansion of the existing operations in the Copper Canyon mining area, the expansion of existing open pits and waste rock dumps, an expansion of the Reona Gold heap leach facility, and construction of various ancillary support facilities. Also included was the development of a new open pit (Reona) and construction of a mill, gold recovery facility and tailings impoundment.

Newmont USA Limited dba Newmont Mining Corporation (Newmont) acquired BMGC, as a wholly owned subsidiary, effective 1 January 2003. In July 2019, Newmont and Barrick Gold Corporation entered into a joint venture transferring the Permit to Nevada Gold Mines LLC, the current Permittee.

Physiography, Geology, and Mineralization: The Phoenix Project site lies within the Basin and Range physiographic province and is composed of two relatively flat valleys and steep-sided ranges with approximately 3,700 feet of relief. Elevations range from approximately 4,520 feet along the Reese River to 8,232 feet at Antler Peak. The mountains serve as hydrologic divides that separate drainage basins. The mountain flanks are deeply incised in places, and the resulting canyons collect and discharge runoff to creeks and alluvial fans. The valley floors grade toward the Reese River and Buffalo Valley Playa.

Quaternary alluvial deposits cover most of the valley floors and lower drainage basins. In general, the alluvium fan away from the mountain fronts, with the coarsest material having accumulated in upper alluvial fan deposits and the finest material being deposited in the center of the valleys away from the mountain front. The valley fill in many basin and range valleys in Nevada can be more than 3,000 feet thick.

The Quaternary volcanic rocks within the Phoenix Project site principally consist of basalt flows southeast of Copper Canyon referred to as the Caetano Tuff. The Caetano Tuff has a maximum thickness of approximately 300 feet and caps ridges near Rocky canyon and Elephant’s Head, which lies to the northeast of the Phoenix Project site.

There are numerous small igneous intrusions of Mesozoic- and Tertiary-age exposed in the Battle Mountain Range. The most hydrologically significant intrusive is the Tertiary Copper Canyon granodiorite, which roughly divides the Phoenix/Fortitude pit from the down-gradient Reona and Bonanza pits.

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The Golconda allochthon (or Havallah sequence) is comprised of the Pumpernickel and Havallah Formations. The Havallah sequence is a tectonically interleaved assemblage of chert, argillite, shale, siltstone, sandstone, conglomerate, limestone, and greenstone. The Pumpernickel Formation consists predominantly of argillite and chert that forms ridges and ledges where exposed.

The Havallah Formation consists of a lower basalt and gabbro unit, as well as chert, siltstone, sandstone, and limestone units. The Havallah sequence rocks cover most of the surface of the Battle Mountain Range west of the Phoenix Project site.

The Antler Sequence is an autochthonous, overlap sequence that lies unconformably on the Roberts Mountain allochthon within the Phoenix Project site. It is made up of three formations from oldest to youngest: the Battle Formation, the Antler Peak Limestone, and the Edna Formation. These formations were deposited in a shallow marine environment. The Battle Formation consists of thick-bedded conglomerate, sandstone, shale, and limestone. The overlying Antler Peak Limestone is a limestone that is locally shaley, sandy, and pebbly. The Edna Mountain Formation is mostly sandstone and chert pebble conglomerate, with cherty limestone.

The Harmony Formation is the oldest rock exposed within the Phoenix Project site. Much of the exposed rock of the Battle Mountain Range east of copper canyon is comprised of the Harmony Formation. The formation is mainly medium- to coarse-grained sandstone with lesser shale cemented by calcite approximately 3,000 feet thick.

Base and precious metal mineralization occurs as disseminated and massive sulfide replacements of calcium-silicate rock units. Mineralization also occurs as sulfide veins and fissure fillings within and outside areas of calcium-silicate alteration.

Mining: The Phoenix Project currently involves the mining of the Phoenix and Iron Canyon open pits.

The Phoenix open pit is a lateral and vertical expansion of the existing Fortitude, Midas, Reona, Minnie, and South Canyon/Bonanza pits, which have already penetrated groundwater. Once mining is completed, dewatering operations will cease and groundwater will rebound to pre-mining static elevations.

Pursuant to WPCP NEV0087061, Part I.N.1, the Permittee is required to submit to the Division for review and approval, an updated groundwater flow model, pit lake study, and ecological risk assessment with each Permit renewal and with any application to modify the Permit that could affect the pit lake predictive model. The study and assessment shall address, at a minimum, the requirements of NAC 445A.429, and shall include all available data, alternative pit lake or in-pit backfill scenarios, and mitigations to reduce ecological risk, as applicable.

Greater Phoenix Project Major Modification: The Greater Phoenix Project (GPP), permitted as a Major Modification, extends the mine life from 2040 to 2063; it consists of an expansion of the Phoenix Pit area through consolidation of five existing pits and an increase in pit depth by 380 feet. The GPP is proposed in three phases: Phase IV, Phase V, and life-of-mine. Phase IV of the GPP (approved by the Division in July 2018) will mine the currently approved pits in addition to beginning to strip the North Optional Use Area combining the Fortitude, Reona, and North Bonanza pits.

The GPP also proposes a modification of the mine closure approach, including the management of pit water through treatment to meet applicable water quality standards and subsequently put to a beneficial use of agriculture. Please see sections ***GPP Tentative Plan for Permanent Closure*** and ***GPP Investigations*** for more information.

GPP Tentative Plan for Permanent Closure (TPPC): The previous permitted TPPC for the Phoenix Mine pit complex was pit backfill to 40 feet above the rebounded groundwater table. As the groundwater rebounded the groundwater would become a flow-through system, the outflow component would have required, after 200 years, a pump back and treatment system to remediate the contaminant plume in perpetuity.

For the initial phase of mining, Phase IV (2018-2022), the TPPC requires backfilling to 40 feet above the predicted recovered groundwater table with lime-amended backfill to preclude the formation of any pit lakes. The groundwater system will still become a flow-through system with time and a pump back and treatment system would still be necessary after 200 years and would operate in perpetuity. The estimated volume of water for treatment from the pump back system is 570 gpm to capture the sulfides and additional metals released by the backfill in the flow through system.

For Phase V and life-of-mine TPPC, the Division has determined more information would be required before the Division would accept these proposed conceptual closure plans. The following paragraphs discuss these proposed conceptual closure plans, both of these plans will not eliminate the flow through component of the groundwater system and a pump-back and treatment system would still be necessary in perpetuity.

The TPPC for the next phase of mining, Phase V (end 2056) will backfill (with lime-amended material) the south Bonanza Pit area 40 feet above the predicted groundwater table to preclude the formation of a pit lake, water from the Fortitude Pit area will be pumped to North Bonanza Pit where it will be treated with lime and pumped to a pit crest tank for additional lime treatment. From the pit crest tank, the treated water will then flow via gravity through a buried double-contained pipeline (12-inch within a larger diameter HDPE pipe) to the Reona Pond. The Reona Pond will be relined and improved to serve as a settling pond for the treated water. The treated pit water will be then used for agriculture at Section 31 west of the mine site. The Pit Lake in north Bonanza would fluctuate seasonally to store water during winter for use during the growing season.

The life-of-mine (2063) TPPC incorporates a similar pit configuration as Phase V but water from Fortitude will gravity drain to north Bonanza through an inert septum drain and drainage blanket. The water will be treated in the pit lake and crest tank just as mentioned above and transported to the Reona Pond and Section 31.

GPP Investigations: Due to the complexity of the Phoenix Project, the Permittee will be completing additional investigations to aid in demonstrating the closure plan. The Permittee is required per Part I.N of the Permit to update the predictive models, waste rock management plan, and TPPCs with each Permit Renewal. These updates will incorporate the additional information learned during each Permit cycle as the Project progresses.

The proof-of-concept work completed to August 2021, included field-scale water treatment testing and a demonstration that the treated water would produce an agricultural crop. The field water treatment utilized a surrogate water, the Iron Canyon Surge Pond Water diluted, and was treated utilizing a two-phase lime treatment. The results of the water treatment evaluation provided data that the treatment method did reduce the metal concentration in the surrogate water, although there were still constituents that remained elevated above the treatment goal. The Proof-of-concepts had challenges with the surrogate water being similar to the modeled water chemistry. The Division will require additional information to make informed decisions for closure and reclamation of the site.

Based on an evaluation of the NAC 445A regulations, the Division has determined that use of the tailings impoundment for agriculture will need to ensure the ability to close the facility per NAC 445A.446.

Haulage and Transport: ROM ore containing coarse gold and silver with low-grade copper values is loaded into haul trucks and transported to the ROM Stockpile Pad or directly to the Crushing Plant at the Phoenix Mill site for beneficiation. This is discussed in greater detail under the subsections ***ROM Stockpile Pad*** and ***Mineral Processing and Beneficiation*****.** ROM leach-grade, low-sulfide gold-silver ore is transported directly to the Reona Gold HLP for cyanide leaching. This is discussed in greater detail under the subsection ***Reona Gold HLP.***

ROM copper ore containing low-grade gold values are transported to the Phoenix Copper HLP for sulfuric acid leaching. ROM copper ore containing high-grade gold values is transported to the Reona Copper HLP for sulfuric acid leaching. This is discussed in greater detail under the subsection ***Phoenix Copper Leach Project*****.**

Ore and Waste Rock Identification, Classification, and Segregation: Proper identification, classification, and segregation of rock types mined is critical to the economic and environmental success of the mine. As a general rule, any rock with sufficient minerals (gold, silver, or copper) that are in an economically extractable form is classified as ore; all other rock is identified as waste rock. Rock identified as ore is classified and segregated by its chemistry to promote recovery of metals. The variable chemistry of the ore types makes blending of ores from the different pits and benches a necessary tool in enhancing metal recoveries. Waste rock is further classified as either Potentially Acid Generating (PAG) or non-Potentially Acid Generating (non-PAG) according to its ability to affect the environment through the formation of Acid Rock Drainage (ARD).

Two factors are used to classify the ore and waste rock; how much sulfide is present and how much acid neutralizing or buffering capacity is available. Samples of ore and waste rock are collected for mineralogical, Meteoric Water Mobility Procedure (MWMP), Acid Base Accounting (ABA), Profile I constituents, and radionuclides.

Material with either a sulfide content greater than 0.1 percent or a Net Neutralizing Potential (NNP) less than or equal to zero, as identified using standard ABA methods, is classified as PAG. Rock with less than or equal to 0.1 percent sulfide and a NNP greater than zero are classified as non-PAG. Data utilized to classify rock at the Phoenix Project include geologic modeling, geologic formation mapping, blast hole mapping, laboratory analyses of blast hole cuttings and data from previous mining in the same location, but on other benches (i.e. higher elevations).

Ore and geologic block models are used to predict where various rock types are anticipated. These three-dimensional models are produced by extrapolating geology and geochemistry between exploration drill holes, and conducting a statistical analysis of mineralization and associated controls. The models are updated and field corrected as mining progresses. Current data used to refine and improve the model enhances the ability to predict where differing rock types are to be expected.

Mineralization at the Phoenix Project site is affected, and often controlled, by structure and lithology. Structural zones and contrast between lithotypes often define preferential pathways or constraints to mineralizing fluids. As such, knowledge of the area lithology and structural fabric is often helpful in defining where ore and waste rock types may be found. Past geologic mapping and ongoing mapping projects help define and identify the structural and lithologic constraints of interest.

Blasting is required to break up and loosen the rock and make it possible for mining of ore and waste rock. Site geologists examine and classify (or map) the blast holes and their cuttings in order to further refine the knowledge base about rock types, rock structures, and mineralization present.

Samples of the blast-hole cuttings are collected and characterized. The analyses performed include those needed to define the boundaries between ore and waste, as well as those needed to identify and classify ore and waste rock types. Therefore, accurate and timely results from these chemical analyses are very important to the operations at Phoenix.

In addition to providing the chemical data needed to identify ore types, laboratory analyses, including LECO testing to identify the percent sulfide, total sulfur, carbonate, and total carbon present in the samples, are used to classify waste rock types. The LECO analyses are performed on 1 out of every 5 samples (Permit requirements stipulate that 1 in 10 blast holes must be analyzed using the LECO Method) and have a typical turnaround time of 3 to 7 days. The constituents determined through the LECO analysis are used to calculate the acid neutralizing/acid generating potential (ANP/AGP) of the material, and as such is the primary method for determining PAG versus non-PAG.

Waste Rock Management: Waste rock generated is characterized during mining and managed pursuant to the most recent version of the *Phoenix Mine Waste Rock Management Plan (Revised March 2018)*. The waste rock is either placed in existing and sequentially mined open pits, deposited over existing inactive waste rock and copper leach dumps, or placed within waste rock disposal facilities (WRDFs).

Current and proposed surface-deposition waste rock facilities include Philadelphia Canyon, Box Canyon, and the Natomas WRDFs. The proposed in-pit waste rock facilities are located in the old Bonanza and Fortitude pit areas. These two in-pit waste rock facilities will be amended with lime to 40 feet above the predicted recovered water table.

Pursuant to the current Waste Rock Management Plan (WRMP), when a portion (i.e. lift) of a WRDF is completed the requirement for concurrent reclamation is triggered. Completed lifts are recontoured and capped with benign (net neutralizing) capping materials within twelve months of their completion.

A WRDF is considered complete when it has received all of the PAG waste rock it can contain and is ready for recontouring to final slope and capped. While the same criterion applies to individual lifts as well, safety factors must be considered. For instance, recontouring and capping of a single lift may only be accomplished if a subsequent lift is not under construction above (restricted access below active dump faces). As such, recontouring of said lift may not be accomplished until the lift above is complete, providing a catch bench for work to safely proceed on the first lift. After being contoured and capped the slopes are ready to be seeded, usually in the fall or early spring of each year to take advantage of the seasonal precipitation.

Caps for Phoenix Mine WRDFs are designed to minimize meteoric water infiltration and promote vegetative growth (and thus transpiration). All WRDFs at the Mine are designed to be capped and/or covered with at least 5 feet of benign non-PAG (net neutralizing) waste rock or alluvium.

Changes in the mine plan can affect the amount of capping material required and/or amount of available benign waste rock. As such, any changes will be provided within the annual WRMP review. The suitability of all growth media/capping materials will be demonstrated to the Division and BLM through studies and testing as required by the 2003 Phoenix Record of Decision and Plan of Operations approval. After the facility has been contoured to the final reclamation topography, cap materials (non-PAG waste rock or alluvium) are placed on the facility and spread to a minimum thickness of 5 feet. Cap monitoring devices and stormwater structures are constructed as soon as possible, but not later than the next construction season following contouring of capping materials. Also, depending on conditions and time of year, reseeding may occur before or after installation of stormwater structures and cap monitoring test stations.

