

FACT SHEET

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

Permittee Name: **Comstock Mining LLC**
P.O. Box 1118
Virginia City, NV 89440

Project Name: **Lucerne Project (formerly Billie the Kid Project)**

Permit Number: **NEV2000109 (Renewal 2014)**

A. Location and General Description

Location: The Lucerne Project is located on public and private land in the southwest portion of the Virginia Range near the town of Gold Hill in Sections 5, 6, 7, and 8 of Township 16 North, Range 21 East, Mount Diablo Baseline and Meridian within Storey and Lyon Counties. The mine site is adjacent to State Route (SR) 342 and the process facility is located approximately two (2) miles west of the town of Gold Hill. The mine and process facilities are separated by approximately two (2) miles.

General Description: This Project consists of open pit mining with ore processing using conventional cyanide heap leaching technology with precious metal recovery via the Merrill-Crowe process. The precipitate is dried, mixed with fluxing agents, and melted in a gas or electric furnace to produce gold doré. Up to 4,000,000 tons of ore are permitted to be processed per year, including in the high-grade ore mill process (not yet constructed). The facility is required to be designed, constructed, operated, and closed without any discharge or release in excess of those standards established in regulation except for meteorological events which exceed the design storm event.

B. Synopsis

Geology

The site is situated at an elevation of approximately 5,550 feet above mean sea level on the southern end of the Virginia Range. In general, the geology of the Project area is typified by metamorphosed Mesozoic volcanic and sedimentary rocks, unconformably overlain by Tertiary rhyolite and andesite. The Lucerne Project deposit is located in the Alta Formation, which overlies the Hartford Hill Rhyolite.

Subsoils in the area of the heap leach pad consist primarily of a layer of clayey-sand with

gravel underlain by volcanic bedrock. Bedrock is typically highly weathered andesite flows with ashy tuffaceous lenses. The andesite extends beyond the maximum depths penetrated by the test pits. Occasional pebble and cobble conglomerate were encountered.

An approximately 12-inch thick layer of the upper soil profile, which consists primarily of gravelly, clayey soils and soils containing organic matter, was removed and stockpiled for future cover material. Soils in the area of Event Pond 1, in the southwest corner of the 40-acre process area, consist of a colluvial deposit of gravelly-, clayey-, silty-sand.

Operation

The Project includes open pit mines, a crushing plant, a heap leach pad (9 cells), process ponds, event ponds, cyanide tank, and Merrill-Crowe plant as well as support facilities such as lab trailers, office, storage, and shop.

Ore is obtained from an open pit mine on the west side of SR 342 near Gold Hill. As part of the Major Modification submitted in March 2009, and approved by the Nevada Division of Environmental Protection (Division) in October 2009, mining was expanded to the Lucerne/Billie the Kid mining zones. Available data indicate that the proposed mine depths will not intercept groundwater. Run-of-mine ore is segregated by grade and type in open stockpiles prior to crushing and placing on the heap leach pad.

Waste rock generated from this mine is placed in waste rock dumps adjacent to the mine. Continued characterization of the waste rock has not indicated acid generating potential. However, the waste rock generated each quarter is required by the Permit to be characterized to confirm that it is non-reactive.

Run-of-mine ore is hauled to the crushing plant, located approximately two miles to the west of the Billie the Kid mine where the ore is crushed to 1¼-inch minus at a maximum rate of 1,000 tons per hour. The ore is agglomerated using cement and/or lime. The ore is then stacked on the heap leach pad to a maximum heap height of 105 feet above the synthetic liner. Lift heights and bench widths are required to be maintained for physical stability. In addition, ore setbacks are required from the edge of the liner to the toe of the first lift. The latest stability analyses submitted with the applications for in March 2009, March 2013, and March 2014 can be found in Division files.

