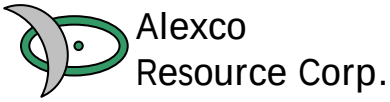

Brewery Creek Mine

Heap Leach Pad Cover and Facilities Monitoring Program

Date:

August 2005

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1 Background

Viceroy Minerals Corporation's (Viceroy) Brewery Creek Mine was issued an amendment to the company's Quartz Mining Licence (QML) in April 2004. The Brewery Creek Mine was subsequently sold to Alexco Resource Corp. (Alexco) in March 2005. Amendment 04-001 to QML A99-001 outlines terms and conditions associated with the Brewery Creek Mine Decommissioning and Reclamation Plan (DRP). Section 17.7.2 states:

> *"A detailed program designed to monitor and report on the geochemical and physical stability of the heap leach cover and pad, and associated facilities, must be submitted to the Chief for review and approval within 120 days of the effective date, and be implemented within 30 days of the Licensee receiving notice of its approval by the Chief, unless otherwise agreed, in writing, by the Chief…"*

2 Purpose

This detailed monitoring program fulfills the requirements of Section 17.7.2 of QML A99-001 Amendment 04-001. The purpose of the monitoring program is to assess the performance of the heap cover, heap effluent water quality and associated heap contingency measures. A heap detoxification adaptive management plan (AMP) for the heap leach pad has been previously prepared and submitted to the Government of Yukon (DRP Executive Summary, November 2003, Appendix G). The heap AMP outlines the contingency measures and responses that will be implemented if the effluent water quality or receiving waters is not achieving the performance standards and objectives. As such, triggers and response actions associated with the monitoring program are not provided in this document as they have already been addressed. These details are left to the heap AMP and will be implemented if necessary.

Pertinent data from the monitoring will be assessed (key trend indicators) to determine if adverse water quality trends are developing in the heap that may adversely impact downstream surface waters. This assessment will review the effectiveness of the closure remedial measures undertaken by the company. Results of the monitoring program will be routinely reported to the Government of Yukon.

3 Monitoring Points

The monitoring points associated with the heap are primarily water quality related. The following summarizes the various monitoring points included in this monitoring program:

1. Heap Water Quality:
    a. Heap Effluent (BC-28a);
    b. Heap solution discharge (BC-28).

2. Physical monitoring:
    a. Heap Stability;
    b. Cover Erosion;
    c. Cover Infiltration.
3. Surface water:
    a. WQ at BC-01;
    b. WQ at BC-02;
    c. WQ at BC-03;
    d. WQ at BC-06;
    e. WQ at BC-38;
    f. WQ at BC-39;
    g. Sediments at BC-01, BC-02, BC-03, BC-06, BC-38 and BC-39;
    h. Benthos at BC-01, BC-06 and BC-38.
4. Terrestrial monitoring:
    a. Revegetation success;
    b. Metals uptake.
5. Climatic monitoring:
    a. Precipitation;
    b. Snowpack;
    c. Evaporation.
6. Contingency measures:
    a. Land Application (Stations BC-65 and BC-66);
    b. Biological Treatment Cell;
    c. Solution Segregation Heap Cells.

Each of these monitoring categories is further discussed and a schedule and frequency for monitoring various stations within these categories is provided. Table 1 summarizes the frequency of the monitoring stations. Table 2 contains the parameters of analysis for the various stations, and Figure 1 shows the location of each of these stations.

4 Heap Water Quality

The primary monitoring locations associated with demonstrating heap detoxification performance are the heap effluent itself and the discharge water either from the heap directly or contained in the solution ponds. The heap solution collection system allows heap drainage to be either discharged directly or collected in the process ponds and discharged on a "batch" basis. The discharged solution, whether it is to the land application area, direct release or from the process ponds is designated as BC-28. The heap effluent is a discrete station designated as BC-28a. These two locations will be monitored as follows:

1. BC-28a will be monitored on a monthly basis when active (MWA) which is defined as when active discharge of effluent is occurring.
2. BC-28 will be monitored on a monthly basis when active which is defined as when active discharge of effluent is occurring.

3. LC50 toxicity sampling will be completed on BC-28 on a MWA basis.
4. Results from the heap effluent water quality (BC-28a) will be reviewed to ensure the geochemical stability of the heap.

Operating experience has demonstrated lag times in the heap from the top elevation until it reaches the discharge point is on the order of several weeks to months. Given this lag time, monthly sampling will capture any trends developing in changing water quality.

