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GROUND WATER QUALITY DISCHARGE PERMIT UGW350017

STATEMENT OF BASIS

Rio Tinto Kennecott (Kennecott)
Copperton Concentrator
South Jordan, Utah

November 2017

Introduction

The Division of Water Quality (DWQ) under the authority of the Utah Ground Water Quality Protection Rules [1](Ground Water Rules) issues ground water discharge permits to facilities which have a potential to discharge contaminants to ground water[2]. As defined by the Ground Water Rules, such facilities include mining operations. [3]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 met.[4] Following this strategy, ground water is divided into classes based on its quality[5]; and higher-quality ground water is given greater protection[6] 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 technology[7] (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;

[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)

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

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.

In addition, as discussed below, pursuant to a Stipulation and Consent Order (SCO UGW 13-02), the Division of Water Quality (DWQ) and the permittee agreed to modify the Permit to include the tailings pipeline facilities as described below. In addition to the requirements of the referenced SCO, Kennecott also agreed to include in this Permit a process water return pipeline and the 3B surge basin, as further described below.

Permit Changes and Modifications

NEW FACILITIES

In addition to renewal, the following new facilities will be regulated under this Permit including the associated Best Available Technology (BAT, Table 2), Permit limits and requirements for monitoring, release reporting (Table 2A) and cleanup (Appendix A).

1) The 48-inch and 60-inch tailings lines, along with associated vent stacks, drop boxes, bubble dissipaters, and splitter box;
2) the 48-inch buried steel process water return line; and
3) the 3B surge basin.

The tailings pipeline system consists of two, approximately 13-mile parallel pipelines that deliver whole tailings slurry to the north splitter box. The tailings lines (48-inch and 60-inch) convey tailings slurry from the Copperton Concentrator north to the tailings impoundment using a gravity flow system. The gravity flow system requires the tailings lines to have open vent stacks along the pipeline to ensure proper hydraulic fluid flow. The vent stacks are also used as inspection ports and access points for monitoring and cleaning activities associated with the tailings line preventative maintenance program. The tailings lines also incorporate a series of drop boxes along the length of the corridor.

The drop boxes reduce the velocity of the tailings slurry and adjust for elevation change along the corridor.

The process water return system extends from the Magna Reservoir to the Copperton Concentrator. This system consists of Pump Stations 3A and 3B, approximately 12 miles of 48-inch diameter steel with reinforced concrete pipeline, and associated infrastructure. Pump Station 3B is a booster station that is located mid-line and incorporates a concrete surge basin to buffer pump operations and process upsets as well as provide adequate suction head pressure to the booster pumps. The surge system at Pump Station 3B provides water storage above the pump station to maintain minimum pump suction inlet pressure, provide reserve capacity to buffer pump starts and stops between the pump stations, and absorb surges from upset conditions. The pumping system hydraulics cause pressure surges and pressure spikes with each start and stop. The system is designed to absorb these changes in pressure.

COMPLIANCE SCHEDULE

- Contaminant Investigation and Potential Corrective Action

  Within 60 days of the effective date of this Permit a Contaminant Investigation Plan is required describing an iterative process for installing investigational wells downgradient of the following spill locations in accordance with R317-6-6.15:

  a) H1.A and A.25 Drop boxes;

  b) Surge Basin 3B;

  c) The area between the Magna Reservoir and the power plant.

  The Contaminant Investigation Plan will include the following information:

  a) Hydrogeologic cross-sections utilizing available existing data nearest the area of the environmental releases;

  b) A table summarizing information regarding the well construction data from nearby wells most likely to detect and/or be impacted by the releases such as: geologic logs, depth to water, depth and length of screened interval, historical sampling data, time series plots of key parameters, etc.;

  c) A discussion of why the existing wells are/are not adequate to monitor the ground water with respect to past releases, including an updated water table map for the vicinity; and

  d) Proposed locations for installation of new ground water investigational wells as identified in the Contaminant Investigation Plan, required by this Permit, for Director approval.

- Based on information available as of the date of Permit issuance, DWQ anticipates between four and twelve investigational wells will be required in order to conduct the investigation. It is possible for a well to serve a dual purpose as both investigational and compliance monitoring location, upon approval by the Director.

