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

Permittee Name: **Barrick Goldstrike Mines, Inc.**

Project Name: **North Block Project**

Permit Number: **NEV0091029 (Renewal 2015, Fact Sheet Revision 00)**

A. Location and General Description of Facility

Location: The North Block Project is located in the Little Boulder Basin adjacent to the Tuscarora Mountain Range in Elko and Eureka Counties, approximately 27 miles northwest of the town of Carlin, Nevada. The North Block facilities are located in Sections 12, 13, 14, 15, 22, 23, 24, and 25, Township 36 North (T36N), Range 49 East (R49E), and Sections 7, 8, 17, 18, 19, 20, 29 and 30, T36N, R50E, Mount Diablo Baseline and Meridian.

General Description: The North Block Project is a mining and beneficiation facility producing mainly gold located on both private land and public land administered by the U.S. Bureau of Land Management. Ore and waste rock are mined from the Meikle and Rodeo underground mines as well as the open pit mine, Betze-Post Pit. Milling and processing of the ore take place at separate autoclave and roaster facilities. Gold recovery from the autoclaving process takes place at the Resin-in-Leach (RIL) facility. Gold recovery from the roaster process is by Carbon-in-Leach (CIL). Waste rock is deposited at the Clydesdale waste rock facility and as in-pit backfill. The North Block Tailings Facility (NBTF) currently receives material from the roaster processes, while the Tailings Storage Facility 3 (TSF3) will receive material exclusively from the autoclave/RIL facility. The North Block Project also includes all ponds, storm diversion channels, pipelines, vehicle fueling and maintenance facilities, and monitoring sites. Facilities are 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.

In 2008, the North Block Permit (NEV0091029) was reorganized, along with the Permit for the AA Block (NEV0090060), such that active areas were consolidated into NEV0091029 while areas in closure or projected to be in closure in the near future were left in NEV0090060. The following components were transferred to NEV0091029 during this process:

- Betze-Post Pit

- AA and West Side Fuel Bays
- Truck Wash and Recycle Pond
- Wet Mill/Autoclave Process Facilities
- Valdez Pond
- Lab Pond
- Autoclave Stockpile Pads
- Southwest Energy Facility
- AA Block Carbon Reactivation Facilities

Historical information and past test results for these components may be found in previous Permit documents and reports for NEV0090060.

B. Synopsis

Design, Construction and Operation of Facilities in the North Block Project: The Permittee has submitted numerous applications that include detailed design reports and supporting technical documentation for the facilities located in the North Block. This information is on file at the Nevada Division of Environmental Protection, Bureau of Mining Regulation and Reclamation (Division), and has been reviewed for compliance with NAC 445A.350 through NAC 445A.447. Design and construction of the NBTF, TSF3, autoclave, roaster, CIL and RIL circuits, ore stockpile pads, ponds, and associated appurtenances, such as piping, either meet or exceed the minimum required engineered containment (e.g., 110% secondary containment). Monitoring (e.g., piezometers, leak detection systems, and monitoring wells) as well as proper operating practices (e.g., subaerial deposition) are routinely evaluated to ascertain that facilities maintain a zero-discharge standard of performance.

Open Pit Mining: As of November 2011, the Betze-Post Pit had a surface area of 1,060 acres with a pit bottom elevation of 4,170 feet above mean sea level (amsl), the production rate of ore and waste rock was 260,000 tons per day, and the Clydesdale waste rock disposal area covered approximately 535 acres. Future expansion of the pit will add two (2) contiguous pit laybacks on the north side of the existing pit. The expansion will produce an additional 315.5 million tons of waste rock, of which only 2% will be Potentially Acid Generating (PAG), along with an additional 12.4 million tons of ore, extending the mine life four (4) years to 2015. As part of this plan, the amount of in-pit backfill will also be increased from 570 million tons, as previously projected, to 940 million tons. These changes impacted the pit lake configuration and the effects of these changes on the projections of pit lake volume, chemistry, and ecological risk assessment are described in more detail in the final paragraphs of Section C below.

To enable mining below the water table, the Permittee operates a system of groundwater extraction wells and in-pit horizontal drains to depress the water table in the area of the Betze-Post Pit. Dewatering wells around the perimeter of

the pit produce a majority of the water. The combined mine dewatering rate for the Betze-Post Pit and the Meikle Underground currently averages 24,000 gallons per minute. The pumped water is collected in a piping system, treated as necessary to lower arsenic concentrations, and used beneficially for ore processing, dust suppression, potable water supply, fire water supply, and crop irrigation. Water in excess of these uses is returned to the aquifer via infiltration and injection in compliance with federal, state (NEV0089068 and UNEV0093209), and local Permits and approvals. Make up water meeting Profile I reference values, except for occasional antimony exceedances is also received from Newmont Mining Corporation Leeville water treatment facility (NEV20021005).

Open pit mining in the Betze-Post Pit is conducted with conventional drilling, blasting, excavation, and hauling methods to move the ore and waste rock. Waste rock is placed on the Clydesdale waste rock disposal area according to the Waste Rock Management Plan of September 2007. Waste rock is also used to backfill inactive portions of the open pit, and for construction of engineered fills including tailings dam construction. Ore is hauled to ore stockpile areas as feed for the crushing facilities. The Bazza waste rock disposal area is now being prepared for closure and no longer receives material from active mining.

Underground Operations: Ore extraction from the Meikle and Rodeo underground mining operations consists of a process of drilling, blasting, mucking, and transporting ore and waste rock to the production shaft location where the material is hoisted to the surface and segregated into either the ore bin or the waste rock bin. Ore is loaded into haul trucks and transported to one of the stockpiles. Waste rock is removed to the Clydesdale waste rock disposal area. Fluid management underground consists of collecting hydrocarbon-contaminated water from the maintenance shop and wash bay areas, processing it through an oil/water separator where hydrocarbons are collected, characterized, and properly disposed of (e.g., used as a fuel additive to provide heat in the roaster). The water is recycled back into the process. Petroleum products are stored in tanks and drums within containment structures.

Backfill: Barrick currently backfills mined out areas of the Meikle and Rodeo Mines using Cemented Rock Fill (CRF) to allow the safe extraction of ore from the remaining underground ore reserves.

In December 2007, January 2008, and January 2011, Barrick conducted tests of paste backfill using mine tailings to evaluate the performance as a replacement for the CRF. Critical to this proposal was whether monitored constituents could migrate into the wall rock during curing and the ability of the paste to immobilize monitored constituents after curing. The initial tests (Phase I of the paste backfill test program) showed good performance of the paste in both of these aspects over the 28-day test period and Barrick was given approval by the Division to proceed

with Phase II of the test program consisting of long term testing of paste in simulated underground, inundated conditions. Inconsistencies in the chemistry of samples from the Phase II test resulted in only a narrow range of possible paste mixtures being approved by the Division for general mining use. The Permittee proceeded to develop a new test program, based on American Society for Testing and Materials (ASTM) C-1308, using 26 different samples with a wide range of combinations of binder percentages and types, and controlling for additional variables such as tails paste preparation methods and water chemistry.

The results of the ASTM C-1308 diffusion tests showed acceptable results for those samples in which the binder was at least 3% of the total weight, 2% of which was Ordinary Portland Cement (OPC), (ASTM C150 Type I/II), and for which at least 50% of the binder was OPC (the remainder typically being fly ash). The Division approved the use of paste for underground backfill according to these criteria in June 2011 based on the test results which showed that the use of paste did not produce a significant probability of degradation of waters of the State.

As a follow-up to these diffusion tests, the Permittee prepared another set of test samples for which the tails material had not been subjected to a cyanide removal process prior to batching (all test samples from the January 2011 test had been prepared with tails which had been subjected to the cyanide kill process). Cyanide concentrations in the base material were measured as high as 20 ppm. Results of the follow-up diffusion tests showed no significant increase in the release of cyanide from paste even with the cyanide kill step removed. The Division approved the removal of the cyanide kill procedure from the design batch process in September 2011.

The paste backfill process utilizes tailings produced during the roasting process, which is used to oxidize refractory ores mined from the surface and underground mines, making them more amenable to cyanide leaching. Gold is then leached with cyanide and adsorbed onto activated carbon for recovery. Tailings are the slurry of oxidized spent ore remaining once this process is complete. Under the approved paste backfill procedure, the roaster tailings are cycloned for size distribution, thickened, and filtered. The tailings solids are then mixed with cement and fly ash to create the paste backfill slurry. Paste backfill is pumped underground through a pipeline, eliminating the need for heavy equipment to place the backfill and filling void spaces more completely than the CRF. Approximately 5,000 tons per day (tpd) of roaster tailings are used at full capacity of the facility.

The anticipated safety advantages of paste backfill over CRF include:

- Increased safety during mining over, beside, and under the deposited paste backfill because of the ability of the slurry to fill void spaces during deposition.

- Reduction in the amount of underground equipment necessary to place the backfill because paste backfill is pumped and distributed underground using a slurry distribution system, which helps reduce the levels of diesel particulate matter in the underground air.
- Elimination of the need for human presence in the stopes or drifts during the backfill process, thereby reducing the potential for conflict between personnel and machinery and the possibility of injury from movement of material.