The implementation of temporary and permanent stormwater best management practices (BMPs) is site specific at the Phoenix Project site. BMPs for final reclaimed WRDFs may include ditches, retention basins, sediment basins, and diversion channels, as well as the final configuration of the WRDF surface (swales, slope breaks, etc.). These BMPs are designed to prevent channel flow off the top of the WRDF, promote sheet flow across the WRDF to diversion channels connected to sediment basins to limit movement of sediment. The BMPs also include maintenance and inspections of the stormwater control facilities in order to ensure that stormwater off of, and around, the WRDFs is managed in accordance with applicable permit requirements.

Pursuant to WPCP NEV0087061, Part I.N.2, the Permittee is required to submit to the Division for review and approval an updated WRMP with each Permit renewal and with any application to modify the Permit that could affect the WRMP. A revised WRMP must also be approved prior to initiating mining or in-pit backfill activities not previously approved. The WRMP must include representative characterization data for all anticipated waste rock and overburden in accordance with the current version of the Division guidance document *"Waste Rock, Overburden, and Ore Characterization and Evaluation,"* in addition to a detailed description of how, when, and where the materials will be managed and monitored, and appropriate controls to eliminate any potential to degrade waters of the State, if applicable.

ROM Stockpile Pad: Mill-grade ROM gold and silver ore is transported via haul truck to the ROM Stockpile Pad located north of the Phoenix Mill. The pad was constructed in three phases beginning in 2005 and occupies a footprint of approximately 672,500 square feet (approximately 15.5 acres) and is graded toward the double-lined ROM Stockpile Pad Collection Pond and Phase 3 Stormwater Runoff Pond. The pond designs are discussed in greater detail under the subsection ***ROM Stockpile Pad Collection Pond and Phase 3 Stormwater Runoff Pond***.

The ROM Stockpile Pad has a design height of 60 feet as measured from the pad surface and can accommodate approximately 1.5 million tons of ore. The pad is comprised of a 1-foot thick soil base and 3-foot high perimeter berm, constructed of Low Hydraulic Conductivity Soil Layer (LHCSL) material with a maximum permeability of 1×10^{-6} centimeters per second (cm/sec). The LHCSL is overlain with a minimum 3-foot layer of protective drainage material above the base and a minimum 6-foot layer of the same material over the perimeter berm.

Solution from the ROM Stockpile Pad drains to an outlet channel cut in the downgradient toe of the perimeter berm. The outlet channel is lined with 60-mil high-density polyethylene (HDPE) and anchored beneath the LHCSL base of the pad. The 3-foot thick protective drainage layer is extended over the HDPE liner and is further protected with a 2-foot layer of rip-rap over the length of the channel. The outlet channel reports to the ROM Stockpile Pad Collection Pond.

ROM Stockpile Pad Collection Pond and Phase 3 Stormwater Runoff Pond: The ROM Stockpile Pad Collection Pond is double-lined with a leak detection sump. The liner system is comprised of 60-mil HDPE primary and secondary liners with a layer of geonet between the liners to serve as a leak collection and recovery system (LCRS). In the event leaks occur in the primary liner, the solution will report to the LCRS, which conveys solution to a gravel-filled sump that is evacuated through an 8-inch diameter HDPE inclined riser pipe. The pond capacity is 524,288 gallons at 2 feet of freeboard and 771,689 gallons at the pond crest. These capacities are adequate to contain the respective 25-year, 24-hour and 100-year, 24-hour storm event volumes (approximately 502,000 gallons).

The Phase 3 Stormwater Runoff Pond utilizes the same design criteria as the ROM Stockpile Pad Collection Pond. The runoff pond acts as an overflow pond and is connected by a 15-foot wide spillway with a base elevation equal to that of the 2-foot freeboard elevation of the ROM Stockpile Pad Collection Pond. The spillway is constructed with primary and secondary 60-mil HDPE liners with a layer of geonet between and is tied to the ROM Stockpile Pad Collection Pond liner and LCRS.

Leak detection for the Phase 3 Stormwater Runoff Pond reports to a dedicated subgrade LCRS sump filled with clean drainage rock encapsulated in 10-ounce per square yard (oz/sq yd) non-woven geotextile. The sump can be evacuated to appropriate containment via a 12-inch diameter HDPE inclined riser pipe booted through the primary HDPE liner at the pond crest. The pond measures approximately 130 feet on a side and 10 feet deep. With a design capacity of 507,000 gallons at 2 feet of freeboard and 718,000 gallons at the crest, the pond is designed to contain, without overtopping, the 100-year, 24-hour storm event flow (594,500 gallons) that would report to the Phase 3 pad expansion area and related components.

Mineral Processing and Beneficiation: The original Fortitude Mill, constructed by Duval, ceased operations in March 1993. All equipment was removed shortly thereafter and by August 2014, all of the Duval-era buildings and building foundations had been demolished, with the exception of the former Maintenance Shop, currently being used for exploration drill core storage.

The new Phoenix Mill is located northwest of the historic Reona Gold HLP. The mill was constructed in 2005 and later expanded in 2011, to beneficiate run-of-mine mill-grade ore from the Phoenix Mine. A new Metallurgical Laboratory Building (EDC approved by the Division in July 2013) provides analytical services for both the gold and copper process operations.

All mill components and associated tanks, conveyors, pipelines, sumps, reagent storage areas, and load-out areas are located within concrete secondary containment. The secondary containment is designed to contain 110-percent of the volume of the largest vessel within an individual containment area or to provide 110-percent containment of the discharge from the largest contributing vessel within multiple containment areas that are hydraulically linked. Tanks that are not elevated above the containment floor are equipped with leak detection pipes, which gravity-drain to the secondary containment. Refer to the subheadings ***Crushing Circuit***, ***Coarse Ore Stockpile Pad***, ***Grinding Circuit***, ***Gravity Separation Circuit***, and ***Flotation Circuit*** for additional design details**.**

Crushing Circuit: ROM ore from the ROM Stockpile Pad is fed via front-end-loader to one of two gyratory crushers for primary crushing. A Metso, 50-inch by 65-inch crusher is utilized for crushing softer, less abrasive ore and a Fuller 800-hp, 60-inch by 89-inch crusher, is utilized for crushing harder and more abrasive ore.

In an effort to optimize mill operations, a Minor Modification (approved in September 2011) authorized the phased expansion of the Crushing Circuit (Phase 1 Expansion) and the Grinding Circuit (Phase 2 Expansion) to increase mill throughput to 76,800 tpd by decreasing particle feed size to the semi-autogenous grinding (SAG) mill from an 80-percent passing size (P_{80}) of 6 inches to a P_{80} of 2 inches. This expansion involved the installation of a secondary crushing circuit to handle the entire amount of tonnage discharged from the primary crushers.

The secondary crushing circuit consists of a multi-slope, double deck screen to remove fines from the primary crusher product. The oversize material is crushed by two secondary cone crushers operating in parallel. The product from the secondary crushers is conveyed to the mill stockpile feed conveyor. An individual feeder belt from each primary crusher transfers nominal minus 6-inch crushed ore to the shared transfer conveyor, which delivers the ore to the stacker conveyor. Ore from the stacker conveyor is dumped onto the Coarse Ore Stockpile Pad, which has approximately 33,000 tons of live storage and 70,000 tons of dead storage capacity. The live storage can supply the mill for one day of operation and the dead storage can provide an additional two days of ore feed if the crusher is down.

Coarse Ore Stockpile Pad: The circular Coarse Ore Stockpile Pad is approximately 400 feet in diameter with a geosynthetic clay layer (GCL) base. The GCL is protected with a minimum 2-foot layer of overliner drainage material. The pad is constructed with a compacted-fill perimeter berm to prevent the escape of fluids from the pad and a ditch encircles the exterior of the bermed pad to divert stormwater flow away from the component.

Solution collected within the pad area drains to two outlet channels lined with 60-mil HDPE that is tied to the GCL. The outlet channels penetrate the pad berm and report to a single Outlet Sump (OS) that hydraulically links the pad to the secondary containment for the Phoenix Mill via the concrete slab beneath the ore conveyor. The sump is approximately 30 feet by 4 feet by 2 feet deep, with the long axis perpendicular to the pad gradient. The sump is comprised of a prepared subbase with a 6-inch layer of protective bedding sand, lined with 60-mil HDPE, keyed approximately 15 feet upgradient and beneath the GCL. Solution reporting to the OS is conveyed through the pad perimeter berm and conveyor corridor retaining wall via two 24-inch diameter HDPE outlet pipes.

The concrete conveyor corridor slab is a minimum 13 feet wide. A 2-foot high curb is constructed on both sides of the conveyor corridor slab from the retaining wall to a minimum of 20 feet beyond the outlet pipes discharge point. The remainder of the conveyor corridor slab is lined with a 1-foot curb to the point where it connects with the Phoenix Mill containment.

The corridor stem walls are designed to contain the flow and accommodate sediment buildup that may occur. The Permit requires routine removal of sediment from the corridor to ensure adequate capacity. In addition, the Phoenix Mill secondary containment is adequate to contain 166 percent of the 100-year, 24-hour storm event flow from the pad plus the volume of the largest vessel in the mill building.

Grinding Circuit: Ore is removed from the Coarse Ore Stockpile Pad by means of three belt feeders that convey material to the SAG Mill Feed Belt. The SAG Mill Feed Belt conveys new ore, crushed pebbles, and grinding balls to the 36-foot diameter by 18-foot long SAG mill where water is added for grinding. Overflow from the SAG mill is diverted to a cone crusher and reintroduced to the SAG Mill Feed Belt.

Underflow from the SAG mill drops into a sump and mixes with discharge from two ball mills. The sump slurry is pumped to a bank of cyclones. Overflow from the Grinding Circuit cyclones (P_{80} approximately 150 mesh) reports to the Flotation Circuit and the underflow stream is divided and conveyed to each of the two 20-foot diameter by 33-foot long ball mills.

The existing grinding area was expanded as part of the Phase 2 Expansion. In an effort to meet the desired mill throughput rate of 76,800 tpd, the P_{80} particle size of the grinding cyclone circuit overflow was increased from 150 to 100 mesh by reducing slurry velocity entering the cyclones.

Gravity Separation Circuit: A portion of the discharge from each ball mill is pumped to two gravity gold and silver recovery units and the concentrates from the gravity units are diverted to a cyanidation unit. The gravity unit tails are pumped to a contact flotation cell to recover finer-grained gold.

Flotation Circuit: The flotation circuit consists of a rougher flotation circuit followed by a three-stage cleaner flotation circuit and a cleaner-scavenger circuit. Slurry from the grinding cyclone overflow feeds a series of six rougher flotation cells. The rougher flotation concentrate and contact cell concentrate are combined and cleaned in two stages of gravity separation.

The Phase 2 Expansion included in the September 2011 Minor Modification, also expanded the rougher flotation area and tailings deslime area in an effort to double the current rougher flotation retention time, and increase capacity of the existing

rougher tailings deslime cyclones. A new rougher flotation building was constructed parallel to the existing Phoenix Mill to accommodate two new banks of rougher flotation cells of six cells each, which effectively doubled the rougher circuit retention time from 15 to 30 minutes. Interconnecting pipelines connecting pumps and pump boxes between the existing Mill Building and the new Mill Building were also installed and the deslime cyclones were modified for coarser separation in order to increase throughput.
Concentrate from the two-stage gravity separation unit is directed to a primary cleaner column flotation cell. Rougher scavenger concentrate, along with concentrate from the 1st cleaner flotation circuit (four cells in series) and the cleaner scavenger flotation circuit (four cells in series), is sent to the flotation regrind mills. The regrind concentrate is then cleaned in three stages of flotation utilizing both mechanical and column flotation technology.

A magnetic separator removes magnetite/pyrrhotite concentrates from the cleaner flotation stream and gold and silver are recovered from the magnetic concentrate via a gravity recovery unit. Cleaner gravity tails and magnetic separation tails are pumped to the copper concentrate thickener to be dewatered. This is discussed in greater detail under the subsection ***Flotation Copper Concentrate Thickener Circuit.***

The final flotation concentrates are thickened, filtered, stockpiled, and eventually shipped to a smelter for metal recovery. Tails material from the rougher and cleaner scavenger circuits is pumped to a pair of deslime cyclones at the head of the CIP Leach Circuit. The cyclone underflow is pumped to the CIP Leach Circuit where it is combined with cleaner scavenger tails (CST). Most of the gold and silver in the slurry reports to the cyclone underflow while most of the copper reports to the cyclone overflow.

Flotation Copper Concentrate Thickener Circuit: Cleaner gravity tails and magnetic separation tails are pumped to the copper concentrate thickener to be dewatered. The thickener overflow solution reports to the mill water tank for use as make-up water and the thickened copper concentrate is pumped to a copper concentrate storage tank equipped with an agitator.

Copper concentrate is pumped from the storage tank to a pressure filter and further dewatering to approximately 10-percent moisture content. The “dry” concentrate is conveyed to the dry floatation concentrate building (e.g. Concentrate Barn) with a 10,000 ton capacity. The copper concentrate is loaded into trucks, which are washed with an in-building truck wash, and then shipped off-site to a smelter.

In anticipation of the copper flotation circuit reaching its full design capacity, an EDC approved by the Division in May 2013 authorized construction of a second concentrate barn approximately 50 feet southwest of the existing concentrate barn. The facility was placed into operation at the approval of the as-built report by the Division in November 2013.

The new pre-fabricated building is similar in construction to the existing concentrate storage building. The building occupies a footprint of approximately 138 feet by 130 feet and is constructed on a reinforced concrete pad with reinforced concrete stem wall with a containment capacity of 6,313 gallons and a dry concentrate storage capacity of 7,600 tons. A reinforced concrete pad with a surrounding berm for containment is located on the southwest side of the new Flotation Concentrate Storage Building. Containment volume is approximately 6,059 gallons and is designed to accommodate a maximum container/tank volume of 5,500 gallons, assuming 110-percent containment capacity. Typically, 55-gallon drums are stored in this area.

