GROUND WATER DISCHARGE PERMIT RENEWAL
PERMIT NO. UGW450011
KIEWIT PROJECT
STATEMENT OF BASIS

Desert Hawk Gold Corporation
1290 Holcomb Ave.
Reno, NV 89502
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Mine Process Summary

Desert Hawk Gold Corporation (DHG) has constructed facilities to mine and process approximately 5,000 tons per day of gold and silver ore, 200 days annually, from three deposits having estimated reserves of 10,000,000 tons of ore. Ore is crushed and placed on a cyanide heap leach pad for recovery of gold and silver. Ore is hauled to a crusher then placed on the leach pad in lifts 10 to 20 feet high. Dilute sodium cyanide solution at high pH is sprinkled on the surface of the heap leach pad at rates of approximately 0.003 to 0.005 gallons/ft^2/day and the solution flows through the stacked ore to the leach pad liner. This solution then flows to the process water pond where it is pumped through a four stage carbon column, and other adsorption columns, stripped of dissolved metals and recycled. The facilities were built under a construction permit issued by the Division of Water Quality (DWQ) on January 30, 2014 and modified on April 8, 2014. Under the terms of the previous version of this permit, issued December 6, 2010, leaching began on September 12, 2014.

DHGC will also process up to 30,000 tons of ore mined from an offsite mine called the Trixie mine. The Trixie ore will be isolated and placed in separate containment to be processed on the heap leach pad. The ore will be in a fully contained system in the southeast corner of the existing leach pad using a 60 mil HDPE liner, and will include a five foot diameter carbon adsorption tank and a 10-HP pump. The Trixie ore is very low in total sulfur content. Upon completion of leaching the Trixie Ore, the area will be capped with a 40 mil HDPE cover and 24" minimum compacted clay before any Kiewit Ore will be leached over the top.

Hydrogeology

The Kiewit heap leach facility is located in the northern Deep Creek Mountains in the Gold Hill Mining District at an elevation of 5,800 feet. Annual precipitation at the mine site is approximately 10 inches. The geology of the District consists of complexly folded and faulted sedimentary rocks of Paleozoic age, intruded by igneous rocks of Jurassic and Tertiary age. Bedrock at the Kiewit leach pad site is Jurassic granodiorite which is in intrusive contact with the Carboniferous Oquirrh Formation a short distance to the southwest, and the Carboniferous Ochre Mountain Formation a short distance to the northeast. The Oquirrh Formation consists of interbedded limestone, dolomite, and sandstone and the Ochre Mountain Formation consists mostly of limestone. Contact metamorphism may be present at the intrusive contacts.

The leach facility site is located in an area covered with alluvium associated with Rodenhouse Wash, an ephemeral stream bed with rare water flows that occur during extreme weather events. The wash flows past the leach pad site about five miles to the northeast, where it discharges into the Great Salt Lake Desert salt flats. Two monitor wells were drilled at the toe of the leach pad. Well MW-1 was drilled to 50 feet and encountered bedrock at 3 feet. Well MW-2 was drilled to 100 feet and encountered bedrock at 4 feet. The driller's log reported the bedrock as "granite". Neither of these monitor wells encountered ground water. DHG's water supply well is located near the monitor wells, also downgradient of the leach pad facility, and was drilled to a total depth of 750 feet. Bedrock was encountered at 25 feet and reported as "granite" in the driller's log. Ground water was encountered at a depth of 328 feet. Mine exploration drill holes in the area encountered ground water at depths ranging from 350 to 400 feet below the surface.

Bedrock at the leach pad site is felsic intrusive igneous rock, described as "granite" in driller's logs. As such, it has very low primary porosity and permeability. Ground water encountered in the water supply well in the granitic bedrock is very likely contained in fractures within the rock. The thin layer of alluvium overlying the bedrock is likely significantly more permeable than the fractured bedrock.

Ground Water Quality

The closest site to the leach pad where ground water can be sampled is DHG's water supply well. This well is located at latitude 40° 6' 42.3714" North and longitude 113° 48' 26.8416" West, at a ground surface elevation of 5903.7'. The well has sand pack from 400' to 720' depth and is screened from 520' to 720'. Ground water at the site is classified as Class II Drinking Water Quality Ground Water.

Table 1. Background Water Quality in DHG water supply well

Parameter	Value in mg/1 unless otherwise noted
total dissolved solids	2366
conductivity	3697 µmhos/cm
pH	7.6 (units)
total cyanide	0.01[1]
nitrate + nitrite, as N	0.08[2]
antimony	<0.0025[1]
arsenic	<0.005[1]
barium	0.08
beryllium	0.0009[2]
cadmium	<0.0009[1]
copper	0.01[2]
lead	0.005[2]

mercury	<0.0002[1]
selenium	0.002[2]
silver	0.002[2]
thallium	<0.002[1]
zinc	3.13

1. Limit of Detection
2. Non-detects in background data assigned a value of (0.5 x detection limit) for calculation of background mean.