The anticipated environmental advantages of paste backfill over CRF include:

- Reduction of surface disturbances by decreasing the demand for rock from the surface aggregate mine.
- Reduction in emission of air pollutants replacing much of the aggregate mining, crushing, screening and material handling with wet process paste production.
- Reduction in the volume of tailings requiring surface disposal by approximately 10%.

The paste backfill operation includes a surface batch plant adjacent to the existing roaster wherein all ingredients of the paste are treated, combined, and prepared for delivery to the stopes and drifts. The facility includes:

- Cyanide Destruct Tank
- Paste Tailings Thickener,
- Clarifiers,
- Disc Filter System,
- Cement and Fly Ash Feeders,
- Paste Mixer, and
- Associated Pumps, Conveyors, Piping, etc.

During the batch process, samples will be taken from three (3) locations and tested to insure the proper make-up and consistency of the paste:

- Samples will be taken from the Filter Cake and tested for levels of Weak Acid Dissociable (WAD) Cyanide;
- Paste samples will be taken prior to pumping and subjected to slump measurement procedures; and
- Cylinders of the paste will be made and allowed to cure for 28 days, after which they will be characterized by Meteoric Water Mobility Procedure (MWMP) testing at a Nevada-certified lab.
- Cylinders will also be tested for compressive strength according to ASTM C39 or equivalent with minimum 28-day strength of 14.5 pounds per square inch.

Prior to backfilling, the designated stope or drift will be sealed off by a temporary bulkhead. The paste will be pumped behind the bulkhead until the entire space has been filled. To clean the pipes, rinse water is pushed through the pipe with compressed air. The excess water will be consumed by cement hydration during the curing process.

Waste Rock Facilities: The Clydesdale Waste Rock Facility (WRF) is designed to accommodate up to 350 million tons of waste rock. To minimize haul distance and surface disturbance, the proposed facility was constructed within the Clydesdale Block, approximately 3,500 feet west of the Betze-Post Pit, and just west of the current confluence of Bell and Rodeo creeks. The toe elevation will be approximately 5,150 feet amsl, and the final crest elevation will be approximately 5,650 feet amsl for a facility height of approximately 500 feet. To provide a spatial buffer for Bell and Rodeo creeks, the Clydesdale WRF will be set back at least 100 feet from the uppermost edge of the west creek bank.

The Clydesdale WRF has been engineered, constructed, and will be reclaimed in a similar manner as the previously Permitted Bazza WRF to ensure long-term stability and provide for effective reclamation. Mined waste rock is hauled to the Clydesdale WRF and placed by end dumping from haul trucks from the top of the active dump faces, resulting in working faces at the angle of repose (approximately 1.3Horizontal:1Vertical [1.3H:1V]). The bench heights are in lifts of approximately 100 feet. Where practical, the Clydesdale WRF is maintained as a terraced structure to facilitate re-contouring and reclamation. During reclamation, the terraces will be incorporated into the overall reclaimed slope at approximately 2.5H:1V on the north and west slopes and at approximately 2.8H:1V on the south and east slopes.

As required by the Permit, quarterly samples of distinct waste rock units are collected from the Betze-Post Pit and subjected to meteoric water mobility and acid base accounting tests. Based on the results, any localized areas of acid-generating waste rock are placed internal to the WRF and encapsulated or blended with acid neutralizing waste rock. These procedures, as well as specific waste rock handling procedures for the Clydesdale WRF, will also be implemented for the Betze-Post Pit Expansion Project in accordance with the Waste Rock Management Plan for the Clydesdale WRF.

Approximately 310 million tons of non-PAG waste rock will be mined from the Betze-Post Pit laybacks. Most (90 percent or about 280 million tons) of the non-PAG waste rock will be placed in the Clydesdale WRF. The estimated PAG tonnage to be mined is 4.5 million tons. Ten (10) percent of this (0.45 million tons) will go into the Clydesdale WRF. Ninety percent (90%) (approximately 4.05 tons) of the PAG will go into the pit as backfill. By design, backfill will be placed in three (3) zones including the lower backfill (<5,116 feet amsl), middle backfill

(5,116 to 5,246 feet amsl), and the upper backfill zone (>5,246 feet amsl). Only portions of the lower and middle backfill may be inundated when the pit lake fills with water. The lower backfill will contain approximately 23% PAG material but will be alkaline overall with average net neutralization potential (NNP) of +130 kilograms $CaCO_3$/1000 ton. The middle zone will not contain PAG.

PAG waste rock routed to the Clydesdale WRF will be placed in an encapsulated PAG cell within the facility. The PAG cell will have a minimum 50-foot setback from the base of the facility and will be overlain with a 6-foot thick cover system. The composite cover is designed to eliminate or reduce infiltration of water and oxygen. The non-PAG waste rock cover will consist of a minimum of 12 inches of either topsoil, Carlin material, or a combination of those materials. To control erosion and for long-term stability of the Clydesdale WRF, appropriate stormwater controls will be constructed and the waste rock dumps appropriately graded to control stormwater runoff and run-on. Engineered stormwater diversions constructed upgradient of the facility, as needed, will be designed to accommodate flow from a 100-year, 24-hour storm event and will route the flow to the drainages downgradient (Bell, Rodeo, and Boulder creeks) of the facility. During operations, the WRF will be visually monitored following spring snowmelt and intense rain events to ensure that drainage and sediment control measures are effective and operating properly.

A haul road was constructed to provide for the transport of waste rock from the pit to the Clydesdale WRF. The road is approximately 3,500 feet in length and has a travel surface of 170 feet in width with a total width of 400 feet. The road was constructed with safety berms on the outer edges and is gravel covered, as needed, to provide for all weather travel. Drainages are established between the road edge and safety berm.

The haul road crosses the historical drainages which no longer carry water since both Brush and Rodeo Creeks have been diverted to the south perimeter of the Betze-Post Pit. Culverts were installed at the Bell Creek crossing, with inlet and outlet erosion protection. The culverts are designed to safely handle flows of a 100-year, 24-hour storm event. Corrugated metal pipe (CMP) culverts were placed at the Bell Creek crossing. The inlets and outlets for the culverts are rip-rapped to minimize erosion and damage to the natural stream channel.

<u>Ore Stockpile Pads and Basins:</u> The design and construction of the four (4) stockpile pads, referred to as the South, Roaster, North Refractory Ore, and RF1, includes one (1) foot of compacted soil with a maximum permeability of 1×10^{-5} centimeters per second (cm/sec) sloped to direct any fluid within the stockpile area to one of three (3) dedicated clay-layered basins and one double-synthetic lined basin. The clay basin's compacted clay layers have a maximum permeability of 1×10^{-6} cm/sec. However, the Roaster Fresh Water Pond, northeast of the roaster, which is used to store fresh water, also provides containment for the ore

stockpiles northeast of the roaster. This pond is double-synthetic lined with 100-mil High Density Polyethylene (HDPE) primary and 60-mil HDPE secondary liners, with geonet in between to convey leakage to the leak detection port (3,197 gallon sump capacity). If the pH of any solution reporting to a clay-layered basin is outside the neutral range, the Permittee is required to pump the solution into a process component approved by the Division. A fifth ore stockpile, Goldbug, was processed in the roaster and no longer exists. In addition, the basin associated with the Goldbug stockpile no longer exists.

As part of the 2015 Renewal, Part I.D.2. of the Permit was modified to reflect that only three clay basins need to be monitored for the presence of fluid and sampled if it is present. These three basins are listed in the Permit by the names Refractory Ore, South, and RF1. The Roaster Freshwater Pond was redundantly included in Part I.D.7. and has been removed from Part I.D.2.

The Autoclave Ore Stockpiles are located within the processing area in the vicinity east of the crusher. A portion of the AA heap leach pad has been converted to a run-of-mine ore stockpile. The closed Phase I pond has also been converted to an ore stockpile. Crushed ore stockpiles are located immediately east of the Mill and are actively used and replenished. Meteoric precipitation from these stockpiles is routed to the Valdez Containment Pond where it is pumped to the autoclave processing facility or to the tailings impoundment.

In May 2011, the Permittee submitted an EDC proposing to locate a lay-down area for construction materials, a mineralized ore stockpile (up to 60,000 tons), and a magnetic separation concentrate stockpile (up to 350,000 tons) on the AA Block (NEV0090060) tailings impoundment (currently in closure). The area designated for these components is on well consolidated material well removed from the supernatant pond and are temporary (5 years maximum). The EDC was approved by the Division in June 2011.

<u>Primary and Secondary Crushing, Ore Storage, and Dry Grinding</u>: Two (2) stages of open circuit crushing are used to reduce the size of the run-of-mine ore to 80% passing 1.5 inches. Coarse run-of-mine ore is supplied to the gyratory crusher by 100-ton trucks. Crushed product is withdrawn from the surge pile below the gyratory crusher by an apron feeder discharging onto a transfer conveyor, which in turn discharges onto the feed conveyor to secondary crushing. Ore from the primary crusher is fed to the scalping screen of the secondary crusher circuit. Screen oversize is discharged to the cone crusher for secondary crushing. A conveyor transfers undersize and cone crusher discharge to the coarse ore stockpile. Waste rock is also crushed and diverted off the stockpile conveyor for transfer to the appropriate backfill stockpile based on results of characterization.