- To the extent practicable, the Contaminant Investigation Plan should be crafted to meet the purposes of the Compliance Monitoring Plan; specifically, data from investigational wells should serve as a means of collecting additional baseline data regarding the aquifers, hydrogeological conditions, and background water quality. DWQ intends to exercise its discretion in connection with the Compliance Monitoring Plan and the Contaminant Investigation Plan so as to minimize the scope of required wells while also meeting applicable legal and technical requirements.
- Ground Water Compliance Monitoring Plan

  A Ground Water Compliance Monitoring Plan is required within 30 days of the DWQ approval of the Contaminant Investigation Report. The required plan shall be prepared in accordance with R317-6-6.4.C.2 and R317-6-6.9A and shall include a minimum of five (5) new monitoring well locations for review and approval by the Director. The purposes of the Compliance Monitoring Plan include (i) obtaining additional baseline data regarding the aquifers, hydrogeological conditions, and background water quality; and (ii) establishing suitable points of compliance for the Permit.
- Kennecott shall submit a Contaminant Investigation Report to the Director for review and approval in accordance with R317-6-6.15.D.1.within 60 days of the completion of the required wells within a given area.
- Corrective Action – Following the submission, review and approval of the contaminant investigation above, the Director may require the submission of a Corrective Action Plan in conformance with R317-6-6.15.D.2.

Background

PERMIT HISTORY

The Ground Water Discharge Permit Application for the facility was initially submitted to DWQ in October 2000 (Kennecott Utah Copper, 2000). UGW350017 was initially issued to Kennecott Utah Copper in 2004 in accordance UAC R317-6-6.4. The Permit was renewed in 2009. This is the second renewal of the UGW350017 Permit. To assure adequate ground water quality protection, the facility was designed to employ discharge minimization and control technology with ground water monitoring to prevent any impairment of present and future beneficial uses of the ground water.

Compliance monitoring for this facility is a combination of ground water monitoring and periodic inspections. Ground water monitoring is performed at wells located downgradient of the concentrator; monitoring parameters, and protection limits are listed in Table 1 of the Permit. Inspections are conducted at tanks, pumps, ponds, pipes, and reservoirs to verify the condition and operation of the equipment, and identify and correct maintenance issues that could lead to a release of process fluids to the environment. Appendix A of the Permit is the Process Material Pipeline Spill Prevention, Minimization, and Response Plan and describes maintenance and inspection procedures for pipelines as well as spill clean-up procedures.

DESCRIPTION OF FACILITY

The Copperton Concentrator facilities are comprised of:

1) The coarse ore stockpile and grinding mill;
2) Copper-Molybdenite flotation, concentrate re-grind and concentrate thickening tanks;
3) Molybdenite recovery plant;
4) Copper concentrate and tailings thickening tanks;
5) Water supply reservoir;
6) The 48-inch and 60-inch tailings lines, along with associated vent stacks, drop boxes, bubble dissipaters, and splitter box;
7) the 48-inch buried steel process water return line;
8) the 3B surge basin;
9) the tailings line launder; and
10) other associated facilities including those identified in the Permit (e.g., Table 2).

Figure 1 provides a generalized overview of the facility.

The Copperton concentrator was completed in 1988. Modernization and expansion of the facility was completed in 1992 and was designed to process a capacity of 142,000 tons of ore per day. Ore is transported from the Bingham Mine via a conveyor belt to the coarse ore stockpile. The ore is fed to Semi-Autogenous Grinding (SAG) mills which crush the ore for separation and floatation to concentrate metal recovery. Tailings are slurried via a 13 mile pipeline to the tailings impoundment adjacent to the Great Salt Lake.

Water used by the Copperton facilities is acquired from the Process Water Reservoir (PWR) and various storage tanks. The PWR is a two chamber lined reservoir with a 7.5 million gallon capacity. The sources of water for the PWR are reclaim water from the tailings pond and smelter via the process water return line, thickener overflow, molybdenite plant effluent, north end surface drainage and springs, existing deep wells and the Bingham Tunnel. The concentrator facilities require approximately 55,000 gpm for milling purposes.

HYDROGEOLOGIC AND SITE CONDITIONS

The Copperton Concentrator facilities, including the process water and tailings pipelines, are located predominantly on bedrock with portions in unconsolidated valley-fill alluvium at the base of the Oquirrh Mountains. The process water and tailings pipelines are in a corridor running north south along the Oquirrh Mountains, extending approximately 13 miles between the Copperton Concentrator and tailings impoundment adjacent to the Great Salt Lake (Figure 2). The base of the Oquirrh Mountains constitutes a portion of the primary recharge area of the principal, basin–fill (alluvial) aquifer of the Salt Lake Valley (Anderson, et al., 1994, pg. 23 and Plate 4). Hydrogeologic conditions along the 13 mile pipeline corridor vary due to the geologic complexities summarized above.

