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STATEMENT OF BASIS

Ground Water Discharge Permit UGW350001
Kennecott Barneys Canyon Mining Company

August 2018

Introduction

The Division of Water Quality (DWQ) under the authority of the Utah Ground Water Quality Protection Rules¹(Ground Water Rules) issues ground water discharge permits to facilities which have a potential to discharge contaminants to ground water². As defined by the Ground Water Rules, such facilities include mining operations³. The Ground Water Rules are based on an anti-degradation strategy for ground water protection as opposed to non-degradation; therefore, discharge of contaminants to ground water may be allowed provided that current and future beneficial uses of the ground water are not impaired and the other requirements of Rule 317-6-6.4.A are met⁴. Following this strategy, ground water is divided into classes based on its quality⁵; and higher-quality ground water is given greater protection⁶ due to the greater potential for beneficial uses.

DWQ has developed permit conditions consistent with R317-6 and appropriate to the nature of the mined materials, facility operations, maintenance, best available technology⁷ (BAT) and the hydrogeologic and climatic conditions of the site, to ensure that the operation would not contaminate ground water.

Basis for Permit Renewal

This Permit is being renewed in accordance with R317-6-6.8 which states that a permit may be terminated or a renewal denied if any one of the four items below applies:

- A. Noncompliance by the permittee with any condition of the Permit where the permittee has failed to take appropriate action in a timely manner to remedy the Permit violation;
- B. The permittee's failure in the application or during the Permit approval process to disclose fully all significant relevant facts at any time;
- C. A determination that the permitted facility endangers human health or the environment and can only be regulated to acceptable levels by plan modification or termination; or

1 Utah Admin. Code Rule 317-6

2 https://deq.utah.gov/ProgramsServices/programs/water/groundwater/docs/2008/08Aug/GWQP_PermitInfo.pdf

3 Utah Admin Code Rule 317-6-6.1A

4 Preamble to the Ground Water Quality Protection Regulations of the State of Utah, sec. 2.1, August, 1989

5 Utah Admin. Code Rule 317-6-3

6 Utah Admin. Code Rule 317-6-4

7 Utah Admin. Code Rule 317-6-1(1.3)

D. The permittee requests termination of the Permit.

Basis for Modification and Permit Issuance

Under Rule 317-6-6.4A, DWQ may issue a ground water discharge permit if:

- 1) The applicant demonstrates that the applicable class TDS limits, ground water quality standards protection levels and permit limits established under R317-6-6.4E will be met;
- 2) The monitoring plan, sampling and reporting requirements are adequate to determine compliance with applicable requirements;
- 3) The applicant is using best available technology to minimize the discharge of any pollutant; and
- 4) There is no impairment of present and future beneficial uses of ground water.

Changes and modifications to the renewed permit are further described below.

Facility Description

Barneys Canyon Mining Company is in the process of final closure of its gold recovery facility west of Salt Lake City approximately two miles north of Copperton, Utah, on the east flank of the Oquirrh Mountains. Mining operations ceased in 2001, active cyanide leaching ceased in 2007 and ore on the heap leach pads was rinsed with process water for gold recovery until 2013. The former process ponds have been taken out of service. Reclamation of the oxide waste rock dumps and the sulfide waste rock repositories were completed by the end of 2002. Closure of the heap leach pads, including recontouring of the slopes and placing approximately three feet of cover soil, is in process and is being completed under construction permits from the Division of Water Quality (DWQ). A small stockpile of sulfide ore consisting of approximately 125,000 tons of material has been incorporated into the heap leach pads as part of the closure activities. In addition, soil adjacent to the heap leach pads containing materials from ore handling has also been incorporated into the leach pads and will be beneath the final cover.

The leach pads, processing ponds, processing plant, pits, reclaimed waste rock dumps and ancillary facilities were operated under the concept that there is no intentional direct discharge to waters of the State. All drainage pad water generated from the heap leach pads is gravity drained to the Tailings Pipelines through a dual contained piping conveyance system. Although sodium cyanide (NaCN) was the lixiviant used in the original gold-leaching process, its addition was discontinued in 2007 when rinsing of the pads started and continued through 2013. Since 2013, no operational water has been added to the pads and drainage consists of meteoric water that falls on the pad footprint.

Historical Leach and Rinse Water

Historically, the leach solution generally contained less than 50 ppm NaCN until its addition was

discontinued in 2007. NaCN leaching was followed by the addition of rinse water that was pumped in pipes to the top of the leach pads where it was distributed at the rate of about 2,000 to 2,500 gallons per minute. Sodium hydroxide (NaOH) was used as necessary to manage the pH and the base metal loading within the circulating rinse water. The rinse water was a re-circulated combination of process water from the Kennecott process water line (when make-up water was needed) and meteoric and barren pond water which contained residual cyanide. The chemical composition of solution varied as they moved through different stages of the gold extraction process. At all stages of the process, the solutions had high sulfate content, generally greater than 2,000 milligrams per liter (mg/l), reflecting the closed circulating system which had been operating continuously since 1989. Metals listed in Table 1 of the Ground Water Protection Rules are present at low to moderate concentrations, generally below 20 mg/L. Currently, the pads generate a flow of 15 to 40 gpm of meteoric drainage water which is conveyed via a gravity piping system to the Tailings Pipelines. The fluctuation in flow is directly correlated with the site precipitation amounts.