Analytical parameters for the heap water quality stations are summarized in Table 2.

The water quality data will be reported in the company's monthly report to the Yukon Water Board and QML Annual Report. Key trend indicators as outlined in Table 3 will be graphed and presented with historically data and used to assess heap performance.

The heap will be deemed detoxified and geochemically stable when the Total CN at BC-28a is less than 2.0 ppm for a period of 5 years.

For effluent and flow monitoring, the following protocols will be used:

Guidance Document for the Sampling and Analysis of Metal Mining Effluents, April 2001, (Report: EPS 2/MM/5), Minerals and Metals Division, Environment Canada.

Guidance Document for Flow Measurement of Metal Mining Effluents, April 2001, (Report: EPS 2/MM/4), Minerals and Metals Division, Environment Canada.

5 Physical Monitoring

A 0.25 meter storage and release cover was constructed over the heap in 2003. The purpose of the cover is to reduce the infiltration rate of precipitation through the heap and ultimately minimize the amount of solution requiring release. With respect to physical monitoring, the following programs will be conducted:

1. Annual geotechnical inspections of the heap for Years 1-5. Further geotechnical inspections conducted in years 10 and 15. A qualified professional will assess the stability of the heap and containment dike;
2. Inspection of the heap cover by a qualified professional for signs of erosion and general instability. The inspections will be conducted on an annual basis for Years 1-5 and on a biannual basis for Years 6-10;
3. Flow from the heap will be logged. Additionally, pond volumes will be recorded to use as a basis for the total volume of solution flowing from the heap over a period of time. The cover infiltration rate will be reviewed and assessed to ensure cover effectiveness; and
4. A report on the findings of the geotechnical report will be included in the company's annual report.

Infiltration through the cover will determined by using the same waterbalance model used in previous assessments. This model has been modified and presented in the 2004 QML Annual Report. The model uses actual snowpack and precipitation data, pond volumes and release volumes to determine the amount of solution that infiltrates through the cover. The model differentiates and separates surface runoff from water that infiltrates through the cover. The model uses the basic water balance assumption:

Starting Pond Volume + Water IN – Water OUT = Ending Pond Volume.

The starting and ending pond volumes can be measured at the end of each reporting period (i.e. monthly/quarterly).

Water IN is measured by snowpack surveys and precipitation amounts. The amount of precipitation falling over the leach pad is separated by the amount falling over the ponds.

Water OUT is directly measurable from the volumes of land application and direct discharge. The model balances the Water IN and Water OUT and calculates the "missing" amount of water that has left the system. This amount is assumed to be the volume that has been lost through evapotranspiration and uptake by vegetation.

6 Surface Water

There are six surface water stations of significance below the heap. These stations include BC-01, BC-02, BC-03, BC-06, BC-38 and BC-39. These stations will be monitored as follows:

1. Monthly at stations BC-01, BC-02 and BC-03 during years 1-3 and Quarterly during year 4-5. Quarterly for water quality during Years 1-5 at Stations BC-06, BC-32, BC-38 and BC-39;
2. Semi-annual for water quality during Years 6-10; and
3. Annual for water quality during Years 11-15.
4. Annually for sediments during Years 1-5;
5. Benthos monitoring at BC-01 (B3 benthos), BC-06 (B5 benthos), BC-38 (B4 Benthos) during Years 1, 3 and 5;

Analytical parameters for the surface water quality stations are summarized in Table 2. The surface water quality data will be reported in the company's monthly report to the Yukon Water Board and part of the QML annual report. Key trend indicators as outlined in Table 3 will be graphed and presented with historically data and used to assess heap performance and downstream receiving water quality.

This schedule is consistent with the requirements under the company's water license Amendment #7. Analytical parameters for the surface water quality stations are summarized in Table 2. Toxicity monitoring will not be conducted and is not a requirement for surface water in the water license monitoring program.

For sediment monitoring, the following protocols will be used:

- Environment Canada. December 1994. *Environmental Protection Series – Guidance Document on the Collection and Preparation of Sediments for Physico Chemical Characterization and Biological Testing*, Report EPS 1/RM/29.

- *Metal Mining Guidance Document for Aquatic Environmental Effects Monitoring*. Environment Canada. June 2002.

For benthos monitoring, the following protocols will be used:

- *Guideline for Monitoring Benthos in Freshwater Environments*. Environment Canada, 1993.
- *Metal Mining Guidance Document for Aquatic Environmental Effects Monitoring*. Environment Canada. June 2002.