Ore from the primary and secondary crushing circuits is collected and stored in the 8,000-ton live capacity stockpile that provides a nominal 14 hours of grinding

circuit supply. A bunker, located under the stockpile, contains four (4) apron feeders and two (2) transfer conveyors. Two (2) stand-by apron feeders are located under two (2) emergency service dump hoppers. Any stormwater run-off from the stockpile area is collected along with stormwater run-off from the Roaster site, which gravity-drains to the double HDPE-lined (with leak detection system – 9,132 gallon capacity) Roaster Containment Pond (located south of the roaster).

There are two (2) parallel dry grinding circuits. Crushed ore is transferred to the two (2) grinding circuits by the two (2) reclaim transfer conveyors that originate from beneath the crushed ore stockpile. The two (2) identical dry grinding circuits consist of the following:

- Crushed ore is fed into the grinding chamber of the grinding mill. The lifter plates of the drying chamber scatter the crushed ore into the hot gas stream, provided by propane-fueled burners, that serves as the drying medium. A lifting diaphragm at the end of the drying chamber conveys the material into the first drying chamber. Between the first and second drying chambers is the central discharge device (CDD). The CDD discharges ground material from both the first and second grinding chambers through openings into the mill shell.

- Fine ore from the first and second grinding chambers is elutriated from the coarse material within the mill and CDD and transferred with the off-gas to the Static Classifier (SC) located immediately above the mill. The SC further separates the large and small fines, discharging the large fines to the Oversize Bucket Elevator and the smaller fines to the SC Baghouse.

- The coarse ground material from the first and second grinding chambers is discharged from the bottom of the CDD to the Oversize Bucket Elevator via an air slide located under the grinding mill. The coarse ground ore is subsequently transferred from the Bucket Elevator, via another air slide, to the Dynamic Classifier.

- The Dynamic Classifier separates the remaining fines from the coarse ground material. Ground ore is fed into the dynamic classifier through a central feed hopper centrally located above the classifier. The fine and coarse fractions are classified within the separating chamber. Coarse material is returned to the first and second grinding chambers through the underflow splitter. Ore fines are transferred with the classifying air to the Dynamic Classifier Baghouse.

Grinding mill fine ore product collected within the two (2) baghouses is transferred to the Roaster Silo by means of rotary airlocks and airslides. The Static Classifier Baghouse off-gas exhaust flow rejects the moisture from the ore to atmosphere. The remaining Static Classifier off-gas is recycled to the mill. The

Dynamic Classifier Baghouse exhaust flow is set to reject infiltration air to the atmosphere. The remaining off-gas is recycled to the Dynamic Classifier.

Engineered Containment: All components meet or exceed the applicable design containment criteria established under NAC 445A.436 (see Design Reports) including:

Table 1

Component	Number in Facility
Neutralization Tank	2
Neutralization: Calcine Thickener	1
Carbon-In-Leach	6
Copper Sulfate tanks	2
Carbon Movement Water Tank	1
Liquid Cyanide Tank	1
Calcine Flocculant Tank	1
Quench Water Cooling Tower	1
Regeneration Thickener	1
Regeneration Flocculant Tank	1
Mercury Collection Tank	1
Secondary Settling Tank	1
Wet ESP Tank	1
Aqueous Ammonia Tank	1
Calcine Ore Quench Tanks	2
Condensate Collection Tank	2
Dust Scrubber Seal Tank	2
Scrubber Cooling Tower	1
Sulfuric Acid Storage Tank	1
Diesel Storage Tank	1
Ammonium Bisulfite Tank	1
Roaster Air Products	1
Sulfur Prill Silo	1

Internal plant containment includes concrete floors and stem walls designed and constructed to grade toward recovery sumps where process fluids can be pumped back into primary containment (e.g., tanks). Dedicated, permanently installed generators are available as back-up to maintain solution flow rate in the circuit.

In addition to the required containment, the areas around these facilities are graded to drain to the double-lined (with leak detection) Roaster Containment Pond, which is designed to contain runoff resulting from the 100-year, 24-hour storm event. Meteoric water outside the plant and stockpile area is diverted so that it will not affect the process components.

Operation: Ground ore is discharged from the grinding mill baghouses and collected in the Roaster Silos. One (1) silo is provided for each dry grinding circuit. Each silo has a 2,000-ton live capacity providing a nominal six (6) hours of ground ore supply to the roasters.

The Roaster Feed Distribution Box is fluidized with air and discharges to the two (2) roaster feed systems. If required, coal is added by screw feeder to the bucket elevator feed air slide. From the bucket elevator, the ore is transferred to the fluidized feeder using another air slide.

Two (2) parallel roaster circuits are provided to heat the refractory gold ore and oxidize the organic carbon and sulfide sulfur. Each roaster is comprised of two (2) bubbling, fluidized-bed reactors in a single vessel, plus a fluidized feed system, first and second stage cyclone systems, and ancillary systems.

The fluidized feeder distributes ore continuously from its hopper to the first stage (upper) bed of the roaster. The feeder is fluidized with air and overflows into the roaster through standpipes extending into the first-stage bed.

The upper bed is maintained at a constant, uniform temperature of approximately 1,025 degrees Fahrenheit (°F). The heat source for the first stage is provided by the ores net heat resulting from the oxidation reaction. Coal may be added to the ground ore to provide additional fuel for low fuel-value ores, or water may be injected to cool the first stage bed for high fuel-value ores. Water may also be sprayed into the first stage freeboard to cool the roaster off-gas if excessive freeboard combustion occurs. The ore is oxidized predominantly in the first-stage.

Solids discharge continuously from the first-stage through the inter-stage solids transfer system to the second-stage (lower) bed and to the transfer boxes used for cyclone solids return; inter-stage and product solids transfer. Hot exhaust gas from the second-stage reactor is conveyed through the inter-stage gas transfer system and the hot windbox to fluidize the first-stage bed. The hot, oxygen-rich gas from the second stage promotes rapid oxidation of organic carbon, sulfur, and fuel in the first-stage bed. The first stage exhaust gas is de-dusted in the gas discharge system before passing to the gas quench and cleaning train. Air is injected in various locations to fluidize the feed system, to provide the transport medium for diesel oil, to cool oil and water guns, and to purge solids from instruments and other equipment.

The exhaust gas from each roaster stage is processed in a set of primary and secondary cyclones. In both cases, the coarser fraction of the elutriated solids recovered by the primary cyclone is returned to the bed. The finer fraction recovered by the secondary cyclone is fed forward, first-stage to second-stage and second-stage to calcine product, to prevent an accumulation of fines within the fluidized bed.

In March 2011, the Permittee submitted an EDC proposing to add a sulfur prill addition system to the roaster to supplement fuel value in the roasting process. Components added included a dedicated truck wash for sulfur prill delivery trucks, truck unloading station, sulfur prill storage silo and feed system, conveyor system for delivering the sulfur prill to the storage silo after unloading, and dust suppression equipment. All new components were placed on new or existing containment with capacity to impound 110% of the volume of the largest vessel located therein. The EDC was approved by the Division in April 2011.

In April 2012, the Permittee submitted an EDC proposing to add a system for collection of roaster fines for further gold recovery. The facility is designed to collect material from the wet electrostatic precipitator drain tank discharge, regeneration thickener underflow, venturi scrubber dust density bleed, gas quench underflow, and transport water from the carbon fines loading facility, combining them into a single stream conveyed to the mix tank. Flocculant and coagulant reagents are added to enhance separation of the gold bearing solids, after which the slurry is pumped to a new thickener. Thickener underflow will be pumped to the filter feed tank and then fed to the filter press from which the gold bearing filter cake is reintroduced to the roaster feed circuit.

New containment for the reagent storage, mix tank, thickener, filter feed tank, and filter press will be constructed using concrete slab and stem wall configuration, with waterstops and sealant at all cold joints. Volume of secondary containment exceeds 110% of the largest vessel for each area. Piping to connect the facility components is either pipe-in-pipe or routed over existing secondary containment. The EDC was approved by the Division in May 2012.

Calcine Quench: Calcine exiting the roaster at a temperature of approximately 1,050 °F is rapidly cooled to 105 °F by quenching with water before being sent to the leaching circuit. Recycled process quench water at 70 °F from the quench water cooling tower contacts the hot calcine in a quench header. The quenched calcine slurry falls into a quench launder that flows into a closed, agitated tank providing sufficient residence time for mixing of calcine and quench water.

Carbon-in-Leach (CIL): Neutralization, Calcine Thickening, CIL: Quenched calcine from both of the quench tanks is pumped to a manifold feeding the first of two (2) agitated neutralization tanks in series. In addition, spent quenching and scrubbing water from the gas scrubbing circuits, flows by gravity to this manifold. The tanks provide sufficient residence time to neutralize any acidity with slaked lime slurry.

Neutralized calcine is thickened before being pumped to the leaching circuit. Flocculant is added to the thickener feed well. The thickener decant solution

overflows to a tank before being pumped to the quench water cooling tower, where it is cooled.

