STATE OF UTAH

DIVISION OF WATER QUALITY
DEPARTMENT OF ENVIONMENTAL QUALITY
P.O. BOX 144870
SALT LAKE CITY, UTAH 84116-0690

Ground Water Discharge Permit
Permit No. UGW450002

In compliance with the provision of the Utah Water Quality Act, Title 19, Chapter 5, Utah Code Annotated 1953, the Act, as amended,

Barrick Resources (USA) Inc.
Mercur Mine Reclamation Project
310 South Main St., Suite 1150
Salt Lake City, UT 84101

is granted a Ground Water Quality Discharge Permit for the Mercur Mine Reclamation Project located at latitude 40º 20’ 00” North, longitude 112º 12’ 30” West in accordance with conditions set forth herein.

This modified Ground Water Quality Discharge Permit amends and supersedes all other Ground Water Discharge permits for this facility issued previously.

Specifically, this Ground Water Quality Discharge Permit incorporates all provisions of UGW450001, and references Stipulation and Consent Order GW-90-030A.

This permit renewal shall become effective on March 15, 2024.

This permit and the authorization to operate shall expire at midnight, March 15, 2029.

Signed this fifteenth day of March 2024

John K. Mackey

John K. Mackey, P.E.
Director
Utah Division of Water Quality

Contents

This page intentionally left blank.

I. SPECIFIC CONDITIONS

A. Ground Water Classification

Based on ground water data submitted by the Permittee, ground water at the Mercur site is generally defined as class II, with the exception of the aquifers near monitoring wells MW-9 at Valley Fill Leach Area 2 (VFL2) and MW-17 at the tailings impoundment that are defined as Class 1A.

B. Background Ground Water Quality

Background for Monitoring Wells – Based on the chemical characteristics of samples taken from monitoring wells MW-1, MW-2, MW-9, MW-10, MW-11, MW-13, MW-15, MW-16, MW-17, MW-18 and MW-19, background ground water quality is defined in Table 1.

C. Ground Water Protection Levels

1. Protection Levels for existing Wells – Ground water quality at monitoring wells MW-1, MW-2, MW-9, MW-10, MW-11, MW-13, MW-15, MW-16, MW-17, MW-18 and MW-19 shall not exceed the ground water protection levels defined in Table 1.

2. Compliance Determination Method – Compliance with ground water protection levels shall be evaluated in eleven compliance monitoring wells. If future monitoring data indicate an exceedance of protection levels, compliance status will be determined in accordance with R317-6.6.16 including, if necessary, reference to methods described in the EPA Interim final Guidance documents entitled “Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities - Unified Guidance”, dated March 2009. Subsequent updates of this document shall be utilized as available and appropriate.

TABLE 1: Ground Water Background Concentrations and Protection Levels

Parameter	Method Detection Limit (mg/L)	Ground Water Quality Standard (mg/L)	MW-1			MW-2			MW-9		
			Background Level (mg/L)		Protection Level (mg/L)	Background Level (mg/L)		Protection Level (mg/L)	Background Level (mg/L)		Protection Level (mg/L)
			Mean	stddev		Mean	stddev		mean	stddev	
pH (units)	n/a	6.5-8.5	8.08	n/a	6.5-8.5	7.98	n/a	6.5-8.5	7.40	n/a	6.5-8.5
Arsenic	0.01	0.05	ND	n/a	0.013 [b]	ND	n/a	0.013 [b]	ND	n/a	0.01 [b]
Barium	0.01	2.0	0.064	0.039	0.5 [b]	0.037	0.047	0.5 [b]	0.016	0.011	0.5 [b]
Cadmium	0.002	0.005	ND	n/a	0.002 [c]	ND	n/a	0.002 [c]	ND	n/a	0.002 [c]
Chromium	0.01	0.1	ND	n/a	0.025 [b]	ND	n/a	0.025 [b]	ND	n/a	0.01 [b]
Copper	0.01	1.3	0.041	n/a	0.33 [b]	0.041	n/a	0.33 [b]	ND	n/a	0.13 [b]
Lead	0.005	0.015	ND	n/a	0.005 [c]	ND	n/a	0.005 [c]	ND	n/a	0.005 [c]
Mercury	0.0002	0.002	ND	n/a	0.0005 [b]	ND	n/a	0.0005 [b]	ND	n/a	0.0002 [c]
Nickel	0.01	0.1	ND	n/a	0.025 [b]	ND	n/a	0.025 [b]	ND	n/a	0.01
Selenium	0.002	0.05	ND	n/a	0.013 [b]	ND	n/a	0.013 [b]	ND	n/a	0.005
Silver	0.01	0.1	ND	n/a	0.025 [b]	ND	n/a	0.025 [b]	ND	n/a	0.01
Thallium	0.001	0.002	ND	n/a	0.001 [c]	ND	n/a	0.001 [c]	ND	n/a	0.001 [c]
Zinc	0.01	5.0	0.051	n/a	1.25 [b]	0.031	n/a	1.25 [b]	0.020	n/a	0.5 [b]
Cyanide-free	0.002	0.2	ND	n/a	0.05 [b]	ND	n/a	0.05 [b]	ND	n/a	0.02 [b]
Fluoride	0.1	4.0	1.94	0.15	2.43 [a]	0.96	0.11	1.20 [a]	0.71	0.06	1.0 [b]
Nitrate-N	0.02	10.0	0.049	0.128	2.5 [b]	0.055	0.195	2.5 [b]	0.15	n/a	1.0 [b]
Nitrite-N	0.005	1.0	0.011	n/a	0.25 [b]	0.012	n/a	0.25 [b]	0.006	n/a	0.1 [b]
Sulfate	5.0	n/a	60.5	42.7	Monitoring only	199.2	22.4	Monitoring only	87	22	Monitoring only
TDS	5.0	3000	516	19	645 [a]	905	108	1131 [a]	469	54	586 [a]

a Protection Level established based on 1.X times the mean background concentration, where X = 0.25, except for MW-9 and MW-17 where X = 0.10.
b Protection Level established based on 0.X times the Ground Water Quality Standard, where X = 0.25 except for MW-9 and MW-17 where X = 0.10 if non-detects predominant in background.
c Protection Level was set at the method detection limit.
d Protection Level based on the mean plus 2 standard deviations.
n/a Not applicable because the background data set was greater than 50% non-detect; therefore standard deviation not applicable.
ND Non-detect; analytical result below the method detection limit.
stddev Standard deviation

TABLE 1 (Continued): Ground Water Background Concentrations and Protection Levels

Parameter	Method Detection Limit (mg/L)	Ground Water Quality Standard (mg/L)	MW-10			MW-11			MW-13		
			Background Level (mg/L)		Protection Level (mg/L)	Background Level (mg/L)		Protection Level (mg/L)	Background Level (mg/L)		Protection Level (mg/L)
			Mean	stddev		Mean	stddev		mean	stddev	
pH (units)	n/a	6.5-8.5	7.55	n/a	6.5-8.5	7.83	n/a	6.5-8.5	7.45	n/a	6.5-8.5
Arsenic	01	0.05	ND	n/a	0.013 [b]	ND	n/a	0.013 [b]	ND	n/a	0.013 [b]
Barium	0.01	2.0	0.041	0.037	0.5 [b]	0.041	0.037	0.5 [b]	0.076	0.032	0.5 [b]
Cadmium	0.002	0.005	ND	n/a	0.002 [c]	ND	n/a	0.002 [c]	ND	n/a	0.002 [c]
Chromium	0.01	0.1	ND	n/a	0.025 [b]	ND	n/a	0.025 [b]	ND	n/a	0.025 [b]
Copper	0.01	1.3	0.0441	n/a	0.325 [b]	0.032	n/a	0.325 [b]	ND	n/a	0.325 [b]
Lead	0.005	0.015	ND	n/a	0.005 [c]	ND	n/a	0.005 [c]	ND	n/a	0.005 [c]
Mercury	0.0002	0.002	ND	n/a	0.0005 [b]	ND	n/a	0.0005 [b]	ND	n/a	0.0005 [b]
Nickel	0.01	0.1	0.026	0.025	0.076 [d]	0.011	0.021	0.053 [d] a	ND	n/a	0.025 [b]
Selenium	0.002	0.05	ND	n/a	0.013 [b]	ND	n/a	0.013 [b]	ND	n/a	0.013 [b]
Silver	0.01	0.1	ND	n/a	0.025 [b]	ND	n/a	0.025 [b]	ND	n/a	0.025 [b]
Thallium	0.001	0.002	ND	n/a	0.001 [c]	ND	n/a	0.001 [c]	ND	n/a	0.001 [c]
Zinc	0.01	5.0	0.118	0.045	1.25 [b]	0.039	0.030	1.25 [b]	0.025	n/a	1.25 [b]
Cyanide-free	0.002	0.2	ND	n/a	0.05 [b]	ND	n/a	0.05 [b]	ND	n/a	0.05 [b]
Fluoride	0.1	4.0	0.787	0.167	1.12 [d]	0.671	0.076	1.0 [b]	0.500	0.089	1.0 [b]
Nitrate-N	0.02	10.0	0.074	0.114	2.5 [b]	0.952	0.535n/a	2.5 [b]	0.197	n/a	2.5 [b]
Nitrite-N	0.005	1.0	0.009	0.005	0.25 [b]	0.012	0.007	0.25 [b]	0.007	0.005	0.25 [b]
Sulfate	5.0	n/a	339	50	Monitoring only	126	39	Monitoring only	308	28	Monitoring only
TDS	5.0	3000	1106	76	1383 [a]	618	37	773 [a]	2124	220	2655 [a*]

a Protection Level established based on 1.X times the mean background concentration, where X = 0.25, except for MW-9 and MW-17 where X = 0.10
b Protection Level established based on 0.X times the Ground Water Quality Standard, where X = 0.25 except for MW-9 and MW-17 where X = 0.10 if non-detects predominant in background.
c Protection Level was set at the method detection limit.
d Protection Level based on the mean plus 2 standard deviations.
n/a Not applicable because the background data set was greater than 50% ND; therefore standard deviation not applicable.
ND Non-detect; analytical result below the method detection limit.
stddev Standard deviation

TABLE 1 (Continued): Ground Water Background Concentrations and Protection Levels

Parameter	Method Detection Limit (mg/L)	Ground Water Quality Standard (mg/L)	MW-15			MW-16			MW-17		
			Background Level (mg/L)		Protection Level (mg/L)	Background Level (mg/L)		Protection Level (mg/L)	Background Level (mg/L)		Protection Level (mg/L)
			Mean	stddev		Mean	stddev		mean	stddev	
pH (units)	n/a	6.5-8.5	7.70	n/a	6.5-8.5	7.44	n/a	6.5-8.5	7.82	n/a	6.5-8.5
Arsenic	0.01	0.05	ND	n/a	0.013[b]	ND	n/a	0.013[b]	ND	n/a	0.01[c]
Barium	0.01	2.0	0.070	0.019	0.5[b]	0.053	0.007	0.5[b]	0.038	0.046	05[b]
Cadmium	0.002	0.005	ND	n/a	0.002[c]	ND	n/a	0.002[c]	ND	n/a	0.002[c]
Chromium	0.01	0.1	ND	n/a	0.025[b]	ND	n/a	0.025[b]	ND	n/a	0.01[b]
Copper	0.01	1.3	ND	n/a	0.33[b]	ND	n/a	0.33[b]	ND	n/a	0.13[b]
Lead	0.005	0.015	ND	n/a	0.005[c]	ND	n/a	0.005[c]	ND	n/a	0.005[c]
Mercury	0.0002	0.002	ND	n/a	0.0005[b]	ND	n/a	0.0005[b]	ND	n/a	0.0002[c]
Nickel	0.01	0.1	ND	n/a	0.025[b]	ND	n/a	0.025[b]	ND	n/a	0.01[bc]
Selenium	0.002	0.05	ND	n/a	0.013[b]	ND	n/a	0.013[b]	ND	n/a	0.005[b]
Silver	0.01	0.1	ND	n/a	0.025[b]	ND	n/a	0.025[b]	ND	n/a	0.01[bc]
Thallium	0.001	0.002	ND	n/a	0.001[c]	ND	n/a	0.001[c]	ND	n/a	0.001[c]
Zinc	0.01	5.0	0.019	n/a	1.25[b]	0.024	n/a	1.25[b]	0.078	n/a	0.5[b]
Cyanide-free	0.002	0.2	ND	n/a	0.05[b]	ND	n/a	0.05[b]	ND	n/a	0.02[b]
Fluoride	0.1	4.0	0.31	0.07	1.0[b]	0.26	0.08	1.0[b]	0.15	0.02	0.1.0[b]
Nitrate-N	0.02	10.0	0.110	0.223	2.5[b]	1.11	0.46	2.5[b]	0.47	0.33	2.5[b]
Nitrite-N	0.005	1.0	0.009	0.006	0.25[b]	0.011	0.005	0.25[b]	0.007	n/a	0.1[b]
Sulfate	5.0	n/a	235	22	Monitoring only	306	28	Monitoring only	34	11	Monitoring only
TDS	5.0	3000	995	54	1244[a]	883	62	1104[a]	345	30	431

a Protection Level established based on 1.X times the mean background concentration, where X = 0.25, except for MW-9 and MW-17 where X = 0.10.
b Protection Level established based on 0.X times the Ground Water Quality Standard, where X = 0.25 except for MW-9 and MW-17 where X = 0.10 if non-detects predominant in background.
c Protection Level was set at the method detection limit.
d Protection Level based on the mean plus 2 standard deviations.
n/a Not applicable because the background data set was greater than 50% non-detect; therefore standard deviation not applicable.
ND Non-detect; analytical result below the method detection limit.
stddev Standard deviation

TABLE 1 (Continued): Ground Water Background Concentrations and Protection Levels

