KENO HILL SILVER DISTRICT

ADAPTIVE MANAGEMENT PLAN – 2009 UPDATE

PREPARED BY:

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1. INTRODUCTION

1.1 BACKGROUND

The Keno Hill Silver District, inclusive of Galena Hill, Sourdough Hill, and Keno Hill, is located in the vicinity of Elsa and Keno City, Yukon, approximately 354 km due north of Whitehorse (please see Figure 1-1). From the first discovery of silver in July, 1903 extensive exploration and prospecting led to numerous commercial open pits and underground mining operations throughout the property; however, due to falling silver prices, commercial production of the property was suspended on January 9, 1989.

Two companies, AMT Canada Inc. and Nevada Pacific Gold, respectively, attempted to commence operations on the property since that time. However, each company ceased to be involved with the project and, as such, the Court appointed PricewaterhouseCoopers Inc. as Interim Receiver and Receiver-Manager of United Keno Hill Mines Limited and UKH Minerals Limited (collectively known as "UKHM") on April 6, 2004. Subsequently, through a selection process Alexco Resource Corp. (Alexco) became the preferred purchaser of the UKHM assets (June 24, 2005). In February 2006, following negotiation of a Subsidiary Agreement between the Government of Canada, the Government of Yukon and the Company, the Supreme Court of Yukon approved the purchase of the assets of UKHM by Alexco through its wholly owned subsidiary, Elsa Reclamation & Development Company Ltd. (ERDC). In December, 2007, Alexco registered the vesting order at the Mayo Mining Recorder Office, the Yukon Land Title Office and the Yukon Lands Branch. This action brought to “Final Close” the acquisition by ERDC of the assets of UKHM, and followed the granting of Water Use Licence QZ06-074 to ERDC by the Yukon Water Board on November 14, 2007. WUL QZ06-074 specifically addresses environmental care and maintenance activities in the district.

In January 2008, Alexco Resource Corp. applied for a Water Use Licence and a Class 4 Mining Land Use Approval to authorize advanced exploration activities in the Keno Hill Silver District. The Class 4 Approval (LQ00240) was issued on June 17, 2008 followed by Water Use Licence QZ07-078 on October 3, 2008 which addresses water usage for the purpose of advanced exploration and preliminary development activities at the Bellekeno Mine in the Keno Hill Silver District.

Under the Care and Maintenance Water Use Licence (QZ06-074) an Existing State of Mine Closure Plan (Closure Plan) is being developed for the district to address long term site liabilities and technical studies relating to ultimate closure are ongoing.

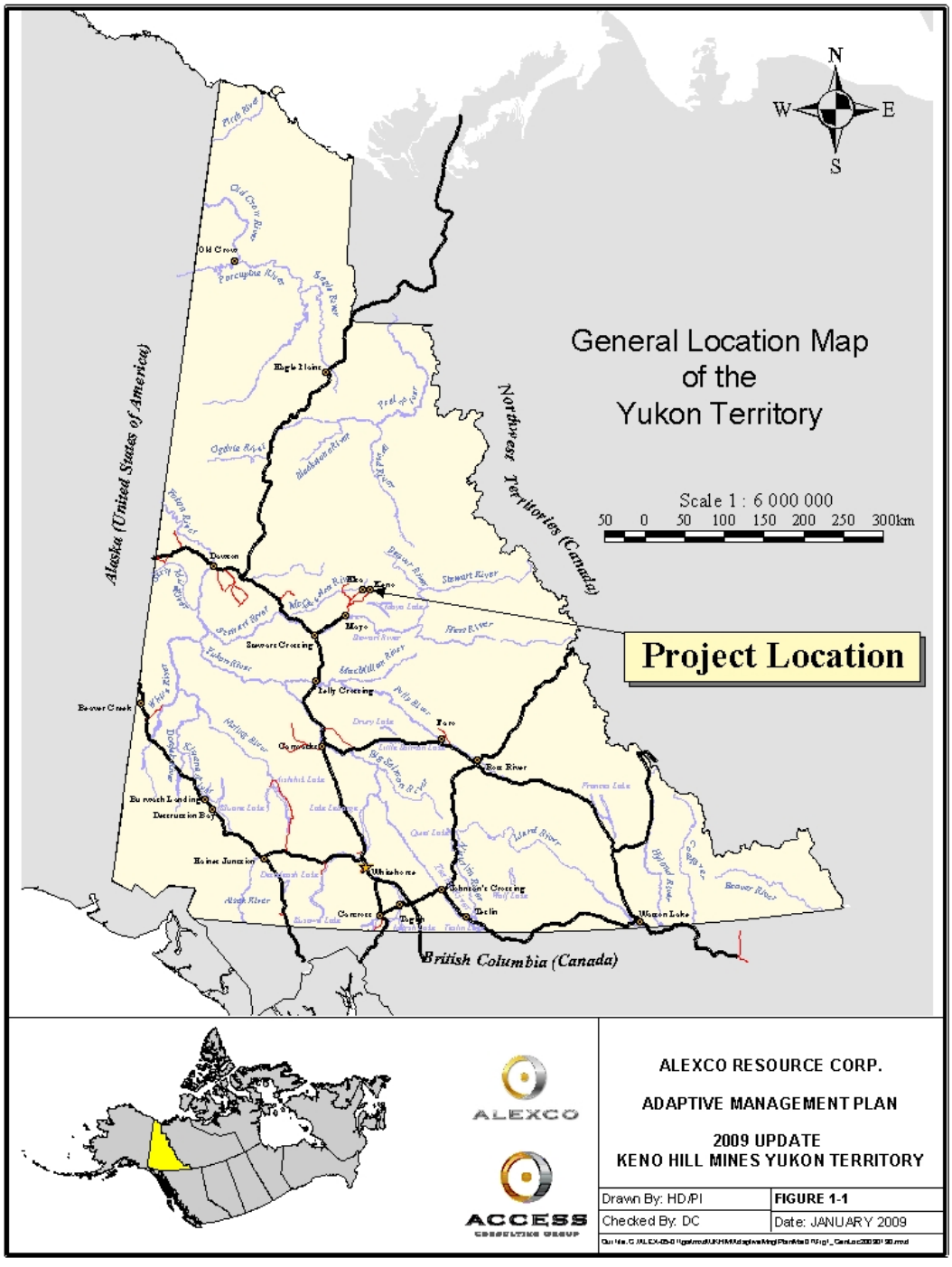
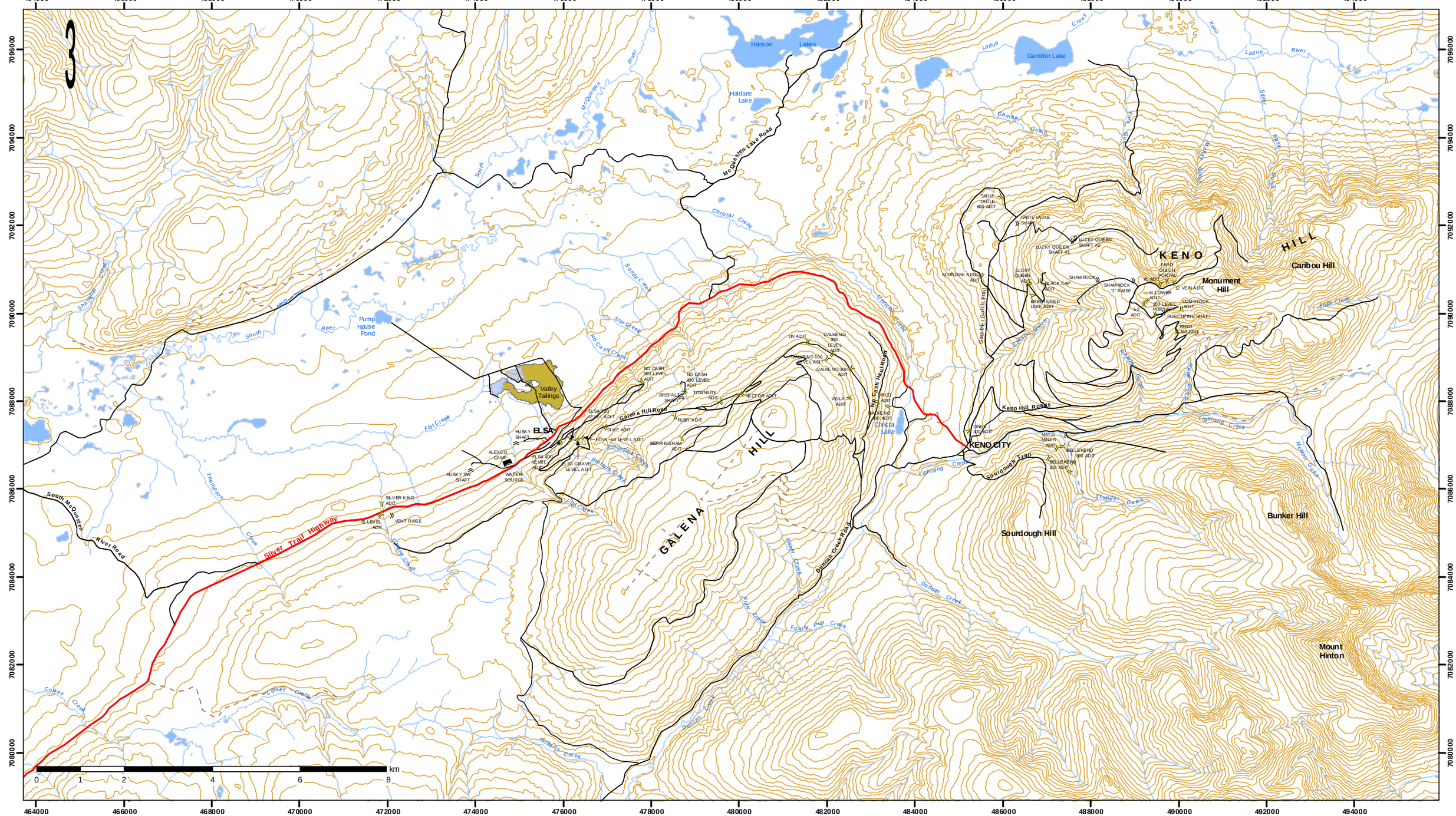


Figure 1-1 Site Location Map Within Yukon

1.2 HISTORIC MINE WORKINGS

Historic mine workings are routinely inspected to ensure public health and safety and continued site security; monitored for site changes or damage; and sampled periodically for flow and water quality. Older mine workings are monitored on a weekly basis during open water season with results of inspections documented and corrective action taken if required. Winter inspections are limited to accessible sites. The site inspection checklists are provided within the Environmental Monitoring Program in Appendix A. Figure 1-2 shows an overview of the property with the mine workings.

The Keno Hill Silver District has a rich and detailed history with many of the older workings dating back to the early 1920's. A complete description of site workings is provided in the report entitled, "UKHM Site Characterization Report", (Access Mining Consultants Ltd., 1996). Chapter 5 – Site Description, of this report provides a detailed description of the entire Keno Hill Silver District mine site developments, including history, type of development and infrastructure, and site plans and figures. The reader is referred to this report for a complete description of development activities undertaken at the old mine workings located on the property. A summary of historic development at each of the mines at the Keno Hill Silver District is provided in Table 1-1.



Legend

Topography

- Town
- Silver Trail
- Secondary Road
- Limited-use road
- Trail
- Watercourse
- Waterbody

Mine Workings

- Valley Tailings
- Adit
- Shaft (to surface - connection to underground not determined)

Notes:
This map is for illustrative purposes only.
This is not a legal document.
National Topographic Data Base (NTDB) compiled by Natural Resources Canada at a scale of 1:50,000. Cadastral data compiled by Natural Resources Canada. Reproduced under license from © Her Majesty the Queen in Right of Canada, Department of Natural Resources Canada. All rights reserved.
Quartz Claim boundaries are current as of October 14, 2005. Data source: http://geomaticsyukon.ca.
Crown Grants confirmed by Land Titles November 2005.
Projection: UTM Zone 8 NAD83
NTS Sheet 105M/13 and 105M/14

ALEXCO

ACCESS CONSULTING GROUP

Property Overview

Drawn By: HD	Date: January 2009	FIGURE 1-2
Checked by: RM	File: D:\Project\AlProjects\ALEX 05-01\gis\mxd\UK\MBE\Jan07\Fig1_SiteInsp.mxd	