CIP Leach Circuit: Lime and cyanide solution are added at the head CIP tank to respectively control pH and enhance precious metal dissolution. The slimes material from the cyclone overflow is pumped to the fines thickener tank and dewatered using flocculant and reclaim water for make-up. The thickened slurry (underflow) is pumped to the CIP circuit tails tank and the thickener overflow is returned as mill make-up water. The CIP leach tanks discharge to the 5-stage CIP circuit, comprised of five individual CIP agitator tanks placed in series, where dissolved precious metals are adsorbed onto activated carbon particles. This is discussed in greater detail under the subsection ***Carbon Stripping, Regeneration and Cyanide Detoxification***.

An EDC (approved by the Division in January 2010), authorized the installation of a high rate, pre-fabricated, deep-cone thickener to increase the percent solids content of the CST stream feeding CIP Tank 1. The CST Thickener provides a higher level of slurry density control when compared to the current system of utilizing the CIP Tank 1 feed cyclones to optimize the operating performance of CIP Tank 1 and increase gold recovery.

Thickener solids from the CST Pump are diluted with water provided by the CST Thickener overflow water. Thickener underflow is pumped to CIP Tank 1 or 2 and the effluent is gravity fed to the mill water tank. The CST Thickener underflow pump is controlled via a variable speed drive in order to keep the density of the thicker underflow at a pre-determined solids percentage. The percentage is determined by a densitometer installed in line with the pump outlet. The mass flow rate is calculated based on the densitometer output and the measurement of the volumetric flow rate. During the thickening stage, flocculant is injected to increase the settling rate.

A flocculant delivery system supplies flocculant to the CST Thickener. The flocculant is conveyed from the Flocculant Storage Tank and diluted with fresh water through an inline mixer before being fed to the thickener. Flocculant addition and volumetric flow is measured with flow meters and percent solids are measured by a densitometer. Dilution water feed is controlled by a flow control valve incorporating both the flocculant flow rate and a 10-percent dilution ratio.

In May 2017 the Division approved an EDC for the conversion of Leach Tank #1 to a surge tank. The modification aids in the managing of the talc within the ore currently processed at the mill, which has been overwhelming the trash screens. In August 2017, the Division commissioned the surge tank.

Carbon Stripping, Regeneration and Cyanide Detoxification: Loaded carbon collected for stripping and tails discharge slurry are treated in a Caro's acid [peroxymonosulfuric acid (H_2SO_5)] destruction circuit prior to discharge to the TSF. An EDC (approved by the Division in January 2008), authorized the addition of two new agitation/reactor tanks and a pumping tank to increase slurry-Caro's acid retention time and cyanide detoxification efficiency prior to the discharge of CIP tailings slurry into the TSF. An EDC (approved by the Division in May 2013) authorized the addition of an INCO/Sulfur Dioxide cyanide detoxification process, which includes the permanent placement of a 12-foot diameter 6,000 gallon polyethylene tank and associated piping. All tanks, pumps, and piping are placed within containment in the Phoenix Mill building, south of the existing CIP area and adjacent to the Tailings Collection Tank.

Loaded carbon is transferred from the mill CIP circuit by pipeline and may be combined with loaded carbon trucked from the Reona Gold HLP Carbon-in-Column (CIC) Adsorption Circuit. The carbon is washed with hydrochloric acid in the acid wash tank, neutralized with caustic soda, and pumped to the strip vessel. Copper is removed from the carbon by an ambient temperature cyanide rinse and the resulting rinse solution is pumped to the leach circuit. Following the cyanide rinse for copper, the carbon is stripped of precious metals with a hot caustic solution. Barren carbon is conveyed through a regeneration kiln and the activated product is mixed with fresh make-up carbon and either pumped to CIP Agitator Tank 5 for reintroduction into the CIP Recovery Circuit or loaded into a transfer truck for the Reona CIC Circuit.

Pregnant solution from the carbon stripping process is pumped through a circuit comprised of four electrowinning cells. The electrowinning precipitate is filtered, heated in a retort to remove mercury, dried, and then shipped to Newmont facilities at Twin Creeks or the Carlin complex for refining of precious metals.

Reona Gold HLP: Heap leach grade ROM gold and silver ore is transported to the Reona Gold HLP via haul trucks. The ore is conditioned prior to placement on the heap leach pad by adding lime in measured amounts to the haul trucks as they pass below silos and/or by adding milk-of-lime once the ore is on the HLP.

Cyanide leach solution is applied by drip emitters and/or sprinklers to the surface of the ore on the HLP. The leach solution then percolates down through the ore, dissolving the gold and silver. The pregnant solution, flows along the pad liner and is collected in piping within a lined solution collection ditch located along the down-gradient edge of the pad. The pregnant solution passes through carbon columns for gold and silver recovery before being recirculated back to the HLP. Loaded carbon from the Heap Leaching Circuit is either processed on-site or off-site through a pressure stripping and electrowinning process. Stripped carbon is loaded directly back into the columns or regenerated and then reused in the processing plant.

The Reona Gold HLP was constructed in four phases, with a fifth phase approved as part of the “Phoenix Expansion” (Major Modification approved by the Division in June 2001). As of August 2021, Phase 5 has not been constructed at this time. Phases 1 and 2 were completed in 1994, and totaled approximately 2.5 million square feet of heap leach pad. Phase 3 was completed in 1995, and created an additional 1.1 million square feet of HLP tied to the west side of Phase 1. Phase 4 construction was completed in November 1996, and consists of an additional 0.6 million square feet of HLP located along the east side of Phase 2. The total Reona Gold HLP area constructed is approximately 4.2 million square feet, or about 96 acres. The maximum HLP height is 320 feet above the primary HDPE liner surface.

The Major Modification authorizes the construction of the Phase 5 HLP and will expand the Reona Gold HLP footprint by approximately 1.2 million square feet along the east side of Phase 4. This expansion, if completed, is expected to increase HLP capacity by 9.8 million tons and total pad capacity to 33.9 million tons of leach-grade ore and a ultimate pad height of 200 feet above the HDPE liner surface. Because of the depletion of heap leach grade ores, it does not appear that Phase 5 construction will be initiated.

Both the Reona and the authorized Phoenix Expansion HLP liner systems are identical in design. The liner systems are comprised of 80-mil HDPE placed over a minimum 12-inch prepared soil subgrade with a coefficient of permeability no greater than 1×10^{-6} cm/sec when compacted to a maximum dry density of 97 percent (American Society for Testing and Materials (ASTM) Method D1557). The Permittee has successfully demonstrated to the Division that a friction layer, comprised of sand and gravel embedded within the upper zone of the prepared subgrade layer at the interface with the HDPE liner, will provide the necessary long-term frictional resistance and increased horizontal stability of the HLP. The friction material has a nominal particle size between 0.05 to 0.5 inches in diameter and will be broadcast across the surface of the prepared subgrade. Mechanical compaction equipment is used to embed the sand and gravel such that a composite material conforming to the requirements of the prepared subgrade is achieved.

Separate leak detection and collection is provided by 2-inch diameter perforated pipe located along the western berm of each cell below the 6-, 8-, and 12-inch diameter collection pipes and beneath the HDPE-lined concrete solution recycle sumps located at the solution discharge point for each cell. This is discussed in greater detail under the subsection ***Reona Gold HLP Leak Detection System***. A portion of the Reona Gold HLP was unloaded and used to construct the TSF.

Approval by the Division on 20 May 2011 authorized the utilization of up to 30 million tons of characterized spent ore from the Reona Heap Leach facility for use as internal TSF embankment fill, filter fill material, and alluvial fill cover for construction of the Phoenix TSF. All random fill and cover material will meet Technical Specifications for Construction of the Phoenix Mine Tailings Impoundment Facility Stage 4, Section 02205-3,4,5,6 Sections 2.02, 2.05 and 2.07 (Golder Associates, May 27, 2010).

Reona Gold HLP Leak Detection System: The leak detection system within Phases 1-3 (PD-1 through PD-9) of the Reona Gold HLP is comprised of 2-inch diameter polyvinyl chloride (PVC) leak detection pipes under the liner within the friction layer. The leak detection pipes are placed adjacent to and upgradient of each cell separation and phase separation berm and surrounded by leak detection sand. The 2-inch diameter leak detection pipe is booted through the liner and daylights in the solution ditch above the storm flow level where it is visually monitored on a daily basis. Any leaking fluids would report to the solution ditch and flow by gravity within the solution channel into the Reona Event Pond (EP-1). This is discussed in greater detail under the subsection ***Reona Gold HLP Event Pond.***

Phase 4 of the existing leach pad (PD-10) and the authorized Phoenix Expansion cells (PD-11 through PD-14), differ from Phases 1-3. Along the western berm of each cell is a 42-inch wide composite drain placed under the HDPE liner. The composite drain transitions to a 2-inch diameter non-perforated PVC leak detection pipe at the end of the cell outlet. The leak detection pipe is placed within a 6-inch diameter HDPE pipe and conveys flow under the solution collection channel to an HDPE observation manhole located at the southern edge of the channel. Each cell has a dedicated manhole, equipped with a submersible pump to remove fluids and record quantities. The manhole is also equipped with an overflow pipe to direct solution into the lined collection channel if necessary.

Flow measurement data, if any flow is present, are collected from the leach pad and solution sump leak detection pipe daily. Flow rates exceeding 25 gpd in any one leach pad leak detection pipe indicate that the leach pad or solution collection ditch is leaking. Efforts will be undertaken to report the leak, identify the source (i.e., leach pad cell) of the leak and initiated to isolate and/or repair the leak.

Reona Gold HLP Event Pond: The Reona Gold HLP Event Pond (EP-1) has a total storage capacity of 16,869,000 gallons. A second event pond (EP-2) is approved and is required for construction with the Phoenix Expansion of the Reona Gold HLP. EP-2 (when constructed) will have a total storage capacity of 10,436,000 gallons and have a construction similar to that of EP-1 incorporating a liner system comprised of 60-mil HDPE primary and secondary liners with an HDPE geonet layer sandwiched between the liners and allow for drainage to a leak detection and collection sump. This is discussed in greater detail under the subsection ***Reona Gold HLP Event Pond Leak Detection System.***

The normal operating volume of EP-1 is 4,023,472 gallons and the freeboard volume (at 2 feet of freeboard) is an additional 2,451,000 gallons. Design criteria for EP-1 incorporated the resultant fluid volume from a 25-year, 24-hour storm event, fluid volumes associated with the full draindown at the design rate of 3,000 gallons per minute (gpm) solution application rate resulting from a 24-hour cessation of pumping due to a pump/power outage, and the 110-percent draindown of the largest process solution tank with a volume of 70,000 gallons.

Process fluids in the heap leaching circuit are managed by maintaining a 1-foot deep "dead" storage volume of approximately 1,205,000 gallons of solution in EP-1. The heap leach process normally operates in a negative water balance situation, with makeup water added to the circuit on an "as-needed" basis to maintain solution volume equilibrium and minimize fluid accumulation in EP-1.

During periods of no leaching or when the available solution inventory is in excess of the dead storage volume, the excess solution is recycled to the Phoenix TSF or Mill Process Circuit via pipeline with secondary containment at a maximum rate of 250 to 300 gpm.

Reona Gold HLP Event Pond Leak Detection System: The EP-1 leak detection system is comprised of a geonet leak detection layer placed between the two HDPE liners. This allows for a preferential flow path for any fluids escaping the primary liner to the leak collection sump located at the lowest corner of the pond and a reduction of hydraulic head against the secondary liner in the event of leakage from the primary liner. A dedicated pump installed in the sump riser pipe is used for weekly monitoring of fluids present and, if necessary, the evacuation of fluids from the sump.

Phoenix Copper Leach Project: The Phoenix Copper Leach Project (Major Modification approved by the Division in June 2010) is comprised of two copper HLPs, Phoenix and Reona. The Phoenix Copper HLP is designed to leach ROM copper ores with low gold values; the Reona Copper HLP is designed to leach ROM copper ores with high gold values. Average sulfuric acid leach solution application rate to the Phoenix and Reona Copper HLPs is 12,500 gpm and 1,000 gpm respectively, total combined application rate is limited to 15,000 gpm. Application rate per unit area is limited to 0.01 gpm/square foot. The heaps are designed with a minimum setback of 30 feet from the toe of the containment berm to the toe of heap and a nominal lift height of 20 feet (25 feet for the initial lift).

Both pads have dedicated process and event ponds, conveyance pipelines and channels, monitoring devices, diversion structures and a share a common SX-EW circuit. These are discussed in greater detail under the section ***Phoenix and Reona Copper HLP Design.***

Pursuant to WPCP NEV0087061, Part I.N.3--Continuing Investigations, the Permittee is required to perform, long-term column leach tests to generate data in an effort to further refine the Tentative Plan for Permanent Closure (TPPC) and to eventually develop a Final Plan for Permanent Closure (FPPC) for the Phoenix and Reona Copper HLPs and associated facilities. Refer to the subheading ***Phoenix Copper Leach Project Tentative Plan for Permanent Closure (TPPC)*** for additional details.

With each subsequent application for renewal of this Permit or operational or facility change that could affect the Phoenix Copper Leach Project and TPPC, the Permittee must reevaluate the TPPC and provide an update or modification of the plan.

The updated TPPC must include, but is not limited to, the following:

1. Any changes to the proposed closure methods of the solvent extraction-electrowinning (SX-EW) plant, copper leach facilities, and process ponds;
2. Any changes regarding the type and depth of cover proposed for placement at closure of the leach pads. Predictive modeling shall be updated to demonstrate the continued effectiveness of the proposed cover design and placement;
3. Any changes regarding the management of heap draindown solutions and solution disposal; and
4. Any changes regarding the projected time frames for leaching, solution recirculation/draindown, solution disposal, regrading of the leach pads and cover placement, pad revegetation, pond closure, and post-closure monitoring.

Phoenix and Reona Copper HLP Design: The Phoenix Copper HLP is located approximately 1,500 feet west of the TSF. The pad is rectangular in shape and extends approximately 5,060 feet in an east-west direction and approximately 3,350 feet in a north-south direction, covering an area of approximately 17,200,000 square feet. The pad has a total capacity of 150 million tons loaded to an authorized heap height of 300 feet. Associated with the Phoenix Copper HLP is a Pregnant Leach Solution/Sediment Pond (PLS/Sed Pond), a sump area for pumping Intermediate Leach/Raffinate Solution (ILS) and Pregnant Leach Solution (PLS), two Event Ponds (Phase 1 EP and Phase 2 EP), and ancillary facilities.