Thickened, neutralized calcine slurry is passed through a set of four (4) trash screens in parallel before entering a manifold that feeds the first tank of the CIL circuit. Any oversized material caught by the trash screens, such as grit from the added lime in the neutralization circuit, is collected in a trash bin. The CIL circuit consists of six (6) agitated tanks in a series that provide an overall retention time of 16 hours. Gold is leached by the addition of sodium cyanide.

Carbon, added to adsorb the gold, flows counter-current to the slurry through the CIL circuit. Slurry is added to the first CIL tank and carbon is added to the sixth (6th) tank in order to provide counter-current flow. Slurry from each tank overflows to the next through a set of four (4) vibrating screens operating in parallel, which separate carbon to prevent it from moving in the direction of the slurry. A vertical, recessed impeller pump is located in each tank to transfer carbon-containing slurry to the previous tank. The three (3) rotating cylinder Kemix screens are sized to handle the slurry flow rate plus the slurry recirculated due to the counter-current carbon advance.

Cyanide Destruction and Tailings: The leached slurry contains cyanide at a concentration of about 100 ppm total cyanide. The International Nickel Company of Canada (INCO) ABS/Air Process is used for cyanide destruction before the slurry is sent to the tailings impoundment in the North Block.

Overflow from the final CIL tank flows over a set of four (4) parallel carbon screens before entering the cyanide destruction reactor. Reclaim water is used as spray water for the screens.

Cyanide destruction occurs in a single, agitated tank that also serves as the tailings pumpbox. The total retention time is one (1) hour. Discharge from the reactor is pumped directly to the North Block tailings impoundment via three (3) surface pipelines (one is standby).

Carbon Handling: Slurry from the CIL circuit containing loaded carbon is pumped to a single screen for carbon separation. The slurry underflow from the screen discharges into a pump box and is pumped back to the CIL circuit. Loaded carbon is collected and stored in the Loaded Carbon Bin before it is pumped to a tanker truck for transfer to reactivation at the AA Block facilities. Any spills that may occur during the loading operation would be contained and drain to a sump where it is pumped back into the CIL circuit.

Loaded carbon is transported to the carbon handling facility at the Goldstrike Refinery. The loaded carbon is pumped to a loaded carbon bin and then into the existing carbon stripping and regeneration plant. Regenerated carbon is stored in

the regenerated carbon bin prior to being loaded into the tanker truck to be transported back to the Roaster plant. Carbon is pumped with the aid of carbon movement water, which, after use, is pumped to tailings. Any spills that may occur within the carbon handling building are contained and drain to a sump. The contents of the sump are pumped back into the carbon handling circuit. Reactivated carbon is returned to the Strip circuit using the same truck, which transfers it to a storage bin. The fresh carbon is pumped to the CIL circuit. A bleed stream from the carbon strip circuit is returned to the roaster via double-wall HDPE pipeline.

Wet Mill/Autoclave Process Facilities: There are two (2) crushing circuits for the mill, which include a primary jaw crusher and a secondary gyratory crusher. The crushers discharge ore via conveyors to two (2) separate stockpiles. Ore is reclaimed from these stockpiles with apron feeders and vibrating feeders. Crushed ore is then conveyed into the milling circuits.

Grinding is accomplished in two (2) semi-autogenous (SAG) mills in closed circuit with cone crushers for oversize material. SAG mill screen undersize is ground in four (4) ball mills in closed circuit with cyclone banks. Ground ore is thickened in three (3) thickeners and treated with sulfuric acid in four (4) acidulation tanks to reduce carbonate minerals. The slurry is then oxidized in six (6) pressure oxidation autoclave systems, incorporating splash condensers to pre-heat the slurry before the autoclaves, and flash tanks, and slurry coolers after the autoclaves. The acid in the cooled slurry is neutralized with slaked lime in six (6) neutralization tanks prior to being pumped to the RIL tanks.

Due to high levels of carbonate in the remaining ore, the Permittee submitted an EDC in August 2010 proposing to change some autoclave production to an alkaline oxidation process. Alkaline oxidation will eliminate the use of acid and lime as reagents, and instead use the carbonates naturally occurring in the ore or potentially trona as autoclave reagents. The ore will be oxidized at a much higher pH, reducing the need for neutralization. The EDC was approved by the Division in September 2010 and construction completed in August 2011.

Loaded carbon from the roaster and other loaded carbon sources is washed with nitric acid in two (2) acid wash tanks and then pumped to carbon stripping vessels where the gold is re-solubilized with a strong cyanide/caustic solution. The resulting pregnant strip solution is treated in 16 electrowinning (EW) cells to remove the gold from solution.

The loaded cathodes and sludge from the EW cells is treated in three (3) retorts to recover mercury and then processed in two (2) furnaces to produce gold doré in the refinery.

Loaded resin from the RIL tanks is sent to the loaded resin hopper and then pumped to the elution circuit for gold recovery. In the elution circuit where the copper and gold adsorbed on the loaded resin is recovered separately using a thiosulfate and trithionate solution respectively. A pregnant gold solution stream is then produced for electrowinning.

The elution circuit consists of two identical trains, each with columns and tanks associated with gold elution and resin regeneration. The elution trains share a common copper elution feed tank, copper elution discharge tank, thiosulfate elution discharge tank, gold elution feed tank, pregnant surge tank, trithionate synthesis feed tank, trithionate synthesis tank, wash water tank, and a spent backwash tank. The pregnant elution solution is then treated in eight (8) electrowinning cells to remove the gold from solution. Sludge from the electrowinning cells is processed in 4 retorts to recover mercury and in two (2) bullion furnaces to produce gold bullion. The airflow from retorts and furnaces are scrubbed to remove sulfur dioxide (SO_2) before proceeding through carbon beds.

All reagent tanks or vessels containing process solutions are located within concrete and/or synthetically lined secondary containment. The secondary containment is designed to hold at least 110% of the volume of the largest contained tank or vessel plus the 25-year, 24-hour precipitation event (for outdoor containment). Spills within secondary containment are collected on the sloping floors, which drain to sumps designed to recycle the spilled materials back into the process.

Any process solutions that accumulate in secondary containment are transferred back to the primary processing circuit from the collection sumps within the process containment areas. The mill and autoclave buildings and the major exterior containment areas are equipped with sumps and dedicated pumps. Captured solutions can be pumped to a minimum of two (2) alternate locations within the primary fluid management system.

Containment integrity tests are performed annually on sumps to assure a zero leakage rate. Results of these integrity tests are documented in the annual reporting to the Division.

Water used in the milling circuit is obtained from the dewatering wells and from reclaim water, which is recycled from the TSF3 tailings thickener after being treated in the micro-filtration plant or the ultra-filtration plant.

In February 2010, the Permittee submitted an EDC for the addition of an RIL demonstration plant located on the east side of the autoclave building. The test plant consists of feed tanks, screens, elution circuit, RIL tanks, and associated piping. The existing concrete floor and stem wall construction is capable of

containing more than 110% of the volume of the largest tank in the system. Autoclave discharge slurry is fed into the system at a rate of five (5) tons per day (maximum). Ion exchange resin flows countercurrent to the slurry prior to transferring to the elution circuit. The eluent is collected and stored at the site for further processing while the eluted resin is recycled into the process. Slurry tails from the process are transferred to the TSF3.

Reagents to be used in the test process include Purolite A500 ion exchange resin, gold lixiviate, cupric sulfate, sodium chloride, sodium sulfite, sodium sulfate, lime, soda ash, sodium hydroxide, hydrogen sulfide, peroxide, ferric sulfate, and Hyperfloc MG655. The EDC was approved by the Division in February 2010 and operation began in the Spring of 2010. This facility was replaced by the full RIL system built in the autoclave facility in 2014.

Engineered Containment: The Mill/Process facility and appurtenant reagent tanks are listed below. All storage and holding vessels, foundations, excavations, backfilling, and drainage features are constructed in accordance with engineering technical designs that meet or exceed the applicable design containment criteria established under NAC 445A.436 (see Design Reports).

Table 2

Component	Number in Facility
Tails Tank	1
SAG Mills	2
Ball Mills	4
Total Carbonaceous Material (TCM) Tanks	16
Pre-oxidation Thickeners	3
Thickener Surge Tank	1
Boilers	3
Ammonium Hydroxide Tank	1
Splash Heating Towers	13
Autoclaves	6
Flash Cooling Towers	13
Shell and Tube Heat Exchangers	7
Cooler Surge Tanks	2
Neutralization Tanks	6
Barren Strip Solution Tanks	2
Carbon Strip Tanks	2
Acid Wash Tanks	2
Carbon Kiln	1
Electrowinning Cells	16
Bullion Furnaces	2
Mercury Retorts	3

Reclaim Water Tanks	10
Freshwater Tanks	4
Nitric Acid Storage Tank	1
Sulfuric Acid Storage Tanks	2
Sodium Hydroxide Storage Tanks	2
Lime Storage Silos	7
Lime Slurry Storage Tanks	3
Anti-scalant Tanks	4
Glycol Storage Tank	1
SLS Storage and mixing Tank	1
Carbon Fines Clarifier Tank	1
Hydrogen Peroxide Tank	1
Scrubbers	7

Internal plant containment includes concrete floors, stem walls, berms, sump pumps, and pipes designed and constructed to grade toward recovery sumps where process fluids can be pumped back into primary containment (e.g., tanks, storage vessels). Dedicated, permanently installed generators are available as back-up to maintain solution flow rate in the circuit.