The original leach pad design encompasses an area of approximately 650,000 square feet and consists of five (5) cells, which were constructed in five phases. All five (5) cells have been completed. These five (5) cells accommodate 2.08 million tons of ore (at 105-foot leach pad height and an assumed dry density of 116 pounds per cubic foot). Design of the leach pad meets the regulatory design criteria consisting of a composite liner with leak detection. A geosynthetic clay layer (GCL), equivalent to a low conductivity soil layer consisting of one foot of 1×10^{-7} centimeters per second (cm/sec) soil, is placed on a cleared, grubbed, and compacted subbase. Above the GCL, in each of the leach pad cells, a 2-inch diameter

perforated polyvinyl chloride (PVC) pipe for leak collection and recovery runs the entire length of each cell. The perforated PVC pipes are placed in 6-inch deep trenches lined with GCL and filled with clean pea gravel. The pipes transition from perforated PVC to solid PVC pipes at the downgradient portion of each cell where the pipes are booted through the GCL. These leak detection pipes report to dedicated leak detection sumps. The transfer channel from the pad to the Pregnant Pond is also constructed with the same composite liner and leak detection system design. This channel leak detection pipe reports to a dedicated leak detection sump.

Three-inch diameter perforated Advanced Drain System (ADS) hydraulic relief pipes, spaced on 50-foot centers, coupled with the agglomerated ore placed on the 60-mil (Cell 1) or 80-mil (Cells 2-5) high density polyethylene (HDPE) liner, provide quick recovery of the process fluid and minimize the hydraulic head on the liner to one (1) foot or less. As part of the 2009 Major Modification, the solution application system was redesigned to operate with two circuits: barren solution at a rate of 660 gallons per minute (gpm), and intermediate solution at a rate of 660 gpm (1,320 gpm total).

Process solution is conveyed to and from the heap leach pad in a network of HDPE pipes varying in diameter from four (4) to 10 inches. Initially, the pipes exit the leach pads in a 60-mil HDPE-lined secondary containment trench. In the area where the pipes run past the north side of the Merrill-Crowe building, the pipes run through buried 24-inch HDPE pipes, which are further contained within 42-inch HDPE pipe. The ends of the primary and secondary pipes extend beyond the crest of the new Pregnant Pond where inspection for evidence of leakage can be done visually.

In March 2013, the Permittee submitted a Major Modification proposing to expand the leach pad to the north by adding Cells 6, 7, and 8, a total of 550,000 additional square feet. The additional cells allow for loading of an additional 2.5 million tons of ore, resulting in a total leach pad capacity (all 8 cells) of four (4) million tons. The same Major Modification also proposed the increase of the annual ore processing rate to four (4) million tons. The Major Modification was approved in October 2013.

Cells 6 and 7 were constructed as extensions of the existing heap leach pad, with all solution reporting to the process pond inlets via 12-inch-diameter pipe placed on top of overliner on the lined heap perimeter. Cell 8 proposed in the 2013 Major Modification has not been constructed as of August 2014. This being the case, the design of Cells 6-8 is very similar to that of the first five (5) cells. The liner system consists of, from bottom to top, a prepared subgrade (native soil), either a 12-inch compacted subbase achieving maximum permeability of 1×10^{-6} cm/sec or GCL with specified permeability equal to 12 inches of compacted soil at 1×10^{-7} cm/sec or less, and an 80-mil HDPE liner. The HDPE liner is in turn covered by a 36-inch layer of free-draining overliner material for protection of the liner system from damage.

The solution collection system, consisting of a network of perforated, corrugated HDPE pipes, conveys solution to the process pond. Four (4)-inch diameter pipes placed on 10-foot

centers lead to 12-inch diameter header pipes, which discharge directly into the existing perimeter solution conveyance pipe. All of the collection pipes sit on the 80-mil geomembrane and are covered by the overliner layer.

The Barren Pond, Pregnant Pond 1 (formerly Pregnant Pond), and Pregnant Pond 2 (formerly Barren Pond), which pre-date the 2009 Major Modification, are all double-lined with 60-mil HDPE. Geonet is located between the liners to transmit solution to a sump for collection and recovery. Each of the pond bottoms are graded, directing leakage through the primary liner to a dedicated, clean gravel-filled, leak detection sump between the liners, (one in each pond), where it is required to be evacuated via an 8-inch diameter PVC pipe that is perforated within the sump and solid where it runs up the pond side wall between the liners and daylights at the pond crest. The capacities of the Barren Pond, Pregnant Pond 1, and Pregnant Pond 2 sumps are 9 gallons (gal) each. The crest dimensions for the Barren Pond are approximately 240 feet by 100 feet, with a maximum depth of 10 feet. The crest dimensions for each Pregnant Pond are approximately 90 feet by 90 feet, with maximum operating depths of 7.2 feet for Pregnant Pond 1 and 5.6 feet for Pregnant Pond 2. Total working capacity for each of the ponds at two (2) feet of freeboard is approximately 536,000 gal for the Barren Pond, approximately 200,000 gal for Pregnant Pond 1, and approximately 137,000 gal for Pregnant Pond 2. Spillways two (2) feet below the pond crest connect the Pregnant Ponds to the Barren Pond, and a spillway approximately one (1) foot below the crest provides an outlet from the Barren Pond to Event Pond 1.