The Phoenix Copper HLP is being constructed in phases (Phases 1A, 1B, 2A, 2B, and 3) to accommodate operational changes. Phases 1A, 1B, and 2A are under active ore placement and leaching. At the completion of Phase 2A and 2B, approximately 120 million tons of copper ore will have been placed on the pad liner and stacked to a maximum authorized height of 300 feet above the Phase 1 and 2 liner surface. When the decision is made to proceed with Phase 3 construction, an additional 30 million tons of ore will be placed on liner and stacked to a maximum authorized height of 300 feet above the liner surface. The decision to construct Phase 3 will be dependent upon future ore reserves and economics.

The Phoenix Copper HLP is designed to accommodate ten independent cells (identified as cells A through J) for solution collection purposes. Each cell is approximately 500 feet wide and will have a maximum length of 1,550 feet for Phase 1,950 feet for Phase 2, and 850 feet for Phase 3.

Drainage within each cell is collected in a solution channel at the south end of the pad. The solution channel drains from east to west toward a low point, from which the channel then turns south to allow drainage flow to the Phoenix PLS/Sed Pond or one or both event ponds, located in the southwest corner of the Phoenix Copper HLP.

The two-phase Reona Copper HLP is located approximately 800 feet north of the TSF and 100 feet east of the Reona Gold HLP. Ore intended for placement on the Reona Copper HLP has a higher gold content; however, ore placement is expected to occur intermittently. Associated with the Reona Copper HLP is a Pregnant Leach Solution/Event Pond (PLS/EP). The PLS from the Reona Copper HLP is re-circulated and periodically directed to the SX/EX plant as feed based on copper concentration and solution volume. As of the end of 2017 the Reona Copper HLP had not been constructed.

The area for the Reona Copper HLP (Phase 1A and Phase 1B) is approximately 1,600 feet in an east-west direction and approximately 1,900 feet in a north-south direction. The Reona Copper HLP is designed to accommodate three independent cells. The cells vary from approximately 350 to 500 feet wide and 1,550 to 1,850 feet in length. Drainage within each cell is collected in a solution channel at the south end of the pad. The solution channel drains from east to northwest and then southwest toward a low point, from which the channel allows drainage to flow to the Reona PLS/EP, located southwest of the Reona Copper HLP.

The containment areas for the Phase 1A and Phase 1B pads are approximately 1,300,000 square feet and 1,100,000 square feet, respectively. The capacity of Phase 1A and 1B is approximately eight million tons loaded to an ultimate heap height of 300 feet above the primary liner surface. The Reona Copper HLP includes a pond that has been designed to store eight hours of operating volume, eight hours of draindown, and the flow generated by a 100-year, 24-hour storm event plus a 3-foot freeboard. The pond includes a sump area that will accommodate pumps to evacuate PLS solution to the SX-EW process plant.

Both the Phoenix and Reona Copper HLPs utilize identical liner system designs. The liner systems are comprised of a 12-inch thick prepared subgrade of low-permeability soil. The soil is compacted to a minimum 97 percent of maximum dry density (ASTM Method D1557) with a coefficient of permeability less than or equal to 1×10^{-6} cm/sec and overlain by an 80-mil double-textured HDPE liner. Friction material comprised of a mixture of sand and gravel (0.05 to 0.5 inches in diameter), is embedded within the upper zone of the prepared subgrade layer at the interface with the HDPE liner to provide additional frictional resistance and increase horizontal stability of the HLP over the long term. The friction material is broadcast across the surface of the prepared subgrade and embedded through the use of compaction equipment such that a composite material conforming to the requirements of the prepared subgrade is achieved.

The HDPE liner extends up the side of the 4-foot high (minimum) perimeter berm where it is anchored in an anchor trench. The liner is overlain by a 12-inch thick protective layer of sand with gravel or silt, produced from the screening of existing stockpiled materials or copper tails.

A drainage layer composed of a 15-inch thick blanket of coarse aggregate overlies the protective layer network of perforated drainage pipes. The drainage layer transmits solution and precipitation flowing through the heap along the base of the pad to the ponds without an excessive buildup of phreatic head on the liner. Leach pad loading (toe) begins 30 feet (minimum) inside the perimeter berm to accommodate regrading of the heap side slopes at closure.

Following placement of ROM copper ore on the HLPs, sulfuric acid leach solution will be applied at a rate of 0.01gpm/square foot over the ore and allowed to percolate. The leach solution is comprised of raffinate (acidic solution exiting the SX circuit and no longer containing copper), recycled PLS, and spent solution from the SX Circuit. During winter operation, emitters may be placed below the surface of the rock material to prevent the lines and heap surface from freezing. Leach solution is collected and recirculated onto the fresh ore for approximately 90 days. Once this leach cycle has been completed, new ore will be placed on top of the previously leached ore.

The copper oxides and various other minerals present in the ore have the tendency to consume leach solution. The metals and non-metals solubilized and their concentrations are specific to the ores leached. Consequently, sulfuric acid is regularly added to the leach solution on an as-needed basis to maintain a leach solution pH between 1.5 and 3.0 standard units (S.U.). Maintaining the pH at these levels optimizes copper extraction and recovery and prevents unwanted precipitation reactions within the HLP due to high pH solution or excessive acid consumption when the pH becomes too low.

Evaporation of the water from the leach solution occurs at significantly different rates throughout the year. To maintain an adequate volume of leach solution, fresh process water is added on an as-needed basis. As the heap increases in height, the leach solution inventory increases. Therefore, the proper water and make-up acid addition to the leach circuit must be maintained at all times.

In 2016, the Phoenix CLP increased the total number of tons placed per year on the copper HLP from 6.5 million tons to 9 million tons. The copper leach process was using make-up water from a low chloride content well, producing approximately

240 gallons per minute. The increase to 9 million tons per year demonstrated that the current make-up water flow rate was insufficient. The total flow rate of low chloride content water required will need to increase to approximately 1000 gallons per minute. At this make-up water addition rate, the total flow to the pad is still well below the permitted application rate to the copper HLP is 15,000 gpm.

The copper leach process requires low-chloride content water to efficiently leach the copper from the ore. The original plan to provide low chloride water for this process involved drilling a new fresh water well. The second option and the one selected that best supports the site water management efforts, uses a reverse osmosis-water treatment circuit (RO-WTC) to filter chlorides from the existing fresh water sources.

An EDC approved by the Division on 9 May 2016 authorized the installation of an RO-WTC at the Phoenix Project site and as-built approved 29 November 2016. The RO-WTC is housed in a sea container placed on precast concrete sleepers within existing containment. The RO-WTC is able to deliver 600 gpm of low-chloride content make-up water to the copper leach facility. The RO-WTC is located near the mill water distribution building. The RO-WTC is fed by fresh water from the freshwater tank (630-TK-116). The water is conveyed from the fresh water tank to the RO units. There are two RO units in the WTC. The low-chloride water is conveyed to an existing fresh water feed pipe which then flows to the Raffinate Tank (535-TK-1 41). The concentrated effluent will be pumped to the Mill Water Tank (200-N-0023).

Solution Collection Piping System: Process solution infiltrating through the heap, collects in the drainage system at the base of the pad, and drains directly to the process ponds located downgradient of the pad. Based on the pipe size, configuration, deformation, and flow calculations, the solution collection piping system has more than adequate flow capacity to handle normal heap draindown in addition to the drainage from the 24-hour, 100-year storm event. With no pipe deformation, design flow volume through the pipes is 50 percent or less. All of the solution collection pipes are sized to handle flows necessary to maintain an application rate of 0.005 gpm/square foot.

As stated previously, the Phoenix Copper HLP is comprised of ten cells (identified as cells A through J) for solution collection purposes. Each cell contains a system of 4-inch diameter perforated (“Type-SP”) corrugated polyethylene (CPE) collection pipes placed at a 20 or 25-foot center-to-center spacing in a “herring bone” pattern. The collection pipes direct flow toward 24-inch diameter “Type SP” CPE collection header pipes that are installed in trenches located near the center of each cell. The trenches for the collection header pipes are 12 inches lower than the pad grade and are underlain by a dedicated leak detection system. Refer to the subsection ***Process Component Monitoring System (PCMS)*** for additional details.

The perforated collection header pipe directs flow to the south end of each cell and then transitions to a solid 24-inch diameter HDPE pipe. At the perforated pipe-solid pipe transition a containment berm has been constructed and covered by smooth 80-mil HDPE liner to serve as a solution retention sheet.

The solid pipe conveys the collected solution to a Parshall flume with flanged connections. The flume structure design allows for flow measurement and directs the outflow into a 24-inch diameter solid HDPE pipe and then to the 32-inch diameter solid HDPE Phoenix PLS Pipe in the solution channel.

As stated previously, the Reona Copper HLP is comprised of three independent cells (identified as cells A through C) for solution collection purposes. Each cell contains a system of 4-inch diameter "Type SP" CPE collection pipes placed at a 25-foot center-to-center spacing in a "herring bone" pattern. The collection pipes direct flow toward 12-inch diameter "Type SP" CPE collection header pipes installed in trenches located near the center of each cell. The trenches for the collection header pipes are placed 12 inches below the pad grade and are underlain by the PCMS.

The perforated collection header pipe directs flow to the south end of each cell and then transitions to a solid 24-inch diameter HDPE pipe. At the perforated pipe-solid pipe transition location, a berm has been constructed and covered by smooth 80-mil HDPE liner to serve as a solution retention sheet.

The solid pipe conveys the collected solution to a Parshall flume with flanged connections. The flume structure design allows for flow measurement and directs the outflow into a 24-inch diameter solid HPDE pipe and then to the 32-inch diameter solid HPDE Reona PLS Pipe in the solution channel.

Solution Channels: The leach solution channel design features trapezoidal cross sections, graded to a minimum slope of 0.75 percent toward the ponds. The channel design includes a 12-inch thick layer of prepared subgrade, double textured 80-mil HDPE geomembrane, and is underlain by a dedicated PCMS. Solid HDPE pipes direct flow from the pad area to the operating ponds. The pipes in the lined channel will be covered with gravel, leak detected and monitored by the PCMS. Where necessary, valves will be installed to direct the flow of solution.

The lined solution channel for the Phoenix Copper HLP is designed to slope from the east and west sides of the pad toward a low point at a grade of 0.75 percent. At the low point of the channel, the solution channel turns south to allow drainage to flow to the west side of the Phoenix Copper PLS/Sed Pond. A secondary solution channel is designed to intercept the primary solution channel north of the ponds and allows solution to be directed into the east side of the pond. A 32-inch diameter solid HDPE pipe conveys the PLS solution. At the intersection of the primary/secondary solution channels, a 32-inch diameter tee and valves control flow to either side of the Phoenix Copper PLS/Sed Pond.

The solution channel is constructed along the south side of the Reona Copper HLP. The channel slopes from east to west at a minimum grade of 0.75 percent and discharges to the Reona Copper PLS/Event Pond, located southwest of the Reona Copper HLP. A 12-inch diameter solid HDPE pipe installed within the lined channel conveys PLS solution flow.

Process Component Monitoring System (PCMS): The PCMS design is a combination trench and sump system for leak detection, collection and recovery. The PCMS is designed to allow independent monitoring of each heap leach pad cell as well as sections of the solution channels where flow is concentrated. At the outlet of each PCMS trench is a PCMS monitoring sump with an effective capacity of approximately 65 gallons. The PCMS monitoring sump consists of a pipe-in-pipe system to accommodate a small pump and discharge pipe for the purpose of removing any solution collected in the sump. In a system upset, the sump overflows back to the lined PCMS trench.

The PCMS is comprised of a 12-inch thick prepared subgrade layer of LHCSL, compacted to a minimum 92 percent of maximum dry density (ASTM Method D1557) and a coefficient of permeability less than or equal to $1x10^{-6}$ cm/sec, and an 80-mil smooth HDPE liner to promote lateral flow and restrict vertical infiltration. A 4-inch diameter perforated CPE pipe is placed within a 4-inch thick layer of gravel overlying the HDPE liner to provide additional flow capacity within the system. In areas where the pipe serves as an outlet pipe for future expansions, solid 6-inch diameter HDPE pipe is utilized. An 18-inch thick layer of gravel covers the pipes and is overlain with a layer of non-woven geotextile to limit migration of fines from the overlying 12-inch thick layer of prepared subgrade material.

Process/Sediment, Process/Event, and Event Pond Design: These ponds are located downstream of the Phoenix and Reona Copper HLPs. Ponds associated with the Phoenix Copper HLP include the Phoenix Copper PLS/Sed Pond and the Phoenix Copper Phase 1 and Phase 2 Event ponds. The Reona Copper PLS/Event Pond will be the only pond associated with the Reona Copper HLP.

A water balance analysis was used to size the ponds with the largest pond capacity requirements estimated to occur in Year 1 of loading for both ponds before the SX-EW Plant start-up. All ponds are surrounded by wildlife fences and bird balls are placed in the ponds to prevent birds from entering the pond area.

All ponds are double-lined and leak-detected, have side slopes of 2.5 horizontal:1 vertical (2.5H:1V), and depths that range between 10 and 30 feet. In addition, all ponds have a design freeboard of 3 feet in addition to their required storage for a 25-year, 24-hour storm event flow. The ponds are constructed with a 12-inch thick prepared subgrade of low-permeability soil, compacted to a minimum 92 percent of maximum dry density (ASTM 1557) and a coefficient of permeability less than or equal to $1x10^{-6}$ cm/sec, overlain by a secondary 80-mil HDPE geomembrane. A layer of geonet is placed between the HDPE liners to convey any leakage from the 80-mil HDPE primary liner to the LCRS.

The pond floors are sloped toward a PLS collection sump, nominally 25 feet by 25 feet by 2 feet deep and have a capacity of approximately 6,100 gallons. The sumps are located in the corner of each pond and collect leakage for return to the SX-EW Plant. Beneath the collection sumps are the LCRS sumps, which are comprised of a layer of geonet, overlain by a primary 80-mil HDPE geomembrane. The LCRS sump consists of a depression filled with select gravel encapsulated in geotextile with an approximate effective capacity of 500 gallons. A 12-inch diameter HDPE riser pipe is installed along the pond slope to the bottom of the sump with the lowest 10 feet of pipe perforated for solution collection. A submersible pump is used to evacuate the sump.

