GROUND WATER DISCHARGE PERMIT UGW450011
KIEWIT PROJECT
STATEMENT OF BASIS

Desert Hawk Gold Corporation
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Mine Process Summary

Desert Hawk Gold Corporation proposes to mine approximately 5,000 tons per day of gold and silver ore, 200 days annually, from three deposits having estimated reserves of 2,300,000 tons of ore. Ore will be crushed and placed on a cyanide heap leach pad for recovery of gold and silver. Ore will be hauled to a crusher then placed on the leach pad in lifts 10 to 20 feet high. Dilute sodium cyanide solution at high pH will be sprinkled on the surface of the heap leach pad at rates of approximately 0.003 to 0.005 gallons/ft²/day and flow through the stacked ore to the leach pad liner. This solution will flow to the process water pond where it will be pumped through a four stage carbon column, stripped of dissolved metals and recycled.

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. The depth of the alluvium and depth to ground water at the leach pad site is unknown at present. Mine exploration drill holes in the area encountered ground water at depths ranging from 350 to 400 feet below the surface.
Ground Water Quality

There are currently no wells near the leach pad site that can be sampled to evaluate ground water quality. Table 1 provides background ground water quality data from a sample collected from a mine shaft located upgradient of the heap leach facility at latitude 40° 6.48' North and longitude 113° 48.47' West in Section 30, Township 8 South, Range 17 West, SLBM. This water sample may not be representative of the uppermost ground water underneath the leach pad site because it has been exposed to the atmosphere and evaporation. Based on this sample, ground water at the site may be classified as Class II Drinking Water Quality Ground Water.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Mine Shaft Water Sample (mg/l)</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH (units)</td>
<td>7.89</td>
</tr>
<tr>
<td>Bicarbonate (HCO₃⁻)</td>
<td>200</td>
</tr>
<tr>
<td>Alkalinity (as CaCO₃)</td>
<td>170</td>
</tr>
<tr>
<td>Chloride</td>
<td>1,200</td>
</tr>
<tr>
<td>Fluoride</td>
<td>&lt;0.5</td>
</tr>
<tr>
<td>Sulfate</td>
<td>230</td>
</tr>
<tr>
<td>Nitrate as N</td>
<td>not analyzed</td>
</tr>
<tr>
<td>Arsenic</td>
<td>0.015</td>
</tr>
<tr>
<td>Calcium</td>
<td>170</td>
</tr>
<tr>
<td>Copper</td>
<td>&lt;0.050</td>
</tr>
<tr>
<td>Magnesium</td>
<td>54</td>
</tr>
<tr>
<td>Manganese</td>
<td>&lt;0.005</td>
</tr>
<tr>
<td>Potassium</td>
<td>4.4</td>
</tr>
<tr>
<td>Sodium</td>
<td>530</td>
</tr>
<tr>
<td>Zinc</td>
<td>0.020</td>
</tr>
<tr>
<td>Total dissolved solids</td>
<td>2,400</td>
</tr>
</tbody>
</table>

Because ground water conditions under the leach pad site are unknown at this time, and ground water may not even be present within several hundred feet below the surface, ground water protection levels will not be established in this first version of the permit. The Permittee will be required to drill at least one monitor well at the site. If ground water is encountered at a depth where ground water monitoring would be useful to evaluate performance of the leach facility’s containment technology, background water quality and protection levels will be defined based on water samples from properly-constructed monitor wells.

Best Available Technology (BAT)

The primary means of assuring that discharges of contaminants to ground water are being prevented under this permit will be containment technology, which has the capability of detecting leaks of leach solutions from the facility. The authorized heap leach facilities will be constructed in accordance with the engineering design plans and specifications
approved by the Construction Permit issued by the Executive Secretary on October 26, 2010. The process area, process pond, and leach pad cover 19.5 acres and will be 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. 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 head after a major precipitation event. Therefore, the process pond will be 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 include:

1. **Process Area, Process Pond, and Leach Pad**
   a) **Subgrade Preparation** – the surface will be prepared by removing top soil and coarse aggregate.
   b) **12-inch thick Clay Subliner** - the clay will be 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 will be conducted during placement of the clay liner.
   c) **80-mil HDPE Primary Liner** - an 80-mil HDPE synthetic liner will be 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 will be 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 will be 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.

2. **Process Pond Leak Detection System** – the process pond 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 in to a thickness of at least 12 inches and compacted to 95% Modified Proctor Scale (ASTM 1557). At least ten (10) compaction tests will be conducted during placement of the clay liner.
b) Secondary HDPE Liner - a 40-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) Drainage Layer - a 200-mil Geonet layer 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 will be 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 will be installed on top of the Geonet layer in accordance with the CQA/QC manual approved by the Construction Permit.

3. Leach Pad Leak Detection System – 4-inch ADS piping will be 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.

4. Perimeter Containment Berm – 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.

**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

Under Part I.H.1 of the permit, within six months of permit issuance, the Permittee shall submit a Ground Water Monitoring Plan for approval by the Division of Water Quality (DWQ). This monitoring will be a supplement to BAT monitoring to make the demonstration that ground water pollution is not occurring due to facility operations. Because of uncertainties about ground water conditions at the leach facility site, it is not possible to specify details of this monitoring program at this time.

DWQ has recommended that the Permittee drill a monitor well located as close as possible to the downgradient toe of the leach pad, to the depth of the contact between the alluvium and bedrock. If ground water is present above the bedrock, the well should be screened in the uppermost saturated zone, and another similar well should be drilled upgradient of the leach facility. Under these conditions, both wells shall be sampled to define background ground water quality, and protection levels will be developed for the downgradient well. At least one sample must be taken from the downgradient well before any process solutions are generated or handled at the site. Quarterly monitoring will follow, with the downgradient well serving as a compliance monitoring point.

If no ground water is encountered above the bedrock, drilling and completing the well farther down into the bedrock would not be able to provide timely notice of BAT failure. In this case, the downgradient monitoring well should be screened at the alluvium/bedrock contact. Compliance with permit conditions will be evaluated by checking for the presence of leach solutions in the downgradient monitor well. The well will be checked for the presence of water according to a schedule proposed by the Permittee in the Ground Water Monitoring Plan. If water is present, the Permittee will sample it and analyze for parameters characteristic of leach solution.

This first version of the permit has been written to allow either of these options, depending upon ground water conditions.

Under either option, ground water samples will be analyzed for:

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

If ground water is present above the bedrock, the Permittee shall follow a schedule of accelerated monitoring after well completion, as specified in Part I.H.3 of the permit, to provide a statistically valid sample to define background water quality and protection levels.

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