Table 1-1 Summary of Historic Development

Summary of Development								
Mine	**Open Pit**	**Underground # levels**	**Shafts, Raises Portals, Adits**	**Bldgs and Equip.**	**Rock Piles waste, ore**	**Mill Tailings**	**Other**	**Adit Discharge & Drainage**
Galena Hill								
Bermingham	2 178,512 t mined	3 for 250 ft depth 7,754 t mined	8 shaft 1 adit	3 bldg @adit	3 continuous 1,000,000t@pit 7,000@adit			KV-18 No Cash Creek drainage
Calumet	3 108,547 t mined	1300 ft depth extensive UG, many lev,2.6Mt	1 shaft 1 adit	none	3@pits,1@adit 1,110,000@pits 198,000t@adit		head of tramway town removed	No discharge
C-structure	1 2,392 t	0			1 28,000 t			No discharge
Dixie		1 23,872 t	1 adit 1 shaft	1 bldg	1 @ adit 19,800 t			No discharge
Elsa		7@+50,100,200 200,400,525,650 &775; 491,009t	6 adits 1 internal shaft >2 raises		3 51,650 t	mill & dams existing + old tlgs	existing town	No discharge
Galkeno		6@100,200,300 400,500,900	5 adits 2 internal shaft 1 external shaft	old bldgs	4 total 171,400t	3,000 to 5,000 t old mill removed	treatment plus ponds 900 level	KV-27 Galkeno 300 level Adit Christal Creek and Lake KV-31 Galkeno 900 level Adit Christal Creek and Lake
Husky		4@125, 250,375 &450; 429,367 t	1 shaft	H.frame	1WR 4,600 t			
Husky SW		3 @ 250, 400, &530; 10,461 t	1shaft	H.frame, blast.	1WR, 1Ore 17,000 t			KV-17 Husky SW Adit No discharge
Miller	1 9,263 t	1 in open pit minimal prdn.	1 old shaft (open pitted)		1 @ pit 63,000 t			
No Cash		4@100,200,300 300 & 500 levels 166,530 t mined	1 raise, 1 shaft 2 adits	h. frame, bldg	1 138,100@500L 6,500 @ 100 L		tram station	KV-20 No Cash 500 level Adit
Ruby		1 @400 level 40,652 t mined	1 raise, 1 adit	1 bldg	1 WR, cribbing 29,800 t		power, tracks	KV-19 Ruby Adit
Silver King	1 6,631 t mined	3 for 325 ft 200,982 t mined	2 shafts, 4 adits 3 raises		2 rock, 1 ore 43,000t@adit 120,000t@pit		treatment plus ponds	KV-13 Silver King Adit Flat Creek drainage
Sime	3 47,304 t	0 (see Galkeno)			3 450,000 t			
Townsite		1 adit 18,570 t	1 adit 1 raise	1 bldg	1 14,300 t		cribbing one bldg	Seasonal discharge
UN		1 adit (no ore mined)	1A		1 3,200 t			Seasonal discharge

Table 1-1 Summary of Historic Development (Continued)

Summary of Development								
Mine	**Open Pit**	**Underground # levels**	**Shafts, Raises Portals, Adits**	**Bldgs and Equip.**	**Rock Piles waste, ore**	**Mill Tailings**	**Other**	**Adit Discharge & Drainage**
Sourdough Hill								
Bellekeno		9 40,502 t mined	4 adits	@625 portal	4 63,950 t		treatment	KV-42 Bellekeno 600 Adit Lightning Creek drainage
Keno Hill								
Black Cap	1 47,497 t	2 ? 1,079 t	2 adits		1 390,000 t @ pit			
Flame & Moth	1 1,590 t	1 (small)	1 adit		1 small		remaining reserves	KV-36 Flame & Moth No discharge
Comstock-Keno Porcupine	1 4,253 t	3 22,863 t ?	3 adits 1 raise	2 @portals	2 1@pit, 1@UG 6,500 t			
Keno 700 & Shamrock "J"		8 283,517 t	4 adits, 2 shafts several raises	several	2 42,100 t total		several veins mined, old camp	KV-33 Keno 700 level Adit Lightning Creek drainage
Lucky Queen	1 (small pit)	4 123,530 t mined	1 shaft, 1 adit	1 @500 portal	2 66,900 t			KV-34 Lucky Queen Adit Cristal Creek drainage
Onek	1 62,254 t	4 for 400 ft 33,036 t	2 shafts 1 adit		3; 7,500 @ adit 600,000 t @ pit			KV-45 Adit flow to ground Cristal Creek drainage
Sadie Ladue		6 244,330 t mined	1 adit	1	2 44,000 t	1	loadout	KV-35 Sadie Ladue 600 level Adit
Shamrock	2 5,035 pit + UG	3	1 shaft 2 adits	shaft bldg	2 9,000 t			No discharge
Valley Tailings							3 ponds	KV-12 Pond #3 decant Flat Creek drainage

1.3 ALEXCO ACTIVITIES

Alexco's is undertaking care and maintenance, exploration and development, and closure studies in the Keno Hill Silver District which includes various activities:

Principal activities:

- surface drilling and advanced underground exploration with view to mine development;
- direct use of water for camp purposes and quartz mining undertakings;
- direct use of water and wastewater for lime mixing operations;
- deposit of waste into water and receiving environment;
- waste rock storage;
- construction and upgrades to access roads;
- operation and maintenance of existing five wastewater treatment facilities and associated settling ponds using lime treatment (Silver King 100, Galkeno 900, Galkeno 300 and Bellekeno 625 adits and the Valley Tailings Area);
- storage of wastewater in the treatment settling ponds and Valley Tailings Area; and
- maintenance of existing diversion channels (Porcupine Creek) and ditches.

Accessory activities:

- maintenance and operation of site infrastructure related to water treatment systems and access roads;
- site security and maintenance of site facilities and structures for public health and safety;
- transport of milk of lime solutions to treatment sites;
- periodic desludging of treatment settling ponds and transportation or pumping to sludge storage areas which are periodically decanted;
- mine dewatering to advance underground exploration or development;
- water sampling (effluent and receiving waters);
- waste rock analysis and classification;
- environmental monitoring, inspections and sample programs, including monitoring and inspection of physical structures;
- removal and clean up of infrastructure related to adits, adit structures and facilities;

- wastewater treatment studies and test programs related to potential closure design options; and
- operation, inspection and maintenance of the Valley Tailings Area.

1.4 PLANS IN PLACE

The Company recognizes that there are waters and physical workings at the Keno Hill Silver District that could potentially become an environmental risk or hazard that do not yet require immediate attention. The development of an Existing State of Mine Closure Plan is intended to address these water discharges and workings which require further intervention over the long term.

Several plans are currently in place pursuant to the existing licences and approvals and are referenced throughout the AMP. A site-wide Environmental Monitoring Program has been compiled for the Keno Hill Silver District which incorporates monitoring associated with the various site activities that are taking place. The Environmental Monitoring Program (EMP) is contained in Appendix A as it provides a basis and grounding for the AMP, and coincides with licenced monitoring requirements. The EMP outlines monitoring plans for physical inspections, and water and aquatic resources.

Additional plans have been prepared pursuant to Water Licences QZ06-074 and QZ07-078, and the Class 4 Mining Land Use Approval to guide the management of activities and monitoring associated with site care and maintenance as well as advanced exploration and preliminary development:

- Waste Rock Management Plan (January 2008);
- Sludge Management Plan Revision No.1 (May 2008);
- Waste Rock Metals and Acid Base Accounting Testing Plan (October 2008);
- Physical Inspection and Reporting Plan (October 2008);
- Flow Monitoring Plan (October 2008); and
- Mine Wall Testing Plan (October 2008).

However, to address risks or hazards over the short term, an adaptive management strategy is required in the event conditions degrade to the point where management actions

are required. This document has therefore been developed and provides detailed AMP implementation protocol for the company's operations at the Keno Hill Silver District.

2. ADAPTIVE MANAGEMENT PLAN OVERVIEW

2.1 ADAPTIVE MANAGEMENT PLAN OBJECTIVES

An adaptive management plan (AMP) is a management tool designed to guide responses to unforeseen or contingency events respecting for example, water quality and quantity and physical conditions of site workings and infrastructure. The adaptive management approach will provide for assessment of mitigation measures and their effectiveness, and guide the orderly implementation of responses. Since it is difficult to predict the specific environmental condition that may arise which requires a response from management, the AMP does not necessarily provide specific detailed descriptions of responses to a situation. The AMP provides a range of possible responses to use as a guide to respond to specific environmental conditions encountered. Management should use the information provided in the AMP and adapt the appropriate response from this guide, which is the sole purpose of an AMP.

The AMP framework encompassing active Company management includes:

- routine inspection and environmental monitoring, maintenance and reclamation;
- routine assessment of monitoring and performance data;
- performance thresholds for implementation of appropriate levels of responses for planned contingency measures; and
- reporting of monitoring results and actions.

Results of the monitoring programs (Section 1.4 – Plans in Place), will be assessed on an ongoing basis to determine if any negative trends in water quality, quantity or other parameters are occurring. If the results indicate that there are no negative environmental impacts, then the frequency and length of monitoring and maintenance would continue as usual. Adaptive management will be implemented to respond to negative trends observed through the monitoring programs.

2.2 AMP EVENTS SUMMARY

A number of "events" have been identified which represent potential environmental conditions that would require a management response, if they were to occur:

1. **Change in Water Quality or Quantity**
    a. Significant Change in Water Quality
        i. Water Treatment Facilities/ Licenced Effluent Discharges
        ii. Adit Discharges
        iii. Bellekeno Mine Water Quality Significantly Altered After Dewatering
        iv. Receiving Water Quality Significantly Altered During or Subsequent to Dewatering Bellekeno Mine
    b. Significant Increase or Decrease in Monitored Flow Occurs
        i. Bellekeno Mine Water Quantity Significantly Altered After Dewatering
    c. Currently Monitored Water Flow Stops
    d. New Water Flow is Observed
    e. Water Flow Path Changes
2. **Waste Rock Seepage Exhibits AML**
    a. Waste Rock Seepage/Run-Off Trending to AML Conditions
3. **Sludge Storage Area Effectiveness Compromised**
    a. Seepage Observed Near Sludge Storage Area
    b. Sludge Storage Area Approaching Capacity
4. **Physical Instabilities**
    a. Area of Significant Subsidence is Observed
    b. Rock Fall or Landslide Occurs Within a Monitored Area
    c. Structure Failure or Portal Collapse
5. **Site Security Compromised**
    a. Gate, Fence or Sign Damaged

The AMP's for each of these events are described individually in subsequent sections while Table 2-1 at the end of this section provides a summary of the approach to AMP events. This table describes a narrative trigger, indicators and response thresholds, monitoring locations and parameters.

2.3 AMP APPROACH

For each AMP event a methodical approach is provided:

1. Description of the event and possible environmental consequences - Addresses issues or information that trigger the AMP;
2. Location of possible event occurrence – Identifies specific working site locations if applicable to event;
3. Monitoring requirements – Identifies the parameters to be monitored, frequency and means for monitoring each parameter;
4. Specific indicators and thresholds - Defines the conditions when management actions should be taken. There may be a series of indicators and staged thresholds for an individual event; and
5. Approach to responses –Description of the approach to responses including a simplified flow chart to guide the implementation process if any specific thresholds have been crossed.

Table 2-1 Overall AMP Summary

EVENT	NARRATIVE TRIGGER	INDICATORS	THRESHOLDS	MONITORING LOCATIONS	MONITORING PARAMETERS
1. CHANGE IN WATER QUALITY OR QUANTITY					
a. Significant change in water quality	Water Treatment Facilities Decline in effluent pH noted or effluent quality trending towards possible exceedance of standards or exceeds licenced standards.	pH, Total zinc, ammonia	Treated effluent: pH <8.0; OR Total Zinc > 0.40 mg/L and pH <6.5 for two consecutive days; OR Ammonia > 4.0 mg/L and pH > 9.0 for two consecutive days; OR Effluent quality standards exceeded.	Water Treatment Facilities	Routine in-situ, on-site total zinc, external multi-element ICP, hardness, pH, conductivity, TSS, ammonia (Bellekeno), LT50
	Adit Discharges Routine site inspections indicate noticeable change in water clarity or declining pH or increasing conductivity. Contaminant concentrations display a statistically significant sustained increase over historical water quality database.	Visual observation of clarity, in-situ pH & conductivity, total cadmium, total zinc	Site inspection: pH < 6.5 or conductivity >2,000 μS/cm; OR Increase of 2X or more in total Cd/Zn load or conductivity when compared to the average for the previous 24 months	Adit Discharges	Routine in-situ, external multi-element ICP, hardness, pH, conductivity, TSS
b. Adit discharge or treated effluent, quantity increases or decreases	Observed or measured flows display a sustained and statistically significant increase or decrease over historical flow database	Flow and water quality (total zinc, pH and conductivity) and stream type - fish bearing	Increase/decrease in flow of 2X or more when compared to the average for the previous 24 months AND threshold for Event 1 a) or b) as applicable also exceeded	Site-wide flow monitoring	same as indicators
c. Flow stops from adit discharge	Water flowing from historical workings stops	Flow, ice plug formation	25% of adit opening filled with ice	Adit and treatment locations	same as indicators
d. New water flow is observed	Previously dry site exhibits flow and effects down gradient water quality and loadings	Flow and water quality (Total zinc, pH and conductivity)	Adit flows for 30 l/s for 7 day period	Site-wide mine workings	same as indicators
e. Water flow path changes	Flow path of mine working discharge changes path from historically known channel and enters a new watercourse	Flow and water quality (Total zinc, pH and conductivity)	Flow path changed and enters a new watercourse	Adit and treatment locations	same as indicators

EVENT	NARRATIVE TRIGGER	INDICATORS	THRESHOLDS	MONITORING LOCATIONS	MONITORING PARAMETERS
2. WASTE ROCK SEEPAGE EXHIBITS AML					
a. Waste rock seepage or run-off trending to AML conditions	Seepages from waste rock storage areas or from works constructed or upgraded with non AML material show significant decline in pH and/or an increase in conductivity OR approaching licenced discharge standards (where appropriate ie. Onek)	pH, conductivity	Significant decline in pH between measurements or pH <7.0 and/or conductivity showing a significant increasing trend or >2000 μS/cm; OR indicators approaching licenced standards for Onek waste rock storage area	Waste rock storage areas and works or upgrades constructed from non-AML material	Routine multi-element ICP
3. SLUDGE STORAGE AREA EFFECTIVENESS COMPROMISED					
a. Seepage observed near sludge storage areas	Routine inspection of sludge storage area shows seepage	Total zinc, pH	pH >8.5 and total zinc > 1.0 mg/L	Sime Pit, Sime Waste Dump, Valley Tailings sludge storage cell	Same as indicator
c. Sludge storage area approaching capacity	Sludge storage area approaching minimum freeboard of 1.0 meter below the decant point	Visual observation of freeboard	Freeboard is at 1.5 meter below decant point	Sime Pit, Sime Waste Dump, Valley Tailings sludge storage cell	Same as indicator
4. PHYSICAL INSTABILITIES					
a. Area of significant surface subsidence has occurred	An observed subsidence has exposed an opening to surface or resulting in slope failure	Visible slope failure, ground subsidence or opening on surface	Opening to underground workings or area of subsidence effects public safety or down gradient environment	Site-wide	same as indicators
b. Rock fall or landslide is observed that effects road right-of-way or intrudes into stream	An observed rock fall or landslide effects a road right-of-way, infrastructure or intrudes into stream	Mine source material movement	Source material effects road or stream	Site-wide	same as indicators
c. Structure failure or portal collapse	A building, engineered structure or portal is seen to be failing (settling, excessive erosion)	Visual observation	Structure near public access	Site-wide	same as indicators
5. SITE SECURITY COMPROMISED					
a. Security gate, fence, sign damaged	Public health and wildlife safety measure damaged or removed	Sign, fence, gates, locks	Security feature damaged, removed, or compromised	Site-wide	same as indicators

3. CHANGE IN WATER QUALITY OR QUANTITY

Results of water quality and quantity monitoring are assessed on an ongoing basis to determine if significant changes are occurring and an adaptive management response is required. The following sections describe what constitutes a significant change to water quality or quantity and associated responses that would be implemented.

