I. DESCRIPTION OF FACILITY

Barneys Canyon Mine operates a cyanide gold leaching facility west of Salt Lake City about two miles north of Copperton, Utah, on the east flank of the Oquirrh Mountains. Mining operations ceased in 2001, but ore on the heap leach pads is still being actively leached for gold recovery. Reclamation of the oxide waste rock dumps and the sulfide waste rock repositories were completed by the end of 2002. A small stockpile of sulfide ore also remains on site and is being used as a smelter flux material. The sulfide ore stockpile is covered with plastic liner to prevent infiltration of meteoric water. The stockpile contains less than 200,000 tons of material and covers less than 6 acres. The site is an east sloping alluvial apron at an elevation of about 5,500 feet and precipitation is light.

The leach pads, processing ponds, processing plant, pits, reclaimed waste rock dumps and ancillary facilities are operated under the concept that there is no intentional direct discharge to waters of the State. All process fluids are re-circulated to the distribution system atop the leach pads. Gold ore on the leach pad is leached with a high pH solution containing sodium cyanide (NaCN). The high pH is maintained by additions of sodium hydroxide (NaOH). Cyanide solution containing gold is collected at the base of the heap pad and piped to and stored in a pregnant pond. The solution is pumped from the pregnant pond to the processing plant where the gold is removed by a carbon adsorption process and the remaining solution flows by gravity to the barren ponds. Additional NaOH and cyanide are added to the solution stored in the barren ponds and pumped to the distribution system atop the heap pads. Additional water may be added at this point to make up for the water lost by evaporation.

A. DESCRIPTION OF LEACH SOLUTION

The leach solution generally contains less than 50 ppm of NaCN. The solution is pumped in pipes to the top of a leach pad where it is distributed at the rate of about 3 to 6 gallons per day per square foot for a total circulating flow of less than 3000 gpm. NaOH is used as necessary to maintain a pH greater than 10, in order to keep the NaCN in solution. The chemical composition of the process solutions varies as they move through different stages of the gold extraction process.
At all stages of the process, the solutions have high sulfate content, generally greater than 2,000 mg/l. Metals listed in Table 1 of the Ground Water Quality Protection Rules are present at low to moderate concentrations, generally below 20 mg/l.

B. DESCRIPTION OF PROCESS FLUID CONTROL TECHNOLOGY AND LEAK DETECTION SYSTEM

Each leach pad consists of several cells. The leach pad's vertical configuration starting at the top consists of several layers:

1. Three to five foot thick process solution collection system of fine grained ore, with a head of less than 12 inches.
2. 60 mil HDPE primary liner.
3. 12-inch minimum thickness secondary soil liner having a hydraulic conductivity of $1.0 \times 10^{-7}$ cm/sec or less.
4. Below the clay, a 6-inch leak detection media having a hydraulic conductivity of $1.0 \times 10^{-3}$ cm/sec or greater. At the bottom of the media, slotted sloping PVC leak detection pipes have been installed.
5. Six-inch minimum thickness engineered secondary soil liner having a hydraulic conductivity of $1.0 \times 10^{-6}$ cm/sec or less.

In the event of a break in the HDPE liner, and if fluids are able to migrate through the clay liners and the permeable medium, they will flow through the PVC pipe into sumps or ports where they will be detected. The pad or sections of the pads where the break occurred can then be shut down. A verified leak of process water beneath the pads constitutes a failure of the best available technology (BAT).

The leak detection system for the ponds built under the March 24, 1989 construction permit is as follows:

1. 60 mil HDPE primary line;
2. 1 pm per foot HDPE drainage net;
3. 8 oz. per square yard geotextile;
4. 12 inches of $1.0 \times 10^{-7}$ centimeters per second clay.
A verified leak of process water beneath the ponds constitutes a BAT failure.

The leak detection system for the pond built under the August 2, 1995 construction permit is as follows:

1. 60 mil HDPE liner;
2. drain net with a transmissivity of 10 gal/min/ft.;
3. 60 mil HDPE liner;
4. 12 inches of $1.0 \times 10^{-7}$ centimeters per second clay.

The allowable leakage rate of 200 gallons per acre per day is a BAT performance standard for this pond.

C. DESCRIPTION OF GEOLOGY

The 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. The site is, therefore, part of the recharge area for the aquifers in the Salt Lake Valley. A production well (BC-280) for the site yields about 280 to 300 gallons per minute.

II. CLASSIFICATION OF GROUND WATER

Based on monitoring done for the permit to date, ground water in the mine area is classified as Class II Drinking Water Quality. On the basis of sampling done 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 at the site 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.
III. PERMIT CONDITIONS

A. To maintain compliance with ground water protection levels, best available treatment technology is used. This requires no discharge of process fluids from the facility to ground water. Well 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 process fluids in leak detection sumps of pads and ponds.

A closure document shall be submitted for review and approval twelve (12) months prior to the end of the operational term of any heap leach pads in the project. The heap leach pads are estimated to have approximately one to five years of available leaching life remaining, depending on economic conditions. **In no case shall the closure criteria for this heap leach project result in exceedance of ground water compliance levels for this site or degradation of beneficial uses of ground or surface water in the vicinity.**

Leach pads must be reclaimed in such a way that ground water pollution is prevented. Any ore heap closure scenario that envisions the release of contact water to the environment will require that the approved water quality criteria be met for three consecutive monthly samples before contact water release can occur. The sampling procedure must be submitted in the closure plan for review and approval.

B. Leak Detection System-Monitoring

All leak detection sumps, pipes and ponds are to be monitored daily during use of the heap leach pads to demonstrate that best available technology performance is maintained. In the event that a verified leak is detected beneath the pads or ponds, it is to be reported by telephone within 24 hours and in writing within 5 days to the Division of Water Quality (DWQ).

C. New Construction

A construction permit must be obtained from DWQ for construction of any new facilities which may cause a discharge of pollutants to waters of the state, or modification of any existing permitted facilities. Such construction may also require modification of this permit.
D. Ground Water Compliance Monitoring

Upgradient monitoring wells BCG-280 and BCG-281 are to be sampled twice yearly and the downgradient wells quarterly. Ground water protection levels described in the permit will be used to make any determinations of possible out of compliance. Ground water quality data are to be collected and reported to the DWQ on a quarterly basis. In the event that a compliance level is exceeded, corrective and remedial action will be determined by the company and DWQ. As a result of detection of cyanide in monitor well BCG-848, the permittee conducted an investigation which involved drilling four new monitoring wells. These wells will be included in this renewed permit as points of compliance.

Under the renewed permit, monitoring will be for parameters which are indicative of a release of process waters. These parameters include major ions, which are present in different proportions in the ground water as compared to the process solutions; 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 high concentrations in the process water solutions. Most of these parameters are highly mobile in ground water and should result in early detection of a release of process waters. If monitoring for these parameters reveals leakage from the mine 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.

E. Mine Pit Water

Water from mine pits at this site, after primary sediment treatment, may be piped to the Copperton concentrator for use. Other use or disposal will require approval from DWQ.