In addition to the required containment, the areas around these facilities are graded to drain to the Valdez Containment Pond. The Valdez Containment Pond was re-lined in 2005 with two (2) additional synthetic liners and a leak detection system (2,421 gallon capacity) located between the upper liners to allow inspection and evacuation of the sump. This pond is designed to contain storm water runoff from the Process Facility resulting from the 100-year, 24-hour storm event and is also used to temporarily store emergency flow from processing components. Water accumulated in the Valdez Pond is pumped back into the processing facility where it is reused or sent to the TSF3.

Tailings are pumped through three (3) pipelines with a capacity of approximately 3,500 gpm each. Critical sections of the tailings lines have been replaced with HDPE-lined steel pipe and are placed in a clay ditch. The leak detection ports at the section joints of the HDPE lined pipe are inspected monthly. Reclaim water is returned to the water treatment plant through two (2) 14-inch diameter HDPE pipelines. An additional 6-inch diameter HDPE line serves to convey fluids from Valdez Containment Pond back to the mill process circuit. Secondary containment corridors for these pipelines are clay and HDPE-lined in areas vulnerable to erosion. The secondary containment corridor is designed and built so that spillage or maintenance activities drain to Valdez Pond or back to the Mill RIL containment and tailings pump house.

RIL Process Facilities: In March 2011, based on the successful operation of the demonstration RIL plant, the Permittee submitted a major modification proposing to add a full-scale RIL process expansion of the existing autoclave facility. The

proposed processing facility will continue to utilize the existing milling, acidulation, autoclave and neutralization circuits prior to reaching the proposed RIL gold recovery circuit. The purpose of the new facility is to provide increased operation flexibility, advance production of gold, and process "preg robbing ore" without oxidation in the existing roaster. The new process will have a capacity of approximately 5.25 million tons per year. Tailings from the new process will be discharged into a new tailings storage facility (TSF3 - see below). The major modification was approved by the Division in October 2011. The RIL facility began operation in 2014.

The TCM process includes new components or modifications of existing components for the following:

- RIL
- Gold recovery from resin
- Metal recovery from solution
- Smelting and refining
- Reagent and water recycling
- Reagent manufacturing
- Reagent storage
- Slurry, reagent, and water pipelines
- Tailings thickener

Conversion of the existing leach circuit to RIL consists of the following modifications:

- Installation of new linings on each of 16 tanks
- Refurbishment of tank top steel to provide longer service life
- Replacement of agitator shafts and impellers
- Replacement of walkway grating
- Addition of one (1) inter-tank screen per tank
- Relocation and replacement of vibrating screens located on top of the tanks
- Refurbishment and replacement of piping and electrical work as required
- Replacement of tailings tank
- Replacement of existing safety screens with larger screens (3)
- Expansion of safety screen building to accommodate new screens

The leach circuit will be fed at a solids rate of approximately 600 tons per hour. The feed first reports to a set of grit screens that are sprayed with mill water to assist the separation. The oversize reports back to the milling circuit for regrinding. The undersize reports to the leach feed hopper where it is pumped to one (1) of two (2) parallel leach trains.

Slurry will be pumped from the grit screens to a feed box above the lead tank in each train. The tanks are butyl rubber lined to protect the steel from corrosion due to exposure to the thiosulfate lixiviant. Gold dissolution reagent solutions will be added at the feedbox, containing thiosulfate (wet) and copper fines along with anion exchange resin beads. The gold dissolution tanks are agitated and air is sparged into the slurry. Slurry flows by gravity through the successive tanks in the leach train. The total slurry residence time in each train is approximately 20 hours. Leached slurry (tailings) is discharged from the last tank in each train. This tailing slurry flows by gravity to one (1) of three (3) resin safety screens in the resin safety screen building.

Gold dissolves in the thiosulfate solution and is recovered from the slurry by absorption onto the anion exchange resin beads - (RIL process). Slurry containing gold-loaded resin is continuously withdrawn from the first tank in each train and sent to the strip (elution) circuit.

The first stage of recovery of gold from the resin is separation of the gold-loaded resin from the slurry. The loaded resin beads are screened out and sluiced to the loaded resin hopper that feeds the elution columns, while the slurry is recycled to the leach circuit.

The strip section of the process is where the gold is recovered from the loaded resins. The purpose of the strip (elution) circuit is to recover the gold from the resin and produce a more concentrated solution from which the gold can be recovered by EW. There are two (2) parallel elution circuits, each containing two (2) columns. The columns are used in sequence and operate independently to each other. Elution is a multi-stage batch process that takes approximately 12 hours. While one column in the train is going through the elution sequence, the other is being filled with loaded resin. Barren resin is recycled to the leach circuit.

The EW circuit is designed to plate out gold on to woven stainless steel mesh cathodes. Gold-bearing solution is heated and pumped from the pregnant solution tank to each of the cells which operate in parallel. Solution flows by gravity back to the EW solution tank to repeat the cycle. The solution is recycled through the cells until a target gold concentration of around 0.5 ppm is achieved. Once the gold concentration is sufficiently low, the EW cycle is complete. Mercury and some copper are also plated out in the cells. The gold depleted (barren) solution is then pumped using dedicated filter feed pumps from the EW solution tank to a discharge filter. This collects any fine particulates suspended in the solution, before it reports to the barren filtrate tank at elution. The filter cake from the EW discharge filter is periodically removed and sent to the mercury retort.

The stainless steel mesh cathodes become loaded with gold/mercury/copper after several cycles. As required, selected cells are taken out of service and drained. The electroplated material is washed off the cathodes, and the gold sludge in the

bottom of the cell is sluiced to the EW sludge filter feed hopper. The gold is washed off the cathodes without removing the cathodes from the cell to minimize mercury exposure. The cleaned cell is then put back in service.

All components of the RIL recovery circuit will be located within existing, modified, or new containment to provide at least 110% secondary containment compared to the volume of the largest vessel in the system. This is typically provided by concrete slab foundations with stem walls and sumps with water stops included in the design of all concrete joints.

Pipelines: The three (3) 14-inch diameter HDPE-lined steel pipelines that convey process slurry from the roaster to the tailings disposal facility and the one (1) 14-inch diameter HDPE pipeline that conveys recycled process solution back to the roaster are located above ground. All pipeline corridors, including the pipelines originating from the AA Block process (Permit NEV90060) are either compacted clay or lined with HDPE. The secondary containment corridor for the pipelines from the roaster is designed and built to drain to the Roaster Containment Pond or tailings impoundment solution collection pond. The secondary containment for the pipelines originating from the AA Block, that are also on the surface, is designed and built to drain back into one of the process components (e.g. pump box, tailings impoundment or Valdez Pond).

NBTF Impoundments and Management: The NBTF is designed and constructed with a liner system that contains all process material and solutions within the system. The facility is lined with a composite liner system consisting of compacted low permeability soil through stage seven (7) overlain by a synthetic liner. The composit liner is a geosynthetic clay layer (GCL) overlain by a 60- or 80-mil HDPE liner through stage six (6), and GCL overlain by a 60-mil linear low density polyethylene (LLDPE) liner in stages seven (7) and eight (8). The synthetic liner is overlain with a coarse rock drainage system, or full blanket drain, in the southwest portion of the impoundment where the supernatant pond is located. Finger drains, also constructed with coarse rock, connect to the full blanket drain, and collect and convey fluid from the tailings in the area upgradient of the supernatant pond to the perimeter of the basin. This drainage system is designed to intercept and remove tailings fluid from the top of the liner to minimize hydraulic head. Piezometers were installed at various locations and depths within the impoundment, including paired piezometers in the blanket drain, to monitor hydraulic pressure on the liner system at specific locations and to ascertain proper operation within the impoundment. The fluid collected in this drainage system is collected in pipes, which penetrate the NBTF embankment liner, seal zone, and sloping drain near its southwest corner and drain to the drainage collection vault. The pipes from the basin underdrain and sloping drain are comprised of 12-inch diameter HDPE and are encased in concrete over the full pipe length beneath the embankment. From the vault, the fluid is pumped back into the process or the tailings impoundment. A double-lined, 2.5 million

gallon overflow pond, located adjacent to the collection vault, is designed to contain overflow from the vault. The vault and the pond are double-lined with HDPE with geonet/gravel-filled sump leak detection and collection systems installed between the liners for monitoring (vault sump capacity 34,544 gallons, pond sump capacity 1,645 gallons). An emergency generator provides back-up power.