Results from the surface water quality will be reviewed and compared with the existing downstream receiving water Canadian Council of Ministers of the Environment (CCME) Guidelines to ensure the effectiveness of closure remedial measures and environmental effects assessment. Key trend indicators as outlined in Table 3 will graphed and presented with historically data and used to assess the need for implementation of the heap detoxification AMP.

7 Terrestrial Monitoring

The following section outlines the monitoring program as it relates to vegetation on the heap.

Terrestrial monitoring related to the heap includes revegetation success and stability and metals uptake. These areas will be assessed by the following measures:

1. Annual inspections by a qualified revegetation specialist during Years 1-5;
2. Based on the recommendation of the specialist and the findings of the assessment during Years 1-5, additional annual monitoring during Years 6-15, with no less than 3 more annual assessments;
3. Metals uptake assessment for baseline conditions conducted during Year 1; and
4. Metals uptake assessment during Year 5 and 10.

Vegetation Test Plots

Three separate test plots will be established over the heap. These 5m x 5m plots will be identified and marked off and used for subsequent monitoring. Monitoring at these test plots will include, species composition, vegetation cover estimation, metals uptake, soil

erosion, moisture content and photographic record. The components of this program are presented below.

Species Composition

A qualified professional will catalogue and confirm species present within each test plot. Natural species and shrub invasion will be documented.

Vegetation Cover Estimation

The total vegetation cover will be monitored using a five graded scale:

- areas without vegetation cover 0-1 %;
- areas with sparse vegetation cover ranging from 1-12.5 %, 12,5 - 25 %, and 25 - 50 %; and,
- areas with sustaining covering 50 - 100 %.

Depth of plant root depth penetration will be recorded.

Vegetation and Soil Sampling for Metal Concentrations

Samples of plant tissue will be collected from established test plots at three locations for metal analysis. At each site, tissue samples from each species will be composited from the three test plots. Approximately 20 grams of each plant species (stem and leaves) were collected and analyzed for total metals.

Soil samples will also collected from a small hand dug pit at each of the test plots.

Vegetation and soil samples will be collected with latex gloves, placed in Ziploc bags, and shipped to an accredited laboratory for metals analysis. The moisture content of soils in the bottom of the test pit will also be determined.

Documentation of Soil Erosion

In each test plot soil erosion will be registered. Vegetation cover performance will be measured as noted earlier. With a ruler the depth and occurrence/non occurrence of erosion gullies deeper than 5 cm, created by water erosion, will be documented. Significant erosion gullies will be photographed and assessed for further maintenance.

Vegetation Plot Photographs

Each test plot will be photographed from a standardized survey hub. Vegetation cover performance, species composition and erosion can be documented over time.

8 Climate Monitoring

Monitoring of climate data is necessary to determine overall infiltration rates through the heap cover.

A manual station is already established near the administration complex and is used for recording climate data used in both assessments for the Blue WRSA and the heap. An automatic station has historically been used at the minesite but as there is no longer any ongoing power supply, the recording of climate data has moved to a manual system. Battery and solar powered systems will be investigated and the automatic station may be used as an alternative to the manual system.

Precipitation will be collected and measured using a manual graduated precipitation gauge. An automatic station may be used in the future. Precipitation will be monitored on the following schedule:

1. On a monthly basis during Years 1-3 and;
2. On a quarterly basis during Years 4-15.

In addition, snowpack surveys will be conducted prior to the onset of the spring freshet and at a minimum will include surveys at the end of March during Years 1-15.

At least six snow survey stations will be established over the heap surface. The snow survey locations will be surveyed and marked to ensure the continuity of the data from one survey to the next. The snow survey procedures consist of cutting a vertical face in the snow, measurement and description of the layering, and coring of the snow for density analysis. Coring of the snow is completed using a 5.1 cm ID x 110 cm long aluminum tube. Five samples are taken from each location and the average of the samples is used to determine the snowpack for each location. After a sample is taken, it is put into a zip lock bag and sealed. Water equivalent is determined by weighing the melted snow and calculating water equivalence based on weight and volume of snow collected.