Best Available Technology

Leach Pads

Each leach pad consists of several cells. The vertical configuration of each leach pad is as follows, from top to bottom:

1. Three (3) to 5-foot thick process solution collection system of fine grained ore.
2. 60-mil high density polyethylene (HDPE) primary liner.
3. 12-inch minimum thickness clay secondary liner with a maximum hydraulic conductivity of 1.0×10^{-7} centimeters per second (cm/sec).
4. Below the clay secondary liner is a 6-inch thick inactive leak detection layer with a hydraulic conductivity of 1.0×10^{-3} cm/sec or greater.
5. 6-inch minimum thickness soil tertiary liner with a maximum hydraulic conductivity of 1.0×10^{-6} cm/sec.

Each leach pad has positive drainage from west to east. At the east end of each leach pad, a series of drains convey drainage water to the water piping system which consists of dual contained pipelines, distribution and desilting boxes and finally a common dual contained pipeline that discharges to a final distribution box prior to entering the Kennecott Tailings Pipeline.

The leach pads have been maintained in a manner that allows sufficient freeboard in the event of a 100 year, 24 hour storm event. The leach pads will be maintained and operated within these parameters until final closure design is completed and commissioned.

Hydrogeology

The former leach site is located on the east flank of the Oquirrh Mountains on the surface of an old east dipping alluvial fan. The fan deposit ranges from 100 to 200 feet thick and consists of sand, gravel and clay. Volcanic rocks underlie the alluvial material. These rocks consist of agglomerates, mudflow deposits and lava flows, and are probably less permeable than the overlying alluvium. The water table slopes downward to the east and according to data from the monitoring wells ranges from 82 to 380 feet in depth. A production well (BC-280) for the site pumps about 50 gallons per minute when needed for closure activities.

Ground Water Quality and Protection Levels

Based on monitoring completed for the permit to date, ground water in the mine area is classified as Class II Drinking Water Quality Ground Water. On the basis of sampling completed since the permit was originally issued, background ground water quality, ground water protection levels, and out-of-compliance levels have been revised. The protection levels for total dissolved solids are 1.25 times the background value. When a contaminant is present in a detectable amount in the background concentration, the concentration of the pollutant may not exceed 1.25 times the background concentration, or exceed 0.25 times the ground water quality standard, whichever is greater. When a contaminant is not present in a detectable amount, the concentration of the pollutant may not exceed 0.25 times the ground water quality standard, or exceed the limit of detection, whichever is greater.

Permit Conditions

Best available technology is used to maintain compliance with ground water protection levels. This requires no discharge of drainage pad water from the facility to ground water. Compliance ground water quality monitoring is required to demonstrate that compliance with ground water protection levels is being maintained. Maintenance of BAT will be demonstrated by the absence of drainage pad water off the pads and maintaining final cover of the leach pads in an erosion-free condition to prevent generation of contact water.

New Construction

A series of construction permits have been obtained from DWQ for the implementation of the final site closure design. At completion of the applicable construction permits, a completion report will be submitted to DWQ for approval. The Completion Report will include a summary of construction activities, as-built drawings of the executed construction and an operation and maintenance plan.

Ground Water Quality Monitoring

All monitoring wells are to be sampled semi-annually. Ground water quality protection levels described in the permit will be used to make any determinations of possible out of compliance. Water quality data are to be collected and reported to the Division of Water Quality Director on a semi- annual basis. In the event that a ground water protection level is exceeded, corrective and

remedial action will be determined by the company and the Division of Water Quality Director.

Under the renewed permit, monitoring will include parameters indicative of a release of pad drainage water. These parameters include major ions, which are present in different proportions in the ground water as compared to the pad drainage water; cyanide, which is a synthetic chemical present in the process solutions but not naturally present in the ground water; and nitrate, a degradation product of cyanide. Analysis for major ions also includes sulfate, which is present in pad drainage water. Most of these parameters are highly mobile in ground water and should result in early detection of a release of pad drainage water. If monitoring for these parameters reveals leakage from the pad drainage facilities, the permittee must monitor for other contaminants which may have been released as part of a Contaminant Investigation as required under R317-6-6.15.

Under this renewed permit, former compliance parameters cadmium, copper, lead, and silver have been dropped from the analyte/compliance list. None of these constituents have been detected in the compliance wells at the site, nor have they been detected in the process water generated at the site, making them unnecessary parameters to continue monitoring.

Arsenic has been added as a ground water monitoring compliance parameter because it is known to exist in elevated concentrations at natural background levels, and is present in the contact water generated from drainage through the heap leach pads.

Upgradient monitoring well BC280 has been removed from the permit as a point of compliance. This well was constructed as a water supply well and has a long screen interval that may lead to dilution of potential ground water contamination as a result of mining activities, making the well ineffective. Additionally, a portion of the screen has collapsed, preventing reliable purging and sampling activities. Given that active mining activities are no longer occurring as the mine undergoes closure, this upgradient monitoring point is no longer necessary. It will be scheduled for proper abandonment as part of mine closure activities.

Mine Pit Water

Water from mine pits at this site, after primary sediment treatment, may be conveyed for use at the Copperton Concentrator and during the construction of the final closure design. Other use or disposal will require approval from the Division of Water Quality Director.