Parameter	Method Detection Limit (mg/L)	Ground Water Quality Standard (mg/L)	MW-18			MW-19		
			Background Level (mg/L)		Protection Level (mg/L)	Background Level (mg/L)		Protection Level (mg/L)
			Mean	stddev		Mean	stddev	
pH (units)	n/a	6.5-8.5	7.37	n/a	6.5-8.5	7.42	n/a	6.5-8.5
Arsenic	0.01	0.05	ND	n/a	0.013 [b]	ND	n/a	0.013 [b]
Barium	0.01	2.0	0.066	0.058	0.5 [b]	0.027	.011	0.5 [b]
Cadmium	0.002	0.005	ND	n/a	0.002 [c]	ND	n/a	0.002 [c]
Chromium	0.01	0.1	ND	n/a	0.025 [b]	ND	n/a	0.025 [b]
Copper	0.01	1.3	ND	n/a	0.33 [b]	ND	n/a	0.325 [b]
Lead	0.005	0.015	ND	n/a	0.005 [c]	ND	n/a	0.005 [c]
Mercury	0.0002	0.002	ND	n/a	0.0005 [b]	ND	n/a	0.0005 [b]
Nickel	0.01	0.1	ND	n/a	0.025 [b]	ND	n/a	0.025 [b]
Selenium	0.002	0.05	ND	n/a	0.013 [b]	ND	n/a	0.013 [b]
Silver	0.01	0.1	ND	n/a	0.025 [b]	ND	n/a	0.025 [b]
Thallium	0.001	0.002	<0.01	n/a	0.001 [b]	ND	n/a	0.001 [c]
Zinc	0.01	5.0	0.058	n/a	1.25 [b]	0.013	0.024	1.25 [b]
Cyanide-free	0.002	0.2	ND	n/a	0.05 [b]	ND	n/a	0.05 [b]
Fluoride	0.1	4.0	0.17	0.07	1.0 [b]	1.10	0.03	1.38 [a]
Nitrate-N	0.02	10.0	0.52	0.19	2.5 [b]	0.034	0.047	2.5 [b]
Nitrite-N	0.005	1.0	0.006	n/a	0.25 [b]	0.006	n/a	0.25 [b]
Sulfate	5.0	n/a	183	13	Monitoring only	276	10	Monitoring only
TDS	5.0	3000	654	78	818 [a]	901	50	1128 [a]

a	Protection Level established based on 1.X times the mean background concentration, where X = 0.25, except for MW-9 and MW-17 where X = 0.10.
b	Protection Level established based on 0.X times the Ground Water Quality Standard, where X = 0.25 except for MW-9 and MW-17 where X = 0.10 if non-detects predominant in background.
c	Protection Level was set at the method detection limit.
d	Protection Level based on the mean plus 2 standard deviations.
n/a	Not applicable because the background data set was greater than 50% non-detect; therefore standard deviation not applicable.
ND	Non-detect; analytical result below the method detection limit.
stddev	Standard deviation

D. Valley Fill Leach Area No. 3 (VFL3) Post-Closure Requirements

1. No Discharge Technology – the Valley Fill Leach Area No. 3 facility, as constructed, incorporates no-discharge technology through the use of a composite liner consisting of a synthetic flexible membrane/clay/synthetic flexible membrane liner system. The reclamation cover design meets BAT. Barrick will monitor the head of the neutralized wastewater through the term of the permit.

2. Spill Containment – Barrick shall design, maintain and construct all pipelines from the Valley Fill Leach Area 3 facility that shall:

   a. Minimize, to the extent possible, any spills or leakage from the pipeline from coming into contact with the ground surface or ground water.
   b. Convey, to the extent possible all spills or leakage to the East Bay, Valley Fill Leach No. 3 or other containment mechanisms approved by the Director (formerly Executive Secretary). Affected structures include any associated piping, valves, pumps or other ancillary equipment. The design and construction of the spill containment systems shall be maintained to meet the requirements of the Construction Permit issued July 13, 1990, by the Director.

3. Valley Fill Leach No. 3 Permanent Closure Plan – The Approved Final Closure Plan is an enforceable appendix to this permit. It is designated as Appendix B to this permit.

E. Valley Fill Leach Area No. 2 Post-Closure Compliance Requirements

1. Ground Water Monitoring – Barrick is required to continue ground water quality monitoring of existing monitoring well MW-9 at VFL2 on a semiannual basis in accordance with the post-closure monitoring plan, attached as Appendix C to this permit. Ground water sampling must include all the chemical parameters, methods, and procedures required by the QA/QC plan contained in Appendix A to this permit. Barrick shall submit the results of semiannual monitoring to the Director in accordance with the compliance monitoring schedule shown in Table 2.

2. Post Closure Monitoring – The approved plans and specifications for the recontouring and covering of Valley Fill Leach No. 2 approved on May 30, 1995 by the Director is subject to the following conditions:

   a. Barrick will maintain the vegetated cover in accordance with the approved Final Closure Plan and compliance schedule for post-closure monitoring attached as Appendix C, and methods and standards approved by the DOGM.
   b. Barrick intends to grout the leakage collection pipe closed, and reclaim the leakage collection system area. Barrick completed the required 5-year post-closure monitoring the leakage collection system in April 2001 and installed drillouts through the liner to provide free draining

infiltrated water. Barrick demonstrated that post-closure monitoring results met previous modeled predictions for the system. The Valley Fill Leach No. 2 leakage collection system shall not be removed without the written consent of the Director.

F. Tailings Wastewater Treatment Discharge

1. Authorized Discharge – During the term of this permit the Permittee is authorized to store, detain and recover storm water runoff from the area immediately surrounding and naturally draining into and from the tailings impoundment and to receive draindown quantities of water pumped from Valley Fill Leach Area 3. If spills of unauthorized chemicals, fuels or other materials enter the tailings impoundment the Permittee shall notify the Director within 24 hours and provide written notification within 5 business days, in accordance with the requirements of Part II.I. Incidental seepage emanating from the reclaim cell and the saddle seep area formerly collected in the saddle seepage pond in Manning Canyon will be piped to VFL2.

2. East Bay – The lined facility has a capacity of approximately 70 million gallons. The pond is designed and authorized to receive wastewater from the tailings impoundment and Valley Fill 3 draindown in order to accelerate dewatering and drying of the tailings surface during final closure and reclamation of the facility. Barrick will eliminate the east bay through water treatment and will discharge the treated water in accordance with work plans developed by Barrick and approved by the Director. Treated waters from the east bay will be discharged to the Golden Gate basin under this permit as approved by the Director. Once the treated east bay water has been drained to the Golden Gate Basin, the East Bay basin will be backfilled and regraded in accordance with the approved final design plans and specifications for final reclamation of the east bay and the tailings impoundment.

3. Lined Chimney Drain Ponds – A regular inspection shall be made of the fluid levels in the chimney drain storage pond and overflow pond. If at any time the fluid levels exceed 1/3 the capacity of either of these ponds, as determined by visual observation, the fluids contained therein shall be pumped into a tank and transported to the East Bay. Alternatively, if analytical results show that water quality meets groundwater quality standards water may be discharged to the Golden Gate Basin. Removal of the water from the chimney drain storage pond shall continue until the ponds are as empty as practicable.

4. Spill Containment – Barrick shall utilize best management practices intended to prevent and contain spills from occurring from any of the following structures:

   a. Pipelines between Valley Fill Leach Area No. 3 and the tailings impoundment.
   b. Tailings impoundment.
   c. Pipelines conveying tailings waters constructed during the term of this permit. The practices shall conform to the following criteria:

1) Minimize, to the extent possible, spills of untreated tailings wastewater, leakage or overflow from contact with unlined ground surfaces, ground water or surface water runoff conveyance systems (ditches, streams, etc.).
2) Convey, to the extent possible, all spills or leakage to the tailings impoundment East Bay, or new containment mechanisms or treatment facilities approved by the Director.

5. Cover design and placement will be in accordance with the final closure plan document and according to the design and methods approved in the 1999 Construction Permit approved by the Division of Water Quality.

6. Incidental Flow Management – Incidental flows are currently managed in the East Bay. Incidental flows from mine draindown will be treated for arsenic and nitrate reduction and discharged to the Golden Gate Basin, as approved in writing by the Director.

G. Compliance Monitoring Requirements

1. Quality Assurance Project Plan – All water quality monitoring to be conducted under this permit shall be in accordance with the general requirements, hereunder, and the specific requirements of quality Assurance Project Plan, dated June 2012, amended and attached as Appendix A to this permit.

2. Compliance Monitoring Wells – The Permittee has installed six monitoring wells at the tailings impoundment, four wells at Valley Fill Leach Area No. 3, and one well at Valley Fill Leach Area No. 2. All eleven wells will be used as compliance monitoring points through the life of the permit unless modified by the Director. Barrick shall maintain its current ground water monitoring well network in compliance with the requirements of this permit. The locations of these wells are described below.

   a. Compliance Monitoring Well MW-1-NE/4 of SE/4 of NE/4 of section 5, T.6 S. R. 3 W 150 ft. west, 1470 ft. south of NE corner.

   b. Compliance Monitoring Well MW-2 - NE/4 of SE/4 of NE/4 of section 5, T. 6 S. R. 3 W. 170 ft. west, 1670 ft. south of NE corner.

   c. Compliance Monitoring Well MW-9 – SE/4 of SE/4 of section 5, T. 5 S. R.3 W 4400 ft. west, 100 ft. north of SW corner.

   d. Compliance Monitoring Well MW-10 – SW/4 of SW/4 of SW/4 of section 32, T. 5 S. R. 3 W 50 ft. north, 810 ft. west of SW corner.

   e. Compliance Monitoring Well MW-11 – NW/4 of SW/4 of SW/4 of section 32, T. 5 S. R. 3 W 700 ft. north, 310 ft. east of SW corner.

f. Compliance Monitoring Well MW-13 – NW/4 of NW/4 of NW/4 of section 5, T. 6 S. R. 3 W 740 ft. east, 480 ft. south of NW corner.

g. Compliance Monitoring Well MW-15 – SE/4 of SW/4 of SE/4 of section 32, T. 5 S. R. 3 W. 1750 ft. west, 140 ft. north of SE corner.

h. Compliance Monitoring Well MW-16 – NE/4 of NE/4 of NE/4 of section 5, T. 6 S. R. 3 W. 410 ft. west, 40 ft. south of NE corner.

i. Compliance Monitoring Well MW-17 – State plane coordinates 728,844.51 N., 1,807,822.13 W.

j. Compliance Monitoring Well MW-18 – State plane coordinates 729,671.55 N., 1,806,786.28 W.

k. Compliance Monitoring Well MW-19 – NE/4 of NW/4 of NW/4 of section 5, T. 6 S. R. 3 W 240 ft. south, 700 ft. east of NW corner.

3. Future Modification of the Monitoring Well Network – if at any time the Director determines the monitoring well network to be inadequate, Barrick shall submit within 30 days of receipt of notification, a response to the Director letter, and if necessary, a plan and compliance schedule to modify the monitoring well network. Any required monitoring well construction shall conform to the criteria found in the EPA RCRA Ground Water Monitoring Technical Enforcement Guidance Document, 1986 OSWER-9950.1 (RCRA TEGD). Subsequent updates to this document shall be utilized as available and appropriate.

4. Compliance Monitoring Period – Monitoring commenced upon the completion of the monitoring systems required by this permit, and shall continue through the life of the permit.

5. Protection of Monitoring Well Network – All compliance monitoring wells must be protected from damage due to surface vehicular traffic or other dangers or contamination due to surface spills. They shall be maintained in full operational condition for the life of this permit, unless otherwise authorized by the Director. Any well that becomes damaged beyond repair or is rendered unusable for any reason will be replaced by the Permittee within 90 days or as directed by the Director.

6. Barrick shall notify and request approval from the Director in writing of any planned well abandonment or modification. Well abandonment shall comply with State Engineer regulations.

7. Ground Water Quality Monitoring Requirements:

a. Ground Water Level Measurements – Ground water level measurements shall be made in each monitoring well prior to any collection of ground water samples. These measurements will be made from a permanent single reference point clearly demarcated on the top of the well or surface casing. Measurements will be made to the nearest 0.01 foot.

b. Ground Water Monitoring Frequency – Groundwater measurements and analysis shall be conducted on a semi-annual basis for all eleven monitoring wells. Semi-annual monitoring will be conducted during the first and third quarters during odd numbered years and during the second and fourth quarters during even numbered years. Monitoring will be reported to the Director as per the requirements stipulated in Part I.I.1.

c. Ground Water Quality Sampling – grab samples of ground water from all compliance monitoring wells will be collected for chemical analysis, in conformance with the Quality Assurance Project Plan that has been approved by the Director, Part I.J.1.

1) Analysis by Certified laboratories – analysis of any ground water sample shall be performed by laboratories certified by the State Health Laboratory.

2) Ground Water Analytical Methods – methods used to analyze ground water samples must comply with the following:

a) All methods cited in UAC R317-6-6. L, and

b) Have detection limits which are less than or equal to the ground water protection levels found in Part I C, Table 1. In the case of cadmium, cyanide (total) and nickel, the detection limits shall be less than or equal to 0.002 mg/l, 0.02 mg/l and 0.015 mg/l respectively.

3) Analysis Parameters – the following analyses shall be conducted on all ground water samples collected:

a) Field parameters – pH, temperature, and specific conductance

b) Laboratory Parameters – including:

(i) Major Anions and Cations: including chloride, sulfate, carbonate, bicarbonate, sodium, potassium, magnesium and calcium.

(ii) Protection Level Parameters – found in Table 1 of Part IC, above.

(iii) Weak Acid Dissociable Cyanide (iv) Cyanide

Amenable to Chlorination

(v) Cyanide Degradation Products including: ammonia, nitrate and nitrite.

H. Non-Compliance Status

1. Probable Out of Compliance Based on Exceedance of Ground Water Protection Limits

Barrick shall evaluate the results of each round of ground water sampling and analysis to determine any exceedance of the ground water protection levels found in Table 1. Upon determination by Barrick that the data indicate a ground water protection level may have been exceeded at any downgradient compliance monitoring well, Barrick shall:

a. Immediately resample the monitoring wells(s) found to be in probable out- of compliance, for protection level parameters that have been exceeded. Submit the analytical results thereof, and notify the Director of the probable out of compliance status within 30 days of the determination of probable out of compliance.

b. Immediately implement an accelerated schedule of <u>monthly</u> ground water sampling and analysis, consistent with the requirements of Section 5.0 in Appendix A. This monthly sampling will continue for at least two additional months for a total of three samples including the original compliance sample or until the compliance status can be determined by the Director. Reports of the results of this sampling will be submitted to the Director as soon as they are available, but not later than 30 days from each date of sampling.