Pregnant Pond 3 was included as part of the 2009 Major Modification. The pond design includes 80-mil primary and 60-mil secondary HDPE liners with geonet placed in between the liners to transmit solution to a sump for collection and recovery. Any leakage through the primary liner is directed to the sump from which it can be evacuated through a 6-inch diameter PVC pipe which daylights at the pond crest. The capacity of the sump is 1,041 gal. Working capacity of the pond is approximately 2.8 million gal at the invert of the overflow culvert connecting Pregnant Pond 3 to Pregnant Pond 2 (two [2] feet below the crest). Overall dimensions of Pregnant Pond 3 are approximately 345 feet by 125 feet and 25 feet deep. The overflow culvert is 24-inch diameter corrugated metal pipe and is only intended to be used during upset conditions.

Near the southwest corner of Pregnant Pond 3 is the Sludge Pond which serves as a sedimentation basin for the solution entering the main pond. The Sludge Pond measures approximately 30 feet by 30 feet at the crest with a depth of approximately 6 feet. A spillway allows clarified solution to overflow into the Pregnant Pond. The liner system is identical to that of Pregnant Pond 3. Leakage is collected in a dedicated leak detection sump (100 gal capacity) which can be evacuated through a 6-inch diameter PVC pipe which daylights at the pond crest. Solids deposited in the Sludge Pond are periodically removed using light equipment or a vacuum truck to prevent damage to the synthetic liner.

In July 2013, the Permittee submitted an Engineering Design Change (EDC) application proposing to upgrade Event Pond 1 (formerly called the Single-Lined Overflow Pond), which

was originally constructed as a single-lined pond prior to the 2009 Major Modification, to a double-lined configuration. The design calls for 80-mil HDPE primary and 60-mil HDPE secondary liners, with geonet in between the liners to transmit solution to a sump for collection and recovery. Total design capacity of the pond is approximately 4,400,000 gal at the bottom of the overflow channel connecting to Event Pond 2 (2 feet of freeboard). The pond design includes a clean gravel-filled leak detection sump (928 gal capacity) to which all fugitive solution reports and from which it can be evacuated through a 6-inch diameter PVC pipe which is perforated within the sump and daylights at the pond crest. The synthetic liners are laid over a prepared subgrade, but in the area of the leak detection sump, the 12-inch subbase is moisture conditioned and compacted to achieve a permeability of 1×10^{-7} cm/s or less. The EDC was approved in August 2013.

As part of the 2013 Major Modification, a second overflow pond, Event Pond 2, was permitted south of Pregnant Pond 3. The design of Event Pond 2 calls for 80-mil HDPE primary and 60-mil HDPE secondary liners, with geonet in between the liners to transmit solution to a sump for collection and recovery. Total design capacity of the pond is approximately 1,260,000 gal at the bottom of the emergency overflow channel. The pond design includes a clean gravel-filled leak detection sump (1,041 gal capacity) to which all fugitive solution reports and from which it can be evacuated through a 6-inch diameter PVC pipe which is perforated within the sump and daylights at the pond crest. The synthetic liners are laid over a prepared subgrade, but in the area of the leak detection sump, the 12-inch subbase is moisture conditioned and compacted to achieve a permeability of 1×10^{-7} cm/s or less.

The fluid management system has been designed to contain the volumes resulting from the 25-year, 24-hour storm event in addition to process solution applied to the heap and returning from the process facility at 1,800 gpm for 24 hours within the operational freeboards of the ponds. The system is also capable of containing runoff resulting from the 100-year, 24-hour storm event, along with process solution draindown, within the crest volumes of the ponds. Diversion ditches have been designed and constructed to accommodate and divert flow resulting from the 100-year, 24-hour storm event around the process components.