The NBTF embankment (through Stage 9) was built using an upstream low-permeability seal zone over the entire upstream face. A HDPE liner was placed over the seal zone, providing additional protection against seepage and wave erosion. The seal zone will extend to the ultimate embankment height. However, to intercept any potential seepage through the liner system, a sloping drain was placed directly behind the seal zone along approximately three quarters (¾) of the length of the southern and western embankments, in the area of supernatant pond. This sloping drain conveys any potential seepage to a low point in the southwest corner of the tailings facility and then through outlet piping to the drainage collection sump. A clay foundation drainage layer, which intercepts and channels any seepage to the drainage collection sump, underlies the downstream portion of the entire embankment. Upon completion of Stage 9, the dam of the tailings impoundment reached an authorized height of 5,853 feet amsl at the crest in the southwestern corner.

The tailings slurry, originating from the North Block processing facilities, is discharged into the impoundment in a controlled manner through a series of valves and dropbars to subaerially distribute the tailings. This allows the heavier tailings to settle, drain, and dry. Deposition of tailings from the eastern and northern sides of the facility maintains the supernatant pond in the southwest corner of the impoundment as required by the Permit. The volume of the supernatant pond is controlled by pumps on a floating barge. The fluid is recycled back into the process via HDPE reclaim pipelines located in the same corridor as the tailings pipelines. The supernatant pond must be maintained at a minimum depth of six (6) feet for proper operation of the barge-mounted reclaim pumps. If the pond depth rises during a precipitation event, increasing the use of the supernatant water at the roaster and wet mill and minimizing freshwater intake reduces the supernatant pond volume. The tailings impoundment is designed to contain both the tailings solids and supernatant pond fluid volume as well as the runoff resulting from the 100-year, 24-hour probable maximum precipitation event, while maintaining an additional three (3) feet of operational freeboard.

An engineered recovery system was installed on the eastern side of the NBTF to capture existing spring water (Spring #1 [SW#1], North Block Spring). The recovery system directs the spring water via solid piping beneath the liner system of the tailings impoundment to the seepage return sump. In addition, Spring #2 (SW#2), which originates at the toe of the southern embankment, is collected and

piped to the seepage return sump. In actual practice, the spring flows evaporate prior to reaching the sump, but would be combined with seepage water if they did.

In order to accommodate downstream embankment construction on the north side of the tailings impoundment, a short section of Bell Creek was diverted. Brush Creek was also rerouted to accommodate a tailings dam buttress. The spring waters and creek waters are required to be sampled and analyzed via the Permit.

The Permittee submitted an application for minor modification for NBTF Stage 10 in August 2013. Upon completion of Stage 10, the embankment of the tailings impoundment will reach an authorized height of 5,870 feet amsl at the crest in the southwestern corner. The Stage 10 Expansion will be constructed using downstream embankment construction and will be consistent with the intent of both the original design (1993) and the modified design (1997). The liner design is similar to previous stages in that it employs a composite liner system consisting of a 60-mil LLDPE liner over a GCL placed on a compacted subbase. By the time Stage 10 is commissioned, the NBTF is anticipated only to receive tailings from the Roaster Facility conveyed via the slurry pipelines. The minor modification also included decreasing the minimum embankment crest width from 150 feet to 50 feet, reducing the bench width between stages from 25 feet to 15 feet, changed the operational downstream side slopes to 2H:1V on north, west and south embankments, changed the downstream side slope to 1.5H:1V on the south embankment in the vicinity of the ultimate TSF3 footprint only, changed the interior side slopes to 1.5H:1V, additional monitoring, and changed the mine waste maximum lift height requirements to 12 feet where the maximum particle is six (6) feet in diameter, and eight (8) feet where the maximum particle is four (4) feet in diameter. Slope stability analyses were performed using the revised earthquake stability criteria contained in NAC 535.250. Slopes are designed to withstand the peak horizontal ground acceleration due to the Maximum Credible Earthquake with a factor of safety of 1.3 for static conditions and 1.0 for pseudo-static conditions. The design provides approximately 20 million tons of tailings storage, assuming an average in-place dry density of 75 pounds per cubic foot. The minor modification was approved by the Division in September 2013.

The Permittee submitted an application for minor modification for NBTF Stages 11 and 12 in February 2014. Upon completion of Stage 12, the embankment of the tailings impoundment will reach an authorized height of 5,951 feet amsl at the crest in the southwestern corner. The maximum embankment crest elevation will be 5,992 feet amsl at the Roaster Distribution Box located on the north embankment. Stage 11 and 12 Expansion will be constructed using downstream embankment construction methods (modified to construct the embankment base to the full width at Stage 11) and will be consistent with the intent of both the original design (1993), the modified design (1997), and the Stage 10 minor modification. The liner design is similar to previous stages in that it employs a composite liner system consisting of a 60-mil LLDPE liner over a GCL placed on

a compacted subbase. Stage 11 will only receive tailings from the Roaster Facility conveyed via the slurry pipelines. Besides increasing the embankment height, the minor modification also includes realignment of 2,500 feet of the existing Bell Creek diversion to accommodate the downstream toe of the north embankment, extended/supplemented north toe drain to accommodate increased footprint on the north embankment, routed access ramp for reclaim water system to the west instead of east, additional monitoring, changed the overall closure slopes to 2H:1V, and modified the conceptual closure plan to accommodate the expansion. Slope stability analyses were performed using the revised earthquake stability criteria contained in NAC 535.250. Slopes are designed to withstand the peak horizontal ground acceleration due to the Maximum Credible Earthquake with a factor of safety of 1.3 for static conditions and 1.0 for pseudo-static conditions. The design provides approximately 90.9 million tons of tailings storage, assuming an average in-place dry density of 75 pounds per cubic foot. The minor modification was approved by the Division in March 2014.

TSF3 Impoundment and Management: The TSF3 impoundment was approved as part of the major modification of 2011. TSF3 is designed to hold thickened tails from the autoclave/RIL process facility which, due to chemical differences, are segregated from the tails produced by the cyanide-based leach process.

TSF3 is located immediately south of the existing NBTF and the existing south embankment is shared by both facilities. In addition, the toe at the southeast corner of TSF3 is located just to the north of the existing AA Block TSF. The TSF3 embankment design calls for a total of six (6) stages up to a final elevation of 5,880 feet amsl, which will provide sufficient volume for a projected total impoundment capacity of 110 million tons.

Stability analyses of the various embankment cross-sections were performed to confirm that the design meets applicable structural standards. For static cases, minimum design factors of safety were 1.4 for the case of steady-state seepage with the maximum storage pool, and 1.3 for the interim case of construction completion prior to filling. For the pseudostatic case, analysis of the embankment design using the Maximum Credible Earthquake, as defined by NAC 535.250, resulted in a minimum factor of safety of 1.0. Deformation analysis of this same case showed that a maximum permanent deformation due to seismic loading of 2.8 inches would be expected.

To increase the operational life of TSF3, and to improve process economics by recovering as much water and lixiviant as possible after processing, the tailings from the RIL process is thickened prior to disposal. The thickener is located at the southeast corner of TSF3 where it receives tailings via slurry pipeline from the process building. The thickening process results in a waste stream discharged to TSF3 at approximately 52% solids by weight. The underflow from the tailings thickener is pumped to the TSF and the overflow is laundered to the tailings

thickener overflow tank. A decant tower is used to withdraw the water from the pond, which is then pumped into the tailings thickener overflow tank. The reclaim water that is collected in the tailings thickener overflow tank is primarily sent to the reclaim water surge tank in the water recycling plant. Subsequently all solutions are returned to the gold recovery plant.

The location of TSF3 requires abandonment of Waldron's Pond and the relocation of the Brush Creek diversion. In addition, two (2) stormwater collection ponds were added on the eastern side of TSF3 to collect runoff from natural drainages that would normally run through the valley and convey the runoff to underlayer drains which ultimately discharge at the western toe of TSF3. These measures are designed to prevent damage to the eastern embankment toe due to stormwater erosion or ponding. In addition, TSF3 is designed to contain all direct precipitation resulting from the 100-year, 24-hour storm event without compromising the integrity of the impoundment structure.

Truck and Light Vehicle Wash Facility: The mine operates a truck washing facility that is designed to collect and reuse water while separating out waste petroleum residue. Water is temporarily stored in a concrete holding pond where petroleum products are skimmed from the water. Water stored in a pond north of the facility is recycled back to the wash circuit. Petroleum contaminated soil accumulated as a result of the washing process is periodically removed from the concrete holding pond and placed on a concrete pad to drain, after which it is removed and handled in accordance with the approved (May 2010) Petroleum-Contaminated Soil (PCS) Management Plan. The truck wash containment was refurbished and extended vertically, and the water skimmer system replaced as part of an EDC approved by the Division in October 2009. Work was completed in January 2010.

Petroleum-Contaminated Soil Management: An EDC for a PCS Plan was approved by the Division in May 2010. PCS generated at the North Block Project, as well as PCS transported from the AA Block Project (NEV0090060), the Arturo Mine Project (NEV2013101), and the Boulder Valley Infiltration Project (NEV0089068) may be managed in accordance with the approved PCS Plan and the Division Guidance for Mine-Site PCS Management Plans. Prior to transport of wet PCS, site personnel will inspect and verify that the vehicle or other container to be used is not leaking. After determination that the PCS is not hazardous waste, it is ultimately placed at the roaster PCS stockpile pad and then fed into the roaster for combustion of all petroleum constituents. Hazardous waste, and any other PCS that cannot be roasted (if any), must be properly disposed off site at an authorized facility.