2. Out of Compliance Status Based on Confirmed Exceedance of Permit Ground Water Protection Limits.

a. Out of Compliance Status shall be defined as follows:

1) For parameters that have been defined as detectable in the background and for which protection levels have been established based on 1.25 times the mean background concentration, out of compliance shall be determined by the use of control charts for intra-well comparisons in accordance with and EPA Interim Final Guidance Documents entitled “Statistical Analysis of Ground Water Monitoring Data at RCRA Facilities”, dated February, 1989 and July, 1992 draft addendum to the Interim Final Guidance. Any other compliance monitoring or statistical method used by Barrick must receive prior approval from Director.

2) For parameters that have been defined as detectable in the background and for which protection levels have been established based on 0.25 times the ground water quality

standard, out of compliance shall be defined as 3 consecutive samples exceeding the protection level and the mean background concentration by two standard deviations.

3) For parameters that have background data sets between 50-85% non-detectable analyses, out-of-compliance shall be defined as 3 consecutive samples from a compliance monitoring point exceeding the established protection level.

4) For parameters that have been defined non-detectable in the background and for which protection limits have been determined based on 0.25 times the ground water quality standard or the limit of detection out-of-compliance shall be defined as 3 consecutive samples from a compliance monitoring point exceeding the established protection limit.

b. Notification and Accelerated Monitoring – upon determination by the Permittee or the Director, in accordance with UAC R317-6-6.17, that an out-of compliance status exists, the Permittee shall:

1) Verbally notify the Director of the out-of compliance status or acknowledge Director notice that such a status exists within 24 hours of determination.

2) Provide an assessment of the extent of the ground water contamination and any potential dispersion.

3) Evaluate potential remedial actions to restore and maintain ground water quality standards such that protection levels will not be exceeded at the compliance monitoring wells.

I. Reporting Requirements

1. Ground Water Monitoring Report:

a. Schedule – The sampling and analysis required in Part I, G 6, above, shall be reported according to Table 2, below.

Table 2 Compliance Monitoring Reporting Schedule

Semi-Annual Period	Report Due On
First	July 15
Second	January 15

b. Sampling and Analysis Report – will include:

1) Field Data Sheets – or copies thereof, including the field measurements, required in Part I G.7.a, above, and other

pertinent field data, such as: well name/number, date and time, names of sampling crew, type of sampling pump or bail, measured casing volume, volume of water purged before sampling.

2) Results of Ground Water Analysis – including date sampled, date received, ion balance; and the results of analysis for each parameter, including: value or concentration, units of measurement, reporting limit (minimum detection limit for the examination), analytical method, and the date of the analysis.

3) Ground Water Level Measurements – water level measurements from ground water monitoring wells will be reported in both measured depth to ground water and ground water elevation above mean sea level.

J. Compliance Schedule

1. Quality Assurance Project Plan – The water quality sampling, handling and analysis plan, Appendix A of the permit, shall be updated and/or modified as required by the Director. The revised plan will be submitted for Director approval, within 45 days following receipt of notice from the Director, that updates or revisions to the plan are required. The revised document will replace the current Appendix A and is hereby incorporated by reference.

2. Final Tailings Impoundment Closure Plan – Final closure of the tailings impoundment shall constitute completion of dewatering of the tailings draindown and removal of the east bay, regrading of the east bay to blend with surrounding topography, and completion of the final engineered cover placement on the east bay. At the completion of closure activities, a construction quality assurance as- built report will be submitted within 180 days for approval of the Director.

II. MONITORING, RECORDING AND REPORTING REQUIREMENTS

A. Representative Sampling.

Samples taken in compliance with the monitoring requirements established under Part I shall be representative of the monitored activity.

B. Analytical Procedures.

Water sample analysis must be conducted according to test procedures specified under UAC R317-6-6. L, unless other test procedures have been specified in this permit or otherwise approved by the Director.

C. Penalties for Tampering.

The Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate, any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than six months per violation, or by both.

D. Reporting of Monitoring Results.

Monitoring results obtained during each reporting period specified in the permit, shall be submitted to the Director, Utah Division of Water Quality at the following address no later than the 15th day of the month following the completed reporting period:

Utah Division of Water Quality
P.O. Box 144870
Salt Lake City, UT 84114-4870
Attention: Ground Water Protection Section

E. Compliance Schedules.

Reports of compliance or noncompliance with, or any progress reports on interim and final requirements contained in any Compliance Schedule of this permit shall be submitted no later than 14 days following each schedule date.

F. Additional Monitoring by the Permittee.

If the Permittee monitors any pollutant more frequently than required by this permit, using approved test procedures as specified in this permit, the results of this monitoring shall be included in the calculation and reporting of the data submitted. Such increased frequency shall also be indicated.

G. Records Contents.

Records of monitoring information shall include:

1. The date, exact location, and time of sampling or measurements;

2. The individual(s) who performed the sampling or measurements;

3. The date(s) and time(s) analyses were performed;

4. The individual(s) who performed the analyses;

5. The analytical techniques or methods used; and,

6. The results of such

H. Retention of Records.

The Permittee shall retain records of all monitoring information, including all calibration and maintenance records and copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least three years from the date of the sample, measurement, report or application. This period may be extended by request of the Director at any time.

I. Twenty-Four Hour Notice of Noncompliance Reporting.

1. The Permittee shall verbally report any non-compliance with permit conditions or limits as soon as possible, but no later than twenty-four (24) hours from the time the Permittee first became aware of the circumstances or determined otherwise. The Verbal report shall be made to the Utah Department of Environmental Quality 24-hour number, (801) 536-4123, or to the Division of Water Quality Ground Water Protection Section at (801) 536-4300, during normal business hours (8:00 am – 5:00 pm Mountain Time)

2. A written submission of any noncompliance with permit conditions or limits shall be provided to the Director within five (5) days of the time that the Permittee becomes aware of the circumstances. The written submission shall contain:
   a. A description of the noncompliance;

   b. The period of noncompliance, including dates and times;

   c. The estimated time noncompliance is expected to continue if it has not been corrected; and,

   d. Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

   e. When applicable, either an estimation of the quantity of material discharged to ground water, the tailings facility or an estimation of the quantity of material released outside containment structures.

3. Written reports shall be submitted to the addresses in part II D, Reporting of Monitoring Results.

J. Other Noncompliance Reporting.

Instances of noncompliance not required to be reported within 24 hours, shall be reported at the time that monitoring reports for Part II D are submitted.

K. Inspection and Entry.

The Permittee shall allow the Director, or an authorized representative, upon the presentation of credentials and other documents as may be required by law, to:

1. Enter upon the Permittee's premises at reasonable time where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of the permit;

2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

3. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and,

4. Sample or monitor at reasonable times, for the purpose of assuring permit compliance or as otherwise authorized by the Act, any substances or parameters at any location.

III. COMPLIANCE RESPONSIBILITIES

A. Duty to Comply.

The Permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application. The Permittee shall give advance notice to the Director of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

B. Penalties for Violations of Permit Conditions.

The Act provides that any person who violates a permit condition implementing provisions of the act is subject to a civil penalty not to exceed $10,000 per day of such violation. Any person who willfully or negligently violates permit conditions is subject to a fine not exceeding $25,000 per day of violation. Any person convicted under Section 19-5-115(2) of the Act a second time shall be punished by a fine not exceeding $50,000 per day. Nothing in this permit shall be construed to relieve the Permittee of the civil or criminal penalties for noncompliance.

C. Need to Halt or Reduce Activity not a Defense

It shall not be a defense for a Permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

D. Duty to Mitigate.

The Permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

E. Proper Operation and Maintenance.

The Permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by a Permittee only when the operation is necessary to achieve compliance with the conditions of the permit.

F. Affirmative Defense.

In the event that a compliance action is initiated against the Permittee for violation of permit conditions relating to best available technology or discharge minimization technology, the Permittee may affirmatively defend against that action by demonstrating the following:

1. The Permittee submitted notification according to part I.H.2.b.1 and Part II.I.1 and 2;
2. The failure was not intentional or caused by the Permittee's negligence, either in action or in failure to act;

3. The Permittee has taken adequate measures to meet permit conditions in a timely manner or has submitted to the Director, for the Director's approval, an adequate plan and schedule for meeting permit conditions; and

5. The provisions of 19-5-107 have not been violated.

IV. GENERAL REQUIREMENTS

A. Planned Changes

The Permittee shall give notice to the Director as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required when the alteration or addition could significantly change the nature of the facility or increase the quantity of pollutants discharged.

B. Anticipated Noncompliance.

The Permittee shall give advance notice of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

C. Spill Reporting.

The Permittee shall immediately report as per UAC 19-5-114 of the Utah Water Quality Act any accidental release from Valley Fill Leach Area 2, Valley Fill Leach Area No. 3, the tailings impoundment or associated facilities which is not totally contained by a collection system. This report shall be made to the phone numbers given in part II I. 2. A written report will be required within 5 business days of the occurrence and should address the requirements of UAC 19-5-114 and Part II I 2. and 3 of this permit.

D. Permit Actions.

This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the Permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

E. Duty to Reapply.

If the Permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the Permittee must apply for and obtain a permit renewal or extension. The application should be submitted at least 180 days before the expiration date of this permit.

F. Duty to Provide Information.

The Permittee shall furnish to the Director, within a reasonable time, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The Permittee shall also furnish to the Director, upon request, copies of records required to be kept by this permit.

G. Other Information.

When the Permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or any report to the Director, it shall promptly submit such facts or information.

H. Signatory Requirements.

All applications, reports or information submitted to the Director shall be signed and certified.

1. All permit applications shall be signed as follows:

   a. For a corporation: by a responsible corporate officer or by a duly authorized representative of that person;

   b. For a partnership or sole proprietorship: by a general partner or the proprietor, respectively;

   c. For a municipality, state, federal, or other public agency: by either a principal executive officer or ranking elected official.

2. All reports required by the permit and other information requested by the Director shall be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:

   a. The authorization is made in writing by a person described above and submitted to the Director, and,

   b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.)

3. Changes to Authorization. If an authorization under Part IV.H.2. is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of Part IV.H.2. must be submitted to the Director prior to or together with any reports, information, or applications to be signed by an authorized representative.

4. Certification. Any person signing a document under this section shall make the following certification:

   "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

I. Penalties for Falsification of Reports.

The Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or noncompliance shall, upon conviction be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than six months per violation or both.

J. Availability of Reports.

Except for data determined to be confidential by the Permittee, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the Director. As required by the Act, permit applications, permits, effluent data, and ground water quality data shall be considered confidential.

K. Property Rights.

The issuance of this permit does not convey any property rights of any sort, or any exclusive privileges, no does it authorize any injury to private property or any invasion of personal rights, nor any infringement of federal, state or local laws or regulations.

L. Severability.

The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

M. Transfers.

This permit may be automatically transferred to a new Permittee if:

1. The current Permittee notifies the Director at least 30 days in advance of the proposed transfer date;

2. The notice includes a written agreement between the existing and new Permittee containing a specific date for transfer of permit responsibility, coverage, and liability between them; and,

3. The Director does not notify the existing Permittee and the proposed new Permittee of his or her intent to modify, or revoke and reissue the permit. If this notice is not received, the transfer is effective on the date specified in the agreement as described in Part IV.M.2, above.

N. State Laws.

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the Permittee from any responsibilities, liabilities, penalties established pursuant to any applicable state law or regulation under authority preserved by Section 19-5-105 of the Act.

O. Reopener Provisions.

This permit may be reopened and modified pursuant to R317-6-6.6.B or R317-6-6.10.C to include the appropriate limitations and compliance schedule, if necessary, if one or more of the following events occurs:

1. If new ground water standards are adopted by the board, the permit may be reopened and modified to extend the terms of the permit or to include pollutants covered by new standards. The permittee may apply for a variance under the conditions outlined in R317-6-6.4. D

2. Changes have been determined in background ground water quality.

APPENDIX A

WATER QUALITY MONITORING

QUALITY ASSURANCE PROJECT PLAN

March 15, 2024

[On File]

APPENDIX A

WATER QUALITY MONITORING
QUALITY ASSURANCE (QA) AND QUALITY CONTROL (QC) PLAN
GROUND WATER QUALITY DISCHARGE PERMIT UGW450002
FOR BARRICK RESOURCES (USA) INC.
MERCUR MINE RECLAMATION PROJECT

January 17, 2024

Prepared By:

Global Environmental Technologies, LLC
SALT LAKE CITY, UTAH

TABLE OF CONTENTS

1.0 INTRODUCTION

This Quality Assurance Plan presents the basic procedures for ground and surface water quality monitoring for the permit. The QA/QC Plan is to be implemented in accordance with monitoring requirements as per the State of Utah Department of Environmental Quality, Division of Water Quality (DWQ), as an Appendix for applicable Ground Water Quality Discharge Permit at the Barrick Mercur Mine that is currently in closure. This plan is attached as Appendix A to Permit No. UGW450002 for the Barrick Mercur Mine Reclamation Project.