In past Permit revisions, the Frog Pond, a natural depression located northeast of the Merrill-Crowe facility, has been included in the monitoring requirements. The accumulation of meteoric water in an area close to the heap leach pad was cause for concern, prompting the addition of the requirement for quarterly analysis of the water (when present). Since the first quarter of 2006, sufficient water was available for sampling only once (that same quarter) and showed exceedances of the Profile I reference values for aluminum (3.87 milligrams per liter [mg/L]) and iron (2.04 mg/L). As part of the 2009 Major Modification, this pond was filled in, regraded, and removed from the monitoring requirement list in the Permit.

The existing cyanide tank containment pad located adjacent to the Merrill-Crowe facility, was designed and constructed to provide containment equal to 110% of the tank volume and is sloped to drain to Pregnant Pond 2. The Merrill-Crowe facility itself was upgraded as part

of the 2009 Major Modification to increase capacity to allow a processing rate of 600 gpm. The building containment has sufficient capacity to hold 110% of the volume of the largest process component in the system with a HDPE liner under the entire Merrill-Crowe facility. Both of these containment systems (cyanide tank and Merrill-Crowe facility) drain to Pregnant Pond 2.

A Minor Modification was submitted in June 2011 which proposed further expansion of the Merrill-Crowe building. The increased area was permitted to house clarification filters, a de-aeration tower, refinery, mercury scrubber, and doré furnace baghouse, all on concrete containment equal to or greater than 110% of the largest tank volume provided by the slab, stem walls, and sumps. Additional areas were permitted to be used for office space, laboratory, and employee facilities (restrooms, lunchroom, etc.). The pipe from the laboratory drain was permitted to be double contained (6-inch diameter HDPE pipe in 60-mil HDPE lined ditch) up to the discharge point at the crest of the new Pregnant Pond.

The same Minor Modification also proposed changing the geometry of the new Pregnant Pond but maintaining the same volume and liner configuration, and established a phased approach to construction of the Major Modification components whereby the new mill facility was permitted to be constructed in stages rather than all at once. The Minor Modification was approved by the Division in August 2011.

As part of the 2009 Major Modification, a milling and agglomeration facility was permitted north of the heap leach pad. This facility was permitted to include a jaw crusher, low grade ore stockpile, high grade ore bin, high grade ore milling/leaching circuit, agglomerator, and a conveyor system. The components adjacent to the mill building were permitted to be situated over an 80-mil HDPE liner which was permitted to be protected by a one (1) foot thick layer of minus ¾-inch gravel. The liner subbase design included grading, compaction to 90% of maximum dry density (modified Proctor), and sloped toward the leach pad to ensure that any fugitive solution does not run off containment.

The milling/leaching plant is designed to process 144,000 tons per year. A wet ball mill was permitted to be operated in a closed circuit with hydrocyclones, a gravity gold recovery circuit, leach tanks, a pulp thickener, and a filter. High grade ore was permitted to be crushed to minus 100-mesh before introduction into the gravity circuit for recovery of liberated free gold. The ground ore was permitted to then be leached in a vat with cyanide solution and the pregnant fluid pumped at a rate of 600 gpm to the expanded Merrill-Crowe facility. The mill building itself was permitted to include a concrete floor with stem wall to act as containment. The total containment volume of the design is greater than 110% of the largest tank.

Lower grade ores are conveyed to the agglomerator, if required, after crushing, where they are mixed with filter cake from the vat leaching process, cement, and barren solution prior to being loaded on the leach pad. This process binds the fine particles to the larger ones in a form that will not degrade under leaching conditions but will promote uniform permeability

throughout the heap. The agglomerator and all conveyors from that point out to the heap are located over an 80-mil HDPE liner which drains to the leach pad liner system. As of August 2013, the construction of the mill and agglomerator had not been carried out, with all ore placed directly on the heap leach pad after crushing.

Included in the March 2014 Renewal, the Permittee proposed to expand the leach pad to the north by adding Cell 9 and revising the configuration of Cell 8 adding an additional 416,000 square feet of lined area to the existing lined area of 1,137,000 square feet for Cells 1 through 7 for a total of 1,553,000 square feet of lined area. The additional Cell 9 and revised Cell 8 will allow for loading of an additional 1.55 million cubic yards of ore, resulting in a total leach pad capacity (Cells 1-9) of 5.79 million tons at an assumed dry density of 116 pounds per cubic foot.