The Permittee initially submitted design information to the Division for a concrete PCS stockpile pad which was approved by the Division as part of the PCS Management Plan review process. However, due to limitations of construction

schedules, the Permittee submitted an EDC, in September 2010, proposing to first construct a temporary PCS stockpile using synthetic geomembrane on a prepared subbase. The composite liner system consisted of, from bottom to top, a prepared soil base, GCL, 80-mil HDPE geomembrane, and a 3-foot layer of granular material for liner protection. The overall pad area is approximately 124 feet by 124 feet, including berms. The EDC was approved by the Division in October 2010, and construction completed in February 2011.

A final permanent closure plan for the existing bioremediation cells was submitted to the Division in November 2011. The plan was approved by the Division and all closure activities were completed in April 2012 and documented in the as-built report submitted on 22 May 2012.

Southwest Energy Facility: A separate truck wash facility is operated for use by Southwest Energy vehicles. The facility is located just south of the Meikle complex and consists of a curbed concrete containment sloping down to one end where a grated sump directs flow into an oil-water separator.

ANFO Facility: The mine operation manufactures ANFO (ammonium nitrate and fuel oil), employing used oil, in part, as the fuel constituent. The used oil is generated from routine maintenance of the mine mobile fleet and processing equipment. A 10,000-gallon used oil tank and an 8,000-gallon No. 2 diesel tank are located in containment constructed to contain 110% of the volume of the largest tank. Used oil that meets specifications outlined in 40 Code of Federal Regulations (CFR) 279.11 is transferred to mixing tanks and ultimately into mine trucks where it is delivered to the active blasting area to be used as a blasting agent.

C. Site Hydrology/Hydrogeology and Background Groundwater Quality

The Barrick mining and ore processing operations are located on the southwest flank of the Tuscarora Mountains in north-central Nevada. The facilities included in this Permit lie in the Little Boulder Basin, which contains the Brush, Rodeo, Boulder, and Bell Creek drainages. The Goldstrike Project area elevations range from about 5,100 feet to 5,926 feet amsl.

The terrain in the vicinity of the Goldstrike Project is typical of the Basin and Range physiographic province, and is dominated by north-trending, fault-block mountain ranges which expose sedimentary rocks.

Surface Hydrology

A detailed description of the regional surface hydrology can be found in numerous documents related to the Goldstrike Project area, including the Draft and Final Betze Project Environmental Impact Statement (EIS) and the Water Pollution control Permit Application Assessment of Area of Review of the AA Block. A detailed description of the site-specific surface hydrology can be found in referenced documents listed in the application.

In general, surface runoff from the Betze Project area flows west and southwest via Brush, Bell, Rodeo and Boulder creeks. The water qualities of these creeks have been established via Permit requirements. In general, Brush and Bell creeks meet Profile I water quality standards whereas Rodeo Creek indicated higher arsenic, iron and manganese concentrations. Surface flow in these drainages infiltrates into the alluvium beneath and adjacent to the creeks.

The North Block area is located between Bell Creek on the north and Brush Creek to the south. Both creeks flow toward the west-southwest and into Rodeo Creek. Bell Creek is perennial in its upper reaches but becomes intermittent approximately two (2) miles north of its confluence with Rodeo Creek. Bell Creek was rerouted to accommodate the northern embankment of the NBTF. Brush Creek, which cuts through the southeastern corner of the North Block, is perennial in its upper and lower reaches, but is ephemeral in its mid-section. Brush Creek was also rerouted to accommodate a NBTF embankment buttress. Bell and Brush creeks have drainage areas of approximately 14.7 and 5.0 square miles, respectively. The North Block is located entirely outside the 100-year flood plain for Rodeo Creek.

Springs occur at two (2) locations within the northeastern portion of the North Block area. These springs are collectively referred to as Spring #1. Because these springs are located directly upgradient of the NBTF, on the eastern side, discharge from the springs is collected and routed under the liner of the impoundment via a solid buried pipeline. Collection and routing of the spring flow allows for both convenient sampling and monitoring of these springs prior to its introduction into the seepage return sump. There is also a spring collection area referred to as South Leg Spring (Spring #2) located at the toe of the southern embankment of the NBTF that is also routed to the seepage return sump. The spring water has consistently met Profile I standards with the exception of Sulfate (up to 1,600 milligrams per liter [mg/l]) and Total Dissolved Solids (up to 2,500 mg/l).

Storm Flow Diversion

In general, surface run-off from a portion of the North Block area is collected and flows west and southwest through a drainage located near the approximate center of the project area. The North Block facilities include stormwater collection

basins capable of withstanding the 100-year, 24-hour storm event. Both tailings impoundments are designed to withstand and fully contain the 100-year, 24-hour storm event.

Hydrogeology

Prior to mining operations, a total of 52 borings were drilled within the project area to characterize the geology and groundwater conditions. Depth to water in these borings ranged from eight (8) to 90 feet below the surface. The groundwater quality was characterized from five (5) borings drilled into Carlin Formation within the North Block area. In general, the groundwater quality met the Profile I water quality standards with the exception of several reference value exceedances in the eastern portion of the area (borehole NBTB-7).

The original groundwater gradient beneath the project area was northeast to southwest. However, dewatering has affected the groundwater gradient towards the Betze-Post Pit well field by depressing the elevation of the local water table.

In 1997, due to the chemical stability of constituent concentrations obtained from monitoring wells coupled with the design and construction criteria used in the North Block, as well as operational considerations, monitoring wells (groundwater observation ports, GWOPs) NB-1, 2, 3, 4, 4A and 5 were plugged. Dewatering of the Betze-Post Pit and underground operations makes groundwater monitoring wells impractical. However, the quality of the dewatering water (i.e. groundwater) is monitored under the Boulder Valley Infiltration Permit (NEV0089068).

The Carlin Formation is found east and north of Rodeo Creek, underlying the Little Boulder Basin regionally, and extends under both the NBTF and the roaster facility. This formation has a thickness of 600 feet regionally and consists of material, which generally exhibits low permeabilities. In the North Block area, Carlin Formation permeabilities range from 5.2×10^{-6} cm/sec to 8.3×10^{-5} cm/sec. The variable nature of the formation produces zones or lenses of higher permeability along the bedding planes within the formation. Very little vertical flow occurs, and the Carlin Formation acts as an aquitard, producing locally confined conditions within the underlying Vinini Formation. Most of the recharge of the Carlin Formation is probably derived from direct infiltration of precipitation and snow melt from the Tuscarora Mountains. This source of local recharge is directly responsible for variations in groundwater quality in the Carlin Formation as opposed to underlying metasediments.

Shallow alluvial deposits are found primarily adjacent to creeks within the project area. Subsurface drainage within these deposits generally appears to follow the course of these creeks to Rodeo Creek or into the underlying or adjacent Carlin Formation. The alluvial deposits generally consist of interbedded clay, silt, sand,

and gravel deposited by channel and overbank flows of the creek. The permeability of the alluvium ranges from 1 x 10^{-4} cm/sec to 8 x 10^{-2} cm/sec.

The Vinini Formation is exposed in both the eastern and western portions of the North Block area. East of the NBTF, the Vinini Formation consists primarily of bluish-gray to brownish-gray massive chert. Constant head permeability tests conducted in borings completed in this area indicate that permeabilities in the Vinini Formation range from 1 x 10^{-7} cm/sec to 2 x 10^{-5} cm/sec.

Barrick has conducted groundwater pumping operations to reduce local groundwater elevations below its mining operations. This has resulted in a localized zone of groundwater depression that is observed west-southwest of the North Block facilities. Continued pumping activities in the project area are expected to maintain the water table at depth in the North Block area. Water produced by Barrick's pumping operation, which is not used in mining and milling operations, is used for irrigation, infiltrated, injected into the ground, or discharged, subject to Water Pollution Control Permits for Boulder Valley Infiltration (NEV0089068) and an Underground Injection Control Permit (UNEV0093209). Barrick also holds a National Pollution Discharge Elimination System Permit, issued by the Division, for discharge to the Humboldt River, if required conditions are met.

Barrick, Newmont Mining Corporation, and the TS Ranch were required to submit a monitoring plan to the State Engineer as a condition of the related water appropriation permits. The plan was required to "address all aspects of potential impacts resulting from any pumping of water including the dewatering of the pit area." The Boulder Valley Monitoring Plan (BVMP) was submitted in June 1990 and was approved by the State Engineer on 11 April 1991. Each quarter, a BVMP report is updated which provides information on:

- Surface Water Hydrology
- Boulder Valley Springs
- Groundwater Hydrology, and pit groundwater levels
- Monitoring Wells
- Boulder Valley Injection and Infiltration
- Boulder Valley Recirculation System

Potential groundwater pumping effects were modeled for the Betze EIS, and the model was updated in a September 2000 report entitled: "Draft Supplemental Environmental Impact Statement, Betze Project".