Evaporation will be measured using a galvanized pan conforming to Evaporation Pan Class ‘A’ dimensions (1219mm diameter by 254mm high). This equipment and approach is the same as used over the past 8 years as required in the company’s water license. Evaporation will be measured during the months of May – September. Evaporation measurements will be taken on the following schedule:

1. On a monthly basis for Years 1-3;

2. Quarterly basis for Years 4-5.

The climate data will be compiled and used to assist with the assessment of the cover effectiveness. Results will be reported in the annual report,

9 Contingency Measures

Contingency measures have been incorporated into the heap detoxification plan in the event the heap effluent water quality does not remain stable. Complete details are presented in the heap AMP. The primary heap contingency measures requiring monitoring consist of the following:

1. Land Application;
2. Biological Treatment Cell (BTC); and
3. Solution Segregation Heap Cells.

9.1 Land Application

Monitoring of the land application area will be consistent with the requirements in the company's Water Use License QZ96-007 and any amendments.

9.2 Biological Treatment Cell

A biological treatment cell (BTC) is a passive contingency measure. In the event the BTC is constructed, the company's QML requires the submission of an operating, monitoring and maintenance plan. As such, details of monitoring of the BTC will be provided as a condition of Clause 17.12.2, within 120 days of the completion of construction of the BTC.

9.3 Heap Cell Solution Segregation

Segregation and collection of individual solution cells has been proposed as a contingency measure. This measure is included in the heap AMP, previously provided in the company's DRP Executive Summary, 2003 (Appendix G). With respect to this monitoring program, individual heap cells will not be monitored on a set basis for water quality unless the heap AMP is triggered and implemented. In this event, the heap cell monitoring program will be consistent with the schedule and frequency contained in the heap AMP.

10 Heap Assessment

On an annual basis as part of the annual report, an assessment will be undertaken of the monitoring program data, including all key trend indicators. This assessment will review the performance and effectiveness of the heap remedial measures and need for maintenance activities or additional monitoring. The assessment will also review effects to the downstream receiving environment to ensure that performance receiving water criteria are being adhered to and whether the heap detoxification AMP is required.

11 Reporting

Results of the heap monitoring program will be reported in the company's monthly and annual reports. Discussion of key trends indicators will be provided. Table 3 summarizes the key parameters that will be used to assess the effectiveness of the remedial measures. These key parameters will be graphically compared to previous years to determine if any adverse trends are developing. This assessment will be made to determine if the Heap AMP requires implementation.

Alexco Resource Corp.
Brewery Creek Mine

Table 1
Heap Leach Pad Cover and Facilities Monitoring Program

Frequency	Description
Q	Quarterly
SA	Semi-annual
A	Annual
QWA	Quarterly when active
AWA	Annual when active
BA	Bi annual
NLA	No longer active

		UTM LOCATION (m) ZONE 7		TYPE/STATION ID					YEAR 1-5 FREQUENCY					
SITE	DESCRIPTION	Northing	Easting	Surface Water	Groundwater	Effluent	Sediment	Benthos	Surface Water	Groundwater	Effluent	Sediment	Benthos	Other
BC-01	Laura Ck., 50 m u/s from Ditch Road	7,099,870	634,405	BC-01			W5	B3	M/Q			A	BA	
BC-02	Carolyn Ck. u/s from Laura Ck.	7,102,410	632,240	BC-02			W15		M/Q			A		
BC-03	Laura Ck. above Carolyn Ck.	7,102,500	632,295	BC-03			W4B		M/Q			A		
BC-06	South Klondike d/s from confl. with Lee Ck.	7,097,200	627,345	BC-06			W9	B5	Q			A	BA	
BC-28	Effluent solution to LAA or Laura Ck.	7,103,850	632,540			BC-28					QWA			
BC-28a	Heap Effluent	7,104,180	632,410			BC-28a					Q			
BC-38	South Klondike u/s from confl. with Golden Ck.	7,102,600	642,200	BC-38			W8	B4	A			A	BA	
BC-39	Laura Ck., u/s South Klondike River	7,098,290	631,425	BC-39			BC-39		Q			A		
BC-65	Land Application Piezometer	7,104,020	632,840		Q					A				
BC-66	Land Application Piezometer	7,103,570	632,655		Q					A				
	Heap Leach Pad Geotechnical Inspections													A
	Heap Leach Pad Revegetation Monitoring													A
	Heap Cover Monitoring													A

Alexco Resource Corp.
Brewery Creek Mine

Table 1
Heap Leach Pad Cover and Facilities Monitoring Program

Frequency	Description
Q	Quarterly
SA	Semi-annual
A	Annual
QWA	Quarterly when active
AWA	Annual when active
BA	Bi annual
NLA	No longer active