Construction of Cell 9 requires realignment of the stormwater diversion channel along the uphill side of the cell that collects and diverts uphill runoff away from process components. The new alignment is also designed to safely convey runoff from the 100-year, 24-hour storm away from process components. The channel is designed to have a trapezoidal section and armoring of durable stone riprap and wire mesh reinforced riprap (gabions) in locations requiring heavy armoring. A revision to the design of Cell 8 was made necessary by the as-built condition of Cell 7 resulting from the continued operation of the crusher plant in its current location on the site of Cell 8.

The proposed new cells are to be constructed as extensions of the existing heap leach pad, with all solution reporting to the existing heap leach pad perimeter channels. This being the case, the designs of Cell 9 and revised Cell 8 are very similar to that of the existing seven (7) cells. The liner system consists of, from bottom to top, a prepared subgrade (native soil), either a 12-inch compacted subbase achieving maximum permeability of 1×10^{-6} cm/sec or a GCL with specified permeability equal to 12 inches of compacted soil at 1×10^{-7} cm/sec or less, and an 80-mil HDPE liner. The HDPE liner is in turn covered by a 36-inch layer of free-draining overliner for protection of the liner system from damage.

The solution collection system consisting of a network of perforated, corrugated polyethylene pipes (CPE) conveys solution to the process building. Four (4)-inch diameter CPE pipes placed on 40-foot centers lead to 12-inch diameter CPE header pipes, which will discharge directly into the existing perimeter solution channel. All of the collection pipes sit on the 80-mil HDPE liner and are covered by the overliner layer.

The 2014 Renewal also incorporated several changes to monitoring locations that were approved in EDCs subsequent to the 2013 Major Modification including the following: installation of groundwater monitoring wells GWMW-3 and GWMW-4; installation of a new monitoring port for location HDPE42 and addition of surface water sampling point SC-1. Also, the leak collection and recovery sump, monitoring location PSCLCR, previously located in the pregnant solution transfer channel between the heap and Pregnant Pond 1 (former Pregnant Pond) was removed during the 2013 Event Pond 1 improvements and

construction of the Solution Diversion Structure.

C. **Receiving Water Characteristics**

Measurements in wells at the mine site have shown that the static depth to groundwater ranges from 35 to 90 feet. Analyses of samples from the downgradient monitoring wells (GWMW and GWMW-2) and production wells (WS-2, WS-3, and WS-4) have shown the groundwater constituent levels to be below the Profile I reference values with occasional exceedances of iron in GWMW. Background water quality is monitored by means of an upgradient monitoring well (GWMW-1) installed as part of the 2009 Major Modification.

As part of the Major Modification of 2013, production well WS-2 was abandoned and replaced by a new well WS-4. Production well WS-3 was abandoned due to its location within the new heap leach pad footprint. When required, the mine also uses water provided by the Storey County municipal water system. In addition, monitoring well GWMW-5 was permitted to be added downgradient of Event Pond 2.

Surface water resources in the Project vicinity are limited. However, several springs, which flow during non-drought years, feed intermittent drainages. These intermittent drainages coalesce in American Flat and a single channel passes through American Ravine west of the mine site. A surface water sample point (AR-1), located at the downgradient end of the culvert under the road approximately 1,000 feet south of the mine property in American Ravine, is included in the Permit. Additional surface water monitoring is provided by AR-2 (American Ravine west of the permitted facilities), AR-3 (drainage feeding American Creek northwest of the permitted facility), and SC-1 (stormwater diversion channel at outlet of sedimentation basin). Drainage from the mine site is to the southeast through Gold Canyon, which flows into the Carson River near Dayton, Nevada.

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 contained within the Permit, is being sent to the **Nevada Appeal** for publication. The notice is being mailed to interested persons on the Division mailing list. Anyone wishing to comment on the proposed Permit can do so in writing within a period of 30 days following the date of public notice. 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, any affected 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.

A public hearing has been requested for the 2014 Renewal and is scheduled for September 17, 2014 at 2:00 to be held at the Legislative Council Bureau Building, Room 2135, in Carson City.

E. **Proposed Determination**

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

F. **Rationale for Permit Requirements**

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

The primary method for identification of escaping process solution will be placed on required routine monitoring of leak detection systems as well as routinely sampling downgradient monitoring well(s) and surface water in American Flat Ravine. Specific monitoring requirements can be found in the Water Pollution Control Permit.

G. **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 (Title 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 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: Shawn Gooch
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