2.0 PROJECT DESCRIPTION

2.1 Purpose

The specific objectives of this QA/QC plan for the subsurface and surface water quality investigations and monitoring at the permitted facilities are to:

1. Evaluate background ground water and surface water quality for each facility.

2. Establish ground water protection levels for each monitoring location.

3. Establish ground water and surface water compliance monitoring procedures.

The specific activities that will be carried out to achieve the above objectives are:

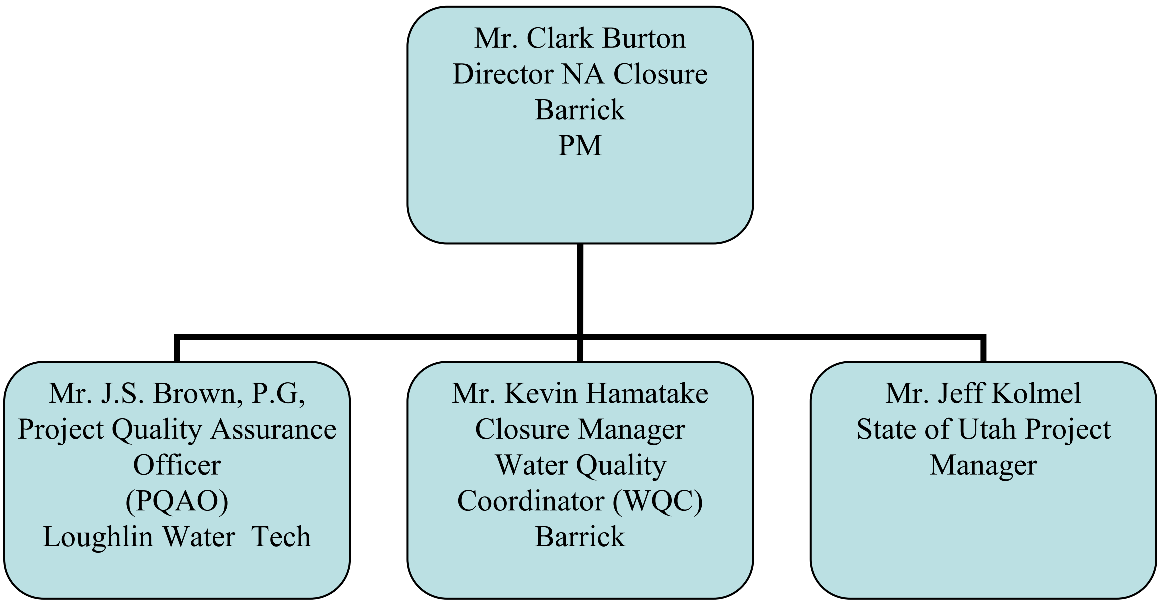
1. Measure static ground water levels at all monitor well sites.

2. Collect and analyze ground water quality samples from the monitor wells for compliance monitoring on a semiannual basis. Analytes are presented in Table A-1. Monitor well water quality data and surface water quality data reporting frequency will be completed as required by the permit.

3.0 PROJECT ORGANIZATION AND RESPONSIBILITY

3.1 Organization

The organization for the activity is as follows:



3.2 Responsibilities

The project manager (PM) will have overall responsibility for direction of the project quality control and reporting and will prepare QA plans for review.

The PM will be responsible for execution of the activity in accordance with the plan. The PM and the Project Quality Assurance Officer (PQAO) will review all data generated from the monitoring or investigation and will be responsible for validating the data.

The PM and the PQAO will 1) review and approve the QA/QC plan, 2) review all quality control data, and 3) identify problems and recommend corrective action as necessary. The PQAO will report directly to the PM.

The State of Utah Project Manager (UPM) will be advised of any proposed changes to be made to this plan, and will advise the PQAO and Barrick PM of any comments or objections to this plan, its implementation or any proposed changes to the plan.

4.0 ANALYTICAL PARAMETERS AND QA OBJECTIVES

Analytical parameters, their detection limits, methods of analysis and holding times are given in Table A-1. Specific conductance, temperature and pH will be measured in the field. Sample collection will proceed in the following order:

1. Non-filtered, non-preserved bottles
2. Non-filtered preserved bottles
3. Filtered, non-preserved bottles
4. Filtered, preserved bottles

As a check on field measurements, pH and specific conductance will be run in the lab.

Chemical analysis will be performed by a lab certified by the State of Utah, a laboratory certified under either the Clean Water Act, Safe Drinking Water Act and the Resource Conservation and Recovery Act, for the required parameters listed in Table A-1. The internal quality assurance program for this project will be in accordance with the State of Utah Department of Environmental Quality protocol. Laboratory certification will be monitored by the PM and PQAO.

Routine analysis of samples will be performed in accordance with standard EPA procedures; special analyses will be performed according to EPA methods for chemical analyses of water and wastes. Specific analytical methodologies and references are listed in Table A-1. These methodologies specify the documentation needed to complete and evaluate the data. They also define acceptable accuracy and precision criteria that must be set for the data to be judged valid. Accuracy is defined by the EPA as the percent recovery of a spiked sample. Laboratory matrix spikes are actual field samples spiked in the laboratory with a representative group from the list of required parameters as per Table A-1. The lab may specify the additional volume required from a sampled location in order to perform both matrix spike and matrix spike duplicate analysis. Matrix spikes and matrix spike duplicates will be performed at the rate of 10 percent of all samples obtained from the permit on an annual basis. As part of the monitoring program, a minimum of two samples per year will be split for matrix spike analysis. No well will be sampled consecutively during the same year for a matrix spike. Precision is defined by the EPA as the relative percent difference of duplicate sample analysis of similar matrix. Duplicate samples will be performed at the rate of 10 percent of all samples obtained from each permit. As part of the semiannual monitoring program, two samples minimum per year will be split for duplicate analysis from wells regulated under Permit UGW450002. No well will be sampled consecutively during the same year for a duplicate analysis. Only the required parameters as per Table A-1 will be analyzed in the laboratory.

An assessment of laboratory blank analytical results is required to verify the existence and magnitude of contamination problems that may be identified during analysis. Blanks verify that there is no or minimal contamination in the prep method procedure. A method blank is prepared with every analytical batch and is processed and analyzed in the same manner as the samples. The maximum permissible level of an analyte in the method blank is method specific and is stated in each individual method and procedure.

4.1 Data Quality Objectives

The data collected as part of this investigation is intended for use by the State of Utah Project Manager (the State of Utah Department of Environmental Quality, UDWQ), and by Barrick and its consultants. Laboratory and field procedures have been selected to ensure a high confidence level in the analytical results based on precision, accuracy, representativeness, completeness, and comparability.

The quality control of field data will be managed by the WQC and the PM for each type of data as defined in this report. Field data will be compared to other data at the site for reasonableness. The historic data will also be assessed for accuracy during this process to evaluate consistency and compatibility of all data taken at the site. Data will be compared to assess if the results are reasonable and consistent. Unreasonable results will be evaluated by technical personnel who will decide if retesting is required. Table A-1 presents the list of analytes for water quality samples with the laboratory analytical method shown for each analysis.

5.0 SAMPLING PROCEDURES

This section presents details on water quality sampling water level measurements, and flow rate measurement methods.

5.1 Ground Water Sampling

Ground water sampling locations are specified in Part I.G.2 in Permit No. UGW450002. Samples will be taken from monitoring wells MW-1, MW-2, MW-9, MW-10, MW-11, MW-13, MW-15, MW-16, MW-17, MW-18 and MW-19.

Prior to the sampling event, sample bottles of the appropriate size and with the required preservative as per the EPA-RCRA Ground Water Monitoring Enforcement Guidance Document (September 1986) or subsequent revisions, will be obtained from the laboratory.

5.1.1 Water Level Measurements

Static water level measurements are to be made in all monitor wells during this investigation. Ground water level measurements are to be made with an electrical water level meter graduated in 0.01- foot increments. Before each measurement, the instrument probe is to be thoroughly washed with distilled water. Measurements are to be made to a standard reference point, usually the top of the north side of the steel casing. Care will be taken to make sure that the water level measurement is reproducible. Ground water level elevation measurements relative to mean sea level will also be reported.

Measurements will be recorded on the water level measurement log as shown on Figure A-1 and transcribed to the water level records.

5.1.2 Chemical Samples

Upon arrival at each well, water level measurements will be made prior to sampling as specified above. The height of the column of water in the wells will be used to determine the volume of water inside the well casing and three casing volumes of water will be evacuated during the well purging process. Dedicated submersible pumps are installed in all of the wells. Pumping shall be conducted to ensure that the static water column is evacuated and three casing volumes are removed from the well during the purging process. Pump discharge will be captured in a calibrated bucket to verify the discharge rate and measured periodically to ensure that the discharge rate has not diminished as the result of well drawdown.

Before purging begins at each well, field instrument for pH, specific conductivity, and temperature will be calibrated according to manufacturer's directions and documented on the sampling form. Orion pH and conductivity meters, or their functional equivalents will be used. Calibration buffers for pH will be selected which bracket the sample pH, if possible, and conductivity standards will be selected which are the same order of magnitude as sample conductivity. Lot numbers and expiration dates will be documented on the field sampling form. Instrument calibrations will be checked after sample collection and all calibration procedures will be documented on the sampling field log.

During evacuation of the three casing volumes, pH, conductivity and temperature measurements of ground water will be made at the beginning and just prior to final purging of the last casing volume. Field measurements and observations will be recorded in a bound notebook or field logs (Field Log forms are shown on Figure A-1). Monitor well evacuation will be complete after three casing volumes have been purged. Data from the field sheets are entered into a database to track water levels over time.

In the event that three well casing volumes cannot be evacuated, samples will be obtained in accordance with criteria for sampling of low-yielding wells (EPA, 1986). If not enough sample volume is available to extract a sample following a 48-hour period after purging, then the well is to be considered dry for that sampling event and will not be sampled until the next scheduled sampling event.

Ground water samples will be bottled directly from the discharge of the pump. Samples for total metals will not be filtered and samples for dissolved trace metals will be filtered in the field immediately upon collection. A new 0.45-micron filter and new silicon tubing will be used for filtering each sample for dissolved metals analysis. An in-line, pre-filter may also be used for excessively turbid samples. To prevent aeration of sample water, bottles will be filled with the tubing outlet just under the water surface in the bottle. Bottles will be properly labeled prior to filling and stored on ice immediately after filling. Sample bottles of the appropriate size and with the required preservative, as per the EPA-RCRA Ground-Water Monitoring Enforcement Guidance Document (September 1986), or subsequent revisions will be obtained from the laboratory. Pump discharge for each well should be restricted so that drawdown does not exceed the depth to the top of pump. If any well is noted to be pumping air during the purging stage, the discharge rate must be immediately reduced. Any sampling equipment contacting water samples will be decontaminated prior to utilization at another site. Decontamination will include cleaning with a non-phosphate detergent, a rinse with 0.1 N HCl acid solution, a rinse with tap water and a final rinse with de-ionized or distilled water and a thorough air drying in a location not susceptible to mine facility dust.

5.2 Surface Water Monitoring and Sampling

Surface water and process effluent samples for laboratory analyses will not be collected during closure monitoring as a result of cessation of milling and leaching activities. Tailing pond water quality will be monitored by Barrick for informational purposes during closure and will be subject to field and laboratory analytical procedures detailed in this plan. Field measurements for pH, conductivity and temperature will be made prior to filling sample bottles and will be recorded in the field log. East bay or incidental draindown solution surface water samples will first be collected using a pre-cleaned Teflon bailer or in a pre-cleaned 1-gallon plastic container and the sample bottle will be filled from this container. A 0.45 micron filter will be used for filtering samples for dissolved metals analysis. Container filling order will proceed as specified in Section 4.0.

Bottles will be properly labeled prior to filling and stored on ice immediately after filling.

5.3 Sample Handling

Table A-1 lists specific requirements for proper handling of samples including types of containers, preserving agents, temperature control, and holding times. Sample bottles will be obtained from the lab with the proper preservative already included. Upon sample collection, the sample containers will be placed on ice out of direct sunlight, shipped and analyzed within the maximum allowable holding times as specified in Table A-1.

6.0 SAMPLE CUSTODY

6.1 Field Operations

Documentation of field operations from sample collection to data reporting is an essential part of sampling procedures. Documentation of sample possession assures that it will be possible to trace the possession and handling of the samples from the time of collection through analysis and final disposition. This documentation of the history of the sample is referred to as chain-of-custody. The following records and actions will be taken.

1. Sample Labels - Sample labels are necessary to prevent misidentification of samples. The sample label or equivalent shown on Figure A-2 will be completely filled out and attached to each sample bottle before sample collection.

2. Field Sampling and Analysis Record - Pertinent field measurements and observations will be recorded. Equipment used to measure field parameters shall be calibrated before the collection of each sample. To facilitate these records, the appropriate form shown on Figure A-1 will be filled out for each sample site. Documentation of the sources (lot numbers and expiration dates) of buffers, standards, reagents, sample containers, etc., will be recorded on these forms.

3. Chain-of-Custody-Record - To establish the documentation necessary to trace sample possession from the time of collection, the chain-of-custody record as shown on Figure A-3 will be filled out in duplicate with one copy to accompany every sample shipment from the time of collection through receipt by the analytical laboratory. The WQC will sign and date the COC record and assure that the receiving person signs and dates it when he relinquishes control of the container. One copy of the form will be retained by the field sampler. The samples will be delivered to the laboratory for analysis as soon as possible, usually within one day after sampling. Maximum holding times are shown on Table A-1. Copies of the form sent to the laboratory with the samples will be returned to the PM and PQAO with the analytical results and will be included in the report.

4. Sample Seals - Will be placed on each shipping container (e.g., each ice chest) to verify the integrity of the samples.

6.2 Laboratory Operations

The analytical laboratory will acknowledge receipt of the samples by signing and dating in the appropriate box in the form shown on Figure A-3. This form will be returned to the PM and the PQAO with the analytical results.

The laboratory will maintain internal chain-of-custody control in accordance with protocol as per the Utah Department of Environmental Quality.

7.0 CALIBRATION PROCEDURES AND FREQUENCY

7.1 General

Meters used to measure pH and specific conductance will be calibrated as outlined below prior to and during use. Source and identification (Lot No., etc.) of standards used to calibrate and expiration date will be recorded on the form as presented in Figure A-1.

7.2 Field pH

Field pH is to be performed with the following:

Orion, Model SA-250, or equivalent.

The meter that will be used should have automatic temperature correction.

Follow manufacturer's instructions for operation and standardization of instruments. Perform two-buffer standardization with buffers approximately 3 pH units apart and spanning the anticipated measurement values, if possible. The meter will be standardized at the beginning of each sample collection day and checked against the standard after each sample collection day. However, if sample pH values vary widely during purging, the meter will be re-standardized with a buffer having a pH within 1 or 2 units of that sample.

Notes:

1. If oil gets on the electrodes, the electrodes shall be cleaned with methanol or hydrochloric acid as necessary.

2. The pH electrode will be stored in pH 7 or pH 4 buffer, or probe storage solution depending on the manufacturer's recommendations.

7.3 Field Specific Conductance

Field specific conductance measurements are to be done with the following:

Oakton PC-10, or equivalent.

This meter automatically indicates specific conductance corrected to 25°C. Calibration is to be done before each sample measurement as per manufacturer's instructions.