3.1 SIGNIFICANT CHANGE IN WATER QUALITY

3.1.1 Description

All data for current water sample stations in the Keno Hill Silver District are stored in an EQWin database that allows water quality to be tracked at each site such that conditions can be identified at any point in the season. In this way parameters can be seen to be fluctuating from the normal, and reaching levels where management is required to respond. Set point triggers can be placed in the database so that response parameters are flagged for notification and action.

3.1.2 Locations

Water quality is monitored from discharging adits and water treatment facilities for potential effects to the receiving environment including loading of down gradient waters. These sites are listed below and shown in Figure 3-1 of the Environmental Monitoring Program in Appendix A.

Water Treatment Facilities:

- KV12 - Valley Tailings Pond #3 Decant;
- KV14 - Silver King Treatment Pond #2 Decant;
- KV28 - Galkeno 300 Treatment Pond Decant;
- KV32 - Galkeno 900 Treatment Pond Decant; and
- KV43 - Bellekeno 625 Treatment Pond Decant.

Adits:

- KV17 - Husky South West;
- KV18 - Bermingham Adit;

- KV19 - Ruby Adit;
- KV20 - No Cash 500 Adit;
- KV33 - Keno 700 Adit;
- KV34 - Lucky Queen Adit;
- KV35 - Sadie Ladue Adit;
- KV36 - Flame and Moth Adit;
- KV45 - Onek Adit;
- KV53 - UN Adit;
- KV66 - Klondike Keno Adit;
- KV67 - Keno 200 Adit;
- KV68 - Brewis Red Lake Adit; and
- KV74 - Bellekeno East Adit.

3.1.3 Monitoring Requirements

Regular water sampling has been conducted at several sites in the Keno Hill Silver District where regular water flow is expected either continuously or at various times of the year. Sites monitored are summarized within the Environmental Monitoring Program (Table 3-1 of Appendix A). This monitoring program coincides with required monitoring under Water Licences QZ06-074 and QZ07-078.

Specific parameters monitored will be compared to specific thresholds to determine if they have been breached. Monitoring requirements will change should one of the AMP thresholds be triggered. This could include more frequent monitoring of grab samples at the station location as well as more frequent monitoring of the receiving environment, including down gradient receiving waters or down gradient piezometers located below the site or workings where the trigger was initiated.

3.1.4 Specific Thresholds

Specific thresholds for the different categories of monitoring stations that will initiate a response are provided in the following sections.

3.1.4.1 Water Treatment Facilities/ Licenced Effluent Discharges

Water quality data from treatment facilities and other effluent discharges (Bellekeno East decline or Onek Pit Waste Rock Storage Facility) will be assessed to determine if the following thresholds have been exceeded:

- Daily sampling result for pH less than 8.0 units at a water treatment facility decant;
- Daily sampling result for zinc or ammonia trending toward possible exceedance of discharge standard:
    - Total zinc > 0.40 mg/l and pH < 6.5 units for two consecutive days; or
    - Ammonia > 4.0 mg/l and pH > 9.0 for two consecutive days (applies to Bellekeno only).
- Sample result exceeds effluent quality standard (Table 3-1).

Table 3-1 Licenced Effluent Quality Standards

Parameter	Maximum Concentration in a Grab Sample (mg/L)
pH	6.5 to 9.5 pH Units
Suspended solids	25.0
Ammonia Nitrogen*	5.0
Arsenic (Total)	0.50
Cadmium (Total)	0.05
Copper (Total)	0.30
Lead (Total)	0.20
Nickel (Total)	0.50
Silver (Total)	0.10
Zinc (Total)	0.50

* Ammonia nitrogen standard applies to Water Licence QZ07-078 only (Bellekeno 625, Bellekeno East, Onek Pit Waste Rock Storage Facility)

3.1.4.2 Adit Discharge

Old mine workings adit discharge quality will be assessed to determine if thresholds are triggered indicating that a significant increase in metals loading or conductivity is occurring:

- Field measurements will be implemented during routine weekly site inspections (during open water season). The following represent thresholds for these inspections:

- noticeable change in water clarity;
- pH appears to be significantly declining between measurements or dropping below 6.0; and
- conductivity shows a significant increasing trend or conductivity above 2,000 μS/cm.

- A monitoring result at an adit discharge sample location whereby there is an increase of two-times (2X) or more in metal load for total cadmium or total zinc when compared to the average loading for the previous 24-months' water quality data for that site, along with discharge concentrations for the site which are at or greater than those concentrations provided elsewhere on the property as licenced effluent quality standards. For example, if the load (kg/yr) for these parameters increases by two-times or more when compared to the average for the previous 24 months, but the data does not exceed licenced discharge standards, the AMP is not triggered. Similarly, if water quality data exceeds licenced effluent quality standards but does not result in an increase of two-times or more in metal load when compared to the average for the previous 24 months, the AMP is not triggered (See No Cash 500 Example below). Both conditions must be met for the AMP to be triggered;

- A monitoring result at an adit discharge sample location whereby there is an increase of two-times (2X) or more in conductivity (measured externally by an accredited lab) when compared to the average conductivity for the previous 24-months' water quality data for that site.

<u>No Cash 500 Adit Cadmium, Zinc & Conductivity Examples</u>

Using the No Cash 500 Adit (monitoring station KV-20) as an example, an average total cadmium concentration of 0.131 mg/L is calculated for 6 sample events during 2007 and 2008. At an observed average discharge of 7.3 L/s this computes to total cadmium loading of 29 kg/yr. Therefore, while licenced discharge standards provided elsewhere on the property for total cadmium are 0.05 mg/L, the AMP would only be triggered if the total cadmium also exceeded 29 kg/yr by two times or more (≥ 58 kg/yr).

Continuing with the No Cash 500 Adit as an example, an average total zinc concentration of 12.2 mg/L is calculated for the 6 sample events in 2007 and 2008. At an observed average discharge of 7.3 L/s this computes to a total zinc loading of 2,709 kg/yr. Therefore, while licenced discharge standards provided elsewhere on the property for total zinc are 0.50 mg/L, the AMP would only be triggered if total zinc also exceeded 2,709 kg/yr by two times or more (≥ 5,418 kg/yr).

At the No Cash 500 Adit, an average conductivity of 951 μs/cm (external lab analyses) is calculated for 6 samples collected between October 24, 2006 and September 10, 2007. The AMP would therefore be triggered if conductivity exceeded the average of 895 μs/cm by two times or more (≥ 1790 μs/cm).

3.1.4.3 Bellekeno Mine Water Quality Significantly Altered After Dewatering

The same thresholds provided for adit discharges (section 3.1.4.2) would apply to the Bellekeno 625 adit discharge (KV-42) to determine if mine water quality had been significantly altered after dewatering:

- A monitoring result whereby there is an increase of two-times (2X) or more in metal load for total cadmium or total zinc when compared to the average loading for the 24-months' water quality data prior to dewatering, along with discharge concentrations for the site which are at or greater than those concentrations provided elsewhere on the property as licenced effluent quality standards. Both conditions must be met for increased monitoring to be triggered; or

- A monitoring result whereby there is an increase of two-times (2X) or more in conductivity (measured externally by an accredited lab) when compared to the average conductivity for the previous 24-months' water quality data prior to dewatering.

3.1.4.4 Receiving Water Quality Significantly Altered During or Subsequent to Dewatering Bellekeno Mine

Receiving water quality down gradient of Bellekeno mine in Thunder Gulch and Lightning Creek will be assessed to determine if it has been significantly altered during or subsequent to dewatering Bellekeno mine. Water quality data from monitoring stations KV-41 (Lightning Creek u/s bridge at Keno City) and KV-76 (Thunder Gulch downstream of Bellekeno 625 Adit) will be used in this assessment. As with adit discharge thresholds, metals loading and conductivity will be tracked to determine if receiving water quality has been significantly altered:

- A monitoring result whereby there is an increase of two-times (2X) or more in metal load for total cadmium or total zinc when compared to the average loading for the 24-months' water quality data prior to dewatering; or

- A monitoring result whereby there is an increase of two-times (2X) or more in conductivity (measured externally by an accredited lab) when compared to the average conductivity for the previous 24-months' water quality data prior to dewatering.

3.1.5 Approach to Responses

As per the general approach to the AMP, a staged response to a change in water quality will be implemented if one of the thresholds is breached. Triggered responses are outlined below for the different types of monitoring stations and may be specific to the particular threshold that was breached. For example, an exceeded threshold could indicate the potential for a 'low risk' event or a 'high risk' event which in turn triggers an appropriate level of response.

3.1.5.1 Water Treatment Facilities/ Licenced Effluent Discharges

For water treatment facilities the following responses will occur if daily effluent sampling at the decant results in a pH less than 8.0 units OR an effluent quality standard for zinc or ammonia is near to exceedance;

- routine system monitoring and inspections;

- ensure system power and site operations;
- operate back up power if necessary;
- verify lime slurry tank volumes and flow rate;
- adjust lime addition rate;
- verify system pH;
- verify internal sampling and analytical results;
- re-sample and analyze;
- replace or repair system equipment;
- review need for settling pond desludging and desludge pond;
- consider need to send samples for outside analyses and/or analytical equipment maintenance.

For water treatment facilities the following responses will occur if an effluent quality standard is exceeded;

- consider the need for capital improvements and implement.

Additional responses specific to the Tailings Dams:

- routine dam monitoring and inspections;
- ensure decants structure free flowing;
- daily water levels measured and verified;
- geotechnical inspection as appropriate; and
- structural repairs or maintenance identified and remedial action taken.

Response specific to Bellekeno East decline:

- direct discharge to Bellekeno 625 treatment facility.

Response specific to Onek Waste Rock Storage Facility

- no discharge from Onek Pit Waste Rock Storage Facility – run-off collected and transported to Bellekeno 625 treatment facility.

3.1.5.2 Adit Discharge

For adit discharges, initial responses can include a number of mitigative measures such as ditching, berming, or pumping water, or whatever alternative is needed as to not degrade the quality of water nearby. A comprehensive analysis will be performed by the laboratory to verify the accuracy of monitoring information. Additional samples will be sent to the lab to ensure quality control. Included in the lab testing will be a LT50 bioassay toxicity test for acute lethality.

The next step will be to document and re-affirm the flow path of the watercourse above where the sample was taken and the down gradient environment. This is to determine if the cause of the trigger is a variation in the flow path which has allowed water to flow through an area which could be the source of new metal loading. Areas that may be suspect to loading will be documented for further analysis.

The next step will be to perform a comprehensive analysis of samples taken at the sampling stations in the drainage area down gradient of the site in question. At certain old mine workings (No Cash 500 adit and Onek adit), down gradient piezometers have been installed to track effects to the local receiving environment. Additional drive point piezometers could be installed at other locations based on continued tracking of adit discharge flow paths. Results of 2007 monitoring of adit flow paths tracked most flows to receiving waters, however, if flow goes to ground and is not observed to enter receiving waters, additional piezometers may be installed. Results from piezometers would be analysed to determine the extent of the groundwater contamination, if any. The purpose of this analysis will be to aid in the identification of potential down gradient environmental effects. This will also allow a determination of the extent of the higher contamination levels and will dictate the extent of the response measures. If deemed necessary, monitoring frequency will be increased to help pinpoint the cause of the trigger in the effluent discharge and include additional groundwater, seepage or surface water sampling in the receiving environment.

Technical experts and regulatory agencies will be consulted to determine temporary mitigation measures which can be implemented to control the flow of contaminants, if occurring, into nearby watercourses or groundwater while a mitigation plan is developed. Once a mitigation or treatment plan is developed, construction of any required facilities and implementation of any required work plans will then proceed according to any directives returned by the Yukon Water Board. These plans should allow water quality to return to normal levels by securely preventing the noted contaminants from proceeding any further past the treatment point, much like the treatment sites at Galkeno 300 or Bellekeno 625. The water treatment plans will be designed such that treatment can proceed for an undetermined length of time until the final Closure Plan can be implemented.