		YEAR 6-10 FREQUENCY						YEAR 11-15 FREQUENCY					
SITE	**DESCRIPTION**	**Surface Water**	**Groundwater**	**Effluent**	**Sediment**	**Benthos**	**Other**	**Surface Water**	**Groundwater**	**Effluent**	**Sediment**	**Benthos**	**Other**
BC-01	Laura Ck., 50 m u/s from Ditch Road	SA						A					
BC-02	Carolyn Ck. u/s from Laura Ck.	SA						A					
BC-03	Laura Ck. above Carolyn Ck.	SA						A					
BC-06	South Klondike d/s from confl. with Lee Ck.	SA						A					
BC-28	Effluent solution to LAA or Laura Ck.			QWA						QWA			
BC-28a	Heap Effluent			Q						Q			
BC-38	South Klondike u/s from confl. with Golden Ck.	A						A					
BC-39	Laura Ck., u/s South Klondike River	SA						A					
BC-65	Land Application Piezometer		A										
BC-66	Land Application Piezometer		A										
	Heap Leach Pad Geotechnical Inspections						year 10						year 15
	Heap Leach Pad Revegetation Monitoring						year 10						year 15
	Heap Cover Monitoring						year 10						year 15

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Brewery Creek Mine

Table 2
Water Sample Analysis Parameters

												33-Element					
Monitoring Type	pH	Flow/Depth	TDS	TSS	Alk.	Acidity	SO4-	NH3	NO4	T CN	WAD CN	ICP T Metals	ICP D Metals	LC_{50}	TOC	LOI	Sieve Analysis
Heap Effluent	x	x	x	x	x	x	x	x	x	x	x	x					
Surface Water	x	x	x	x	x	x	x	x	x	x	x	x					
Groundwater	x	x[1]	x	x	x	x	x	x	x	x	x		x				
Sediments												x			x	x	x
Benthos																	

Notes 1 - water elevation

Alexco Resource Corp.
Brewery Creek Mine

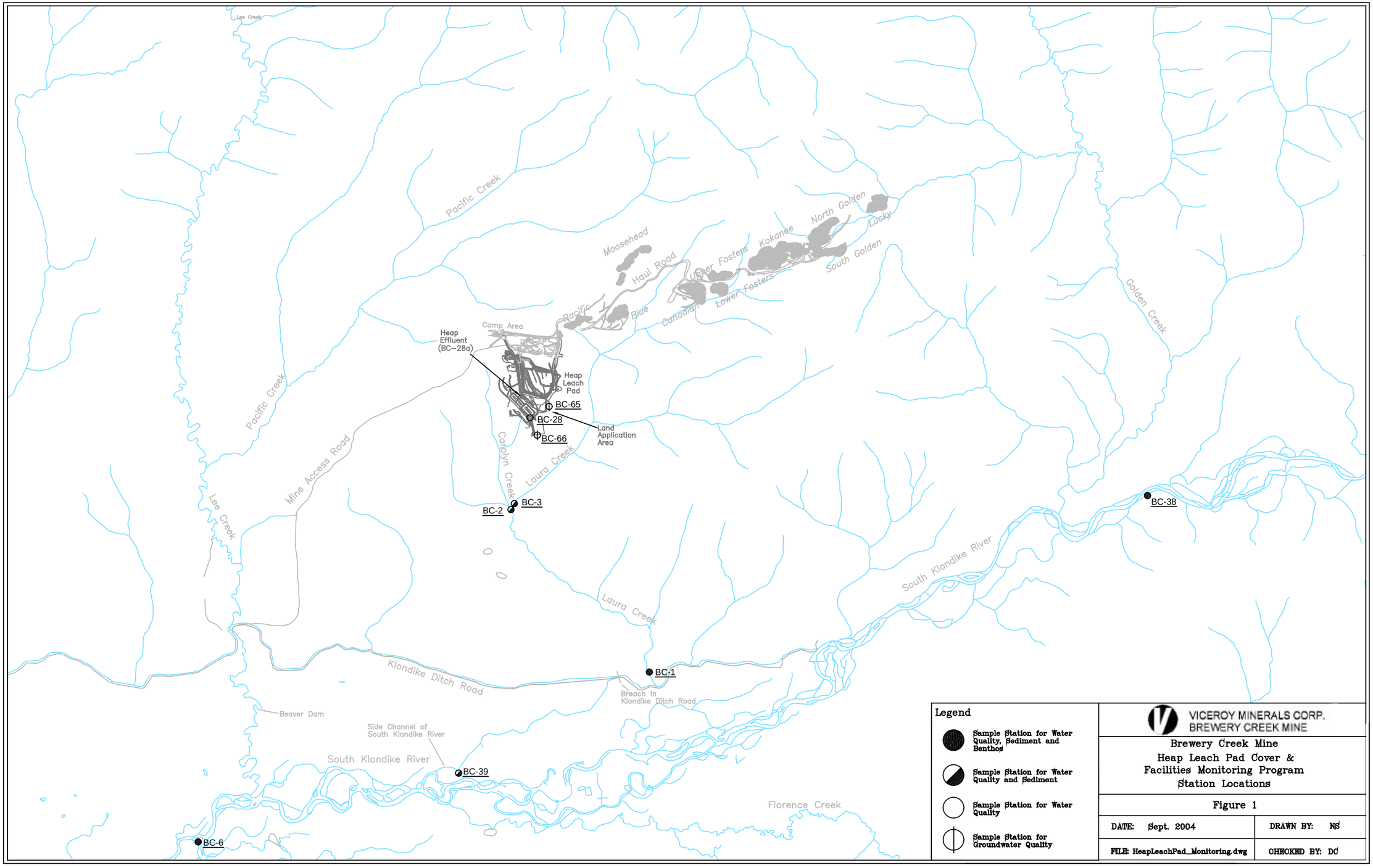
Table 3
Heap Leach Pad Cover and Facilities Monitoring Program