7.4 Temperature

Temperature will be measured using the internal thermometer function of the pH meter or a good grade mercury-filled thermometer. Temperature should be reported to the nearest 0.1°C.

7.5 Water Level Meters

Water level measurements will be made with an electrical interface probe capable of accuracy to within 0.01 feet. This probe will be checked annually against a calibrated tape and will be repaired or re-calibrated, if necessary, prior to reuse. Water levels will be recorded in the field on the form shown on Figure A-1, along with all pertinent observations.

8.0 INTERNAL QUALITY CONTROL CHECKS

8.1 Field Operations

During each sampling event, at least one blind field ground water duplicate sample will be prepared and submitted to the laboratory. Splitting of water samples for duplications will be done by simultaneously filling sample containers.

If non-dedicated sampling equipment is used, one field equipment blank will be collected per sampling event. The field equipment blank sample will be prepared by pumping distilled water through the peristaltic pumping system into sample containers in the same manner as is done for a typical sample.

8.2 Laboratory Operations

The laboratory will conduct quality control checks in accordance with the State of Utah's certification requirements. This quality control check will include initial calibration blanks, lab duplicate and matrix spike and matrix spike duplicate samples. The laboratory will summarize the results of these quality control checks and submit them with the analytical results, to be included with each data report submitted to the DWQ.

One ground water sample from each sampling event will be designated for laboratory matrix spike duplicate. Field personnel will ensure that sufficient sample material is provided to the laboratory and indicate on the chain-of-custody which sample is designated for the matrix spike.

9.0 DATA MANAGEMENT REDUCTION, VALIDATION AND REPORTING

All field data and chain-of-custody forms generated from sampling will be appropriately identified and included in each water quality data report. Standardized data collection forms will be used by all personnel collecting field data during the project. Standardized data forms will be used for laboratory data during this project. Use of such forms will enable consistent presentation of the data throughout the project.

Validation of all analytical data will be performed. Laboratories will be required to submit results which are supported by sufficient backup data and QA/QC results to enable the reviewer to determine the quality of the data. Validity of all data will be determined based on the precision and accuracy assessments outlined in Section 4.0 of this report. All data will be stored and maintained according to the procedures outlined.

Data will be processed through an orderly, easily traceable and logical sequence. Field data will be assessed for accuracy. Subsequent analysis, interpretation and reporting of results will be conducted by appropriate professional staff, using documents which are initialed and dated whenever necessary. Any calculations will be checked. All assumptions necessary for calculations will be approved by the PQAO. No results will be reported without the required supporting documentation and proper review.

10.0 AUDIT PROCEDURES

The PM and the PQAO will monitor and audit performance of the QA procedures outlined in this report. The PM will conduct random field and office audits which will assure that the information being gathered is reliable and of good quality. The PQAO will ensure independent evaluation and compliance with the QA procedures. The PQAO will report to the PM responsible for the project.

10.1 Field Audits

The PM will conduct unscheduled audits of field activities during each of the sampling events to evaluate the execution of sample identification, sample control, chain-of-custody procedures, field documentation, equipment calibration and sampling operations.

An evaluation will be based on the extent to which the applicable standard operating procedures are being followed. Field documents pertaining to sample identification and control will be examined for completeness and accuracy. Field data sheets will be reviewed to see that all entries are dated and signed and that the contents are legible, written in waterproof ink or pencil and contain accurate and inclusive documentation of project activities. Because the field data sheets form the basis for reports, they will contain all measurements and observations.

The PM will also check to see that chain-of-custody procedures are being followed and that samples are being kept in secure custody at all times.

The PM will check to see that any field instruments which require calibration are current in their calibration status and that the calibration documents are traceable. Sampling operations will be evaluated to determine if they are performed as stated in Section 6.0 or directed by the project manager. The proper number of samples will be collected at the assigned locations. The PM and WQC will check to determine that the samples are in proper containers and are properly labeled and preserved. The PM and WQC will also determine if the required field measurements and quality assurance checks are being performed and documented as directed.

10.2 Office Audits

Once a field project has been completed, the individual files will be assembled, organized and securely stored. The documents will be examined to determine that all necessary items such as signatures, dates and project numbers are included. The PM will examine all documents and determine if they have been handled and stored in the proper manner. Such files will be maintained at Barrick Mercur Mine.

The PM will review product quality to assure that the project is being performed in accordance with approved quality assurance procedures. All work products will undergo review by the PQAO. This will include review of calculations, test analysis, graphs, tables, computer input/outputs of any document that involves generating information from the field data. These reviews will be documented.

11.0 CORRECTIVE ACTION

Appropriate corrective action will be undertaken if sample collection deficiencies or unreliable analytical results prevent QA objectives for the project from being met. The criteria for acceptable sample collection data are given in Section 4.0 and the laboratory's

QA program provides the criteria for acceptable analytical results.

Analytical results supplied by the laboratory will have been subjected to the laboratory's Quality Control reporting and will be considered by the PQAO and the PM to be acceptable unless the results significantly contradict prior knowledge of the site conditions. When this situation occurs, the PQAO will request that the laboratory review the quality control documentation for the sample or analysis in question. Further corrective action will be based on the specific details of the situation.

The principal appropriate action that will be required as a result of deficiencies in sample collection is resampling if one or more of the following problems occur:

1. Sample contamination is suspect due to sample results which do not represent known site conditions.
2. Sample is lost in transit to the laboratory.
3. Holding times are violated for required parameters.

Variation between duplicate analyses for all protection level parameters in Table A-1 including trace metals or pH which are outside control limits (greater or less than 2 standard deviations of concentration mean) will be evaluated by the PM, PQAO and by the UPM to determine if re-sampling may be required. Re-analysis may be substituted for re-sampling if the holding time has not expired and the sample condition is satisfactory. A request for appropriate action may be initiated by the PM, the PQAO or the UPM.

12.0 QA REPORTS

Water quality data reports will be submitted as specified in the permit, to the State of Utah Department of Environmental Quality, (UDWQ). If re-sampling and/or re-analysis are required and the results are unavailable at the time of the data report submittal deadline, these will be forwarded to the UPM as soon as they are available following QA review of the data. Specifically, QA reports will address the following areas:

- Results of system and/or performance audits of sample collection activities.

- Summary of the laboratory QA report, including notation of QA modifiers.
- Listing and basis for any unacceptable data.
- Significant QA problems and recommended solutions.

The QA report will be prepared by the PQAO and the PM and distributed to the UPM.

13.0 REFERENCES

U.S. Environmental Protection Agency, September 1986. RCRA Ground-Water Monitoring Technical Enforcement Guidance Document, OSWER-9950.1.

Dames & Moore , January 1990. Ground Water Assessment For Dump Leach Area #3, Barrick Mercur Gold Mine, Utah For Barrick Resources (USA), Inc.

State of Utah, Department of Health, March 20, 1990. "Written Notice to Apply For a Ground Water Discharge Permit: Tailings Pond" addressed to Mr. Eurick, signatory Don A. Ostler, Executive Secretary.

State of Utah, Department of Health, June 1990. Ground Water Quality Discharge Permit for Dump Leach #3, for Barrick Resources (USA) Inc., Mercur Mine.

State of Utah, Department of Environmental Quality, August 1994. Ground Water Quality Discharge Permit No. UGW450001, Renewal for the Reservation Canyon Tailings Impoundment; Barrick Resources (USA), Inc., Mercur Mine.

State of Utah, Department of Environmental Quality, December 1994. Ground Water Quality Discharge Permit UGW450001, renewal, for Valley Fill Leach Area No. 3, Barrick Resources (USA) Inc., Mercur Mine.

APPENDIX B

VALLEY FILL LEACH AREA No. 3

CLOSURE PLAN DECEMBER 1997

[On File]

APPENDIX B TO PERMIT UGW450002

BARRICK RESOURCES (USA) - MERCUR MINE

VALLEY FILL LEACH AREA 3
GROUNDWATER QUALITY DISCHARGE PERMIT
FINAL CLOSURE PLAN

Original: October 28, 1991
Revision 1: January 13, 1995
Revision 2: January 1996
Revision 3: August 1996
Final: December 1997

TABLE OF CONTENTS

Attachments: (2)

Appendix a - Cyanide Bioremediation of Barrick Mercur's VFL#3 Heap Leach Pad

Appendix b - Dewatering Well Installation, Valley Fill Leach Area #3, Barrick Mercur Gold Mine

1.0 GENERAL

Appendix B to Permit UGW450002 provides a narrative of historic events involved in the permitting, operation and closure of Valley Fill Leach Area No.3 (VFL3). A construction permit for VFL3 was issued on July 13, 1990, by the Utah Department of Environmental Quality, Division of Water Quality (UDWQ). Conditional Groundwater Quality Discharge Permit No. UGW450001 was issued on July 10, 1990, with an expiration date of July 10, 1995. The conditional Approval to Operate the facility was issued in December 1991. The facility continued to operate with the approval of the UDWQ through 1997.

The formal renewal process for UGW450001 was accelerated from January 1995 to August 1994 to expedite necessary changes in ground water quality protection levels and operating conditions for VFL3. A renewed Ground water Quality Discharge Permit No. UGW450001, with conditions, was issued December 12, 1994, and expired December 12, 1999.

The following conditions were specified in Part I.H.1-3 of the renewed permit:

- Necessary revisions to the Quality Assurance/Quality Control Plan (QA/QC) as required by Part E.5.a of the renewed permit were submitted as Appendix A by January 13, 1995.

- Necessary revisions to the Conceptual Closure Plan as required by Part I.D.8 and I.H.2 were submitted as Appendix C by January 13, 1995. This revised Conceptual Closure Plan contained the following information:

    (1) Discussion of spent ore neutralization techniques
    (2) Discussion of final site contouring, drainage, and cover design
    (3) Discussion of post-closure ground water monitoring program
    (4) Discussion of post-closure facility monitoring

Submittal of a final VFL3 Closure Plan, pursuant to Part I.H.3 of the permit, was required no later than 90 days prior to the closure date of the facility. The original closure date for VFL3 was expected to be December 1997. Exhaustion of ore earlier than modeling predicted necessitated Barrick to call for cessation of leaching in mid-1997. Submittal of final proposed closure plans were strategically delayed until December 1997 to await results of the bioremediation activities for VFL3 and the installation of the dewatering well.

The UDWQ reviewed the January 13, 1995, revised conceptual plan and raised additional issues in correspondence dated October 6, 1995. Barrick responded to these additional concerns by incorporating changes into Revision 2 and submitting the plan on January 8, 1996.

On April 19, 1996, Barrick Mercur Mine management met with the UDWQ to discuss revisions to the conceptual closure plan. The UDWQ requested that Barrick perform column rinse studies to evaluate rinsing options for VFL3. As a result of the meeting, Barrick agreed with the UDWQ to perform column rinse studies. The results of these studies were presented in the August 1996 Conceptual Closure Plan (Revision 3) as Attachment 2 to the document.

The August 1996 Conceptual Closure Plan was approved by the UDWQ on May 23, 1997.On June 4, 1997, Barrick Mercur Mine management met with the UDWQ to discuss the operating plan for the detoxification of VFL3 using bioremediation techniques. Results of the bioremediation activities are documented in "Cyanide Bioremediation of Barrick Mercur's VFL#3 Heap Leach Pad" contained in Appendix A to this closure plan.

During the June 4 meeting, Barrick also discussed the submission of a plan for installation of a vertical dewatering well in VFL3 to remove residual saturation from the sub ore during closure activities. The dewatering well plan and technical specifications were submitted to the UDWQ on June 15, 1997 and approved by the UDWQ during July 1997. The well was drilled and completed between the dates of October 20 through October 28, 1997. Details of the construction of the well are contained in "Dewatering Well Installation, Valley Fill Leach Area #3, Barrick Mercur Gold Mine", Appendix B to this closure document.

It should be noted that the closure plan for VFL3 is only one component of the overall Mercur Mine Comprehensive Final Closure Plan. The development and implementation of the Mercur Final Closure Plan is a dynamic activity and may necessarily require minor modifications in any ultimate VFL3 closure plan scenario. The Mercur Closure Plan was developed pursuant to the cessation of mining activities in 1997 and milling activities in 1998 and submitted to the Utah Division of Oil, Gas, and Mining as well as to the UDWQ for their respective jurisdictional approvals.

2.0 FACILITY DESCRIPTION

VFL3 was utilized for the cyanide leaching of subore from the Mercur Mine from December 1990 to October 1997. Ore loading ceased in February 1997. The facility operated until October 1, 1997 for gold recovery. Gold recovery continued through bioremediation between the dates of June 16 through October 1, 1997. VFL3 has been closed. Section 3.0 describes the closure procedures implemented and post-closure physical and ground water quality monitoring at VFL3.

3.0 CLOSURE PROCEDURES

3.1 Neutralization

Following optimum resource recovery from VFL3, the application of cyanide solution for gold leaching was discontinued in June 1997. Cyanide and reagent storage, support systems, and all non-essential elements of the VFL3 plant were converted for bioremediation purposes. Carbon tanks were used to polish rinse solutions with activated carbon. Pumping, piping, and all essential elements of the existing plant necessary to carry out the neutralization and closure program were utilized during bioremediation activities, which were carried out between the dates of June 16 through October 1, 1997. Solution application systems used for cyanide application were converted for the use of neutralization solution and bioremediation application. Upon completion of the bioremediation process, the plant was dismantled.

VFL3 was neutralized in 1997 primarily for cyanide-WAD and pH using the following methodologies:

- An initial neutralization using recycled VFL3 barren solution without cyanide fortification in order to reduce the cyanide-WAD levels;

- Incidental rinsing with natural precipitation to provide additional make up water to the system;

- Bioremediation treatment through inoculation of recycled barren solution.

The goal of the 1997 neutralization effort was to achieve rinsate solution characteristics that will, under long-term infiltration conditions, be protective of the ground water regime underlying VFL3. Bioremediation treatment using inoculation of indigenous bacteria was accepted in the August 1996 Conceptual Closure Plan as the preferred method of treatment. Bioremediation was initially evaluated through column rinse test studies (Attachment to the August 1996 Revised Conceptual Closure Plan). Both the column rinse test results using process waters from VFL3, and the bioremediation effort during 1997 at VFL3 indicated that this method of rinsing provided a relatively rapid decline in cyanide-WAD concentrations while minimizing the addition of water to the system. Reductions in the levels of arsenic, mercury, copper, and nickel were also achieved. Results of rinsing VFL3 during 1997 with the addition of bacteria are contained in Appendix A to this document.