This well is located downgradient from the leach pad facility and from the driller's log appears to be completed in granitic rock.

Best Available Technology (BAT)

The primary means of assuring that discharges of contaminants to ground water are being prevented under this permit is containment technology, which has the capability of detecting leaks of leach solutions from the facility. The authorized heap leach facilities were constructed in accordance with the engineering design plans and specifications approved by the Construction Permit issued by the DWQ on October 26, 2010, with minor changes to the maximum slope and maximum height approved on January 30, 2014. The process area, process pond, and leach pad cover 19.5 acres and is entirely underlain by a composite liner system consisting of an 80-mil high density polyethylene (HDPE) synthetic liner underlain by a one-foot thick clay liner, sloped at a 1% grade to gravity drain to the process pond. Piping is installed under the HDPE liner of the leach pad at 200 foot intervals, and will conduct leakage to sumps on the north side of the pad. The greatest potential for leakage of process solutions is from the one acre process pond that will contain 100,000 gallons of solution during normal operations, but may have 16 to 19 feet of hydraulic head after a major precipitation event. Therefore, the process pond is underlain by a double liner system with leak detection, and leakage will gravity drain to a collection sump, which will be monitored daily.

Approved construction elements would include:

1. <u>Process Area, Process Pond,</u> (2) temporary secondary containment ponds, <u>and Leach Pad in four phases</u> A-D (Phase A is already constructed). Phase B will add 14.8 acres and one secondary pond, Phase C will add 23.4 acres and one secondary pond, and Phase D will add 8 acres. The final full buildout acreage of the heap leach pad will be 65.7 acres.

    a. Subgrade Preparation – the surface has been prepared by removing top soil and coarse aggregate.

    b. 12-inch thick Clay Subliner - the clay has been placed in to a thickness of at least 12 inches and compacted to 95% Modified Proctor Scale (ASTM 1557). At least ten (10) compaction tests were conducted during placement of the clay liner.

    c. 80-mil HDPE Primary Liner - an 80-mil HDPE synthetic liner has been installed immediately above the clay subliner across the entire operating area in accordance with the construction quality assurance/quality control (CQA/QC) manual approved by the Construction Permit.

d. Process Area Protective Fill Layer - a two-foot layer of one-inch minus crushed granodiorite fill has been placed over the 80-mil HDPE liner of the process area for protection during heap leach operations.

e. Leach Pad Protective Fill Layer - prior to placement of ore, the open HDPE liner of the heap leach pad was covered by a four-foot layer of one-inch minus crushed granodiorite fill to protect the liner from potential perforation and to provide a percolation base for the solutions draining from the heap.

f. Future Phases of the heap leach pad will include all elements listed in 1-5 and will require a Construction Permit. A compaction test (ASTM 1557) will be performed for every 200 ft x 200 ft area on the heap leach pad.

2. Process Pond Leak Detection System – the process pond is underlain by a leak detection system consisting of the following layers from bottom to top:

a. Clay Subliner - a clay subliner has been placed in to a thickness of at least 12 inches and compacted to 95% Modified Proctor Scale (ASTM 1557). At least ten (10) compaction tests were conducted during placement of the clay liner.

b. Secondary HDPE Liner - a 40-mil secondary HDPE liner has been installed on top of the clay subliner in accordance with the CQA/QC manual approved by the Construction Permit.

c. Drainage Layer - a 200-mil Geonet layer was installed on top of the 40-mil secondary HDPE liner to promote leakage through the primary HDPE liner to gravity drain to a leak collection sump.

d. Leak Detection Sump - a gravel filled leak detection sump has been constructed beneath the lowest section of the process pond between the primary and secondary HDPE liners. A sump pump and collection pipe will allow samples to be collected at the surface if any leakage is detected in the sump.

e. Primary HDPE Liner – an 80-mil HDPE synthetic liner was installed on top of the Geonet layer in accordance with the CQA/QC manual approved by the Construction Permit.

3. Temporary Secondary Ponds Construction – the temporary secondary ponds will be underlain by a leak detection system consisting of the following layers from bottom to top:

a. Clay Subliner - a clay subliner will be placed to a thickness of at least 12 inches and compacted to 95% Modified Proctor Scale (ASTM 1557). A compaction test will be performed for every 200 ft x 200 ft area on the temporary secondary containment ponds.

b. Secondary HDPE Liner - a 60-mil secondary HDPE liner will be installed on top of the clay subliner in accordance with the CQA/QC manual approved by the Construction Permit.

c. MW-3 is downgradient from the temporary secondary containment ponds and will be used to monitor any leakage.