Key Trend Indicators

		Key Parameter and Frequency - Year 1-5							
SITE	**DESCRIPTION**	**pH**	**Flow/Depth**	**SO4-**	**WAD CN**	**ICP T Metals (As, Sb, Se)**	**LC50**	**Sediment (T. Metals As, Sb, Se)**	**Inspection**
BC-28	Heap Effluent	MWA	MWA	MWA	MWA	MWA			
BC-28a	Heap Solution Discharge	MWA	MWA	MWA	MWA	MWA	MWA		
BC-01	Laura Ck., 50 m u/s from Ditch Road	M/Q	M/Q	M/Q	M/Q	M/Q		A	
BC-02	Carolyn Ck. u/s from Laura Ck.	M/Q	M/Q	M/Q	M/Q	M/Q		A	
BC-06	South Klondike d/s from confl. with Lee Ck.	Q	Q	Q	Q	Q		A	
BC-39	Laura Ck., u/s South Klondike River	Q	Q	Q	Q	Q		A	
	Heap Leach Pad Geotechnical Inspections - Stability								A
	Heap Leach Pad Revegetation Monitoring - Growth								A
	Heap Cover Monitoring - Infiltration Rate		QWA						A

Frequency	**Description**
M/Q	Monthly Years 1-3, Quarterly Years 4-5
MWA	Monthy When Active Years 1-3, Quarterly When Active Years 4-5
Q	Quarterly
QWA	Quarterly while flowing
A	Annual

Analyses Annual report to provide individual graphs for the key parameters noted above and trends identified. Historic trends from previous years to be compared.
Monitoring for pH, SO4, WAD CN, Metals (As, Sb, Se) and bioassay at BC-28 and BC-28a provides early warning of changes in heap with key indicators and flag for furhter action. Monitoring stations BC-01; BC-02; BC-06; and BC-39 monitoring key trends in receiving waters and flagged for further action. See Heap Leach Pad AMP.
Geotechnical and revegetation monitoing annual assessment of structural stability and vegetation growth.


Lee Creek
Pacific Creek
Moosehead
Haul Road
Upper Fosters
Kokanee
North Golden
Lucky
South Golden
Lower Fosters
Canadian
Blue
Pacific
Camp Area
Heap Effluent (BC-28a)
Heap Leach Pad
BC-65
BC-28
BC-66
Land Application Area
Carolyn Creek
Laura Creek
Golden Creek
Pacific Creek
Mine Access Road
Lee Creek
BC-2
BC-3
BC-38
South Klondike River
Laura Creek
Klondike Ditch Road
BC-1
Breach in Klondike Ditch Road
Beaver Dam
Side Channel of South Klondike River
South Klondike River
BC-39
Florence Creek
BC-6
Legend
Sample Station for Water Quality, Sediment and Benthos
Sample Station for Water Quality and Sediment
Sample Station for Water Quality
Sample Station for Groundwater Quality
VICEROY MINERALS CORP.
BREWERY CREEK MINE
Brewery Creek Mine
Heap Leach Pad Cover &
Facilities Monitoring Program
Station Locations
Figure 1
DATE: Sept. 2004
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FILE: HeapLeachPad_Monitoring.dwg
CHECKED BY: DC