Experience obtained in the neutralization of previously closed Valley Fill Leach Areas 1 (VFL1) and 2 (VFL2) was also drawn upon during the VFL3 neutralization effort. VFL1 experienced limited fresh water application followed by an extended period of natural precipitation infiltration prior to capping. VFL2 was rinsed with tailings reclaim solution, fresh water, natural precipitation, and reclaim solution treated with ferric sulfate. The final closure plan for VFL2 was approved in May 1995 and is currently being implemented.

Barrick did not anticipate additional rinsing of the VFL3 sub ore (with the exception of natural precipitation) beyond the 1997 rinsing performed during the bioremediation of the heap. Any additional applied fresh water may increase the level of environmental impact associated with water balance considerations during the closure of the tailing impoundment. Samples taken from the dewatering well at VFL3 indicated that the bioremediation achieved the goals of neutralization.

The schedule of events for VFL3 neutralization included:

- May 1997: Cyanide solution application for gold leaching was discontinued. All solutions were managed at the VFL3 plant and recirculated within VFL3. Rinsing of VFL3 spent ore was accomplished using barren recycle solution for additional incremental gold recovery and physical displacement of residual free and WAD cyanide.

- Bioremediation treatment was initiated through inoculation of the recycled barren solution being applied to the heap between the dates of June 16 through October 1, 1997.

- A 6-inch vertical dewatering well was completed to 174.5 feet below grade in the deepest portion of the cistern basin. The well was completed and tested on October 27, 1997. All neutralization waters were managed within VFL3 and to the tailing impoundment following neutralization. The schedule for this activity was subject to water balance considerations within the tailing impoundment and incorporated neutralization "'rest–periods''.

- November 1997-1999: Natural precipitation intermittently infiltrated the VFL3 neutralized ore and was managed within VFL3 prior to dewatering to the tailing impoundment. No application of pumped potable water was used.

1998 activities consisted of completing design infiltration and plume transport modeling efforts and initiating physical closure activities. Physical closure activities were initiated at the beginning of the construction season in 1998, and included:

1. Grouting both the upper the lower leakage collection system pipes and removing the LCS tankage. Grouting the leakage collection system was completed because the upper leakage collection system discharged at a de minimus average rate of 26 gallons per month while the lower leakage collection system was always dry.

2. Subsoil cover placement on the sub ore.

3. Topsoil placement and seeding.

4. Dismantling and removal of reagent storage, support systems, and all non-essential elements of the VFL3 plant.

Solution characteristics were monitored pursuant to the applicable VFL3 Ground Water Quality Discharge Permit UGW450001 and associated Quality Assurance/Quality Control Plan.

3.2 Dewatering

The removal of solutions from VFL3 will be managed by pumping solutions to the East Bay where the water can be treated for nitrate and arsenic and be discharged into the Golden Gate Basin

3.3 Facility Decommissioning

Upon approval from the UDWQ that the neutralization effort had achieved acceptable rinsate characteristics, all distribution piping was decommissioned. The operating pumping system will be operated as long as the system is required to maintain pumping from VFL3 to the East Bay and then decommissioned in favor of the vertical dewatering well. The dewatering well will remain intact for the term of the permit. Upon completion of all spent ore dewatering activities, the plant site, cistern, dewatering well, and all associated components will be dismantled and disposed of or salvaged in accordance with applicable law. Power supply components, ground water wells, area lighting, and associated devices will remain to accommodate the post-closure ground water monitoring period.

3.4 Shaping / Contouring

VFL3 was loaded at a 3:1 horizontal:vertical configuration to accommodate final shaping. Drawing Valley Fill Leach Area 3, 3:1 Contour, December 16, 1994, which was provided with the August 1996 Conceptual Closure Plan, depicts this configuration.

Following the decommissioning of the solution distribution piping, the spent ore was contoured and shaped to a configuration and bearing capacity sufficient to support a final cover. Approximately 70 percent of VFL3 was constructed with an overall side slope of 3:1.

The two upgradient drainages were filled with mine overburden material to an elevation consistent with the two roadways passing around the VFL3 site on the west and east sides. The tops of these filled areas were topsoiled, and the drainages routed to tie into the above-mentioned channels.

3.5 Cover Placement

The final cover placed in 1998 consists of two distinct zones: (1) a nominal three-foot layer of subsoil, and (2) a nominal one-foot layer of topsoil which demonstrates application of Best Available Technology. Justification for this conceptual cover design is provided in the report entitled “Infiltration and Solute Transport Analysis, August 1996, TriTechnics Corporation for Barrick Mercur Mine” which was provided with the accepted August 1996 Conceptual Closure Plan. The cistern and vertical dewatering well pumping systems will be removed and cover installation completed in these limited areas only after the decision is made by UDWQ/Barrick that additional pumping of residual heap solutions is not warranted as a result of cover effectiveness.

3.6 Erosion Control / Revegetation

The final topsoil cover was graded to prevent significant ponding of water. Additionally, Best Management Practices to mitigate erosion potential were practiced. Concurrent with the erosion control placement, the topsoil was seeded by hydroseeding or other methods approved by the Utah Division of Oil, Gas & Mining. A seed mixture of native grasses, legumes and shallow-root brushes were utilized at VFL3. All seed mixtures were applied with appropriate mulch and fertilizer.

3.7 Post-closure Facility Monitoring

Post-closure monitoring will ultimately be designed to satisfy the various regulatory agencies with applicable oversight. Monitoring of the revegetative effort will continue while ground water post-closure monitoring is being performed. The goal of the revegetation is to achieve adequate plant growth that is self-propagating within a period of three growing seasons, in accordance with the Utah Department of Natural Resources, Division of Oil, Gas & Mining surety bond release provisions. Monitoring of facility stability and erosional impacts, and general security matters will be maintained until Barrick has accomplished all site responsibilities. Monitoring of the final cover will consist of quarterly inspections during the revegetation period for cover erosion, settlement, animal burrows, drainage ditch conditions, and plant growth. Immediate repairs will be undertaken as necessary to return the spent ore cover to the original post-closure conditions.

Access to the reclaimed VFL3 may remain open indefinitely utilizing the historical public access road to the east side of the site up Meadow Canyon, as mandated by Barrick's conditional use permit with Tooele County and agreements with adjacent landowners. Alternate routing away from VFL3 will be evaluated as well as protective barriers for VFL3 access.

4.0 POST-CLOSURE FACILITY GROUND WATER QUALITY MONITORING

Permanent closure and final reclamation of the VFL3 was initiated in 1998 as part of a mine-wide closure. Under previous versions of these permits, permanent closure and final reclamation requirements that are protective of ground water were incorporated. Ground water monitoring during the post-operational phase of VFL3 will be governed by applicable permit conditions. Ground water quality monitoring will continue for the life of the permit.

Compliance Technology

Innovative Systems for the Remediation of Mine and Industrial Process Waters

Cyanide Bioremediation of Barrick Mercur's VFL #3 Heap Leach Pad

November 4, 1997

TABLE OF CONTENTS

Executive Summary

Active cyanide detoxification was pursued at Barrick Resources (USA) Inc., Mercur Mine Valley Fill Leach #3, (VFL #3) heap leach pad to ensure that low levels of residual WAD cyanide could be achieved. Testing of several detoxification methods showed that bioremediation was capable of increasing the rate of cyanide destruction

A bioreactor was constructed at the VFL #3 process area. The purpose of the bioreactor was to grow large numbers of cyanide-degrading bacteria in a short period of time. Laboratory testing had shown that the VFL #3 process solution contained indigenous cyanide-degrading bacteria and that these bacteria populations could be increased to high numbers (lO8 cells/mL) using brewers yeast extract as the bacterial nutrient.

The bioreactor consisted of a 4000-gallon, stirred tank to which VFL #3 process solution and nutrient were added on a continuous basis. The bioreactor was heated using an immersion heater and air was bubbled into the tank to maintain aerobic conditions. The bioreactor produced a high bacteria inoculum that flowed into the barren surge tank. Solution flow through the bioreactor was initiated June 16, 1997. The bioreactor was operated until October 1, 1997.

Within a month after initiation of bacteria addition, the WAD cyanide concentration in the VFL #3 pregnant solution decreased from about 29 mg/L to less than 0.56 mg/L. Much of this initial decrease was natural degradation of free cyanide. By October 1, 1997, the entire surface of VFL #3 had been sprayed with bacteria inoculum. The resultant rinsate from all parts of the pad contained between 0.20 and 0.56 mg/L WAD cyanide; the target WAD cyanide concentration of 0.20 mg/L was achieved on a sporadic basis through the inoculum period

The concentrations of metals present as WAD cyanide complexes also decreased, indicating that the bacteria were indeed destroying the WAD cyanide. The copper concentration in the pregnant solution dropped from 0.97 to 0.0 18 mg/L, while mercury concentrations decreased from 1.3 to 0.002 mg/L. Nickel, which forms a particularly strong WAD cyanide complex, dropped from 1.3 to 0.02 mg/L. Since arsenic in the VFL #3 process solution is not present as a cyanide complex, cyanide bioremediation did not have a significant effect on the arsenic concentration.

Introduction

Options for cyanide detoxification of Barrick Mercur's 5-million ton Valley Fill Leach #3 (VFL #3) heap leach pad were evaluated in May of 1996. Column rinse tests were performed at this time to compare five rinsing/detoxification techniques. These techniques included barren solution recycle, fresh water rinsing, hydrogen peroxide treatment, ferrous sulfate treatment and bioremediation. Although fresh water rinsing provided the fastest detox, this technique would generate a large amount of rinsate requiring handling problems at the tailing impoundment. Of the other methods tested, bioremediation provided the quickest reduction in cyanide and was chosen as the method for detoxification of the VFL #3 heap. These column rinse test results were summarized in a report to Barrick Mercur dated July 22, 1996.

Bioremediation involves growth and application of cyanide-degrading bacteria *(Pseudomonas pseudoalcaligenes)* to the heap leach pad. These bacteria metabolize the cyanide, utilizing the nitrogen to form amino acids, while the carbon is either taken into the bacteria cellular structure or released as carbon dioxide. Consequently, byproducts from cyanide bioremediation are nontoxic.

A lab-scale continuous bioreactor was operated to determine full-scale operating conditions and best nutrient. This testing indicated that a 2400-gallon bioreactor with a continuous flow of 3.3 gpm would result in a bacteria population of 10^6 cell/mL in the barren solution flow to the pad. The nutrient which provided the best growth of bacteria was Amberex 1003AG, an agglomerated brewers yeast extract.

Conversion of the Cyanide Tank to a Bioreactor

Cyanide bioremediation was performed at the VFL #3 heap leach pad by growing cyanide degrading bacteria to a high population in a continuous flow-through bioreactor and adding these bacteria to the barren solution sprayed on the pad. A 4000-gallon tank capable of achieving the designed flowrate and population of bacteria was converted to a bioreactor. The bioreactor was configured according to Figure 1. The following modifications were made to the tank:

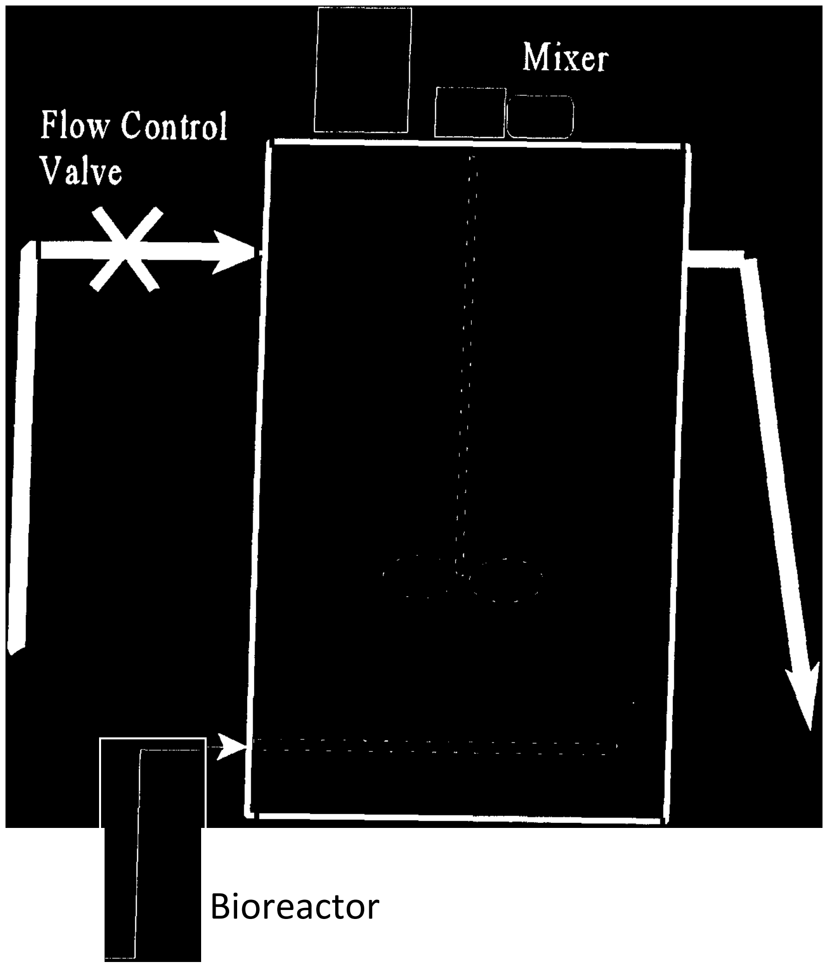
- The original cyanide mix tank was used to feed the bioreactor because a pump and flowmeter already existed at the discharge of this tank which could control flow to the bioreactor in the range of 0 to 5 gpm. In addition, the mix tank contained a heater which could preheat the barren solution.

- The mixer, which had one impeller mounted on a 4-ft shaft, was overhauled to handle continuous service.