Well Location in the Project Area

Numerous groundwater monitoring wells, dewatering wells, and piezometers exist within the North Block and AA Block areas. The locations of the wells within the

North Block area and on adjacent properties and project areas can be found in the application. These wells are monitored and sampled and the results are submitted as required by the Permit. Dewatering of the Betze-Post Pit and underground operations makes groundwater monitoring impractical. However, the quality of the dewatering water (i.e., groundwater) is monitored under the Boulder Valley Infiltration Permit (NEV0089068).

The water treatment plant at the roaster provides potable water to the site. Two (2) wells, BW-40 and BW-41, supply water to the treatment plant.

Pit Lake Modeling

The 2007 update of the pit lake model includes a reassessment of the hydrologic and geochemical understanding of the system. Some changes in the hydrologic and geochemical understanding have occurred because of modifications in the mine design, collection of new geochemical data, and plans for placement of 570 million tons of backfill into the pit. The technical approach used in the study included three (3) separate scenarios:

1. Refill of the final Betze-Post Pit for the proposed mine plan with groundwater, runoff, and direct precipitation (i.e. including the pit expansion and increased in-pit backfill);
2. Refill of the final Betze-Post Pit for the current mine plan (i.e. the no action alternative under the National Environmental Policy Act [NEPA]);
3. Refill under the proposed plan (item 1) plus input of surface water from the upper Rodeo Creek.

Hydrology and water quality were analyzed and projected to 400 years and the results for each of the three (3) scenarios above were compared.

The pit lake is predicted to reach hydrologic equilibrium in approximately 400 years, reaching a final elevation ranging from 5,098 feet amsl (scenario 1), to 5,144 feet amsl (scenario 2), with scenario 3 falling in between the other two scenarios at 5,111 feet amsl. The increased surface area of the pit lake under scenarios 1 and 3 proportionally increases evaporative losses, resulting in a slightly lower final lake level. The addition of the creek inflow in scenario 3 partially offsets this effect.

The predicted water quality in the pit lake will not degrade waters of the State and is protective of terrestrial, avian, and human health. The pit lake is terminal with the basin that drains into the open pit having an area of nearly 2,160 acres, including 620 acres of reclaimed waste rock, with the remainder composed of nearly equal amounts of highwall and reclaimed backfill.

The NNP of rocks exposed in the highwall of the Betze-Post Pit is +141 kilograms $CaCO_3$/1,000 ton. Less than 15% of the highwall has rocks with NNP values less than 0. The average NNP of backfilled rocks (+111 kilograms $CaCO_3$/1,000 ton) was similar to the average NNP in the highwall. The highwall area and backfill have little risk of long-term acid generation because essentially all of the low NNP rocks will be inundated as the pit fills with water. Groundwater from the carbonate rocks provides the majority of water to fill the pit. Consequently, the pH of the lake system is predicted to remain alkaline after year 14, increasing slightly with time (from 7.5 to 7.7) due to the transition from a calcium-bicarbonate towards sodium-bicarbonate type water. If necessary, low pH in the early years of filling (up to year 14) may be mitigated by the addition of lime or other alkaline amendments. Sulfate concentration will be highest during early stages of filling and decreases with time due to decreasing contributions from the highwall. Calcium also decreases with time due to formation of calcite.

Only minor variations in trace element concentration occur through time. Concentrations of trace elements in the pit lake are strongly controlled by pH and by the quantity of iron available for sorption. As the lake's pH increases from 7.5 to 7.7, and as the total quantity of iron decreases because of decreasing rinse-out of the weathering products from the highwall, the amount of sorption diminishes between year 50 and year 400. Consequently, the predicted concentration of arsenic increases slightly, while the concentration of antimony stays roughly the same. Zinc and nickel levels decrease through time, rapidly for 25 years, then more slowly thereafter.

The predicted water quality in the pit lake at year 50 was used as the basis for the Ecological Risk Assessment (ERA). Several types of avian and terrestrial species known to inhabit this area of the State, as well as aquatic species which may be introduced artificially, were evaluated for exposure to the levels of metals predicted by the pit lake study. The overall conclusion of the assessment is that chemical risk to wildlife and livestock posed by the concentrations of metals predicted in the pit lake study is not likely.

The 2015 Renewal application includes an updated pit lake study dated November 2013 prepared by Schafer Limited LLC. The purpose of the study is to provide an analysis of the effects of the Betze-Post Pit on long-term water quality and waters of the State considering the addition of the interaction of rebounding groundwater with underground mine voids and various backfilling practices. The analysis consists of two phases. The first phase assesses the rate of groundwater recovery and transient changes in groundwater chemistry, while the second phase predicts pit water quality. The Division has expressed concern about the potential effects of underground mines on the water quality in the Carbonate Aquifer. The Rodeo and Meikle Underground Mines are located just north of the Betze-Post Pit while Newmont's Leeville underground operation and various open pits are located 1 to 3 miles south and southeast of the Betze-Post Pit. One particular concern

expressed about underground mine filling is the effect that acidic efflorescent salts, also referred to as evaporative mineral precipitates (EMP's), that form in portions of the development headings may have on water quality.

This study is an evaluation of the potential effects of the underground mines on the rate of recovery of the Carbonate Aquifer and the effects on water quality. The evaluation consisted of:

- Estimation of void volumes in the mines as a function of elevation;
- Comparative evaluation of groundwater recovery with and without consideration of the underground mine voids;
- Predicting the flow rate and flow direction for groundwater that flow through the mine voids;
- Assessment of likely water quality that will develop in the mine void as the system floods;
- Predicting chemical transport from the underground mines; and
- Overall assessment of effects on the Carbonate groundwater.

Groundwater recovery is virtually identical for the groundwater simulations with and without inclusion of the underground mine voids. For about the first 33 years of the simulation no water from the Carbonate Aquifer reaches the pit lake as the groundwater level remains below the pit floor. Sources of inflow to the pit lake during the early time stages are from pit wall runoff and the Carlin groundwater system. By year 100, 84% of the total inflow to the pit lake is from the Carbonate Aquifer. Groundwater flux through the Rodeo Mine peaks at about 1 cubic feet per second (cfs) by year 30 and then decreases to a long-term flux of about 0.25 cfs. Peak inflow through the Meikle Mine of 0.75 cfs occurs in about year 100 of the simulation and decreases to a steady state flux of about 0.3 cfs. Groundwater flux through the Leeville, averaging 0.03 cfs, is a small fraction flux through the other mines. Even though groundwater flux through the underground mines exceeds the flux into the pit lake during early time stages of the model, one cannot infer that all groundwater reaching the pit lake has previously contacted the underground mines. By year 70 all water flowing through the underground mines will reach the pit lake. However, based on particle tracking analysis, only a portion of the water that initially flows through the underground mines would reach the pit lake during the first 400 years of filling.

Based on the particle tracking results, chemical loads will not reach the Betze-Post Pit for over 400 years and a small portion of the loading may migrate across the Siphon Fault in 400 to 600 years and never reach the pit lake. However, small changes in the dewatering system management at one or more of the mine operations within 5 to 10 miles of Goldstrike may alter flow directions enough so that chemical loads from the underground mines will reach the pit lake. Consequently, in order to provide a conservative pit lake model, the loads from

the underground mine will be added to the Carbonate groundwater system during the early to intermediate stages of filling (e.g., year 30 to 150).

The resulting effect on the Carbonate groundwater will be higher calcium and sulfate levels but little change in metals. The increased major ions levels that result from interaction with the underground mines is similar to the changes in groundwater that are predicted when water flows through the weathered highwall. Predicted pit lake water quality is not expected to change appreciably as a consequence of the underground mine contact water.

D. Procedures for Public Comment

The Notice of the Division's intent to issue a Permit authorizing a facility to construct, operate, and close subject to the conditions contained within the Permit, is being sent to the **Elko Daily Free Press** in Elko, for publication. 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 from the date of the 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. Any public hearings must be conducted in accordance with NAC 445A.403 through NAC 445A.406.

E. Proposed Determination

The Division has made tentative determination to issue the Permit.

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

See Part I of the Permit.

G. Rationale for Permit Requirements

The facility is located in an area where annual evaporation is greater than annual precipitation. Therefore, it must operate under a standard of performance which

authorizes no discharge(s) except for those accumulations resulting from a storm event beyond that required by design for containment.

The primary method for identification of escaping process solution will require routine monitoring of leak detection systems, as well as routine sampling of downgradient monitoring wells and surface water. Specific monitoring requirements can be found in the Permit.

H. Federal Migratory Bird Treaty Act

Under the Federal Migratory Bird Treaty Act, 16 U.S. Code 701-718, it is unlawful to kill migratory birds without license or Permit, and no Permits are issued to take migratory birds using toxic ponds. The Federal list of migratory birds (50 CFR 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 (2) 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 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 Blvd., Suite 234, Reno, Nevada 89502-7147, (775) 861-6300 for additional information.

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Revision 00: Renewal 2015, Boiler Plate Updates, 2012 EDC to add a system for collection of roaster fines for further gold recovery, Revision of ore stockpile pad containment basin monitoring, 2013 minor modification NBTF Stage 10, 2014 minor modification NBTF Stage 11 and 12, Updated Pit Lake Modeling provided with renewal application,[SG 5/2015]