3.1.5.3 Bellekeno Mine Water Quality Significantly Altered After Dewatering

Dewatering of the Bellekeno Mine is a licenced activity pursuant to Water Licence QZ07-078. Schedule A, Part V of the Water Licence provides a compliance monitoring schedule during and for 12 weeks following dewatering Bellekeno Mine. Should mine water quality (and/or quantity – see Section 3.2.5.3) be significantly altered after dewatering of the Bellekeno mine, the period of weekly monitoring outlined in the Water Licence for the Bellekeno 625 adit and treatment facility effluent (KV-42 and KV-43) as well as the Bellekeno East decline and pond decant (KV-74 and KV-75) would continue until water quality has stabilized.

If the mine water quality effects the water treatment facility performance and thresholds are being exceeded (Section 3.1.4.1) then dewatering can be reduced or shut down until modifications to the treatment facility are made (Section 3.1.5.1).

3.1.5.4 Receiving Water Quality Significantly Altered During or Subsequent to Dewatering Bellekeno Mine

Should water quality in Thunder Gulch and/or Lightning Creek be significantly altered during or subsequent to dewatering Bellekeno mine, the monitoring frequency of monitoring stations KV-37 (Lightning Creek upstream of Hope Gulch), KV-38 (Lightning Creek upstream of Thunder

Gulch), KV-41 (Lightning Creek u/s bridge at Keno City) and KV-77 (Thunder Gulch upstream of Bellekeno East) would increase from quarterly monitoring to monthly and then to weekly if the event were to persist. Water quality measurements and data analysis will be interpreted in an attempt to determine the cause of the altered receiving water quality in Thunder Gulch and Lightning Creek. Dewatering and treatment facility operations would be reviewed and treatment facility performance assessed.

Once water quality is no longer considered significantly altered from pre-dewatering conditions, water quality monitoring at quarterly intervals will be resumed.

3.1.6 Significant Change in Water Quality AMP Summary

Table 3-2 provides a summary of the AMP for a significant change in effluent quality from the water treatment facilities including specific thresholds and actions to be taken in order of priority. Table 3-3 provides the AMP summary for a significant change in adit discharge quality as well receiving water quality as a result of dewatering Bellekeno.

Table 3-2 Significant Change in Effluent Quality AMP Summary

SPECIFIC THRESHOLD	ACTIONS TAKEN IN ORDER OF PRIORITY
Daily sampling result pH < 8.0 at a water treatment facility decant; OR Total zinc > 0.40 mg/L and pH < 6.5 units for two consecutive days; OR Total ammonia > 4.0 mg/L and pH > 9.0 for two consecutive days (Bellekeno only); OR	Routine system monitoring and inspections; Ensure system power and site operations; Operate back up power if necessary; Verify lime slurry tank volumes and flow rate; Adjust lime addition rate; Verify system pH; Verify internal sampling and analytical results; Re-sample and analyze; Replace or repair system equipment; Review need for settling pond desludging and desludge pond; Consider need to send samples for outside analyses and/or analytical equipment
Sample result exceeds effluent quality standard. →	Shut down mine de-watering (Bellekeno) Consider need for capital improvements and implement

Table 3-3 Significant Change in Adit Discharge/Receiving Water Quality AMP Summary

SPECIFIC THRESHOLD	ACTIONS TAKEN IN ORDER OF PRIORITY				
ADITS Field measurement during routine weekly site inspections: - noticeable change in water clarity; - pH appears to be significantly declining between measurements or drops below 6.0; - conductivity shows significant increasing trend or conductivity above 2,000 µS/cm. OR Increase of 2X or more in metal load for total zinc / cadmium when compared to the average loading for the previous 24 months, AND exceeds licenced discharge standards for the parameters provided elsewhere on the property; OR Increase of 2X or more in conductivity (lab measurement) when compared to average for previous 24 months.	Initial response if necessary to ditch/ berm/ pump water or take necessary measures to prevent degradation of nearby waters.				
	Additional sample sent to lab*				
	Re-affirm Flow Path	Flow path has changed	Document areas suspect to loading		
		Flow path has not changed			
				Analyze data	Implement mitigation or treatment plan
	Sample downstream sites				
	Continue weekly dewatering monitoring for Bellekeno until water quality stabilizes	Reduce or shut down dewatering if Bellekeno water treatment facility affected	Make modifications to Bellekeno water treatment facility		
BELLEKENO RECEIVING WATER Increase of 2X or more in metal load for total zinc / cadmium when compared to the average loading for the previous 24 months prior to dewatering; OR Increase of 2X or more in conductivity (lab measurement) when compared to average for previous 24 months prior to dewatering.	Increase receiving water quality monitoring to monthly, then weekly if event persists	Analyze/interpret data to determine cause	Review dewatering and treatment facility operations/performance		

***Toxicity tests include acute toxicity testing.**

3.2 SIGNIFICANT INCREASE OR DECREASE IN MONITORED FLOW OCCURS

3.2.1 Description

For every currently monitored site where water flow occurs, the volume of water flowing from the source is measured or estimated and compared with historical observations for that particular site. The flow data is recorded and maintained in the EQWin water quality database. Much like the responses for water flow ceasing completely, a significant increase or decrease in a monitored flow can be an indication of problems or issues further upstream. Therefore, responses should be in place for irregularities observed in flows with a reasonably predictable flow history.

3.2.2 Locations

Discharge from adits and water treatment facilities is measured to prevent significant adverse effects to the receiving environment including loading of down gradient waters. These sites are listed below and shown in Figure 3-1 of the Environmental Monitoring Program in Appendix A.

Water Treatment Facilities:

- KV14 - Silver King Treatment Pond #2 Decant;
- KV28 - Galkeno 300 Treatment Pond Decant;
- KV32 - Galkeno 900 Treatment Pond Decant; and
- KV43 - Bellekeno 625 Treatment Pond Decant.

Adits:

- KV17 - Husky South West;
- KV18 - Bermingham Adit;
- KV19 - Ruby Adit;
- KV20 - No Cash 500 Adit;
- KV33 - Keno 700 Adit;
- KV34 - Lucky Queen Adit;
- KV35 - Sadie Ladue Adit;
- KV36 - Flame and Moth Adit;
- KV45 - Onek Adit;

- KV53 - UN Adit;
- KV66 - Klondike Keno Adit;
- KV67 - Keno 200 Adit;
- KV68 - Brewis Red Lake Adit; and
- KV74 - Bellekeno East Adit.

3.2.3 Monitoring Requirements

All water treatment and old mine adits at the Keno Hill Silver District where regular water flow is expected are monitored either continuously or at various times of the year during water quality sampling events. These sites are listed in Appendix A with monitoring frequency for each site including receiving water monitoring sites. Monitoring schedules coincide with the requirements of the Water Licences and data necessary for closure planning.

3.2.4 Specific Thresholds

The specific thresholds that will indicate a significant change in discharge and initiate an adaptive management response are outlined below. For reference, average flow for each of the locations listed above is provided in the following Table 3-4.

Table 3-4 Average Flow for 2007 and 2008 – Treatment Sites Decants and Adit Discharge

Site	Description	2007 & 2008 Average Flow L/s	N (# samples)	Max	Min
Water Treatment Facilities					
KV14	Silver King Treatment Pond #2 Decant	6.4	390	13.0	2.5
KV28	Galkeno 300 Treatment Pond Decant	12.4	528	30.5	7.5
KV32	Galkeno 900 Treatment Pond Decant	3.1	392	8.0	1.8
KV43	Bellekeno 625 Treatment Pond Decant	2.1	457	10.0	0.0
Adits					
KV17	Husky South West	0.4	6	1.6	0.017
KV18	Bermingham Adit	4.2	4	9.7	1.5
KV19	Ruby Adit	1.0	6	2.0	0.3
KV20	No Cash 500 Adit	5.3	6	7.8	3.0
KV33	Keno 700 Adit	2.9	5	5.5	1.3
KV34	Lucky Queen	None	0		
KV35	Sadie Ladue Adit	4.5	6	10.0	0.5
KV36	Flame and Moth	None	0		
KV45	Onek Adit	2.3	6	5	0.8
KV53	UN Adit	None	1	0.75	0.75
KV66	Klondike Keno Adit	Dry	0		
KV67	Keno 200 Adit	0.3	2	0.4	0.3
KV68	Brewis Red Lake Adit	Dry	0		
KV74	Bellekeno East Adit	None	0		

3.2.4.1 Decrease in Discharge

- Noticeable decrease in adit discharge since last inspection.

- A monitoring result at a sampling site whereby there is a decrease of two-times (2X) or more in water flow when compared to the average flow for the previous 24-months' data for that site.

3.2.4.2 Increase in Discharge

- Noticeable increase in adit discharge since last inspection.

- A monitoring result at a sample site whereby there is an increase of two-times (2X) or more in water flow when compared to the average flow for the previous 24-months' data for that site; AND

- Average metal loading (total zinc/cadmium) has increased by two-times (2X) or more when compared to the average loading for the previous 24-month's water quality data for that site, along with discharge concentrations for the site which are at or greater than those concentration limits provided elsewhere on the property as licenced discharge standards (see Section 3.1 Significant Change in Water Quality); OR

- A monitoring result at a sampling site whereby there is an increase of two-times (2X) or more in conductivity (measured externally by the lab) when compared to the average conductivity for the previous 24-months' water quality data for that site (see Section 3.1 Significant Change in Water Quality).

3.2.5 Approaches to Responses

As per the general approach to the AMP, a staged response to a significant increase or decrease in an observed water flow will be implemented if a threshold is breached. For adit discharges, initial responses can include a number of mitigative measures such as ditching,

berming, or pumping water, or whatever alternative is needed as to not degrade the quality of water nearby and receiving environment.

3.2.5.1 Decrease in Discharge

The initial response to a significant decrease in flow rate will be to examine the flow path upstream from the observed location of the flow decrease. Normally, this will consist of examining the adit from where the water flow originates from. This will determine if the decrease in water flow is due to an ice plug forming or a cave-in has occurred that has blocked a portion of the flow. If the cause of the reduced flow is the formation of an ice plug in the adit, monitoring will be increased until such time as the flow returns to normal or until the ice plug causes the water flow to cease, at which time the AMP for flow stopping (Section 3.3) will be triggered.

If the reduced water flow is due to a cave-in either at the entrance of an adit or further into the adit, then regular monitoring will be implemented as removal of the material impeding on the flow may be difficult to removal due to safety or other concerns.

Depending on the nature of the flow reduction, inspection frequency may increase and water quality sampling may be conducted to assist with the assessment of the potential causes or implications of the decreased flow.

3.2.5.2 Increase in Discharge

The response to a significant increase in the flow rate will be to increase inspection frequency and to document the path of the water flow (photo's and GPS survey). It is entirely possible that the path of the water flow could have changed due to the increase of water flow, which may have caused the water to breach it's banks or to accelerate the erosion of certain portions of the side banks. Areas of particular concern when documenting the flow path should include flows through waste rock piles, flows into other underground mine workings, and flows into other watercourses or near site infrastructure. Documentation should be sufficient enough so that if the water flow has indeed changed course, it can be accurately displayed on a site map. Refer to Section 3.5 for a staged response to a change in flow path.

The next step of the response to a significant increase in water flow is to obtain a grab sample and to perform a comprehensive analysis of the water. This analysis is important as it will determine whether the increase in flow is also contributing to metals loading or contamination to a nearby watercourse or local groundwater levels, which will in turn determine the severity or impact the increased flow will have on the surrounding environment, and whether a mitigation program will have to be implemented at this location. If metal concentrations are found to be of concern, and the flow path does not intersect with a potential fish bearing stream, then the site will be subject to continual monitoring. Downstream or down gradient locations should be monitored to ensure that the flow path does not eventually reach fish bearing waters.

If the flow path does deposit loading into a fish bearing stream or creek, an assessment of mitigation or treatment options will be performed and an appropriate mitigation plan will be implemented after consultations with technical experts and regulatory agencies.

The next step of the response is to determine the physical stability of the environment along the flow path. The most common area to suffer physical instability due to water flows will be waste rock piles, followed by steep embankments with loose soil. If either short or long term stability is threatened, then mitigative measures will have to be addressed and could consist of redirection of the flow.

3.2.5.3 Bellekeno Mine Water Quantity Significantly Altered After Dewatering

Dewatering of the Bellekeno Mine is a licenced activity pursuant to Water Licence QZ07-078. Schedule A, Part V of the Water Licence provides a compliance monitoring schedule during and for 12 weeks following dewatering Bellekeno Mine. Should mine water quantity (and/or quality – see Section 3.1.4.3) be significantly altered after dewatering of the Bellekeno mine, the period of weekly monitoring outlined in the Water Licence for the Bellekeno 625 adit and treatment facility effluent (KV-42 and KV-43) as well as the Bellekeno East decline and pond decant (KV-74 and KV-75) would continue until water quantity has stabilized.

Water quality analysis would be conducted as per the Water Licence with continued daily flow monitoring to assess implications to the treatment facility. The treatment facility may require

modification to handle increased flows or dewatering may need to be stopped to ensure treatment facility performance and that effluent quality standards are achieved.

3.2.6 Significant Increase or Decrease in Flow AMP Summary

Table 3-5 provides a summary of this AMP event including specific thresholds and actions to be taken in order of priority.