There are no perennial streams near these facilities and surface water runoff only exists

during high intensity storms or snow melt.

There are two aquifers in the vicinity of the Copperton Concentrator facilities, the bedrock and principal alluvial. The bedrock aquifer is composed of Paleozoic sandstones and quartzite and Tertiary volcanic rocks. Flow within the bedrock aquifer is assumed to be primarily by fracture flow and provides recharge to the overlying principal aquifer.

The principal aquifer is unconfined and composed of interbedded volcanic and quartzitic gravels, clays and cemented gravels. The principal aquifer extends eastward from the foot of the Oquirrh Mountains and is bounded at its base by the Jordan Narrows formation. Aquifer thickness increases to the east, thins to the north and remains fairly constant to the south. Near the concentrator the principal aquifer is approximately 150 feet thick. Two production wells, approximately one-half mile from the concentrator, are used as a source of drinking water for the town of Copperton. The wells are screened in volcanic gravels of the principal aquifer. The area around the Copperton Concentrator provides recharge to the principal aquifer of the Jordan Valley.

In the Salt Lake Valley ground water flow is generally from the mountain front toward the Jordan River. Ground water flow from the Copperton Concentrator facilities and pipeline corridor is generally east and turns north in the vicinity of the Bennion area and as water moves closer to the Great Salt Lake (Anderson, et al., 1994 pgs. 23-24, Figure 12). The concentrator has three wells for culinary and fire use. The wells are screened in the bedrock aquifer near the facility. To the north, downgradient (east) of the tailings pipeline corridor, a variety of private water supply wells and municipal production wells are present including those that serve the Kearns Improvement District, Magna, and West Jordan.

BACKGROUND GROUND WATER QUALITY

Only limited data are available regarding background water quality in the vicinity of the pipelines to be permitted. One of the purposes of the Compliance Monitoring Plan and the Contaminant Investigation Plan is to obtain additional data to inform DWQ's future permitting and enforcement decisions as to this facility. Ground water in the immediate area of the Copperton Concentrator is not classified. The water quality for the principal basin-fill aquifer of the Salt Lake Valley has been classified by the Utah Geological Survey (Wallace and Lowe, 2008) and is generally Class II Drinking Water Quality downgradient of the Copperton Concentrator facilities (refer to Figure 3) with TDS values that range from 512 to 2588 mg/L. There is an area of Class IA Pristine Ground Water (TDS < 500 mg/L) near Kearns and UT Hwy 173. The area north of Hwy 201 is Class III, Limited Use Ground Water (TDS values >3000 mg/L). Additional aquifer characterization is required for DWQ to better understand whether the pipeline facilities may potentially impact these groundwater resources.

RELEASE HISTORY

The existing Copperton Concentrator facility (renewal) has operated in compliance with its existing permit conditions with the exception of the October 21, 2015 release listed

below. In addition to other releases in the area, and to determine if the facility presents a threat to human health and the environment in accordance with R317-6-6.8(C), a contaminant investigation is being required in this location as described below and Part I.(J) of the permit. The release dates, locations, and written report references are summarized as follows:

- February 4, 2013 – Reported release of tailings slurry from 48-inch tailings pipeline vent stack 335 (UGW13-02) described in 5-day follow-up letter DWQ-2013-001562.
- September 13, 2013 – Reported release of tailings slurry from drop box H1A and drop box A.25 (UGW14-07) described in 5-day follow-up letter DWQ-2013-006515.
- June 3, 2014 – Reported release of process water from the tailings launder (UGW14-13) described in 5-day follow-up letter DWQ-2014-010559.
- November 8, 2014 – Reported release of process water from the Pump Station 3B surge basin (UGW15-03) described in 5-day follow-up letter DWQ-2014-016499.
- October 21, 2015 – Reported release of process water from the Concentrator Process Water Reservoir (UGW15-07) described in 5-day follow-up letter DWQ-2015-013801.
- July 31, 2017 – Reported release of process water from a failed nipple on a pipeline running between the Magna Reservoir and the power plant (UGW17-03) described in 5-day follow-up letter DWQ-2017-007498.