- A small vane-type air compressor, capable of delivering 9 cfm air, was mounted to the sideof the tank to provide air for the aerobic bacteria. The air was fed to the reactor via a 1-inch pipe mounted horizontally across the tank below the mixer. Small holes were drilled

FIGURE 1 Full Scale Bioreactor

Dry Yeast Feeder



Preg Solution from Holding Tank

To

Barren

Surge

Bioreactor

Tank

4000 -

- The outlet of the bioreactor was piped to allow the tank to maintain a full level at all times. Thus, the tank was operated by solution overflow. The outlet drained directly to the carbon column discharge surge tank.

- A dry-powder screw feeder (Accu-rate) was installed on top of the mix tank to feed the Amberex 1003AG. The discharge of the feeder was enclosed to prevent wind loss of the nutrient .

- .Thermostatically-controlled immersion heaters were used in both the bioreactor and the holding tank to maintain a temperature of about 70^0F (heating the pad runoff from *45* to 70^0F significantly increases the growth rate of the bacteria)

Initiation of Bacteria Growth

The growth of bacteria in the bioreactor was initiated the week of June 9, 1997 by filling the bioreactor with barren solution One forty pound bag of Amberex lOO3AG was added to the reactor. The mixer was turned on and air flow to the reactor was initiated. Indigenous bacteria in the barren solution began to multiply. By June 16, 1997 the bacteria population in the bioreactor had increased to 5.6 x lO^8 cells/mL No barren solution or nutrient was added during this growth period. Bacteria populations were measured with a microscope using a Petroff-Hauser counting chamber.

Continuous-Flow Operation

On June 16, 1997, solution flow through the bioreactor was begun, thus, initiating the bacteria inoculation into the barren surge tank; the bacteria-laden barren solution was then sprayed onto the pad. Amberex 1003 AG was continuously fed to the reactor with the screw feeder. The bioreactor was operated from June 16, 1997 until October 1, 1997 with intermittent shut-downs. The shut-downs were caused by power outages; problems with the air compressor and the mixer also caused shutdowns. Some of the interruptions required that the bacteria population be allowed to increase before restarting flow-through operation.

The bioreactor was monitored for pH, dissolved oxygen, temperature, solution flow and nutrient feeder setting (Table 1). A bacteria population of 10^7 to 10^9 cells/mL was maintained in the bioreactor during flow-through operation. Bioreactor temperature was maintained at 64 to 78^0F. During flow-through operation, the dissolved oxygen concentration remained below 1 mg/L which is an indication of significant biological oxygen consumption An unsuccessful attempt was made to increase the oxygen concentration in the bioreactor by adding baffles to increase mixing efficiency. The bacteria produced in the bioreactor during continuous operation were aerobes even though the dissolved oxygen concentrations were low. Conditions in the bioreactor may have become anaerobic on two occasions when solution flow through the tank was disrupted.

In addition to monitoring the bacterial population in the bioreactor, bacteria cell counts were measured in the pregnant solution to determine if bacteria addition to the pad was affecting the bacteria population at the bottom of the heap. Table 2 shows the pregnant solution bacteria population from April 21, 1997 through September 25, 1997. Bacteria populations varied significantly throughout bioremediation.

WAD Cyanide Detoxification During Water Rinsing and Bioremediation

During the period of bioreactor operation, June 16 to October 1, 1997, barren solution sprays were moved across the pad, inoculating the entire surface of VFL #3 with bacteria. Table 3 shows the volume of solution sprayed onto VFL #3 during bioreactor operation.

Table 4 shows the WAD cyanide concentration, temperature, dissolved oxygen and pH of the pregnant solution from the pad which was measured periodically by Compliance Technology. Figure 2 shows this data graphically. The WAD cyanide concentration in the pregnant solution was above 26 mg/L before initiation of bioremediation on June 16, 1997. This concentration decreased to below 0.6 mg/L by July I0 and remained in the range of 0.20 to 0.56 mg/L throughout the remaining period of bioremediation. The main reason the WAD cyanide concentration did not continue to decrease is that barren solution was applied to portions of the pad not yet inoculated with bacteria. This flushed out cyanide from areas not yet remediated. By the time bioremediation was suspended on October 1, 1997, the entire surface of the pad had seen bacteria inoculums and solution spray. The consistency in WAD cyanide analyses over several months gives some assurance that the WAD cyanide concentration is between 0.20 and 0.56 mg/L in the process solution throughout the entire pad.

The decrease in the WAD cyanide concentration of the pregnant solution may not be fully attributable to bioremediation. During rinsing of heap leach pads in general, free cyanide concentrations will decrease relatively quickly even without active treatment. Once the free cyanide is gone, the remaining cyanide is tied up in metal/cyanide complexes. For example, the VFL #3 process solution contained copper, nickel and mercury cyanide complexes. Based on the original concentrations of these metals in the VFL #3 process solution, the rate of cyanide detoxification should have significantly slowed when the WAD cyanide concentration reached 3 to 4 mg/L. The rate of cyanide detoxification did not slow until the WAD cyanide concentration reached 0.5 mg/L, indicating bioremediation may be partially responsible for the quick rate of cyanide detoxification.

Dissolved oxygen levels in the pregnant solution were generally less than 1 mg/L after June 30, 1997 indicating the oxygen was being consumed within the pad. Pumping through the process plant and spraying the pad reoxygenated the solution. Measurement of oxygen in the barren solution returning to the pad showed a near saturated concentration of 7 mg/L

WAD Metals Reduction During Bioremediation

Metals analyses were conducted by AEC Laboratory (a State of Utah certified lab) on samples of pregnant solution every one to two weeks; analytical reports from AEC are appended to this report. Samples were analyzed for arsenic copper, mercury, nickel, and silver. Mercury was measured using hydride generation atomic absorption; the other metals were analyzed using an inductively coupled plasma technique. The concentrations of metals which form WAD cyanide complexes (copper, mercury, nickel and silver) are shown in Table 5 and in Figures 3, 4 and 5. The concentrations of these metals decreased as a result of cyanide detoxification.

Copper. The concentration of copper in the pregnant solution decreased from about 1 mg/L to below the detection limit of 0.05 mg/L during bioremediation as shown in Figure 3. The sample taken on October 1,1997 was analyzed by JCP/mass spectroscopy which gave a lower detection limit. The copper concentration in this sample was 0.018 mg/L.

Mercury. The mercury concentration in the process solution was above 1 mg/L during leaching and water rinsing. Once bioremediation was begun, the mercury concentration in the pregnant solution decreased to about 0.003 mg/L as shown in Figure 4. Reducing the mercury concentration is important due to the particularly low drinking water MCL of 0.002 mg/L.

Nickel. The nickel concentration decreased slowly from about 1 .3 mg/L to less than the detection limit of 0. 1 mg/L during the period of rinsing and bioremediation as shown in Figure 5. The final sample was analyzed by ICP/mass spectroscopy to lower the detection limit. The nickel concentration in this sample was 0.020 mg/L

Silver. The silver concentration in process solution was relatively low (<0.05 mg/L)

Arsenic Concentration during Bioremediation

The arsenic concentration in the process solution remained between 0.36 and 1. 1 mg/L during leaching and bioremediation as shown in Figure 6. In heap leach process solutions, arsenic is generally present as arsenite, AsO_2 or arsenate, AsO_4-^{3}, not as a cyanide complex; thus, cyanide bioremediation does not have a significant effect on reducing the arsenic concentration.

Conclusions

Several conclusions can be made from the data presented in this report, including:

- Cyanide-degrading bacteria were successfully grown and applied to the VFL #3 leach pad
- The combination of natural degradation and bioremediation reduced the WAD cyanide concentration in the rinsate from all portions of VFL #3 to less than 0.56 mg/L

- The concentrations of the WAD cyanide metals (copper, mercury, nickel and silver) were significantly reduced. The total concentration of these metals as of October 1, 1997 was less than 0.05 mg/L, indicating almost complete destruction of the WAD cyanide complexes.

APPENDIX b TO FINAL CLOSURE PLAN

GROUND WATER QUALITY DISCHARGE PERMIT
UGW450002

DEWATERING WELL (DW-20) INSTALLATION
VALLEY FILL LEACH AREA #3
BARRICK RESOURCES (USA) Inc.
- MERCUR MINE FINAL REPORT

DEWATERING WELL (DW-20) INSTALLATION
VALLEY FILL LEACH AREA #3
BARRICK RESOURCES (USA) Inc. - MERCUR MINE
FINAL REPORT

December 21, 1997

GLOBAL ENVIRONMENTAL TECHNOLOGIES, L.L.C.
Salt Lake City, Utah

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF ATTACHMENTS

1.0 INTRODUCTION

On October 27, 1997, Barrick Mercur Mine completed the installation of a vertical dewatering well (DW-20) at the Mercur Mine Valley Fill Leach Area #3 (VFL3). The concept of the dewatering well was modeled in the "Infiltration and Solute Transport Analysis, Valley Fill Area #3, Barrick Mercur Mine" dated August 15, 1996, included as an attachment to the Interim Conceptual Closure Plan for VFL3, submitted in August 1996. The plan was approved by the Utah Division of Water Quality (UDWQ) on May 23, 1997. The installation of the dewatering well was discussed during a joint meeting between Barrick and the UDWQ on June 4,1997, and the specifications for the well and engineering drawings were presented in a document to the UDWQ on June 15, 1997. The purpose of the well is to provide maximum dewatering capability to VFL3 following cessation of leaching and sub ore neutralization, and to minimize the potential for infiltration through the liner during closure and following placement of the engineered cover. Operation of the dewatering well is expected to follow the modeled duration used in VFL3 infiltration model. The well was located using VFL3 as-built drawings and survey datum taken during the construction of VFL3. As-built drawings were used to provide the location of the deepest portion of the permanent process pool, and to ascertain elevations for the liner and the top of the Golden Gate Tailing Blanket. The boring was collared at a surveyed elevation of 7211.37 feet msl at coordinates N. 27303.13, E. 20891.14. This location was confirmed by a licensed professional surveyor prior to initiation of drilling. Barrick provided access to this location and constructed a drill pad location prior to drilling. Location of the well is shown on Figure 1. The well bore was advanced through approximately 170 feet of leached sub ore that was loosely consolidated to unconsolidated. Spent ore materials rest on historic Golden Gate Tailing, used as a blanket liner. This is shown on as-built drawings to have a thickness of 4 to 5 feet, and directly overlies a polyethylene flexible membrane liner (FML). VFL3 covers approximately 26 acres. The facility is located in the southern end of the Oquirrh Mountain Range in Meadow Canyon, within the northwest quarter of Section 5, Township 6 South, Range 3 West, and the south-west quarter of Section 32, Township 5 South, Salt Lake Base and Meridian. VFL3 has been in operation since December 1990.

1.1 Scope of Work

Barrick contracted the drilling, well installation, and well development for the dewatering well. Barrick issued technical specifications for well construction to the drilling contractor. Well drilling was performed by Layne Christensen of Salt Lake City, Utah. Well construction oversight, development, testing and sampling of the neutralized process water was performed by Global Environmental Technologies (GET) personnel. Barrick contracted the laboratory analysis to CHEMTECH Ford Chemical Laboratory in Salt Lake City, Utah. GET provided quality assurance, engineering and geological services during the field activities. The objectives of services provided by GET were to:

- Observe drilling and well construction activities in order to provide Barrick with quality assurance control, and;

- Collect and evaluate technical information.

The scope of services performed by GET included:

- Observation of drilling and well construction activities to evaluate conformance with technical specifications for dewatering well DW-20;

- Observation of well drilling to document that the optimum depth of drilling had been achieved, and the boring did not penetrate the liner materials;

- Development and pump installation;

- Compilation and interpretation hydrologic information. The boring was logged and hydraulic conditions were evaluated following the performance of well testing;

- Preparation of this summary report. Details of field activities are included in the appendices.

2.0 FIELD ACTIVITIES

Field activities included technical observation of the drilling and installation of well DW-20 and performance of well testing. Water quality samples were collected during the specific capacity test by GET. The results of the initial water quality analysis are presented in this report in Attachment A.

2.1 Drilling and Well Construction

Drilling, well installation, well development, and well testing were performed by Layne Christensen Drilling of Salt Lake City as contracted directly with Barrick. The boring was drilled with a Schramm 685 drill rig using ODEX reverse drilling methods. Drilling fluids included only air. The boring was drilled to a total depth of *174.7* feet below grade, and the outer ODEX casing was advanced directly behind the drill bit to avoid collapse of the loosely consolidated sub ore materials. Ore materials consisted of sand to boulder size particles that were loaded onto the valley fill through dumping from trucks. Air monitoring for cyanide was conducted throughout drilling and well construction activities. Air monitoring indicated that no cyanide was encountered in the boring during drilling or construction of the well.

The well was constructed using 6-inch Schedule 80 PVC materials in accordance with specifications issued by Barrick. No significant unforeseen conditions were encountered, and no modifications were made to construction procedures. Figure 2 shows the schematic construction details of the well.

Ten—inch ODEX casing was advanced through the neutralized ore to a depth of 173 feet. At this depth, drilling characteristics indicated that a softer (Golden Gate Tailing blanket) had been intercepted, which was confirmed by the nature of the return cuttings from the cyclone. Drilling commenced for approximately 1 additional foot into the tailing material.
The 10-inch casing was left in place, and a Mills Knife was lowered to the bottom of the casing. Four knife slots per foot of steel casing section were made between depths of 174 to 154 feet below grade.

The 20-foot section of PVC screen was lowered into the steel casing, with stainless steel centralizers attached at the base, middle and top of the screen. A PVC end cap was used to close the bottom of the screened assembly. Screen slot size was 0.040 inches. The screen was gravel packed using tremie methods. The gravel pack was a 8-16 cleanwashed Colorado Silica Sand, which extended from the bottom of the boring to 138.5 feet below grade. A 6-foot bentonite pellet seal was placed directly on the gravel pack to a depth of 132.5 feet. A neat-cement grout, placed using tremie methods was used to seal the well to the surface.

2.2 Well Development and Testing

The well was developed initially using a bailer to remove development sand and fine materials generated during the drilling of the boring. Water discharged from the well was collected in a container and inspected for the presence of sand pack and cuttings materials. Development was considered complete when the presence of these materials was negligible.

