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STATEMENT OF BASIS

GROUND WATER DISCHARGE PERMIT UGW210011

Black Iron, LLC
6249 West Gilbert Industrial Court
Hurricane, UT 84737

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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 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.

[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)

Purpose

Black Iron, LLC owns and operates the Comstock/Mountain Lion open pit located in the Iron Springs District, west of Cedar City, Utah. Iron ore extracted from the open pit is processed on site via crushing and grinding methods, followed by magnetic separation and reverse flotation. Currently, tailings from the concentrate process are dry-stacked in an area north of the existing facilities, per Ground Water Discharge permit-by-rule dated January 26, 2011.

Black Iron is proposing to install a tailings pipeline that would transport iron and gangue tailings from the milling facilities to two existing pits (Blackhawk and Blowout) located on the southern flank of Iron Mountain. After processing, the tailings will be approximately 20-50 percent solids and 57 percent liquid. The tailings would be transported as slurry and discharged into the two existing pits, where they would be allowed to settle and assist in backfilling the existing disturbance. A return water pipeline will pump and recover pit water for re-use in the milling and separation process.

Ground Water Discharge Permit UGW210011 is being issued to establish requirements for ground water monitoring, BAT performance standards, sampling and analysis methods, and closure procedures for all activities at the site that have the potential to impact ground water. A compliance schedule is included in Part I.H of the permit establishing deadlines and summarizing requirements for each submittal.

Potential Impacts to Ground Water

Previous water quality permit-by-rule status had been granted to the Iron Mountain Mine. Potential impacts to ground water have been minimized by dry stacking iron tailings at the site. The Blackhawk and Blowout pit lakes are a combination of surface water discharge, precipitation, and intercepted ground water. The tailings discharge into the pits is considered a discharge to waters of the state. The ground water monitoring plan will ensure that any indications of tailings chemistry problems will be detected early and resolved. Ground water quality monitoring of the shallow aquifer down-gradient of the pits will be conducted to determine if ground water quality has been impacted by tailings discharge into the pits.

Geologic Description

The Iron Springs District is characterized by a pluton intrusive with ore deposits situated along the flanks in sedimentary rocks. A complex series of fractures also exists in the flanks as parallel and cross faults. The Blackhawk and Blowout pit walls consist of quartz monzonite, the Homestake Limestone member of the Carmel Formation, and Navajo sandstone. The Iron Mountain area is underlain by unconsolidated Quaternary alluvial sediments (sands, silts, and clays) in the valley floors and semi-consolidated to consolidated Jurassic/Cretaceous rock sediments in the mountains and hills.

Hydrogeology

Regional. The direction of regional groundwater movement in this part of the Basin and Range Province is toward the west. Groundwater exists in the deeper Jurassic rock and along the iron ore contacts primarily in fracture planes (joints/faults) and along bedding planes. Flow is controlled by the fracture pattern systems, fault trends, and attitude (strike and dip) of the bedrock.

The overall water table level in the Iron Mountain area has dropped between 12 and 100 feet between 1996 and 2009. This small but general decrease in ground water elevation is mirrored by a similar, if not stronger, decrease in groundwater levels throughout the Escalante Desert basin, of which Iron Mountain is a part. Data extending back to 1945 show a clear decline in water table elevations of agricultural lands located in this basin to the north and west of Iron Mountain due to water-well pumping for irrigation in the Enterprise-Beryl-Lund area. Records show that discharge exceeds recharge in this area, resulting in a declining water table; in some areas groundwater levels have decreased by 70 or more feet (Thomas and Lowe 2007). Because agriculture is ongoing in the Escalante Desert, it can be assumed that water table elevations will decline further, rather than increase, over time.

Local. The Quaternary and Cretaceous sediments comprise the principal groundwater aquifer. Ground water exists in the shallow Cretaceous Iron Springs Formation, which consists of continental sandstone with subordinate shale and other rock types. According to pump testing in the area, the aquifer in the Iron Springs Formation is shallow and has very low re-charge, indicating the aquifer occurs in very tight rock with limited transmissivity and is fed primarily by rainfall and other means of infiltration.