The LCRS sumps collect drainage conveyed from the geonet and from the 4-inch diameter perforated CPE leakage collection pipes that run along the toe of the ponds and discharge into the LCRS sump. The sumps are constructed on the east side of the Phoenix Copper PLS/Sed Pond, and on the west side of the Reona Copper PLS/Event pond. The LCRS sumps consist of a lined depression filled with select gravel encapsulated in geotextile with an effective capacity of 500 gallons.

The Phoenix Copper PLS/Sed Pond and the Phoenix Copper Phase 1 Event Pond were constructed as part of the Phase 1 Phoenix Copper HLP construction. An additional event pond (Phoenix Copper Phase 2 Event Pond) is currently being constructed as part of the Phoenix Copper HLP Phase 2A construction to contain the maximum volumes associated with both the Phase 2 and proposed Phase 3 pads.

The footprint of the Phoenix Copper PLS/Sed Pond is approximately 665 feet by 195 feet. The pond has two compartments (a Sediment Storage Compartment and a PLS Compartment) separated by a 10-foot high internal berm (as measured from the Sediment Storage Compartment side) and a 12-foot high internal berm (as measured from the PLS Compartment). The Pond has a combined design capacity of 8.6 million gallons at 3 feet of freeboard. In addition a dedicated sump has been installed to collect and pump PLS solution to the SX-EW process plant.

The PLS Compartment is approximately 390 feet by 170 feet by 12 feet deep with a design capacity of 4.1 million gallons (at 3 feet of freeboard). The Sediment Storage Compartment has a design capacity of approximately 2.0 million gal (at 3 feet of freeboard) and measure 240 feet by 170 feet by 10 feet deep. The pond is designed to be drained by a low-level outlet pipe buried under the berm in the southeast end of the pond. The drain pipe is leak detected and monitored by the PCMS.

The Phoenix Copper Phase 1 Event Pond occupies a footprint of approximately 600 feet by 270 feet with a depth of 30 feet. Pond capacity is 19.8 million gallons at 3 feet of freeboard. The Phoenix Copper Phase II Event Pond occupies a footprint of approximately 480 feet by 730 feet with a depth of 30 feet and a capacity of 52.2 million gallons at 3 feet of freeboard. These event ponds are connected by a spillway lined with 80-mil HDPE and leak detected. The spillway is designed to be 20 feet wide by 4 feet deep and the floor of the spillway is constructed 4 feet beneath the pond crest elevation. The spillway has design volumetric flow rate of 18,000 gpm at a flow depth of 0.75 feet.

A single process pond serves the Reona Copper HLP. The pond collects PLS from the pad and is designed with sufficient capacity to also serve as storm event pond. The Reona Copper PLS/Event Pond is located downstream of the Reona Copper HLP and is connected via an 80-mil HDPE lined and leak detected solution channel. The pond is approximately 500 feet to the southwest of the Reona pad and is rectangular in shape, measuring 450 feet by 190 feet by 18 feet deep. The Reona Copper PLS/Event Pond will have a design capacity of 6.1 million gallons at 3 feet of freeboard. A collection sump and pump system is installed to convey collected Reona Copper PLS/Event Pond solution to the SX-EW process plant, a distance of approximately 4,000 feet.

Diversion and Sediment Control Structures: Stormwater diversion channels are constructed as part of the Phoenix and Reona Copper HLPs to intercept surface water runoff from upstream catchment areas and divert the flows around the proposed leach facilities to either a natural drainage or a constructed channel located downstream. The diversion structures are constructed and sized to accommodate the 100-year, 24-hour storm event. Sediment control structures are constructed in those areas where runoff from disturbed areas enters the surface water diversion system.

Diversion channels extend around the Phoenix Copper HLP along the north and west sides. The Reona diversion channel extends along the north and east sides of the leach pad and is separated from the leach pad by the pad perimeter road.

Groundwater Monitoring for Copper Leach: Several new groundwater monitoring wells have been installed at the Phoenix Copper Leach Project area. Four new groundwater monitoring wells (HLP-1 through HLP-4), are located along the downgradient (south) side of the Phoenix Copper HLP. Two additional wells (HLP-5 and HLP-6) have been installed on the upgradient (north) side of the pad. If the gradient reverses as a result of dewatering, HLP-5 and HLP-6 will become downgradient wells and HLP-1 and HLP-4 will become upgradient wells. Two additional monitoring wells will be installed north of the leach pad and a new well (HLP-7) south of the leach pad. An existing monitoring well (CM-13) located south of the pad will also be utilized to monitor fluctuating groundwater conditions.

Four new groundwater monitoring wells are scheduled for installation within the Reona Copper HLP area. Monitoring well (RLP-1) will be located along the upgradient (north) side of the Reona Pad, two wells (RLP-3 and RLP-4) will be located along the downgradient (south) side of the Reona Copper HLP and a third well (RLP-2) will be located downgradient (south) of the Reona Copper HLP PLS/Event Pond. In the event dewatering results in a gradient reversal, additional monitoring wells will need to be installed north of the Reona Copper HLP.

Phoenix Copper Leach Project Solvent Extraction and Electrowinning (SX-EW): Solvent extraction (SX) is a method used to separate (extract) compounds based on their relative solubilities from one immiscible liquid phase to another. In an SX circuit, an immiscible organic solvent (also referred to as a "lixiviant") is added to the PLS and thoroughly mixed.

The organic solvent is comprised of two components: a copper-specific extractant (similar in chemical composition to shortening) and an organic carrier/diluent (typically high flashpoint kerosene). During mixing, copper is removed from the PLS and loaded onto the extractant component. Once the extractant component is fully loaded, the immiscible phases are separated via specific gravity, with the lighter organic fraction above the heavier, acidic PLS fraction.

The acidic solution exiting the SX circuit and no longer containing copper is referred to as the "raffinate" and is recycled back into the acid leaching process. The copper-loaded organic solvent is pumped to a stripping circuit where a mixer-settler unit separates the copper from the organic solvent, yielding a high-grade solution for electrowinning. The organic solvent is returned for re-use in the extraction stage. The solid residue comprised of copper-bearing organics is referred to as "crud" and is allowed to settle out for eventual removal.

In its current configuration, the Phoenix SX-EW Circuit is designed to produce up to 12,000 tons of cathode copper annually from the PLS. The operation consists of an SX-EW circuit, a tank farm for reagent storage and distribution, a Raffinate Tank and a raffinate/PLS pumping and distribution network. All components are located on reinforced concrete containment, surrounded by a berm, coated with an acid-resistant compound and embedded with waterstop material at all concrete joints. Design containment is well in excess of the 110-percent minimum design criteria for the largest tanks present. Refer to the subheadings ***Phoenix SX Circuit***, ***Phoenix EW Circuit***, ***Tank Farm, Acid-Diluent Storage and Distribution System***, and ***Raffinate and Organic Recovery Tanks*** for additional details.

Phoenix SX Circuit**:** The Phoenix SX Circuit consists of two mixing-extraction-settling stages (referred to as E-1 and E-2) and one stage of mixing-stripping-settling (referred to as S-1), all placed within secondary containment (referred to as Containment Area #1710). Each stage has a nominal throughput of 5,000 gpm of aqueous feed and the piping is configured such that the E-2 mixer settler can also be operated as a parallel extractor, if necessary. The mixing phase for the E-1 and E-2 stages each consist of a Primary, Secondary and Tertiary Mix tank, all connected in series. The Primary Mix Tank has an operating volume of 8,300 gallons while the Secondary and Tertiary Mix tanks each have a volume of 12,000 gallons. The extraction-settling phase utilizes an Extraction Settler Tank, each 102 feet by 81.5 feet by 4.25 feet deep with a volume of 248,742 gallons.

The mixing phase for the S-1 stage consists of a Primary Mix Tank with a volume of 8,300 gallons and a Secondary Mix Tank with a volume of 12,000 gallons. The stripping-settling phase utilizes a Strip-Settler, 102 feet by 81.5 feet by 4.25 feet deep and a volume of 248,742 gallons.

In addition to the above components, other ancillary equipment such as pumps, piping, centrifuges, and heat exchangers are utilized in the SX Circuit for the conveyance and treatment of electrolyte solution and the management of crud to acceptable levels. All components are constructed of stainless steel or other acid resistant materials. Each tank is covered with acid-resistant covers to protect the solutions from external particulates, ultraviolet radiation, and wind, and to inhibit evaporative losses from the settlers. Piping for SX process solution is placed in lined trenches located between the tanks and sized to contain the volume of one mixer-settler in the event of failure. Available secondary containment for Containment Area #1710 is 832,658 gallons which equates to 219-percent of the required containment volume. The containment area construction consists of a reinforced concrete pad and stem wall network with an acid resistant coating and embedded with waterstop material at all concrete joints.

During active SX operations, the first stage of extraction (E-l) receives pregnant leach solution (PLS) and partially loaded organic from the second stage of extraction (E-2) and produces a loaded organic and a partially depleted copper leach solution.

The second stage of extraction (E-2) receives the partially depleted leach solution and stripped organic and produces a partially loaded organic and raffinate (or barren aqueous solution).

The stripping stage (S-1) receives loaded organic and lean electrolyte and produces rich electrolyte and stripped organic.

Operation of the SX Circuit is maintained by controlling PLS, loaded organic, lean electrolyte, and aqueous recycle solution flows. As the copper concentration in the various streams changes the flow rates are also changed to maintain a chemical "steady-state" condition. Crud must be periodically removed from the settlers and processed for recovery of contained organic. The crud can be pumped, drained, or flooded out of the settler under controlled conditions and then processed through the centrifuge located in the tank farm.

An EDC approved by the Division on 14 February 2014, authorized improvements to the SX/EW Plant and Circuit first identified during the 2013 commissioning of the plant and circuit. In its initial As-Built configuration, instrumentation associated with the mixing tanks became submerged in solution resulting in the instrumentation shorting out and the tanks overflowing. The addition of 1-foot extensions on the tanks reduced these issues. In order to facilitate the mixing of starch utilized in the plant, the existing starch tank was replaced with a tank that is equipped with baffles and an upgraded mixing system. Additionally, a recirculation pump and line will be added to the starch tank in order to promote mixing of the starch and keep it suspended in solution.

Phoenix EW Circuit: The Phoenix EW circuit is comprised of two rectifiers, 30 electrowinning cells, a cathode wash and stripping machine, and an acid mist extraction and scrubbing system, all located within an enclosed building (EW Building). Secondary containment for the entire EW Circuit (referred to as Containment Area #1720) consists of reinforced concrete pad and stem wall network with an acid resistant coating and embedded with waterstop material at all concrete joints. Available secondary containment for Containment Area #1720 is 32,820 gallons which equates to 960-percent of the required containment volume and also allows for future expansion.

The two rectifiers provide D.C. power to the cells for the electrowinning process. The rectifiers are located outside the south-east side of the EW Building. Each rectifier has an output capability of 0 to 20,000 amps and 0 to 75 volts.

The electrowinning cells are constructed of acid-resistant polymer concrete. Each cell contains 60 stainless steel cathode mother blanks and 61 rolled lead-calcium-tin anodes. The center to center spacing between anodes and cathodes is 4 inches. The anodes and cathodes are connected electrically in parallel within a cell and in series between cells so that ideally each anode/cathode pair receives the same amperage. Electrolyte is fed to each cell from a distribution header and enters through a manifold in the bottom of each cell. The electrolyte discharges from the cells at the top of the end of the cell near the center walkway and enters one of two discharge headers which carry it to the Lean Electrolyte Tank.

For optimum copper recovery, electrolyte entering the EW Building requires the addition of heat to maintain a temperature of 120 degrees Fahrenheit (^oF) to optimize reaction kinetics. Direct current, generated by the rectifiers, flows from anode to cathode, resulting in the plating of copper onto the cathode. A typical EW cycle lasts between 5 and 7 days in duration. At the end of the cycle, the copper loaded cathodes will be removed from the EW cell and sent to a cathode washing/stripping machine, to remove any residual electrolyte solution and any other contaminants adhering to the copper surface.

The cathode stripping machine actually consists of several related functions. The cathodes are washed and the copper cathodes are removed from the stainless steel cathode mother blanks and stacked; the stripped mother blanks are then returned to the cells. All wash water is recycled as make-up water and for recovery of any residual copper content. The copper is mechanically removed from the cathodes by the stripping operation.

The EW process results in the oxidation of the lead anode surface, creating lead oxide sludge. The amount of sludge generated is a function of the EW circuit operation and power application. Starch is added to the electrolyte to create a smooth cathode surface since a smooth surface is less likely to trap lead oxide flakes and less likely to retain electrolyte during cathode washing. Cobalt sulfate is added to the electrolyte solution to stabilize the amount of anode surface corrosion and limit lead oxide formation on the anodes. The lead oxide sludge collected on the anodes and in the bottom of the cells is removed and returned to the anode supplier for reprocessing. Anode life expectancy is typically 5 to 10 years. At the end of their useful life, spent anodes are returned to the anode supplier for reprocessing.

A crane is used to transport anodes and cathodes within the EW Building. The electrolyte recirculation tank receives electrolyte via overflow from the lean electrolyte tank and returns the electrolyte to the commercial cells. The lean electrolyte tank receives lean electrolyte from the discharge of the cells in the tank house. The majority of the solution overflows the lean electrolyte tank into the electrolyte recirculation tank. Some of the lean electrolyte is used for backwashing of the electrolyte filters and some is pumped to the stripping stage primary mixer in the SX Circuit.

The EW process also results in the generation of oxygen at the anode during the plating of copper. When oxygen bubbles break the solution surface and burst, small droplets of the acidic copper electrolyte are released into the air, creating an acid mist within the EW Building.

A ventilation system, consisting of individual hoods on each EW cell is connected to a collection header and ductwork to maintain sufficient flow of air across the top of the cells to keep any airborne mist from escaping the hood and entering the working zone. All wash water generated by the scrubber operation is recycled back to the SX-EW Circuit as make-up water.

Tank Farm and Acid-Diluent Storage and Distribution System: The Tank Farm (referred to as Containment Area #1715) and Acid-Diluent Storage and Distribution System (referred to as Containment Area #1815) are located southwest of the SX area, within bermed, concrete pads, coated with an acid-resistant compound and embedded with waterstop material at all concrete joints. All tanks, piping and pumps are constructed of stainless steel or other acid-resistant materials. Available containment for the Tank Farm is 267,873 gallons which equates to 128-percent of the required containment volume. Available containment for the Acid-Diluent Storage and Distribution System is 368,138 gallons which equates to 128-percent of the required containment volume.