Table 3-5 Significant Increase or Decrease in Monitored Flow AMP Summary

SPECIFIC THRESHOLD	ACTIONS TAKEN IN ORDER OF PRIORITY					
Noticeable increase/decrease in adit discharge since last routine weekly site inspection; Increase of 2X or more in water flow when compared to the average flow for the previous 24 months; AND Metal loading (total Zn/Cd) has increased by 2X or more when compared to average loading for the previous 24 months and discharge standards for these parameters at other locations on the property are exceeded; OR There is an increase of 2X or more in conductivity when compared to the average for the previous 24 months.	Initial response if necessary to ditch/ berm/ pump water or take necessary measures to prevent degradation of nearby waters and receiving environment.					
	Document flow path	Flow enters fish bearing waters	Initiate monitoring of water quality and flow	Water quality exceeds effluent regulations	Initiate mitigation or treatment plan	
				Water quality does not exceed effluent regulations		Continue monitoring of water quality and flow until regular flow resumes
		Flow does not enter fish bearing waters				Initiate monitoring of water quality and flow until regular flow resumes
		Flow poses risk to physical stability or infrastructure downstream or water treatment system		Complete mitigative design for areas of potential physical instability. Review and assess effects to water treatment facility. Revise dewatering strategy and/or treatment system		Implement physical instability preventative measures. Review treatment system performance and make adjustments to system
Decrease of 2X or more in water flow when compared to the average flow for the previous 24 months	Examine flow path upstream from observed area	Formation of ice plug evident				Increase monitoring of ice plug until AMP Event 2 (flow stops) triggered
		Evidence of cave-in or collapse		Immediate mitigative measures unnecessary		Increase monitoring for physical stability issues

3.3 CURRENTLY MONITORED WATER FLOW STOPS

3.3.1 Description

When the expected water flow is interrupted, this could be the result of a few situations. The interruption could be the result of low precipitation levels leading up to the observed event. An inlet for water hydraulically linked to the subject adit could have been intentionally or unintentionally sealed, an underground cave-in or subsidence could have occurred thereby stopping sufficient water from entering the workings to create the expected water flow.

Another situation could be the formation of an ice plug in the adit. The formation of an ice plug could result in a build-up of water pressure behind the plug. If the water pressure becomes too much for the ice plug, the plug may release water. This could lead to a release of water into the receiving environment.

Dewatering also can also stop flows for a period of time, but is controlled by site personnel.

3.3.2 Locations

Water Treatment Facilities:

- KV14 - Silver King Treatment Pond #2 Decant;
- KV28 - Galkeno 300 Treatment Pond Decant;
- KV32 - Galkeno 900 Treatment Pond Decant; and
- KV43 - Bellekeno 625 Treatment Pond Decant.

Adits:

- KV17 - Husky South West;
- KV18 - Bermingham Adit;
- KV19 - Ruby Adit;
- KV20 - No Cash 500 Adit;
- KV33 - Keno 700 Adit;
- KV34 - Lucky Queen Adit;
- KV35 - Sadie Ladue Adit;

- KV36 - Flame and Moth Adit;
- KV45 - Onek Adit;
- KV53 - UN Adit;
- KV66 - Klondike Keno Adit;
- KV67 - Keno 200 Adit;
- KV68 - Brewis Red Lake Adit; and
- KV74 - Bellekeno East Adit.

3.3.3 Monitoring Requirements

All treated adit discharges and old mine workings at the Keno Hill Silver District where regular water flow is expected either continuously or at various times of the year are inspected and sampled (see Appendix A). These sites are listed in Appendix A and include the monitoring frequency for each site. Monitoring schedules coincide with the requirements of the Water Licences and reflect the data necessary for closure planning.

3.3.4 Specific Thresholds

The specific thresholds that will initiate the adaptive management response will be as follows:

- A currently monitored flow ceases or is reduced by more that 50% of the historical average flows during a period of the year when flow has been historically present.

3.3.5 Approach to Responses

As per the general approach to the AMP, a staged response to an interruption in the water flow at adits where flow should be observed will be implemented if this trigger is activated.

The initial response to the trigger will be a more thorough inspection of the adit. This may involve looking deeper into the adit, and looking for evidence of the formation of an ice plug or cave in. If physical inspection of the underground workings is not possible, then evidence of adit ice formation or cave in near surface will be conducted.

If an ice plug has formed and impeded the constant flow of water, the next step will be the determination of the extent of the ice plug. If the ice plug consumes less than 25% of the adit opening where it is located, then increased monitoring of the ice plug will be necessary to observe whether the ice plug develops into a larger plug or whether it has reached the extent of its formation and will recede once the seasonal increase in the temperature occurs. This inspection will also include linkages to other developments including vent raises and shafts and their status (i.e. are they closed to prevent air movement).

If the ice plug consumes more than 25% of the adit opening where it is located, then it has to be determined whether the adit contains or requires heat trace. If heat trace is present, then an inspection of the electrical system will be required as the presence of ice in this amount will likely be an indicator that the heat trace is not working. The first components to inspect are electrical connections making sure that all connections are clean and are firmly in contact. If all contacts are satisfactory, then the unit should be checked for external damage and any damaged parts should be replaced. If the electrical connections are all good and there is no evidence of external damage, arrangements should be made to have a qualified repair technician look at the unit and repair.

De-icing measures need to be implemented for adits with an ice plug forming in them in order to bring the ice formation under control whether or not the adit contains a heat trace. The process of de-icing will consist of utilizing a heated steam point to thaw a number of holes into the ice block that has formed in the adit. The holes should be sufficient to enable the establishment of adit flow. Once the holes are generated, steam pipes will operate until the ice blockage has been reduced to enable adit flows.

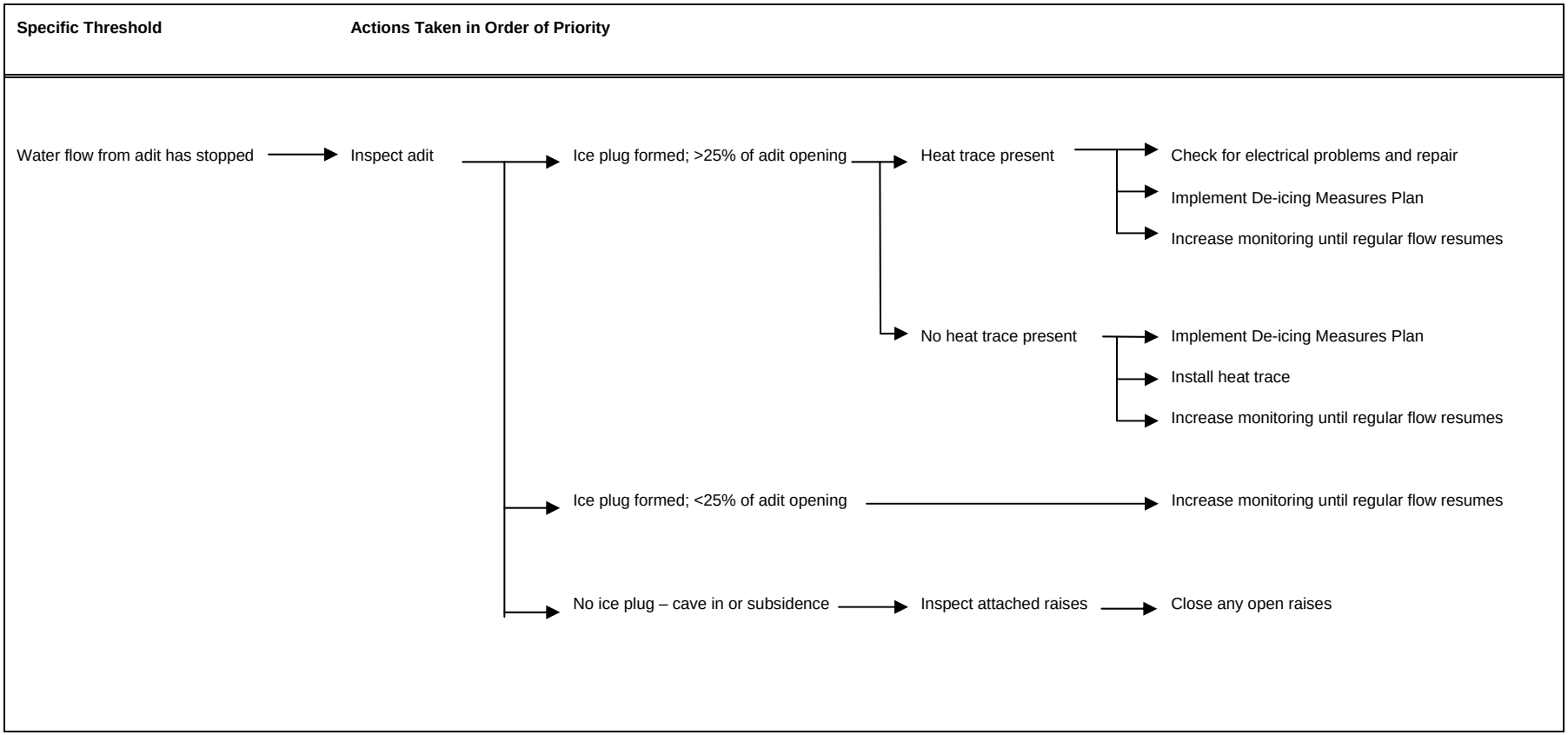
If the adit is not equipped with a heat trace, then heat trace could also be installed in order to prevent the long term build-up of another ice plug once the de-icing measures have been completed.

In both cases, the monitoring of these locations should be increased to ensure that the staged response has been adequate to mitigate the consequential effects of the event.

3.3.6 AMP Summary for Monitored Flow Stops

Table 3-6 provides a summary of this AMP event including specific thresholds and actions to be taken in order of priority.

Table 3-6 AMP Summary for Monitored Flow Stops



3.4 NEW WATER FLOW IS OBSERVED

3.4.1 Description

Although the site caretakers are aware of the majority of water flows exiting from the underground workings at the Keno Hill Silver District, there is always the possibility that a water flow can be generated from a previously dry location, or a location that was previously undisclosed or undiscovered.

The environmental consequences of a new water flow being generated on the property is the potential exposure of humans, wildlife or down gradient stream, including fish bearing streams to potentially increase levels of contaminants (metals, sediments) that could be contained in the flow. Another consideration is the affect of the water flow on physical characteristics of the environment, such as soil erosion or permafrost degradation, which could negatively impact the surrounding environment.

3.4.2 Locations

Site wide based on routine inspection throughout the property (See Appendix A).

3.4.3 Monitoring Requirements

Since it is impossible to predict where a new flow of water is going to be generated, there can be no specific monitoring requirements to observe new water flows prior to their existence. New water flows would be observed during routine monitoring of known sites, either during travels from site to site, or upon inspection of the sites themselves. Generally there is daily travel and site inspections from one end of the district to the other as part of the operation of the water treatment facilities.

3.4.4 Specific Thresholds

The specific thresholds that will initiate an adaptive management response will be as follows:

- A water flow is observed with a flow greater than 30 L/sec, persists for at least 7 days and is observed to influence other site workings, facilities, infrastructure or property, or drains to a downstream receiving water that is fish bearing. This flow is considered adequate as it

allows for the winter season when glaciation occurs at numerous locations and is a normal site occurrence.

3.4.5 Approach to Responses

As per the general approach to the AMP, a staged response to a sighting of a new water flow will be implemented if the trigger is activated.

The initial response to the trigger will be to document the path of the new water flow. Areas of particular concern when documenting the flow path should include flows through waste rock piles, flows into other underground mine workings, and flows into other watercourses. Documentation (photo's and GPS survey) should be sufficient enough so that the new water flow can be accurately displayed on a site map.

The next step of the response to a new water flow is to obtain a sample for water quality from the water flow and to perform a comprehensive analysis of the water. This analysis is important as it will determine whether the new flow will contribute high metal loading or contamination to a nearby watercourse or to the local groundwater levels, which will, in turn, determine the severity or impact the new water flow will have on the surrounding environment, and whether a specific mitigation treatment program will have to be implemented at this location. If metal concentrations are found to be of concern, and the flow path does not affect human resources or intersect with a potential fish bearing stream, then the site will be subject to continual monitoring. Downstream locations would be monitored to ensure that the flow path does not eventually reach fish bearing waters either through an unobserved flow or through groundwater.

If the flow path does deposit loading into a fish bearing stream or creek, an assessment of mitigation measures or water treatment options will be performed and an appropriate plan will be implemented after consultations with technical experts and regulatory agencies.

The next step of the response is to determine the physical stability of the environment along the new flow path. The most common area to suffer physical instability due to water flows will be waste rock piles, followed by steep embankments with loose soil. If either short or long term stability is threatened, then mitigative measures will have to be addressed and could consist of redirection of the flow.

3.4.6 AMP Summary for New Water Flow

Table 3-7 provides a summary of this AMP event including specific thresholds and actions to be taken in order of priority.

Table 3-7 AMP Summary for New Water Flow

SPECIFIC THRESHOLD	ACTIONS TAKEN IN ORDER OF PRIORITY			
Flowing water is observed at a previously dry site - >30 L/s for 7 days	Document the flow path	Identify areas of metal loading or physical instability (long or short term)	Complete mitigative design for areas of potential physical instability	Implement physical instability preventative measures
	Initiate monitoring of water quality and flow	Water quality does not exceed effluent guidelines		Continue regular monitoring of water quality
		Water quality exceeds effluent guidelines and does not enter fish bearing waters		Initiate monitoring of downstream sampling locations
		Water quality exceeds effluent guidelines and enters fish bearing stream		Implement mitigation or treatment program

3.5 WATER FLOW PATH CHANGES

3.5.1 Description

Although the flow path of most of the major water contributing adits are previously documented and rarely change their course, there is the possibility that, due to some unforeseen circumstances, such as an unusually large or long freshet period, above average precipitation, or the displacement of soil or rock due to landslides or rock falls, the flow path of any one of these sites could be altered.