Stipulation and Consent Order, UGW 13-02

To resolve an administrative Notice of Violation and Compliance Order for UGW 13-02, Kennecott and DWQ agreed in the above-referenced SCO that the tailings pipelines that had been considered as permitted by rule under Utah Admin. Code Rule R317-6-6.2.A.20, would be brought under the Permit by modification of Copperton Ground Water Discharge Permit, UGW 350017. The SCO established that the draft Permit modification would include additional Best Available Technology Standards, monitoring, and operating and reporting requirements for the 48-inch and 60-inch tailings pipeline facilities within the Copperton Concentrator pipeline Corridor. SCO UGW 13-02 also included an order that the draft Permit include a schedule and outline of reports and actions to be taken by Kennecott regarding contaminant investigation and possible corrective action in accordance with R317-6-6.15 for pipeline releases other than those addressed by SCO UGW 13-02. Kennecott submitted that schedule in March of 2016.

Basis for Specific Permit Conditions

BEST AVAILABLE TECHNOLOGY AND PERFORMANCE MONITORING

Best Available Technology (BAT) is defined in R317-6-1.3 as "... the application of design, equipment, work practice, operation standard or combination thereof at a facility to effect the maximum reduction of a pollutant achievable by available processes and methods taking into account energy, public health, environmental and economic impacts and other costs." For this Permit BAT is implemented through a discharge minimization

approach with a monitoring component to assess impacts to ground water quality from the operation of the Copperton Concentrator facilities. This approach is coupled with the use of appropriate containment technology for process waters associated with the operation of the facility.

BAT includes concrete process fluids basins, HDPE lined process water ponds and asphalt lined storage pads. Table 2 in the Permit lists the BAT, including the function, containment, inspection and work practice for each facility covered by the Permit. Kennecott conducts periodic inspections throughout the facility to insure the proper operation of all structures that have the potential to release process fluids. In addition, the entire length of the tailings line corridor is driven twice daily to inspect for leaks from tailings lines, vents, and drop boxes. A spill of any volume reaching a drainage bottom as identified on Figure 4 is reported to DWQ within 24 hours.

PERFORMANCE (BAT) AND GROUND WATER MONITORING

Performance monitoring is a requirement for each facility in the Permit and has been established for each permitted facility listed in Table 2 and Appendix A. For the newly permitted pipelines, select locations along the pipeline corridor will be chosen for installation of ground water monitoring wells to establish compliance monitoring in accordance with R317-6-6.4.C.2 and R317-6-6.9A. These compliance points will serve the purpose of monitoring for potential impacts to ground water resulting from permitted releases along the pipelines, unpermitted releases from the pipelines, and undetected releases resulting from joint settlement, cracks, and other potential pipeline failures. As discussed above, limited data are available regarding background water quality in the vicinity of the new facilities. The intent of the Compliance Monitoring and the Contaminant Investigation Plans is to obtain additional data to inform DWQ's future decisions regarding BAT performance and any necessary ground water monitoring.

PERMIT LIMITS FOR NEW/PIPELINE WELLS

Permit Limits will be established on a well-by-well basis for each new ground water monitoring well installed to monitor the tailings/process water pipelines. Permitted releases from the pipelines are considered to have a de minimis actual or potential effect on ground water quality. As a result, Permit limits will be established as the background concentrations in the monitoring well.

CONTAMINANT INVESTIGATION

A contaminant investigation is being required to assess if there have been any ground water impacts associated with prior releases from the tailings and process water pipelines. Conducting an investigation in accordance with R317-6-6.15 will characterize the nature and extent of any pollutants resulting from past releases, and determine if a Corrective Action Plan will be required.

LIST OF FIGURES

1) Copperton Concentrator Site Map

2) Tailings Pipeline Corridor Location Map
3) Salt Lake Valley Aquifer Classification Map
4) Drainage Bottoms Map

REFERENCES

Anderson, P.B., Susong, D.D., Wold, S.R., Heilweil, V.M., and Baskin, R.L., 1994, Hydrogeology of Recharge Areas and Water Quality of the Principal Aquifers Along the Wasatch Front and Adjacent Areas, Utah: U.S. Geological Survey Water-Resources Investigations Report 93-4221

Kennecott Utah Copper, 2000, Copperton Concentrator Ground Water Discharge Permit Application, October, 2000: DWQ files, DWQ-2000-001101

Wallace, J. and Lowe, M., 2008, Ground-Water Quality Classification for the Principal Basin-Fill Aquifer, Salt Lake Valley, Salt Lake County, Utah: Utah Geological Survey, August, 2008