Tanks storing temperature-sensitive reagents are located inside the EW Building. All organic solution tanks and pumps are stored outside for fire prevention/protection purposes.

The Tank Farm contains a centrally located concrete trench, which serves as a sump and permits the collection of drainage from the process facility and any overflows from the tanks. Approximate effective capacity of the sump is 54,000 gal and has an internal API-type baffle system which allows for the recovery of any spilled organic substances from this area. The sump drains to the ***Raffinate Tank***.

The equipment in the Tank Farm area is arranged as follows:

1. The Loaded Organic Tank (total volume 128,250 gallons) receives loaded organic from the overflow launder of the first stage of extraction. The loaded organic is then pumped back to the stripping stage;
2. The Filter Feed Tank (total volume 30,000 gallons) receives rich electrolyte from the stripping stage and holds it until it is pumped through the filters;
3. The Crud Decant Tank (total volume 17,131 gallons) receives various mixtures of solutions from the settlers and holds it for processing through the crud treatment system and is used as a treatment tank if clay treatment of the organic is desired. If special treatment is not required, the Crud Decant Tank is used merely as a Centrifuge Feed Tank. Overflows from all tank farm area tanks also go into the Crud Decant Tank;
4. The Crud Filter Filtrate Tank (total volume 846 gallons) receives clean organic produced by the Filter Press and holds it until it is pumped back into the loaded organic tanks;
5. The Electrolyte Filter Backwash Storage Tank (total volume 13,500 gallons) receives lean electrolyte solution that has been used to backwash the electrolyte filters and holds it until it is pumped to the E-l settler at a controlled rate. The Filtered Electrolyte Tank receives the filtered rich electrolyte from the filters and holds it until it is pumped through the heat exchangers and on to the electrolyte recirculation tank; and
6. The Electrolyte Recirculation (total volume 54,146 gallons) and the Lean Electrolyte tanks (total volume 24,000 gallons) are located within the Tank Farm containment area but are associated with the ***Phoenix EW Circuit.***

Equipment associated with the Acid-Diluent Storage and Distribution System includes but is not limited to the following:

1. A reagent addition and metering system for acid mist suppression during electrowinning;
2. A cobalt-sulfate addition and metering system;
3. A starch addition and metering system;
4. A diatomaceous earth or clay addition metering system;
5. An extractant addition and metering system package;

6. A Diluent Storage Tank (total volume 16,920 gallons) and metering system pump;
7. Two sulfuric acid storage tanks of carbon steel construction (total volume 169,684 gallons, each) with distribution pumps for leach pad acid; and
8. One EW Acid Storage Tank of carbon steel construction (total volume 11,850 gallons) with distribution pump for high purity electrowinning cell make-up acid.

The utility and ancillary facilities associated with the SX-EW Circuit include but are not limited to the following:

1. A hot water system with three natural gas-fired, 4 million British Thermal Unit per hour (BTU/hr) heaters, and distribution pumps and piping to electrowinning and electrolyte heating;
2. A 50 gpm reverse-osmosis system with storage tank and distribution pump;
3. Two air compressors (one operating and one standby), rated at 200 standard cubic feet per minute (scfm) at 125 pounds per square inch-gauge (psig) output. Air dryer and receivers are located at SX, electrowinning and the tank farm;
4. A site substation including a meter, transformers and switchgear to distribute electric power at 13.8 and 4.16 kilovolts (kV); and
5. A Reverse Osmosis Water Tank (total volume 8,812 gallons) and Fire/Process Make-up Water Tank (total volume 67,860 gallons).

Raffinate and Organic Recovery Tanks: The Raffinate Tank (total volume 526,380 gallons), organic Recovery Tank (total volume 8,225 gallons), and their associated pumping systems supplies barren leach solution (raffinate) to the HLP. PLS pumps receive PLS from an intake at the PLS Pond and pump the PLS via a lined pipeline corridor to the E-l and E-2 solvent extraction settlers at the SX-EW plant. All components are located within containment (referred to as Containment Area #0535) with an available volume of 579,018 gallons which equates to 127 percent of the required containment volume.

The Raffinate Tank discharges the solution by gravity to the HLPs. Initially, the raffinate will be delivered by gravity, but a provision for raffinate pumps is provided for the future increase in elevation of the leach pad. At the Raffinate Tank there is an Organic Recovery Tank (total volume 8,225 gallons) that recovers the undissolved organic residue floating on the surface of the tank. This system is comprised of a collection tank and organic transfer pump that returns the recovered organic to the Crud Decant Tank.

The Raffinate and Organic Recovery tanks are located within containment in what was originally intended to be the double-lined Raffinate Pond which was originally approved for construction as part of the Phoenix Copper Leach Major Modification.

The pond has surface dimensions of 420 feet by 140 feet, with a depth of 24 feet and with side slopes of 2.5H:1V. The double-lined pond is comprised of a 12-inch prepared subgrade of low-permeability soil, compacted to a minimum 92 percent of maximum dry density (ASTM Method D1557) and a coefficient of permeability less than or equal to $1x10^{-6}$ cm/sec, overlain by a secondary 80-mil HDPE liner, and an LCRS consisting of a layer of geonet, and overlain by a primary 80-mil HDPE liner.

The pond floor is sloped toward a floor sump, 25 feet square by 2 feet deep. Beneath the floor sump is an LCRS sump installed to collect any flows that may pass through the primary liner. The LCRS sump is filled with pea gravel and has an approximate effective capacity of 500 gal. The sump collects drainage from the geonet and from 4-inch diameter perforated CPE pipes that run along the toe of the pond and discharges into the LCRS sump. The LCRS sump consists of a depression between the primary and secondary liners, filled with select gravel encapsulated in geotextile. A 12-inch diameter HDPE riser pipe is installed between the liners along the pond slope to the bottom of the sump with the lowest 10 feet of pipe perforated for solution collection. A submersible pump is used to evacuate the sump. Netting has been placed over the Raffinate Tank to prevent birds from entering the tank.

An engineered pad and access ramp, approximately 110 feet by 140 feet, to accommodate the Raffinate Solution Tank and Organic Solution Recovery Tank. The pad is comprised of a 2-foot layer of structural fill overlying a 2-foot layer drainage rock, all overlying a 1-foot layer of gravel. Within the gravel layer is a perforated, 4-inch diameter, corrugated polyethylene (CPe) leak collection pipe which drains to the remaining portion of the Raffinate Pond. Construction of the engineered pad and access ramp has substantially reduced available pond capacity from 5.6 million gallons (as designed) to 579,018 gallons.

Secondary Containment Trenches: Two HDPE-lined secondary containment trenches accommodate pipelines that exit the SX-EW plant and return process solution back to the Phoenix and Reona Copper HLPs. The pipeline to the Phoenix Copper HLP consists of 20- and 28-inch diameter pipe contained in a 9,825 feet long trench lined with 80-mil HDPE. The trench begins at the Raffinate Pond and is configured to allow any solution (process or meteoric) present in the trench to drain to the Phoenix Copper HLP. The pipeline to the Reona Copper HLP will consist of two 8-inch diameter pipes contained in a 2,500 foot long trench lined with 80-mil HDPE. The trench will begin at the Raffinate Pond and is configured to allow any solution (process or meteoric) present in the trench to drain to the Reona Copper PLS/Event pond.

In May 2020, the Division approved an EDC modifying the raffinate delivery pipeline alignment to the Phoenix Copper HLP. The new pipeline alignment is proposed to branch off the existing 30-inch HDPE DR17 raffinate carrier pipe as a

30-inch HDPE DR 11 x 42-inch HDPE DR26 double containment pipe. The double containment pipe will be installed under the haul road with 140 feet of the pipeline encased in concrete. A leak detection port is proposed to be installed at the low point of the haul road crossing to collect any solution if a leak in the primary pipe occurs. Once the pipeline crosses the haul road, the pipe will continue along the edge of Phase 3 HLP in a new HDPE lined containment channel ending the double containment pipe. The 30-inch HDPE DR 11 will continue in the HDPE lined containment channel. The HDPE pipe containment will be installed along the future Phase 3 liner limits and tie into the exiting Phase 2 solution trench at the north east corner of the Phoenix Copper HLP.

The ROC for the pipe alignment was approved in November 2020 and included one major modification during construction the liner bedding material used did not meet the low-permeable soil specifications approved. Therefore during the future phased pad expansions, any part of the raffinate delivery pipeline containment channel that would be in direct contact with leached ore material or process solution will require removal of the current liner system and installation of a dual containment lining system.

Phoenix Copper Leach Project Tentative for Permanent Closure (TPPC): The tentative closure of the Copper Heap Leach facilities is discussed in greater detail in the document entitled *"Tentative Permanent Closure Plan, Phoenix Copper Leach Project—Oct 2020 Revision".*

Once sulfuric acid leaching of the copper HLPs is discontinued, the Permittee will initiate solution recirculation and forced-air solution evaporation. Evaporators will be relocated periodically to other areas of the copper HLPs and precipitate generated as a result of the forced-air evaporation will be bladed, covered, and seeded. Solution recirculation is expected to continue until all draindown from the heap can be managed exclusively via active evaporation.

Process ponds will be converted to backfilled evaporation (E)-cells. The backfilled E-cells will be designed to a sufficient size to contain the residual draindown. The design capacity will consider the predicted post-closure draindown of 15 gpm from the copper leach pads and assume limited maintenance. Evaporation will continue on top of the pad until draindown from the heap has reached "steady-state" passive draindown. At that time the remaining portions of the pad will be capped with 5 feet of alluvial cover material and seeded. Steady-state draindown flow will be routed to an E-cell.

In the event that flow to the E-cell exceeds design capacity, the solution will be handled as described in the Fluid Management Plan for the Phoenix Copper Leach Project (Nevada Gold Mines 2020). If the initial E-cell becomes unusable, an additional E-cell will be constructed. An additional E-cell will be constructed as needed to handle passive drain-down flow.

Any precipitate that forms on top or within the E-cell will be removed, landfilled on top of the pad, and covered with 5 feet of alluvial cover material. Although it is not anticipated, any radioactive precipitates that form will be managed and disposed of pursuant to local, State, and Federal regulations.

The piping systems used to transport reagents and process solutions through the process will be visually inspected to identify any remaining contaminants following cleaning and rinsing. Solids contained within sumps, ponds, and other containment areas are anticipated to be mostly mixtures of residual ore and process reagents. These solids will be disposed on the existing copper leach pad.

The copper HLPs will be regraded and recontoured to prevent surface ponding and the heap leach pad will be covered with 5 feet of capping material to limit meteoric water infiltration. The pad and loading plan have been designed so that leach ore will remain on the HDPE liner during regrading of side slopes. The current plan is for solution to continue to be actively evaporated on top of the pad. Data from the Copper Basin Reclamation Project and other studies indicate that 5 feet of capping material will be adequate to limit meteoric water infiltration, and the study is in progress.

The Reclamation Plan and Reclamation Cost Estimate (RCE) specify a synthetic liner cap with a 3-foot thickness of growth media on top of the liner; however, additional testing and field trials are in progress to determine if a soil cover of a specified thickness without a synthetic liner would be an acceptable alternative closure strategy to minimize meteoric water infiltration onto the pad.

The copper facilities will contain a variety of components that require characterization prior to closure activities. Those that will not require characterization include, but are not limited to, drip tubes and pipelines, which will be buried in place. Process-related components and adjacent soils that require characterization include maintenance buildings where solvents and other petroleum products were used and stored, laboratory areas, and chemical and petroleum product storage tanks and associated piping. These components will be visually inspected to identify any remaining contaminants following cleaning and rinsing. Plastic pipe will be buried in place on the heap and metal piping will be rinsed and salvaged.

Long-term column leach tests performed during the operation of the Phoenix Copper Leach Project are intended for use in the development of a FPPC for the Phoenix Copper Leach Project. Data to be collected includes, but is not limited to, composite samples for mineralogical, MWMP-Profile I, and ABA analysis. Data is submitted on an annual basis for review.

The SX-EW facility area contains a variety of components and many of these will require some level of characterization prior to the initiation of closure activities and their removal. Process related structures and equipment will be rinsed prior to their removal and will be recycled, reused, and disposed in a manner consistent with local, State, and Federal regulations. Reclamation activities include but are not limited to demolishing buildings and structures. Concrete structures and foundations will be inspected and soils beneath the foundations will be characterized if the concrete was previously cracked or visual examination suggests potential for contamination of soils. Based on characterization results, concrete will then be removed or broken and covered in place with 5 feet of cover material.

Copper Heap Leach Pad Cover Studies: The Major Modification (approved by the Division in June 2010) required the Permittee to develop and implement a work plan identifying future Phoenix and Reona Copper HLP closure-related data collection.

A preliminary work plan was submitted to the Division in September 2010. Over the next several months, specifics regarding the type of data required and methods of collection were outlined. Design of the Project was divided into two phases (Phase 1 and Phase 2) to evaluate water storage capacity for cover soils at the Phoenix Project site. Phase 1 (EDC approved by the Division in March 2011) was a compilation and review of available data related to meteorological parameters, borrow soil characteristics and plant community properties.

Included in the Phase 1 report was a preliminary calculation of water storage requirements based on records of precipitation and evaporative demand from nearby weather stations. Those requirements are consistent with the conceptual cover advanced by the Permittee for closure of the Phoenix Copper HLP. The report also included recommendations for additional modeling, identification of a nearby reference site for revegetation studies and a field test facility to provide direct measurement of one or more proposed cover designs.

Phase 2 (EDC approved by the Division in July 2012 and completed in August 2012), authorized the design, construction, operation, and closure of the Test Facility.

The Test Facility consists of three large scale drainage lysimeters located south of the Phase 1 Copper HLP. The three lysimeters have been constructed to test soil cover thickness of 2, 3, and 5 feet. The cover soil, obtained from nearby sources, is representative of the soil material prepared for use in the final reclamation of the Copper Leach Facility.

The dimensions of each lysimeter are approximately 33 x 66 feet. Each lysimeter is lined with 60-mil linear low-density polyethylene (LLDPE) liner with an outlet pipe to collect and discharge any water that percolates through the soil material in the lysimeter. The depth of each lysimeter is 7 feet, including the depth of soil cover, plus a lower base layer of waste rock.