An altered flow path may not have any affect on the surrounding environment other than the path's own displacement, but an altered flow path may also become a hazard if it causes physical instability of soil or rock due to erosion, interferes with property or public infrastructure such as roads or highways, or acts as a conduit for potential contaminates to be deposited in fish bearing creeks or streams. In these cases management will have to step in and intervene and respond in order to prevent a possible detrimental affect on the surrounding environment or infrastructure.

3.5.2 Locations

Water Treatment Facilities:

- KV12 - Valley Tailings Pond #3 Decant;
- KV14 - Silver King Treatment Pond #2 Decant;
- KV28 - Galkeno 300 Treatment Pond Decant;
- KV32 - Galkeno 900 Treatment Pond Decant; and
- KV43 - Bellekeno 625 Treatment Pond Decant.

Adits:

- KV17 - Husky South West;
- KV18 - Bermingham Adit;
- KV19 - Ruby Adit;
- KV20 - No Cash 500 Adit;
- KV33 - Keno 700 Adit;

- KV34 - Lucky Queen Adit;
- KV35 - Sadie Ladue Adit;
- KV36 - Flame and Moth Adit;
- KV45 - Onek Adit;
- KV53 - UN Adit;
- KV66 - Klondike Keno Adit;
- KV67 - Keno 200 Adit;
- KV68 - Brewis Red Lake Adit; and
- KV74 - Bellekeno East Adit.

3.5.3 Monitoring Requirements

Since it is almost impossible to predict when a change in the path of flow of water is going to occur, there can be no specific monitoring requirements to observe these changes prior to their existence. Change in flow paths will be observed during the routine monitoring of known sites, either during travels from site to site, or upon inspection of the sites themselves (see Appendix A).

3.5.4 Specific Thresholds

The specific thresholds that will initiate the action plan will be as follows:

- When the previously documented flow path is observed to have significantly deviated from this path and entered a stream.

3.5.5 Approach to Responses

As per the general approach to the AMP, a staged response to a change in a flow path will be implemented if one of the triggers is activated.

The initial response is to determine new sampling points along the flow path, which will be determined based on areas where it is possible for the new water path to collect and disperse contaminants. This phase of the response should also consider current sampling points that

may be affected, including downstream receiving water sites and down gradient piezometers. Once these points are chosen, grab samples will be taken at the appropriate sites and sent out for water quality analyses and possibly toxicity tests if entering fish bearing streams. If receiving water test results or piezometer water quality test results show high or unacceptable levels of loading, an assessment of mitigation or treatment options will be performed and an appropriate strategy will be implemented after consultations with technical experts and regulatory agencies.

Following this analysis, the next step will be to inspect the entire length of the flow path and to document this path (photographs and GPS survey) and any areas of significance, such as areas where physical stability may be of concern or areas where the path now intersects another watercourse or water body. This will help determine if the new path now presents metal loading potential to a stream whether fish bearing or not that was previously unaffected by this water flow.

After documenting the flow path, areas of instability will be investigated that may have been identified during the inspection of the new flow path. These areas may include waste rock piles or slopes with loose soil or gravel cover or effects to site infrastructure. An assessment of the possible long term effects of water flow through these areas of instability will be performed and, if necessary, temporary mitigative measures will be designed and implemented until the final Closure Plan can be implemented. Construction of any required facilities (ditches, berms, rip rap channels) and implementation of any required work plans will then proceed according to any directives returned by the Yukon Water Board.

3.5.6 AMP Summary for Change in Water Flow Path

Table 3-8 provides a summary of this AMP event including specific thresholds and actions to be taken in order of priority.

Table 3-8 AMP Summary for Change in Water Flow Path

SPECIFIC THRESHOLD	ACTIONS TAKEN IN ORDER OF PRIORITY			
.				
Flow path change to a new stream	Document the entire flow path	Identify areas of metal loading or physical instability (long or short term)	Complete mitigative design for areas of potential physical instability	Implement physical instability preventative measures
	Determine new water sampling locations	Initiate monitoring of water quality and flow	Water quality does not exceed effluent guidelines	Continue regular monitoring of water quality
			Water quality exceeds effluent guidelines/does not enter fish bearing waters	Initiate monitoring of downstream sampling locations
			Water quality exceeds effluent guidelines/enters fish bearing stream	Implement mitigation or treatment program

4. WASTE ROCK SEEPAGE EXHIBITS AML

As mentioned previously in Section 1.4 (Plans in Place) a number of plans are in currently in place with respect to waste rock management and monitoring:

- Environmental Monitoring Program (February 2009);
- Waste Rock Management Plan (January 2008);
- Waste Rock Metals and Acid Base Accounting Testing Plan (October 2008); and
- Mine Wall Testing Plan (October 2008).

The following sections pertain to the potential for acidic or metal leachate (AML) to occur as a result of seepage or run-off though waste rock storage areas or areas where waste rock has been used as a construction material.

4.1 WASTE ROCK SEEPAGE/RUN-OFF TRENDING TO AML CONDITIONS

4.1.1 Description

Waste rock seeps/run-off will be monitored to determine if water quality is trending to AML conditions and an adaptive management response is required.

4.1.2 Locations

- An observed seep has historically been monitored below Bellekeno 625 (KV-44).

- A recently established water quality monitoring station exists at the Onek Waste Rock Storage Facility (KV-78) to monitor run-off.

- Any seepage from works constructed or upgraded with non-AML material, which currently includes Bellekeno East and Bellekeno powerline roads. Other Bellekeno East waste rock management areas as defined in the Waste Rock Management Plan are also monitored for drainage or seeps.

4.1.3 Monitoring Requirements

Specific monitoring requirements for the Bellekeno 625 seep (KV-44) and Onek Waste Rock Storage Facility (KV-78) are outlined in the EMP (Appendix A). Monthly field measurements of pH, temperature and conductivity in will be taken between May and October, and flow at KV-44 will also be estimated. Samples will also be collected on an annual basis for KV-44 and a quarterly basis for KV-78 and sent to an external laboratory for the full suite of water quality analyses.

As per the Waste Rock Management Plan, any waste rock drainage or seeps observed between May and October will be monitored for estimated flow volume and basic field parameters of pH and conductivity. Evidence of sulphide oxidation such as snow melt areas or the presence of oxidations products will also be noted.

One geomembrane-lined lysimeter $\geq 5m^3$ will be installed in both AML (Onek Waste Rock Storage Area) and non-AML storage areas (Bellekeno power line road). Drainage volume will be monitored, with field parameters (pH and conductivity) measured on a monthly basis from May to October. Providing there is sufficient quantity of drainage, a full suite of water quality analyses will be conducted at least twice per year.

4.1.4 Specific Thresholds

Field measurements of pH and conductivity will be monitored to determine if the following specific thresholds have been breached due to AML:

- pH significantly declining between measurements or dropping below 7.0; and/or
- conductivity showing a significant increasing trend or conductivity above 2,000 μS/cm.

As the Onek Waste Rock Storage Facility is a licenced effluent discharge point, specific thresholds and adaptive management responses are discussed in Section 3 – Significant Change in Water Quality or Quantity (Sec 3.1.4.1 and 3.1.5.1).

4.1.5 Approach to Responses

Initial responses to an observed waste rock seep or runoff trending to AML conditions can include further inspection of the waste rock source material to ensure that the rock types used for construction are acceptable and mitigative measures such as ditching, berming, or pumping water, rock removal or whatever alternative is required to not degrade the quality of water nearby. A full suite of water quality analysis will be performed by an external laboratory to verify the accuracy of field measurements.

The location of seepage or run-off will be documented with photos and GPS.

Downstream or down gradient locations should be monitored to ensure that AML run-off does not eventually reach fish bearing waters. If water quality analyses indicates run-off does deposit loading into a fish bearing stream or creek, the initial response of ditching, berming, or pumping or selective waste rock removal to prevent this would be implemented. Once the seepage/run-off is diverted or removed, measures would be taken to prevent the AML from occurring. This may include installing a cover or possibly collection and treatment of the run-off (i.e. Onek Waste Rock Storage Facility).

Weekly monitoring at the location trending to AML conditions would be implemented until seepage/run-off stops for two consecutive weeks or thresholds are not triggered for two consecutive months.

4.1.6 AMP Summary for Waste Rock Seepage/Run-Off Trending to AML Conditions

Table 4-1 provides a summary of this AMP event including specific thresholds and actions to be taken in order of priority.

Table 4-1 AMP Summary for Waste Rock Seepage Trending to AML Conditions

SPECIFIC THRESHOLD	ACTIONS TAKEN IN ORDER OF PRIORITY		
pH significantly declining between measurements or dropping below 7.0; and/or conductivity showing an increasing trend or conductivity above 2,000 μS/cm	Prevent degradation of surface waters →	confirmatory sample to external Lab →	downstream / down gradient monitoring
	Inspect rock types to ensure suitable for construction →	document seepage with photos & GPS →	Cover installation
		→	Selective waste rock removal
		→	Ditching and diverting seepages
		→	Collect & treat run-off

5. SLUDGE STORAGE AREA EFFECTIVENESS COMPROMISED

As mentioned previously in Section 1.4 (Plans in Place) a Sludge Management Plan Revision No.1 (May 2008) is currently in place. The following sections pertain to the potential for the effectiveness of sludge storage areas mentioned within this plan to become compromised.

5.1 SEEPAGE OBSERVED NEAR SLUDGE STORAGE AREA

5.1.1 Description

Any seepage observed in the vicinity of the sludge storage areas will be monitored to determine if it is resulting from sludge deposition.

5.1.2 Locations

Sludge storage areas will be routinely monitored for seepage:

- Sime Pit;
- Sime Waste Dump; and
- Valley Tailings Sludge Storage Cell.

5.1.3 Monitoring Requirements

Specific monitoring requirements for the Sime Pit are outlined within the Sludge Management Plan. Among these monitoring requirements are visual daily inspection reports of the facility and sludge status and inspection for seeps in the immediate vicinity of the Galkeno 300 treatment system, which could provide an indication of decant water from the Sime Pit.

Similarly, visual inspections will be conducted of the Sime Waste Dump and Valley Tailings Sludge Storage Cell when these facilities are in use.

5.1.4 Specific Thresholds

Any new identified seeps will be monitored and analyzed onsite for the pH and zinc thresholds:

- pH > 8.5 and zinc > 1.0 mg/L.

5.1.5 Approach to Responses

Seepage observed in the vicinity of the sludge storage areas will be documented with photos and monitored weekly for flow, field pH and zinc. A full suite of water quality analysis will be performed by an external laboratory to verify the accuracy of field measurements. The flow path will be documented and an assessment of the down gradient environment conducted to determine if flow is reaching surface waters and whether or not they are fish bearing. If seepage is depositing a load into a fish bearing stream or creek, ditching, berming or pumping may be implemented to prevent this. Alternative sludge storage area would be assessed and use of the current one would cease. Other pit locations could be investigated for potential sludge storage areas including the Upper Sime Pit and Hector Calumet Pits.

The Sludge Management Plan would be revised to incorporate any new sludge storage areas and implemented.

5.1.6 AMP Summary for Seepage Near a Sludge Storage Area

Table 5-1 provides a summary of this AMP event including specific thresholds and actions to be taken in order of priority.

Table 5-1 AMP Summary for Seepage Near a Sludge Storage Area

SPECIFIC THRESHOLD	ACTIONS TAKEN IN ORDER OF PRIORITY		
ph > 8.5 and zinc > 1.0 mg/L →	monitor weekly for flow, pH and zinc →	confirmatory sample to external Lab →	downstream / down gradient monitoring & photo documentation
		→	if depositing to fishing bearing waters - ditching /diverting seepage
		→	assess alternative locations
		→	cease use of sludge storage area
		→	Revise Sludge Management Plan & implement

5.2 SLUDGE STORAGE AREA APPROACHING CAPACITY

5.2.1 Description

Sludge storage areas will be monitored daily during use to ensure sufficient capacity.

5.2.2 Locations

Sludge storage locations are outlined in the Sludge Management Plan:

- Valley Tailings Area Sludge Storage Cells;
- Sime Waste Dump; and
- Sime Pit.

5.2.3 Monitoring Requirements

Visual inspection of freeboard in the sludge storage areas. Specific monitoring requirements for the Sime Pit are outlined within the Sludge Management Plan. Among these monitoring requirements are visual daily inspection reports of the facility and sludge status including freeboard.

Similarly, visual inspections will be conducted of the Sime Waste Dump and Valley Tailings Sludge Storage Cell when these facilities are in use.

5.2.4 Specific Thresholds

Freeboard is approaching capacity: 1.5 m. A minimum freeboard of 1.0 m below the decant point will be maintained.

5.2.5 Approach to Responses

Determine if there is seepage from the sludge storage area as per the visual inspection (Section 5.1).

An investigation would be conducted of the ability to increase the facility capacity by increasing berm height for example.

Alternative sludge storage area would be assessed and use of the current one would cease Other pit locations could be investigated for potential sludge storage areas including the Upper Sime Pit and Hector Calumet Pits.

The Sludge Management Plan would be revised to incorporate any new sludge storage areas and implemented.

5.2.6 AMP Summary for Sludge Storage Area Approaching Capacity

Table 5-2 provides a summary of this AMP event including specific thresholds and actions to be taken in order of priority.