4. Leach Pad Leak Detection System – 4-inch ADS piping was installed at 200-foot intervals beneath the HDPE liner of the leach pad to collect and convey potential leakage to leak detection sumps on the north side of the pad.
   a. Leach Pad Leak Detection System will also be installed for any future phases of the heap leach pad (B-D).

5. Perimeter Containment Berm – a three-foot containment berm has been placed around the outer edge of the pad liner, process facilities, and process pond to provide solution containment.
   a. a three-foot containment berm will be placed around the outer edge of the pad liner, process facilities, and process pond to provide solution containment as future heap leach pad phases are constructed.

BAT Performance Monitoring

Best available technology monitoring will include minimum vertical freeboard, maximum allowable leakage rate, and maximum allowable head monitoring. These performance standards are based on the precedence of previous ground water discharge permits and *Action Leakage Rates for Leak Detection Systems* (EPA, January 1992).

1. Minimum Vertical Freeboard – a minimum of two (2) feet of vertical freeboard shall be maintained to ensure total containment of the process pond.

2. Maximum Allowable Leakage Rate – based on a pond area of one acre, the maximum allowable leakage rate through the primary HDPE liner of the process water pond will be 200 gallons per day.

3. Maximum Allowable Head – the maximum head that will be allowed in the leak detection sump is one (1) foot. Any fluids collected in the leak detection sump will be removed and placed into the process pond.

Ground Water Monitoring

Following DWQ recommendations when this permit was first issued, the Permittee drilled two monitor wells as close as possible to the downgradient toe of the leach pad, to 50 feet and 100 feet. Granitic bedrock was encountered in these drill holes at depths of 3 and 4 feet respectively. The wells were screened at depths of 40-50 feet and 90-100 feet respectively. Neither well encountered ground water. DHG also drilled a water supply well to a depth of 750 feet, close to the monitor wells. DHG was also required by the BLM to drill a third monitoring well (MW-3 - 50' deep) downgradient of the heap leach pad in Roadenhouse Wash. This monitoring well will now be used to monitor leakage from the temporary secondary containment ponds which will be needed in future phases of construction of the heap leach pad.

Under these conditions, compliance with this permit shall be monitored by checking for the presence of leach fluid in the monitor wells, and by quarterly measurement of field parameters and semiannual analysis of laboratory parameters in the water supply well. Monitoring parameters were chosen to provide unambiguous evidence for leakage of process fluid from the permitted facilities.

Ground water samples from the water supply well and any water sampled from the monitor wells will be analyzed for:

- Field parameters: pH, temperature, specific conductance
- Laboratory parameters: total dissolved solids, total cyanide, and nitrate + nitrite as N, as specified in Part I.E.2.b.3) of the permit.

The Permittee shall also sample process water solutions quarterly according to Part I.E.3 of the permit, for comparison with ground water samples.

Compliance will be demonstrated by meeting ground water protection levels as defined in the permit at monitor wells, and no presence of process water solutions in leak detection sumps.

All water sampling for this permit shall be done according to the most recently-approved sampling and analysis plan.

Permit Application and Renewal Documents

The following documents are considered part of the ground water discharge permit application and will be kept as part of the administrative file.

1. Desert Hawk Gold Corporation, Utah Ground Water Discharge Permit Application, Kiewit Project, Tooele County, UT, September 15, 2010.

2. Report on the Clifton-Gold Hill Property, Gold Hill Mining District, Tooele County, Utah, USA for Dumont Nickel, Inc., June 30, 2003

3. Completeness Review Comments and Request for Information, Ground Water Discharge Permit Application, Kiewit Project, Letter from DWQ to Desert Hawk Gold Corp. dated August 11, 2010, document No. DWQ-2010-005403.

4. Construction Permit for the Kiewit Project, Tooele, Letter from DWQ to Desert Hawk Gold Corp. dated October 26, 2010, document No. DWQ-2010-007488.

5. Desert Hawk Gold Corporation, Monitor Well As-Built Report, Kiewit Mine Project, August 18, 2014, document No. DWQ-2014-010819

6. Desert Hawk Gold Corp., Compliance Monitoring Report dated August 1, 2014, containing Proposed Monitoring Plan, document No. DWQ-2014-011242

7. DWQ, Approval of Proposed Compliance Monitoring Plan, Permit No. UGW450011, dated August 29, 2014, document No. DWQ-2014-011241

8. Desert Hawk Gold Corp., Compliance Report, Third Quarter 2015, containing Compilation of Background Monitoring Data from Water Supply Well, document No. DWQ-2015-013301

DWQ-2021-021984