The interface of the soil cover and waste rock is representative of the final reclamation configuration of the Copper Leach Facility when soil cover is placed on the spent leached ore. The soil profile within each lysimeter has been duplicated in a 16-foot zone surrounding each lysimeter. This zone is available for destructive testing and other testing not appropriate with lined lysimeters.

Soil water content sensors are placed at multiple locations and depths in the soil profile within each lysimeter. Instrumentation is installed on each lysimeter to measure the volume of any water that percolates through the cover profile.

Meteorological data, soil profile moisture content, and drainage volume from the base of each lysimeter has been collected since August 2012. A summary report is prepared annually and submitted to the Division with the annual monitoring report for WPCP NEV0087061. To date, soil moisture and net percolation flux monitoring data indicate that the lysimeters have achieved or are nearing conditions representative of steady-state ambient precipitation conditions.

Water content in the cover materials increases in response to infiltration of winter and early spring precipitation and snowmelt and subsequently dried slowly in summer and fall. Cover wetting and rapid drying has also been observed from higher-intensity summer precipitation events.

Lysimeter drainage values represent early construction conditions and uninterrupted monitoring over a number of additional water years is necessary to allow for cover material wetting and drying cycles that will replicate the expected long-term capacity for the cover system to limit net percolation flux. Depending on the results, the Division will determine whether to continue to require a synthetic liner cap with a 3-foot thickness of growth media on top of the liner (as required in the Reclamation Plan and RCE) or to accept a soil cover of a specified thickness without a synthetic liner as being equally effective to a lined cap in minimizing meteoric water infiltration into the pad.

Phoenix Tailings Storage Facility (TSF): The historic Fortitude TSF consisted of two basins separated by an east-west earthen embankment. The north basin was constructed first to contain tailings from the historic copper milling process until it was completely filled in 1970. The southern basin was constructed in 1972, to store copper tailings and gold tailings from the more recent gold mining and milling operations. Neither impoundment was constructed with an engineered liner.

A Major Modification approved by the Division on 17 January 2001, authorized the construction of a new, geosynthetic-lined TSF over the existing northern copper tailings basin to be built in two stages (Stage 1 and Stage 2). A Minor Modification (approved by the Division in October 2004) further refined the engineering designs for the TSF (to be referred to as the Phoenix TSF) and increased design capacity from 90 million to 170 million tons of tailings with five additional construction stages (Stage 3 through Stage 7). Stages 3 through 7 of the perimeter embankment and outside the supernatant pool area are or will be constructed using centerline embankment construction methods. A Minor Modification approved by the Division in October 2013, increased the TSF design capacity further to 300 million tons of tailings with four additional construction stages (Stage 8 through Stage 11).

A Minor Modification approved by the Division on 28 March 2016, authorized modification to the Phoenix TSF north embankment to remove the geomembrane on the upstream slope and change the construction technique to centerline. The supernatant pool is located toward the center of the impoundment. Additional tailings deposition spigots were installed along the north embankment, and decant return water pumping system is located on floats within the impoundment.

In July 2017, the Division approved the submittal of annual records of construction of the Phoenix TSF by the Permittee; as of March 2018, the Phoenix TSF is approved as constructed though Stage 6. With the approval of the annual records of construction the monitoring embankment piezometers were updated to within the Permit to reflect the changes in nomenclature. After Stage 6 the stages have been modified to match up with the reference elevation (RE) for the completed construction for the year. The most recent elevation approved for deposition of tailings was RE 4973 approved 22 December 2020.

The Phoenix TSF occupies an 834-acre footprint and has a maximum permitted design embankment height of 5,035 feet above mean sea level (amsl), measured vertically from the upper surface of the geosynthetic liner. Refer to the subheading ***Tailings Slurry Distribution*** for details regarding the discharge of tailings slurry into the TSF.

To construct the Phoenix TSF, the historic copper tailings and alluvium were stripped of vegetation, scarified, moisture conditioned, graded, and compacted for use as liner bedding for the geosynthetic liner. Because of its elastic properties, 80-mil linear LLDPE liner was initially selected for placement on the embankment basin and upstream side of the embankment in the area of the supernatant pool through the Stage 7 construction.

Following the completion of Stage 2 construction in 2006, the Permittee opted to use 80-mil HDPE liner in place of the LLDPE liner, for Stage 3 through 7 basin and upstream embankment raises due to the higher shear strength exhibited by HDPE. This change in geosynthetic liner material was approved as an EDC on 25 April 2007. To tie the new HDPE liner to the existing LLDPE liner, GCL was used to span the Stage 2-to-Stage 3 abutment and extrusion welds were used to attach the new HDPE liner and an overlying six-foot wide HDPE rub sheet to the existing LLDPE liner.

The geosynthetic layer is covered with a minimum 18-inch cover of locally borrowed alluvial silty sand and gravel to protect the synthetic liner and to provide relief for hydraulic head and promote solution collection and flow into the underdrain system. Refer to the subheading ***TSF Underdrain System*** for additional details

The TSF west, south, and east perimeter embankments were constructed with non-PAG mine waste. In the area of the supernatant pool, through the Stage 7 construction, and for the perimeter embankments, through Stage 2 construction, LLDPE liner was placed on the upstream face of the embankment, which utilized downstream construction.

TSF Underdrain System: The TSF Underdrain System is comprised of 6-inch diameter perforated CPE pipe placed in a dendritic pattern on 300-foot spacing throughout the impoundment basin. Within the supernatant pool area, the collection pipe spacing is reduced to 150 feet to further minimize potential hydraulic head on the liner. Between stages of impoundment construction, each perforated collector pipe transitions to a solid pipe, which is passed through an upgradient stage separation berm and capped. The upgradient collector pipe end-cap locations are surveyed to aid future excavation prior to the next stage of impoundment expansion. The 6-inch diameter collector pipes slope at a minimum one-percent grade and connect to 12-inch diameter CPE header pipelines, placed on approximately 2,400 foot spacing in the basin or along the upgradient embankment toe.

Based on the TSF design, spigotted tailings slurry will create a supernatant pool in the southeast corner of the impoundment. In an effort to accommodate higher than anticipated flow volume from this area of the underdrain system, an 18-inch diameter header pipeline was placed beneath the supernatant pool.

All header pipes report to a perforated 18-inch diameter standard dimension ratio (SDR)-17 HDPE toe drain pipe located on the upgradient edge of the embankment beneath the supernatant pool area. The toe drain transmits collected underdrain solution by gravity beneath the toe of the embankment via three separate 18-inch diameter SDR-17 HDPE underdrain outlet pipes. Secondary containment for each underdrain outlet pipe is provided by a 24-inch diameter SDR-32.5 HDPE underdrain outlet containment pipe. The outlet pipe is placed in a trench and encased in an 8-inch thick (minimum) layer of concrete where it passes under the embankment.

The three underdrain solution outlet pipes and the decant solution outlet pipe continue with pipe-in-pipe containment outside the impoundment in a backfilled trench. All pipes report solution by gravity to the Phoenix Mine TSF Reclaim Pond. Refer to the subheading ***TSF Reclaim Pond*** for additional details.

Tailings Slurry Distribution: Tailing slurry is conveyed by the Tailings Slurry Pipeline (TSP). The TSP conveyed the slurry via gravity till Stage 7 of the TSF, and after will be pumped from the Phoenix Mill through a 24-inch SDR-11 HDPE pipe to the TSF. Once the slurry reaches the TSF the pipeline splits and follows the crest of the TSF. Spigots are installed on the tailings distribution line every 150 feet. The tails are deposited with 6-inch slotted HDPE lines (Division approved 5 June 2017) on the north embankment and 6-inch HDPE lines for the remainder of the TFS, to manage the supernatant pool in the center of the facility.

The original pipeline from the mill to the TSF was constructed of Tite-Liner® pipe but was replaced in two main sections with HDPE. The first section was replaced in 2007 for improve the construction of future embankment lifts. The remaining section was replaced after a failure of the TSP on 26 February 2008 resulting in the release of approximately 49,000 gal of tailings slurry. The pipeline was quickly repaired, however, further investigation revealed the presence of HDPE liner fragments within the Tite-Liner® pipe, indicating that the internal liner surface has started to shear (peel) off. If not addressed, the free fragments could potentially restrict slurry flow to a level requiring the complete shutdown of the Phoenix Mill.

Since the TSP alone does not meet the regulatory requirements of NAC445A.436 for a pipeline with secondary containment it is placed within a pipeline corridor with secondary containment provided by 80-mil HDPE lined ditch. For road crossings, the 24-inch diameter HDPE pipe is placed inside a 4-foot by 4-foot split-box concrete culvert of varying lengths, lined with 80-mil HDPE. A minimum of 12 inches of fill material covers the split-box culvert. Following completion of the permanent tailings line, the Permittee decommissioned the temporary line and removed all associated piping.

From the Phoenix Mill to the first road crossing, a distance of 178 feet, the pipeline is contained within an 80-mil textured HDPE-lined barrier rail, a pre-cast concrete structure, with a 24-inch base width, 10-inch top width and 32-inch height. Typical length of the barrier rail section is about 12 feet. The textured HDPE is attached to the barrier rail with a stainless steel batten bolted to the concrete with an anchor bolt. A layer of neoprene protects the HDPE liner.

The road crossing right-of-way utilizes a 56-feet long, HDPE lined, split-box culvert before it transitions back to the lined barrier rail system. The TSP continues for a distance of 186 feet, to a second road crossing, with a split box culvert length of 136 feet. From the second road crossing, the TSP enters a 2-foot deep earthen ditch, lined with 80-mil textured HDPE.

The ditch has a trapezoidal cross section, with a nominal base width of 5 feet, top width of 13 feet and a depth of 2 feet. The HDPE is placed on a prepared subgrade and anchored into a key trench covered with structural fill. The tailings pipeline continues in the lined ditch for a distance of approximately 620 feet before it enters a 36-inch diameter HDPE culvert, 180 feet in length. The TSP continues for a distance of approximately 170 feet before it discharges into the Phoenix TSF.

In September 2018, the Division approved an EDC for a tailings containment pad to the west of the existing Reona Pond and a new tailings header assembly. The tailings containment pad is tied into the Reona Pond liner so any release of solution will be conveyed to the Reona Pond and was constructed from bottom to top of the following: prepared subgrade, 6-inches of alluvial bedding, 80-mill HDPE liner, and 3 feet of alluvial cover for protection. The tailings containment pad as-built was approved in September 2018. The new tailings header assembly was installed in 2018 and has the ability to flush system to clean out the tailings delivery pipeline.

TSF Reclaim Pond: The TSF Reclaim Pond measures approximately 400 feet by 500 feet at the crest and is 16 feet deep. The pond is constructed with 3H:1V side slopes and the cumulative maximum pond volume is approximately 16,400,000 gal. The volume with a 2-foot freeboard is approximately 13,400,000 gal, which is adequate to contain the 9,000,000 gal operating volume plus the inputs from the 100-year, 24-hour storm event on the pond and ditch liners and the underdrain water reporting from the impoundment due to a 48-hour power outage.

The Reclaim Pond is constructed with 60-mil HDPE primary and secondary liners, with a layer of geonet placed between the liners that reports to a 2,000 gal sand-and-gravel filled leak collection sump. The sump is equipped with an automatic evacuation pump installed in the 10-inch diameter riser pipe. Reclaim solution is returned to the Phoenix Mill via the Reclaim Solution Return Pipeline (RSRP) which shares a common pipeline corridor with the TSP. Refer to the subheading ***Tailings Slurry Distribution*** for corridor design details.

The Permit contains specific limits for the areal extent and depth of the impoundment supernatant pool. The Permit also contains specific limits on the minimum distance the supernatant pool may encroach upon an impoundment embankment to be expanded by centerline construction methods. Construction of the next impoundment embankment Stage is triggered by design limits and the minimum depth of the supernatant pool at the upgradient embankment edge and the available supernatant pool freeboard.

Waste Rock Facilities Seepage Collection Systems: There are seven waste rock facilities (WRFs) at the Phoenix Mine, six of the WRFs have a seepage collection system. Four of the six facilities are in-active and in the process of being closed (e.g. Butte Canyon, North Iron Canyon (NIC), South Iron Canyon (SIC), and North Fortitude), while the other three are active facilities (e.g. Philadelphia Canyon, Box Canyon, and Natomas). Natomas WRF is the only facility without a seepage collection system. Please see the previous Fact Sheets (version Renewal 2016 Revision 01 and earlier) for further detailed information: a summary is provided below and also incorporates the Seepage Collection System EDC submitted to the Division in December 2018 and approved by the Division in September 2018.

Butte Canyon, NIC and SIC Seepage Mitigation: The existing collection system at the Butte Canyon, NIC and SIC facilities consist of a collection structure at the toe of each WRF to collect seepage and runoff from storm events. The seepage was first discovered in 1996 and collection structures were originally installed in 1999 with improvements to the systems in 2006/2007.

The seepage collection structure in Butte Canyon consists of a collection structure and seepage cut-off trench which convey the collected water through pipe-in-pipe (4x6-inch to 6x10-inch) conveyance to the Iron Canyon Surge Pond (ICSP).

The Iron Canyon Collection System is subdivided into NIC and SIC. Seepage from NIC is collected and flows to the ICSP. The combined flow from NIC and SIC is conveyed via gravity to the ICSP. Please see the section titled ***Iron Canyon Surge Pond*** for more information.

With the December 2017 EDC, the improvements to the in-active WRFs main objective is to separate the stormwater runoff water from the seepage. Stormwater will be diverted into the native drainages in the canyon. The collection point for seepage will be installed into the toe of each WRF with the following criteria: located within the existing WRF toe on native ground beneath a minimum of 10 feet of waste rock.

Each modified seepage collection system will consist of a 6-inch perforated corrugated polyethylene (CPE) pipe installed within a 2-foot thick layer of drain gravel. The entire layer of drain gravel will be wrapped in a non-woven geotextile to prevent fines migration that could plug the drain over time.

At the downstream edge of the drain gravel, the perforated CPE will transition to a solid wall pipe-in-pipe system which will convey collected seepage through a seepage cut-off berm. The pipe-in-pipe will be a 6-inch inside a 10-inch HDPE (Standard dimension ratio of 17). The seepage collection pipe will be buried and tied into the existing dual containment collection pipe. Once the collection system is installed the waste rock and a minimum of 5-feet of cover material will be replaced and sloped to match the original topography. Riprap will be installed a minimum of 10 vertical feet up the toe to minimize erosion.