Another ground water aquifer occurs in the deeper Jurassic rock and along the iron ore contacts, primarily in fracture planes (joints/faults) and along bedding planes. Permeability of the bedrock combined with fracture pattern flows controls the transmissivity (flow rate) of the aquifers. Like the overlying formations in the area, the deeper aquifer has limited transmissivity and fractures do not appear to be extensively interconnected. This is indicated by previous drilling programs conducted in an attempt to establish a well to supply the facility. None of these test-well drilling programs were able to install a well with sufficient production. Only one test well was considered a possibility (NE, NE, Sec 30, T36S, R13W), yet after two weeks of pumping the water level dropped below the pump level. This indicates that the formation has limited transmissivity, most storage is within the fractures of the formation, fractures are not widely interconnected, and the storage within the fractures is limited. As a result of the inability to install a production well, a pipeline from Cedar City was installed to provide water for the operations.

Ground Water Quality

Ground Water Classification. The uppermost shallow ground water at the site is in both Quaternary and Cretaceous sediments. In accordance with UAC R317-6-3.5 and ground water quality data provided in the permit application, ground water is classified as Class II Drinking Water Quality Ground Water.

Class II Protection Levels. In accordance with UAC R317-6-4.5, Class II ground water will be protected for use as drinking water or other similar beneficial use with conventional treatment prior to use. Class II protection levels are established in accordance with the criteria in UAC R317-6-4.5B.

Processing of the magnetite ore involves usage of a thickening process of concentrate and tailings. The flocculant used in the thickeners does not include hazardous or toxic contents as shown by the MSDS sheets, therefore no water quality impacts are expected.

Based on information submitted in the discharge permit application, the post-processing thickener tank tailings discharge water meets Class II quality comparable to ground water. A long-term analysis of water quality of the tailings was performed in the form of a Toxicity Characteristic Leaching Procedure (TCLP). The long-term prediction of water quality of the tailings conforms to primary drinking water standards and Class II ground water quality standards.

Compliance Monitoring Program

A quarterly ground water compliance monitoring program will commence when tailings discharge operations begin. Monitoring will include measurement and analyses of water chemistry for both process water and ground water.

The following key parameters were selected for compliance monitoring based on their concentrations in the process water compared to concentrations in shallow ground water:

- TDS
- Alkalinity, bicarbonate, chloride
- Nitrate + Nitrite
- Sulfate
- Dissolved Metals

Representative samples will be collected from the Blackhawk and Blowout Pit lakes prior to tailings discharge, then annually thereafter. Once tailings discharge begins, quarterly samples will be collected from both the tailings pipeline and reclaim water pipeline. An up-gradient monitoring well will be sampled annually to monitor background conditions, and a monitoring well will be installed down-gradient of the pit lakes for quarterly monitoring before tailings discharge commences to determine if impacts to water quality are occurring as a result of site operations.

Compliance Schedule

Part I.H.1 of the permit specifies deadlines and requirements for preparation of the following documents once the permit has been issued:

1. Accelerated Background Ground Water Monitoring Report. The Permittee shall conduct an accelerated background monitoring program by collecting at least eight samples from each monitoring location over a one-year period to determine background water quality and variability of the laboratory water quality parameters in the permit.

2. Sampling and Analysis Plan. Within 60 days of the effective date of the permit, the permittee must submit for Director review and approval a plan that describes objectives and procedures for the collection of compliance samples.

3. Pipeline Monitoring and Spill Prevention Plan. Within 90 days of the effective date of the permit, the permittee must submit for Director review and approval a plan that describes procedures for pipeline monitoring and spill prevention and response.

4. Ground Water Monitoring Plan. Prior to discharge of tailings, the Permittee must submit for Director review and approval a plan for ground water monitoring, including installation of up-gradient and down-gradient monitoring points.

5. Closure Plan. At least 1 year prior to closure, the Permittee must submit a Closure Plan for Director review and approval. The Closure Plan shall address facility demolition and site reclamation activities specific to ground water protection, as well as a plan and schedule for ongoing ground water monitoring after closure.

References

Thomas, Kevin, and Mike Lowe. 2007. *Recharge and Discharge Areas for the Principal Basin-Fill Aquifer, Beryl-Enterprise Area, Iron, Washington, and Beaver Counties, Utah*. Utah Geological Survey, Map 225. Utah Department of Natural Resources. ISBN 1-55791-770-1.

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