Attachment B contains detailed information on well development and testing. A short-term specific capacity test was conducted to provide estimates of specific capacity for the well in order to size pump requirements. The well was initially pumped at a constant rate. Throughout the testing, the pumping rate was increased and held in order to assess the changes in drawdown relative to the changes in pumping. Water levels initially dropped during each step of increase in discharge rate, but then began to recover as the increased rate was held constant. This recovery made assessment hydraulic parameters, such as transmissivity or hydraulic conductivity difficult to estimate with any degree of reliability. Water levels were measured periodically using an electric water level probe. Well DW-20 was pumped at rates varying from approximately 13.5 to 22 gpm, the fullest capacity of the pump.

2.3 Water Level Measurements

Prior to and after well completion and development, depth to water was measured using an electric probe and measuring to the nearest 0.01 foot. Water levels fluctuated between 162.15 to 163.50 feet below grade.

2.4 Water Quality Sampling

Water quality samples were collected by GET during the test on October 28, 1997. An initial sample was obtained at the beginning of the specific capacity test (DW-20-0), and then at approximately 2 hours into the test (sample DW-20-45), and a final set (DW-20-90) obtained after about 4.5 hours of pumping. Samples were analyzed by CHEMTECH Ford Analytical Laboratory of Salt Lake City, Utah. Attachment A contains water quality analyses for well DW-20.

Based upon the October 28, 1997 sampling analytical results of well DW-20, water quality indicates the following:

- The pH of the water remained constant at 7.10 throughout the test, and;

- Weak acid dissociable (WAD) cyanide concentrations consistently dropped throughout the test, from 0.70 mg/I to 0.082 mg/I at the end of the test.

3.0 Summary and Conclusions

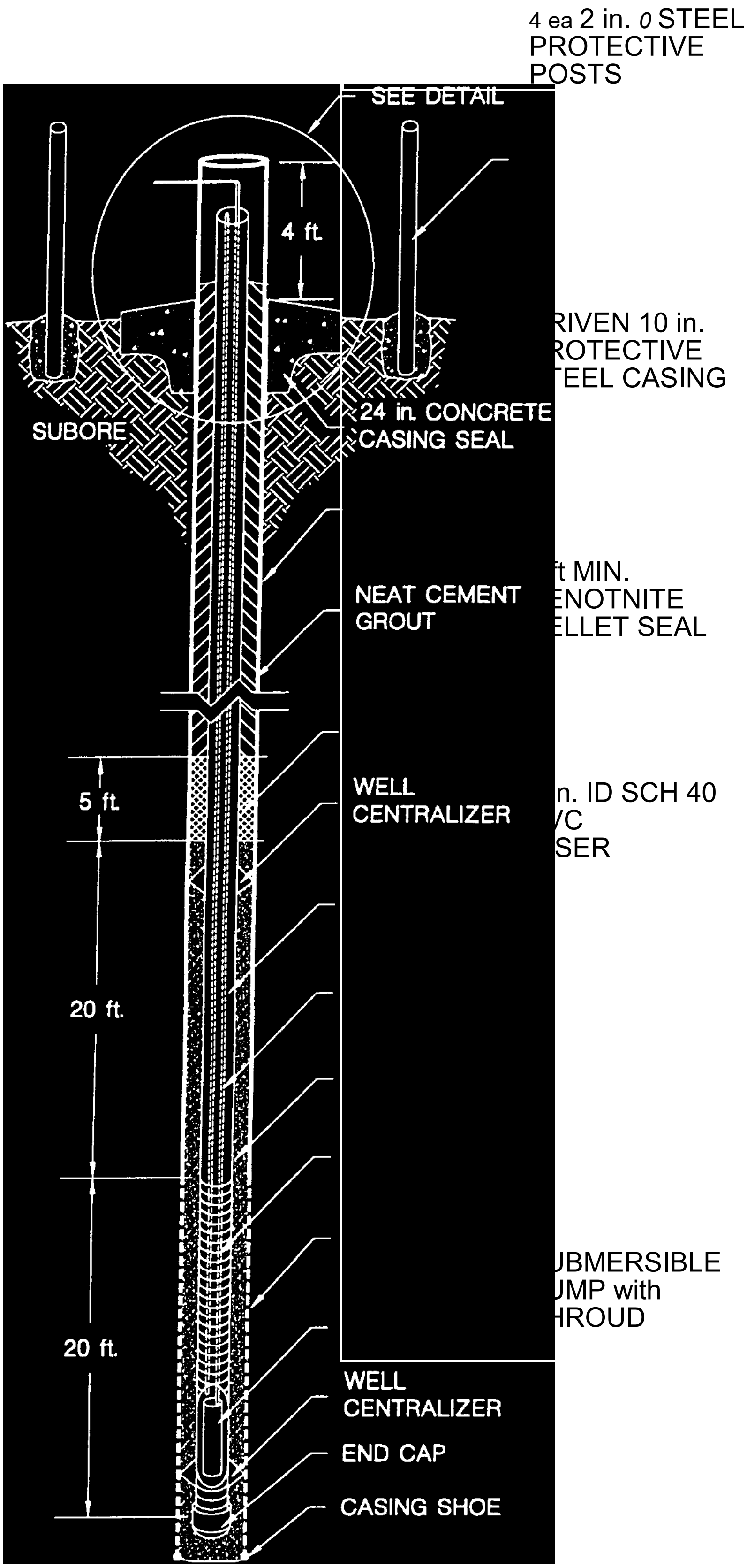
Results and conclusions of this study are summarized as follows:

1. Well DW-20 was drilled through neutralized sub ore to a total depth of 174 feet where the Golden Gate Tailing blanket was intercepted. The VFL3 liner was not reached or disturbed during drilling or construction.

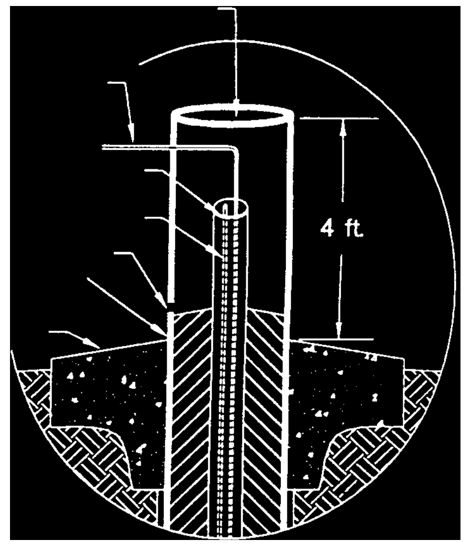
2. Completed installation depth of the vertical dewatering well will allow for essentially complete dewatering of VFL3 to a level above the liner that was modeled in the Infiltration and Solute Transport Analysis submitted with the August 1996 Conceptual Closure Plan for VFL3.

3. DW-20 was pumped at rates up to 22 gpm. Specific capacity was estimate to be 13 gpm per foot of drawdown at the end of the test. Hydraulic conductivity could not be estimated from the data.

4. Measurements of pH and cyanide-WAD obtained from the final water samples during the specific capacity test indicate that the neutralization of the sub ore through bioremediation techniques achieved the goals of the neutralization for both parameters.



ATTACHMENT A



WATER QUALITY CERTIFICATES OF ANALYSIS

ATTACHMENT B1
WELL TEST METHODS, DATA AND ANALYSIS

1.0 INTRODUCTION

A short-term specific capacity pumping test was conducted in well DW-20 on October 28, 1997 to estimate the specific capacity of the well. The average pumping rate and total drawdown measured during the test and the specific capacity, estimated from the test are estimated from measurements taken during the test. This attachment describes field methods used to conduct the test, presents the data obtained from the test, and summarizes the analytical methods used to estimate specific capacity.

2.0 FIELD METHODS AND DATA

The short-term specific capacity pumping test of well DW-20 was conducted using a temporary 4-inch submersible pump. On the day of the pumping test the pump was turned on from approximately 11:36 AM to 13:07 PM to adjust the pumping rate. Pumping rate measurements were made using a calibrated bucket and stop watch. The water level was allowed to recover for about 7 minutes after the pump was turned off before capacity test was started. The pumping test was conducted from 13:14 to 16:27 PM, a total pumping period of 193 minutes. Recovery measurements were obtained, but were not useful data because the water from the pumping column drained into the well.

Water level measurements were made during the test using an electric water level meter. Depth to water measurements, the time of each measurement, and the drawdown, recovery, and residual drawdown calculated were recorded during the test.

3.0 EVALUATION OF DATA

The recorded pumping rates ranged from 13.5 to 22.5 gpm. For most of the test the pumping rate was 20 gpm. A maximum drawdown of 2.4 feet was observed after about 3 minutes of pumping. The water level observed during the rest of the test rose up to about a foot or more, despite the increases in pumping rates during the test. The reason for the rise in water levels is unclear, because it does not appear to coincide with the snowmelt that was occurring during the test. A possible explanation for the rise in water levels is a decrease in pumping rate that occurred in the first few minutes of the test caused by the head loss associated with lifting water from the pumping water level to the ground surface. The first pumping rate measurement was made after approximately 3 minutes of pumping.

The water level rose to above the static water level during the recovery because the pump was not equipped with a check valve, which allowed water in the discharge pipe to flow back into the well.

4.0 Specific Capacity

According to Lohman (1972), specific capacity is equal to the pumping rate divided by the observed drawdown at a specified time during pumping. The drawdown observed at the end of the test (1.61 feet) was divided into the pumping rate measured at the end of the test (21 gpm) to obtain an estimated specific capacity of 13 gpm/foot for well DW-20.

REFERENCES CITED

Lohman, S.W., 1972, Ground-Water Hydraulics: U.S. Geological Survey Professional Paper 708, 70 p.

APPENDIX C

VALLEY FILL LEACH AREA No. 2

CLOSURE PLAN JULY 1995

[On File]

APPENDIX C

VALLEY FILL LEACH AREA No. 2

CLOSURE PLAN

July 1995

APPENDIX C

VALLEY FILL LEACH AREA No. 2

CLOSURE PLAN

July 1995

Valley Fill Leach Area 2 Plan and Compliance Schedule for Post-Closure Monitoring

1.0 General

This plan and compliance schedule for Valley Fill Leach Area 2 (VF2) has been prepared to comply with the requirements of Section 5.0 of the March 12,1992 Stipulation and Consent Order, Docket No. GW-90-03-A. This plan also supercedes all other similar descriptions and details that may have been submitted and/or discussed concerning the post-closure monitoring of VF2.

The requirements for ground water quality monitoring are applicable only to monitoring well MW-9.

2.0 Closure Approval

The closure of VF2 was conditionally approved by the Utah Department of Environmental Quality - Division of Water Quality in correspondence dated May 30, 1995. Item 8 of that correspondence required the preparation and submittal for approval of a post-closure monitoring plan. This fulfills that requirement. Final closure approval was given for VF2 by UDWQ in March 2001.

3.0 Facility Post-Closure Monitoring Plan and Schedule

3.1 Closure and Monitoring Schedule

Physical closure of VF2 commenced in June 1995 with the conditional approval from the UDWQ dated May 30, 1995. The schedule called for the completion of all VF2 shaping, contouring, cover placement and seeding by October 1995. Barrick completed the required 5-year post-closure monitoring of the leakage collection system in April 2001 and installed drillouts through the liner to provide free draining of infiltrated meteoric water. Barrick demonstrated that post-closure monitoring results met previous modeled predictions for the system. Long term physical, facility water, and ground water quality monitoring will continue, as described in Section 3.2, through the term of the permit.

3.2 Water Quality Monitoring

Appendix A to Permit UGW450002 is the Water Quality Assurance - Quality Assurance/Quality

Control Plan (QA/QC Plan) developed for the Barrick Mercur Mine. All specific components related to the monitoring of water quality from the ground water quality monitoring of well MW-9 can be found in Appendix A to the permit. Please note that the reporting of data to the UDWQ will be consolidated whenever possible.

3.2.1 Ground water

The ground water quality monitoring program involves only monitoring well MW-9 pursuant to the Stipulation and Consent Order. Details of this program can be found in Appendix A. A summary is as follows:

_ Semi annual sampling & water elevation readings will be obtained through the life of the permit.
_ Water quality analysis will be for water chemistry specified in Appendix A.

_ Reports to UDWQ will be on a semiannual basis as required by the permit Part I.I.1.

3.2.2 Facility

Facility monitoring involves cover monitoring and collection of water levels from the cistern drillouts. A summary is as follows:

3.2.2.1 Former Production Cistern

_ The former production cistern was abandoned with the approval of the Executive Secretary following the 5-year post-closure monitoring that was completed in April 2001. Two drillouts were installed in 2001 to allow for free draining of the former cistern. Water levels will be measured on a quarterly basis.

3.2.2.2 Leakage Collection System

_ The leakage collection system pumps and electric paneling were removed following the completion of the 5-year post-closure monitoring period. The leakage collection system is in-place. UDWQ approval will be necessary prior to any sampling, monitoring, or reporting modifications or abandonment of the system.

3.3 Facility Physical Monitoring

Post-closure physical monitoring will be principally designed to satisfy the requirements of the Utah Department of Natural Resources - Division of Oil, Gas & Mining (UDOGM) and the Utah Department of Environmental Quality - Division of Water Quality (UDWQ).

Monitoring of the revegetative effort is required by UDOGM for a minimum of three years or until adequate plant growth has been attained, is self-propagating, and is in accordance with the surety bond release provisions. Monitoring of facility stability, erosional impacts, and general security matters will be maintained until all Mercur site responsibilities have been accomplished by Barrick. Long term physical monitoring of VF2 will generally consist of inspections for cap erosion, quarterly water level measurements in cistern drillouts, settlement, animal burrows, drainage ditch integrity, and plant growth. Immediate repairs will be undertaken as necessary to return the spent ore cover to the original post-closure conditions. Access to the closed and reclaimed VF2 will be limited under the current conceptual post-closure public access corridor plan. Barrick's conditional use permit with Tooele County and agreements with adjacent landowners will be refined prior to December 1997.

APPENDIX D

RESERVATION CANYON TAILINGS

IMPOUNDMENT SITE CHARACTERIZATION

AND FINAL CLOSURE DESIGN

JULY 30, 1999

[On File]