Table 5-2 AMP Summary for Sludge Storage Area Approaching Capacity

SPECIFIC THRESHOLD	ACTIONS TAKEN IN ORDER OF PRIORITY	
Freeboard approaching capacity = 1.5 m →	check for seepage	
→	Investigate ability to increase facility capacity →	assess alternative locations
	→	cease use of sludge storage area
	→	Revise Sludge Management Plan & implement

6. PHYSICAL INSTABILITIES

The following sections pertain to potential physical instabilities that may be encountered in the Keno Hill Silver District.

6.1 AREA OF SIGNIFICANT SUBSIDENCE IS OBSERVED

6.1.1 Description

There are many documented cases of underground workings in the area, and even some underground workings that are undocumented. In a number of these workings, the stopes came very close to the surface of the ground, leaving a very thin crown pillar. Over time, some of these crown pillars started to weather and sag with age, creating instability on the surface. This aging of the crown pillar is usually defined by a large depression in the ground, and in some cases, can expose an opening leading to the underground workings.

These depressions do not have to be very deep in order to cause concern. Subsidence on the surface is an indicator that the crown pillar is failing, and there is no good way to determine what the risk is of that pillar catastrophically failing. The risk to human safety is magnified when the subsidence occurs in an area of human use or a right-of-way used by vehicles and equipment, which can accelerate the failure of the crown pillar.

Subsidence can also be observed as a result of slope failure or erosion, which could potentially effect the down gradient environment, particularly surface water. Slope failure could eventually result in a rock fall or landslide (Section 6.2) or lead to structure failure or portal collapse (Section 6.3).

6.1.2 Locations

Site wide based on routine inspection throughout the property and as outlined in the Physical Inspection and Reporting Plan (see Appendix A).

6.1.3 Monitoring Requirements

Since it is almost impossible to predict when or where surface subsidence will occur, there can be no specific monitoring requirements to observe these areas prior to their existence, therefore

any observations of subsidence throughout the Keno Hill Silver District will be noted. Maintenance personnel will routinely observe subsidence in the course of their daily site activities.

6.1.4 Specific Thresholds

The specific thresholds that will initiate an adaptive management response include:

- A depression with defined edges is noted in the ground with the potential to create a public safety concern;
- A cave-in has occurred allowing access to the underground workings of a mine site;
- Break in soil/ slope creep/ sediment transport observed from physical structure with perceived potential to effect nearby structures or down gradient surface water.

6.1.5 Approaches to Responses

As per the general approach to the adaptive management plan, a staged response to an observed area of subsidence will be implemented if the threshold is triggered.

The initial response to observing an area of subsidence will be to prevent a hazard to public health and safety and minimize sediment transport to surface waters. This could include installation of barriers such as dykes or silt fencing or construction of diversion ditches or berms. If necessary physical removal or physical repair of structure to remediate. Access to the area would be limited using fencing, barricades, or signage to alert the public and other maintenance personnel to the danger that may exist.

The next stage of the response will be to locate, if possible, diagrams or information pertaining to any underground workings in the area. This will help determine if the cause of subsidence is due to the collapse of a crown pillar or other underground workings.

If there are no underground workings in the area, then it is possible that the subsidence would be due to liquefaction of soil near the surface and may not be a cause for concern. The break or depression will be filled in with soil and monitored to see if the subsidence continues. If the depression continues to appear after soil mounding, then further investigation by a mining engineer may be warranted, particularly if there is a risk to the stability of a nearby structure.

If the subsidence can be attributed to underground workings, the next stage in the response will be to develop an adequate design to counter the negative effects of the subsidence. This will be done in consultation with a mining engineer. This design could include mounding and the use of certain layers of soil or aggregate of specific sizes or physically capping the area such as a shaft. Any physical repairs to slopes or embankments would involve an assessment in consultation with a mining engineer before hand.

This measure will also be implemented if the subsidence exposes an opening to the underground workings. Mining engineers will be consulted in order to devise a plan to adequately cover the opening to prevent access to the underground workings.

The final stage will be to implement the design at the area of the subsidence and to monitor the area to watch for signs of continued subsidence at or around the previously identified area of subsidence.

6.1.6 AMP Summary for Area of Significant Subsidence

Table 6-1 provides a summary of this AMP event including specific thresholds and actions to be taken in order of priority.

Table 6-1 AMP Summary for Area of Significant Subsidence

SPECIFIC THRESHOLD	ACTIONS TAKEN IN ORDER OF PRIORITY					
Area of subsidence has exposed opening to underground workings		Review available underground mine workings				
Area of subsidence effects public safety	Close off area around subsidence with delineating markers or fence	Review available underground mine workings	Underground mine workings confirmed	Design structurally sound cover for subsidence	Implement design	Continued monitoring
Break in soil/ slope creep/ sediment transport from physical structure	Prevent sediment transport to surface waters		No evidence of underground workings	Fill in depression and monitor for further subsidence	Subsidence continues	Consult with mining engineer

6.2 ROCK FALL OR LANDSLIDE OCCURS WITHIN MONITORED AREA

6.2.1 Description

There are a number of potentially unstable slope and rock/soil depositions throughout the Keno Hill Silver District generated by the numerous mine workings and associated activities that have occurred there over the past 100 years. Instabilities exist in places such as pit walls, many of which are in a state of ravelling. Trenching into steep slopes can often leave an unstable rock wall that could fail due to timely erosion. Waste rock piles can possibly shift due to changes in foundation conditions. Even access roads with sections that have been cut or blasted through rock can suffer wall failure given the right circumstances.

Most areas where there exists the possibility of a rock fall or landslide present minimum risk to human or equipment safety. Even though it is remote or unlikely, a significant amount of material can potentially block access to a site. Soil movement can also impede on certain water flows, thereby changing the flow path and initiating an event noted in Section 3.5 of this AMP - Water Flow Path Changes.

6.2.2 Locations

Site wide based on routine inspection throughout the property (See Appendix A).

6.2.3 Monitoring Requirements

Since it is almost impossible to predict when or where a rock fall or a landslide will occur, there can be no specific monitoring requirements to observe these areas prior to their existence. As with Section 6.1 (Area of Significant Subsidence), the monitoring information required is observations of instability or subsidence throughout the Keno Hill Silver District. Maintenance personnel will routinely observe soil or earth movement in the course of their daily site activities.

6.2.4 Specific Thresholds

The specific thresholds that will initiate an adaptive management response include:

- A rock fall or landslide has blocked access to a previously monitored site.

- A rock fall or landslide has blocked access to a roadway previously used by the public.
- A rock fall or landslide has blocked or re-directed the flow of water of a documented stream or watercourse.
- Liquefaction of a waste rock pile foundation has caused waste rock to migrate closer to a watercourse.

6.2.5 Approaches to Responses

As per the general approach to the adaptive management plan, a staged response to the presence of a rock fall or a landslide will be implemented if a threshold is breached.

The initial response to observing a rock fall or a landslide will be to determine if it impedes on a right-of-way or a water flow path. If the debris impedes on a right of way, access to the area will be limited using fencing, barricades, or signage to alert the public and other maintenance personnel to the debris' presence.

The next stage of the response will be to examine the area to assess the possibility of further erosion of the originating slope. This task may require the services of a registered engineer. If warranted, a plan will be developed to prevent future erosion in the area.

The final step in the response to debris from a rock fall or a landslide impeding on a right-of-way will be to remove the debris, likely with heavy machinery, and transporting it to an isolated waste pile where the debris will not affect any watercourse or physical stability.

If the rock fall or landslide debris enters a watercourse, then water quality testing will be implemented. This will be done to determine if the presence of the rock in the water is contributing any metal loading to the water. If the loading in the water is found to be effected by the source material, then a mitigation plan will be developed and implemented in consultation with technical experts and regulatory agencies until such time as the debris can be removed from the watercourse, and water levels return to their historical norm.

If the metal loading is determined to be not effected by the source material, then no mitigation treatment plan will be necessary, and the debris can be removed from the watercourse.

The final stage will be to continue monitoring water quality at that location for a period of time until it is determined that the rock fall or landslide had no lingering effects on the water quality.

6.2.6 AMP Summary for Rock Fall or Landslide

Table 6-2 provides a summary of this AMP event including specific thresholds and actions to be taken in order of priority.

Table 6-2 AMP Summary for Rock Fall or Landslide

SPECIFIC THRESHOLD	ACTIONS TAKEN IN ORDER OF PRIORITY					
Rock Fall or landslide is Observed	Rocks intrude on right-of-way	Post warning to local traffic	Explore possibility of future rock falls in the area	Implement preventative measures if warranted		Remove intruding rocks with heavy equipment
	Rocks intrude on water flow	Initiate monitoring of water quality and metal leachate testing	Metal loading in source material	Develop and initiate mitigation or treatment plan		
			Metal loading not in source material		Remove rocks or soil from stream or creek bed	Continue water quality monitoring of site

6.3 STRUCTURE FAILURE OR PORTAL COLLAPSE

6.3.1 Description

With advanced exploration and preliminary development taking place in the Keno Hill Silver District, new structures are constructed on site to support these activities. Additionally, the extensive amount of activity in the Keno Hill Silver District in the past century has left behind numerous buildings and mining related structures in various states of disrepair. Although many of these workings are in sparse areas, a number of structures and portals exist in areas where the public can access them easily. In some cases, local literature even encourages the public to attend these sites to observe their historical value.

It is therefore imperative that structures and buildings in those areas frequented by the public that are considered structurally unsafe be dismantled and demolished in an appropriate manner. This type of practice will ensure that the danger to public safety is eliminated.

6.3.2 Locations

Site-wide based on routine inspection throughout the property (See Appendix A) and specifically:

- Water treatment facility settling ponds and adits;
- Valley Tailings Area;
- New waste rock storages areas and road at Bellekeno;
- Historic mine workings and structures (waste rock load out dumps); and
- Old building and structures throughout the property.

6.3.3 Monitoring Requirements

The monitoring information required includes physical inspections of structures in the Keno Hill Silver District for failure or collapse. Maintenance personnel will routinely observe buildings of concern in the course of their site activities.

6.3.4 Specific Thresholds

The specific thresholds that will initiate the action plan will be as follows:

- Failure of engineered structure or mining component (i.e. water treatment facility settling ponds, Valley Tailings Area dams and decants structures, roads, waste rock dumps);
- A supported structure, building, or portal opening in the vicinity of a public access or point of interest that effects public safety partially collapses;
- A supported structure, building, or portal opening in the vicinity of a public access or point of interest that effects public safety collapses completely.

6.3.5 Approaches to Responses

As per the general approach to the adaptive management plan, a staged response to a structure or portal partially failing or collapsing will be implemented if the threshold is triggered.

The initial response to a building or structure partially failing or collapsing will be to limit access to the area using fencing, barricades, or signage to alert the public and other maintenance personnel to the danger that may exist. The structural failure will be documented and an assessment made of the potential effects to worker and public health and safety and the surrounding environment.

Investigation by a mining or geotechnical engineer may be warranted, particularly if an engineered mining component is at risk of failure (mine portal, tailings dam or settling pond). Recommendations from the engineers will be implemented as required and if warranted engineering plans or designs may be required and developed for implementation in consultation with regulatory authorities.

The response to failure of a historic structure will be to implement consultations with the local community, First Nation of Nacho N'yak Dun and the Heritage Resources Branch of the Yukon Government to determine if the structure should be preserved as an artifact or whether the structure can be torn down and disposed of to eliminate the hazard it poses. If it can be demonstrated that there is no public health and safety concern, Heritage Resources may

determine that the structure should be kept for historical purposes. Access to the area will continue to be limited until such time as the structure is returned to a physically stable state.

If authorisation is given to remove the structure, then a plan will be developed to ensure that the removal of the structure takes place without incident. This plan may include the use of an excavator to pick at the remains and filling any open portals with rock in accordance with *Mine Safety Regulations* to close off access to any underground workings.

6.3.6 AMP Summary for Structure Failure or Portal Collapse

Table 6-3 provides a summary of this AMP event including specific thresholds and actions to be taken in order of priority.

Table 6-3 AMP Summary for Structure Failure or Portal Collapse

SPECIFIC THRESHOLD	ACTIONS TAKEN IN ORDER OF PRIORITY				
Building structure near public access collapses →	Erect barriers to prevent public access →	For historic structures - consult with locals and YG for heritage value →	Request to keep structure for heritage values →		Keep barriers erected until heritage takes over responsibility
			No heritage value →	Design plan to remove structure and close portals →	Implement removal plan
Failure of engineered structure or mining component →	Erect barriers to prevent public access →	Assess potential effects to worker and public safety and environment →	Investigation by mining or geotechnical engineer may be warranted →	Implement recommendations from engineers as required	

7. SITE SECURITY COMPROMISED

7.1 GATE, FENCE OR SIGN DAMAGED

7.1.1 Description

Due to the vast history of mining in the Keno Hill Silver District, there exist a large number of mine workings where hazards to public safety exist. In order to alleviate these hazards, depending on the type of hazard and its accessibility, structures, gates, fences, or signs have been erected to prevent the public from entering these areas or draw their attention to the hazard.

Over the course of time, some of these deterrents may suffer damage or fatigue which impedes on their ability to perform as a safety deterrent. The most likely scenario is for the item to have fallen down, however, the items performance may have been degraded by weather erosion or possibly at the hands of vandals.

7.1.2 Locations

Site wide based on routine inspection throughout the property (See Appendix A).

7.1.3 Monitoring Requirements

Since it is almost impossible to predict when or where a gate, fence, or sign will be damaged, there can be no specific monitoring requirements to observe these circumstances prior to their existence. The monitoring information required is observations of damage to any of these safety features throughout the Keno Hill Silver District. Maintenance personnel will be familiar with the placement of gates, signs, and fences around the property and thus, during their routine site activities will be able to observe when one of these features requires attention.