See the section titled ***North Fortitude Waste Rock Facility Seep Mitigation*** for more information in the North Fortitude WRF seepage collection system as the EDC did not propose any changes North Fortitude.

Philadelphia and Box Canyon Seepage Mitigation*:* Philadelphia Canyon WRF has and continues to over dump the pre-regulatory Philadelphia Canyon Copper Dump Leach (Operated 1964-1985). The solution collection system installed along the natural drainage for solution collection for the leaching operation are still collecting impacted water and conveying the water to the Reona Pond.

Box Canyon WRF seepage collection system was installed in 2006 with minor modifications in 2017. The system collects and manages a small volume of water, which is conveyed via pipe-in-pipe to the Reona Pond.

With the December 2017 EDC, the seepage collection system for the active WRFs (Philadelphia and Box Canyon) will be constructed using a phased approach, expanding the system each year based on the mine plan for the anticipated WRF expansions.

The initial construction for the seepage collection system will involve installing seepage collection systems into the toes of Philadelphia and Box Canyon WRFs in the major drainages. The construction of the toe facilities will be similar to the In-Active WRFs without the cover and riprap. The seepage will be directed to two locations depending on the elevation of the collection systems. The existing C4 cutoff trench and C4-C5 pipeline for Philadelphia Canyon and Box Canyon WRF seepage collection system and additional upper elevation drainages will be collected and convey solution via a dual containment pipe to the Reona Pond.

The Philadelphia Canyon WRF lower elevations will be conveyed via a dual containment pipe by gravity to a pair of 13,000 gallon polyethylene tanks installed out of the WRF. The dual containment pipe will either be buried in a trench or placed on ground surface if bedrock is exposed.

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As the WRFs expand, seepage collection trenches will be constructed beneath the expansion areas. Each seepage collection system expansion will consist of a 6-inch perforated CPE pipe and drain gravel in the natural drainages beneath each expansion footprint. The perforated CPE will transition to a solid wall pipe-in-pipe system which will convey collected seepage through a seepage cut-off berm and will then join up the dual containment pipe by a wye connection and flow to the Reona Pond or Philadelphia Canyon Seepage Collection Tanks, as applicable.

Philadelphia Canyon Seepage Collection Tanks: As mentioned above, the Philadelphia Seepage Collection Tanks will consist of two 13,000 gallon tanks and will be constructed in 2022 by the current mine plan. The Philadelphia Canyon Seepage Collection Tanks will be installed above a continuous 80-mil HDPE geomembrane lined secondary containment with a fluid load out pad. The containment will be sized to contain one hundred and ten percent of both the tanks since the tanks will be connected hydraulically, the containment will hold approximately 32,000 gallons.

The Permittee will truck the seepage collected in the Seepage Collection Tanks to the Reona Pond. The tanks will be monitored remotely and will automatically sent a message at 50 percent capacity, 75 percent, 90 percent and 100 percent to allow for scheduling of a water truck to excavate the solution.

Iron Canyon Surge Pond: The ICSP is located at the mouth of Galena Canyon and serves as the outfall of the Butte and Iron Canyon collection systems. The pond is constructed with a single 60-mil HDPE liner. Water accumulated in the ICSP is evaporated (during summer months) or trucked to the Phoenix Mine Site and incorporated into the fluid management system. ICSP capacity (including 2 feet of freeboard) is approximately 6.4 million gallons.

If water is observed within the secondary containment pipes of the collection systems, more frequent monitoring will occur in an effort to isolate any potential leakage from the primary pipe, and repairs completed accordingly. In the event of unusual or emergency conditions, excess water collected in the ICSP is transported by truck to the Phoenix Mill for incorporation into the fluid management system.

In the period from second quarter 2017 to first quarter 2018, between 270,000 to 1,140,000 gallons of seepage water reported to the ICSP and the general quality of the water was pH of 3.0 S.U., total dissolved solids (TDS) exceeding 50,000 mg/L, and additional elevated metals. The water captured in the ICSP is conveyed as needed via water truck to the Phoenix Copper Leach Facility or TSF as approved by the Division.

North Fortitude Waste Rock Facility Seep Mitigation: The purpose of the North Fortitude Rock Seep collection system is to collect and convey water seeping from the toe of the North Fortitude (NF) WRDF. The NF WRDF collection system consists of a cut-off intercept trench, surge tanks, pipe-in-pipe water conveyance system, and associated piping, and valves. Seepage was first observed in June 2005 and a seepage collection system was constructed and in place October 2006. The collection system consists of a conveyance pipeline, approximately 1,350 feet long, located in an open ditch which conveys solution to a pair of 12,000-gal polyethylene storage tanks. Total solution collected is quantified and analyzed in accordance with the Permit. In addition, the Permit requires the tanks be evacuated when a maximum 70 percent of capacity (approximately 17,000 gal) is attained. Solution is conveyed by tanker truck for addition to the Phoenix Mill solution inventory.

Phase IV of the Greater Phoenix Major Modification will not impact the NF WRDF seepage collection system, but the proposed life-of-mine pit expansion of the Fortitude/Phoenix Pit will consume the NF WRDF where the seeps are located, effectively removing the source of the seepage. The pit design and final reclamation of the remaining NF WRDF should eliminate the potential for future seepage in this area with the life-of-mine pit.

A Division-approved proposal in September 2016, moved the NF Seep Collection Tank to the northwest near Well PPW-1. The move connected the NF Seep Collection Tank to the contact water line by a buried dual walled pipe (4-inch by 8-inch). The Tank is equipped with a telemetry system to inform personnel when the tanks are at 80% capacity.

In the period from second quarter 2017 to first quarter 2018, between 55,000 to 295,000 gallons of seepage water reported to the mill from the NF Seep Collection System and the general quality of the water was pH of 3.0, TDS exceeding 141,000 mg/L, and additional elevated metals. As mentioned above this water is transported to the mill via a dual walled pipe.

Fortitude Pit Dewatering System: When a pit lake was expressed in the Fortitude Pit, four pit dewatering wells (PPW-1 through PPW-4) would pump water via single-walled HDPE pipeline to either the Dewatering Water Storage Pond (DWSP) or the Dust Suppression Water Storage Pond (DSSP). The DSSP was removed in 2011 since no water is in Fortitude Pit. Refer to the subheading ***Dewatering Water Storage Pond (DWSP)*** for design details.

Dewatering Water Storage Pond (DWSP): The double-lined and leak detected DWSP measures approximately 200 feet by 140 feet in plan dimension and is a maximum 17 feet deep with 3H:1V side slopes. The pond is capable of containing draindown from the conveyance pipeline and the 100-year, 24-hour storm event with an operating capacity of approximately 1 million gallons and a 1.5-foot freeboard below the emergency overflow spillway. The spillway, single-lined with 80-mil textured HDPE, is located at the northwest corner of the pond, has a 15-foot wide base, and can accommodate maximum flow of approximately 23,000 gpm with 1 foot of freeboard. The spillway flow will report to the existing stormwater pond.

The DWSP liner system consists of a 6-inch prepared subgrade (92 percent maximum dry density per ASTM Method D1557), a 60-mil smooth HDPE secondary liner, a layer of geonet for leakage transmission, and an 80-mil textured HDPE primary liner. The geonet reports to a drain rock-filled sump constructed between the secondary and primary liners. Residence time for treated water stored in DWSP is limited to 20 days. The potential for any treated water to approach this limit is unlikely, since the treated water is consumed within days following its discharge to the pond.

The dewatering water conveyance pipeline discharges to the pond via a 50-foot wide HDPE apron constructed into the liner system on the west sideslope of the pond. The secondary containment pipeline terminates at the inlet edge of the apron to allow quantification of any pipeline leakage. Dewatering water discharges onto the apron and into the pond through an approximately 45-foot long section of the primary conveyance pipeline that has been drilled with 2-inch diameter holes located on 6-inch centers along the pipeline spring line. The discharge pipeline can convey solution at up to 1,200 gpm.

Dewatering water is conveyed to the Phoenix Mill for use as make-up water through a 10-inch diameter stainless steel intake riser. The riser is located in the eastern half of the pond and penetrates the LCRS sump through an 11-foot long, by 4-foot wide, by 4-foot thick concrete ballast block constructed within the sump. The primary liner of the pond is attached to the ballast block with an extrusion weld to a circular HDPE imbed in the concrete. A pipe boot fabricated around the riser is extrusion welded onto the top of the primary liner. The riser pipe exits the sump thorough a flanged connection cast into the concrete ballast to convey fluid by gravity to the Phoenix Mill. Both the 10-inch diameter SDR 17 HDPE primary pipeline and the 14-inch diameter SDR 17 HDPE secondary pipeline are connected to the flange within the concrete ballast and booted to the sump secondary liner.

The pond outlet pipeline can convey fluid to the Phoenix Mill at up to 2,000 gpm. The conveyance pipeline and secondary containment run both above and below ground for approximately 1,750 feet to the Phoenix Mill with a vertical drop of about 150 feet. The dewatering water reports to the existing Treated Reclaim Water Tank (270-TK-091), which has a capacity of approximately 75,000 gallons and provides make-up water storage for the mill. Any fluid within the conveyance pipeline secondary containment reports to the mill secondary containment system via a 4-inch diameter discharge pipe.

Petroleum-Contaminated Soil (PCS) Management Plan. A PCS Management Plan was approved by the Division as an EDC in August 2013, authorizing on-site disposal of non-hazardous PCS at a specified location on the Natomas Waste Rock Facility (WRF). Prior to management under the plan, hazardous waste determinations must be performed to demonstrate that the PCS is not hazardous waste. Hazardous waste must be managed and disposed off-site in accordance with applicable regulations. On-site disposal of PCS is also contingent on the results of periodic screening analyses, which must show that the PCS does not exceed screening levels established via risk assessment for various organic constituents. Otherwise, the PCS must be properly disposed off-site.

PCS may be stored on the approved PCS temporary holding pads while screening analyses are performed, or it may be provisionally placed at the approved disposal location on the Natomas WRF, provided that it will be removed and properly disposed elsewhere in accordance with approved contingency plans if it exceeds screening levels during subsequent screening analyses. Various time limits and other stipulations in the plan and permit apply to temporary storage, provisional placement, and contingency plans.

C. Receiving Water Characteristics

Surface Water: No surface water enters or exits the Phoenix Project site except during storm events and spring runoff.

Ground Water: Groundwater flows in the Phoenix Project area occur within bedrock units along high-angle and low-angle fracture sets and, to a lesser degree, along bedding planes. The structural fabric of the Phoenix Project area is dominated by high-angle normal faults, low-angle thrust faults and broad, open folds. Large-scale structural elements include the Copper Canyon, Virgin, and Plumas high-angle faults and the Golconda and DeWitt low-angle thrust faults.

Faults and other structural features in the Phoenix Project area can influence groundwater flow as hydraulic conduits or barriers. In general, faults in the Project area tend to impede groundwater flow across their strike, but transmit flow along the strike; structural compartmentalization in the Project area influences groundwater flow direction and gradient.

The direction and gradient of groundwater flow in the bedrock portion of the Project area is controlled by these structural elements and by topography. Groundwater recharge at higher elevations in the Battle Mountain Range results in flow toward the range front and alluvial fans. Groundwater flow is generally toward the south in the Copper Canyon drainage, with relatively shallow gradients of flow to the southeast and southwest in alluvial deposits downgradient of Copper Canyon. Groundwater flow is to the east along the eastern margin of the Phoenix Project area with relatively steep gradients across north-south oriented structural zones.

Groundwater flow in alluvial deposits also occurs in the major drainages, and within alluvial fan deposits along the southern and eastern flanks of the Battle Mountain Range. The depth to ground water beneath the proposed project facilities varies from less than 100 feet below ground surface (bgs) to 1,000 feet bgs. In the vicinity of the heap leach facility, the depth varies from about 50 feet to 150 feet bgs. In the area of the tailings impoundment, the depth varies from about 60 feet to 250 feet bgs.

Groundwater quality data from past monitoring indicates water of generally good quality with the Division Profile I reference values being met. However, water quality from monitoring and pumping wells located downgradient of the historic copper-gold tailings impoundment typically shows elevated levels of chloride, magnesium, manganese, sulfate, and total dissolved solids. The elevated constituent levels are due to seepage from the historic and inactive portion of the tailings impoundment, which is associated primarily with the distribution of tails from historic copper and gold processing and occurred prior to the Phoenix Mine development and construction of the lined Phoenix TSF.

Pump Back System for TSF Chloride Plume

The pump back system conveyed the impacted groundwater ("chloride plume") to the surface of the gold tailings impoundment that was in operation since the mid 90's. Deposition to the gold tailings impoundment ceased in late 2003, when alluvial cover was placed on the gold tailings to control fugitive dust and support a vegetative cover reducing the infiltration of water through the tailings reducing the volume of impacted groundwater.

Since the gold tailings was covered, the impacted groundwater has been routed to the Phoenix Mill or Reona Gold HLP to be used in process as make up water. As of November 2015 approximately 45% of the mass chloride has been removed by the pumping wells; the predicted total percent of chloride removed is 80% by 2043 and 91% by the end of 2063. Between July 2017 and July 2018, the volume of water pumped back varied from 800 gpm to 1,500 gpm with a chloride concentration that varied from 416 mg/L to 890 mg/L. The groundwater chloride plume continues to be monitored under the Permit.

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 modified Permit.

F. Proposed Limitations, Schedule of Compliance, Monitoring, 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, the facility fluid management system 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 wells. Specific monitoring requirements can be found in the Water Pollution Control Permit.

The facility fluid management system has been designed to remain fully functional and fully contain all process fluids including all accumulations resulting from a 24-hour storm event with a 25-year recurrence interval pursuant to NAC 445A.433. Groundwater quality beneath the site has been historically monitored and additional water quality monitoring will be sited as may be necessary, in accordance with the Permit and routine operational review as the Phoenix Mine is developed.

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: Natasha Zittel, P.E.

Date: 19 October 2021

Revision 00: Construction Changes to Raffinate Phase 2A Delivery pipeline (Nov 2020), EDC to the Philadelphia Canyon and Box Canyon Seepage Collection System (Aug 2021), Renewal