7.1.4 Specific Thresholds

The specific thresholds that will initiate the action plan will be as follows:

- A gate is found open outside of a scheduled visit by authorised site personnel.

- A gate post is found to be damaged such that the gate is sufficiently disabled to prevent access to the site by authorised site personnel.
- A gate post is found to be damaged such that the gate no longer prevents unauthorised access to a site of concern.
- A fence is found to be damaged such that it no longer prevents unauthorised access to a site of concern.
- A fence or structure is found to be damaged such that it no longer prevents unauthorised access to a site of concern.
- The placard of a sign has been damaged either by environmental conditions or by vandalism such that the sign is no longer effective in relaying the information intended.
- A sign post has been damaged to an extent where the sign is in a position which renders it ineffective in relaying the information intended.

7.1.5 Approaches to Responses

As per the general approach to the adaptive management plan, a staged response to any one of the above circumstances will be implemented if the threshold is triggered.

The initial response to a gate being found open or a fence being damaged and allowing access to the site will first trigger an examination of the area in question in order to ascertain whether trespassers are in the vicinity and may have initiated the condition of the gate or fence. If trespassers are found and do not appear to impose a risk to the site personnel, they will be cordially escorted off the property and the gate will be locked. If site personnel feel that there may be a risk in confronting the trespassers, then the appropriate authorities will be contacted immediately and requested to attend to the situation. If the lock on the gate has been damaged or tampered with, it will be replaced in a timely fashion.

If the gate is found to be damaged such that in no longer prevents unauthorised personnel from accessing a site, then the same measures above will be implemented. Once the trespassers have been escorted off site or the area is deemed to not contain any trespassers, the gate will be repaired or replaced in a timely fashion to ensure it will prevent access to the site by unauthorised personnel.

If the placard of a sign has been damaged either by environmental conditions or by vandalism, or the sign post is broken such that the sign is no longer effective in relaying the information intended, then maintenance personnel should note this at the time of observation and this information should be passed on to the project manager.

7.1.6 AMP Summary for Damage to Gate, Fence or Sign

Table 7-1 provides a summary of this AMP event including specific thresholds and actions to be taken in order of priority.

Table 7-1 AMP Summary for Dame to Gate, Fence or Sign

SPECIFIC THRESHOLD	ACTIONS TAKEN IN ORDER OF PRIORITY					
Gate not closed. →	Examine area of concern for trespassers →	Trespassers found →	Escort off of property →	Examine gate →	Gate is not locked →	Lock gate.
		No trespassers found →			Gate structure is broken →	Repair gate
					Gate has fallen over →	Create more adequate foundation for gate.
Fence cut or knocked down →	Examine area of concern for trespassers →	Trespassers found →	Escort off of property →	Examine fence →	Fence is cut →	Repair or replace fence.
		No trespassers found →			Fence is knocked down →	Create more adequate base for fence poles.
Sign is not visible →	Examine sign →	Face of sign disfigured or faded →				Replace sign placard
		Sign post broken →				Replace sign post and remount sign placard.
		Sign post has come out of foundation →				Create more adequate foundation and replant sign.

8. REPORTING PROCEDURE

The Keno Hill Silver District Remediation Manager will be ultimately responsible for implementation of the AMP. Site personnel including the District Manager, Support Services Manager, Exploration Manager, First Aid Manager and Development Manager will also be aware of the AMP and monitoring and inspection requirements. Site treatment operations personnel who conduct the daily inspections will report directly to the Remediation Manager who will work with other site Managers as appropriate to implement the AMP responses. The Data Manager will report to the Environmental Services Manager and Remediation Manager who will support and work directly with site Managers. Should an AMP event be triggered Alexco Senior Management will be appraised and involved in AMP responses as appropriate.

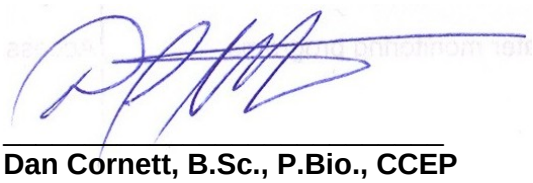
AMP triggered events will be documented and responses reported as part of the monthly water licensing reports. Should an incident occur that triggers an AMP event, this will be reported to the Water Board within 10 days of the occurrence as required under the licences. Monthly reports are provided to the Water Board, YG EMR, Water Resources and the First Nation of Nacho N'yak Dun. The Annual Report will also summarize all AMP events and responses and any revisions to the AMP made as part of the AMP annual review.

9. CERTIFICATION

Should you have any questions regarding this report, or if you require further information, please contact the undersigned at Access Consulting Group in Whitehorse, Yukon, at (867) 668-6463.

Respectfully submitted,

ACCESS CONSULTING GROUP
A registered trade name for Access Mining Consultants Ltd.



Dan Cornett, B.Sc., P.Bio., CCEP
President

KENO HILL SILVER DISTRICT

ADAPTIVE MANAGEMENT PLAN – 2009 UPDATE

APPENDIX A

ENVIRONMENTAL MONITORING PROGRAM

KENO HILL SILVER DISTRICT

ENVIRONMENTAL MONITORING PROGRAM

2009 UPDATE

PREPARED BY:

FEBRUARY 2009

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1.0 INTRODUCTION

This document describes the environmental monitoring program (EMP) that will be carried out to ensure that activities throughout the Keno Hill Silver District are conducted in a manner that strives for overall human and environmental protection. The EMP includes monitoring of a number of components and a surveillance network which is currently in place and designed to monitor:

- potential effects to the receiving environment through scheduled monitoring of water and aquatic resources, terrestrial resources, climate, as well as inspection tours of project components and receiving environment;
- water treatment facilities effluent quality as well as any seepages or run-off from waste rock and sludge storage facilities and consequently operational performance;
- site security to ensure public health and safety;
- site facilities and operations as a preventative measure for accidents and malfunctions;
- stability of historic mine workings;
- mitigation success; and
- adaptive management responses to improve procedure/process.

Monitoring data will be used for site management and closure plan development and implementation as necessary. If monitoring indicates that treatment systems or project facilities are not performing or issues with mine components arise, then maintenance measures or contingency plans can be implemented following an adaptive management approach as discussed in the report entitled “Keno Hill Silver District Adaptive Management Plan – 2009 Update” prepared by Access Consulting Group.

1.1 SUPPORTING PLANS AND LICENCE REQUIREMENTS

In addition to providing a basis and grounding for the Adaptive Management Plan, this EMP has been prepared to coincide with licenced monitoring requirements pursuant to Water Licences QZ06-074 and QZ07-078, and the Class 4 Mining Land Use Approval,

which guide the management of activities and monitoring associated with site care and maintenance as well as advanced exploration and preliminary development. Other plans that have been prepared which contain environmental monitoring aspects are also implemented pursuant to these licences/approval and include:

- Waste Rock Management Plan (January 2008);
- Sludge Management Plan Revision No.1 (May 2008);
- Waste Rock Metals and Acid Base Accounting Testing Plan (October 2008);
- Physical Inspection and Reporting Plan (October 2008) – Appendix B;
- Flow Monitoring Plan – Appendix C; and
- Mine Wall Testing Plan (October 2008).

These documents should be referenced for details on these monitored components.

1.2 REPORTING AND ANNUAL REVIEW

As with the Adaptive Management Plan, an annual review will be completed that assesses monitoring data collected. Data and inspection reports will be compiled and reported each year such that the results can be included into the Annual Report as required by the Water Licence.

2.0 PHYSICAL INSPECTIONS

If structural failures or instabilities (subsidence, settling, excessive erosion) are identified during routine inspections of engineered structures, works and installations (e.g. tailings dams, settling ponds, spillways, diversion ditches, roads, portals, waste rock dumps) an inspection by a qualified geotechnical engineer may be undertaken for physical stability. Table 2-1 outlines the physical inspection monitoring program for the tailings impoundments, settling ponds and diversion ditches as outlined in Water Licence QZ06-074.

Table 2-1 Physical Inspections

Physical Inspection	Frequency
KV10 Tailing Dam No.1	D
KV11 Tailing Dam No.2	D
KV12 Tailing Dam No.3	D
Tailings Dam Crest Survey	A
KV47 Porcupine Diversion Ditch	Q
Treatment Site Settling Ponds	D

The annual inspection of the Valley Tailings Area dams will be carried out in accordance with the Dam Safety Guidelines by a Professional Engineer licenced to practice in Yukon. A report on the inspection prepared by the P.Eng. will document the inspection locations and methodologies, results, problems identified and remedial measures recommended. The status of any remedial measures recommended in the previous year's report will be appended to the report with an exploration regarding any recommendation not implemented. This report will be provided to Yukon Water Board as part of the annual report.

A number of historic mine sites are physically inspected on a monthly basis during the open water season to ensure public health and safety and environmental protection. Site personnel record observations on an inspection check list form (Appendix A), which is provided for review to management personnel for action as necessary.

A Physical Inspection and Reporting Plan is in place as per Water Licence QZ07-078 for water retaining and conveying structures and associated earthworks and is provided in Appendix B.

3.0 WATER RESOURCES

3.1 SURFACE WATER MONITORING NETWORK

A network of surface water monitoring sites is in place to monitor effluent discharges, surveillance sites including receiving waters, and adit discharges for quality control and environmental effects purposes. Many of the monitoring stations have been sampled extensively in the past. A complete description of the stations and historic water chemistry results is discussed in Access Mining Consultants Ltd., June 3, 1996, *United Keno Hill Mines Limited, and Report No. KH/96/01, Site Characterization* (Section 6).

Table 3-1 provides UTM coordinates for the network of numbered surface water sample station locations. External monitoring frequency and the associated water licence are also indicated. Figure 2-1 shows the surface water sample station locations.

There are differing monitoring and analytical requirements for the treatment sites /effluent discharges; surveillance sites including receiving waters; and adit discharges, which are outlined in Table 3-1 and presented in further detail within the following sections. A Flow Monitoring Plan has been prepared and is provided in Appendix C.

Water Licence QZ07-078 provides specific monitoring requirements pertaining to the period of time during and for twelve weeks after dewatering of Bellekeno Mine. The Water Licence should be referenced for these special conditions and monitoring requirements.

3.1.1 Sampling Protocol

Monitoring and sampling will be carried out in accordance with the procedures and standards described in:

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

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

Table 3-1 Surface Water Sample Station Locations Description and Coordinates

SITE	SITE DESCRIPTION	EXTERNAL MONITORING FREQUENCY	EASTING	NORTHING	WATER LICENCE
Treatment Sites					
KV12	Valley Tailings Pond #3 Decant	M	474310	7088278	QZ06-074
KV13	Silver King Adit	M	471887	7085572	QZ06-074
KV14	Silver King Treatment Pond #2 Decant	M	471797	7085755	QZ06-074
KV27	Galkeno 300 Adit	M	482636	7088837	QZ06-074
KV28	Galkeno 300 Treatment Pond Decant	M	482622	7088793	QZ06-074
KV31	Galkeno 900 Adit	M	483483	7087848	QZ06-074
KV32	Galkeno 900 Treatment Pond Decant	M	483512	7087719	QZ06-074
KV42	Bellekeno 625 Adit	M	487363	7087062	QZ06-074, QZ07-078
KV43	Bellekeno 625 Treatment Pond Decant	M	487318	7087147	QZ06-074, QZ07-078
KV74	Bellekeno East Decline	M	487505	7086415	QZ07-078
KV75	Bellekeno East Pond decant	M	487594	7086161	QZ07-078
Surveillance Sites & Receiving Waters					
KV1	South McQuesten River u/s Christal Creek	M	474008	7092790	QZ06-074
KV2	South McQuesten River at Pumphouse	Q	472076	7090036	QZ06-074
KV3	South McQuesten River u/s Flat Creek	Q	465846	7088534	QZ06-074
KV4	South McQuesten River 350 m d/s Flat Creek	Q	465618	7088335	QZ06-074
KV5	South McQuesten River 9 km downstream Flat Creek	Q	460691	7088873	QZ06-074
KV6	Christal Creek at Keno Highway	M	483909	7088242	QZ06-074
KV7	Christal Creek at Hanson Road	M	478657	7092413	QZ06-074
KV8	Christal Creek at mouth	M	474585	7091944	QZ06-074
KV9	Flat Creek u/s South McQuesten River	Q	465836	7088410	QZ06-074
KV10	Valley Tailings Pond #1 Decant	Q	475015	7088571	
KV11	Valley Tailings Pond #2 Decant	Q	474856	7088486	
KV15	South McQuesten River at Bridge below Haggart Creek	Q	449744	7085770	QZ06-074
KV16	Christal Creek 600 m d/s Silver Trail Highway	Q	483887	7088863	
KV21	No Cash Creek at Keno Highway	Q	477500	7088750	QZ06-074
KV29	Silver Trail Culvert #4	M	483740	7088792	QZ06-074
KV30	Christal Creek 825m d/s Silver Trail Highway	Q	483856	7089091	
KV37	Lightning Creek u/s Hope Gulch	Q	490315	7087776	QZ06-074, QZ07-078
KV38	Lightning Creek u/s Thunder Gulch	Q	488193	7087341	QZ06-074,

SITE	SITE DESCRIPTION	EXTERNAL MONITORING FREQUENCY	EASTING	NORTHING	WATER LICENCE
					QZ07-078
KV39	Hope Gulch u/s Lightning Creek	Q	490252	7087783	QZ06-074
KV40	Charity Gulch u/s Lightning Creek	Q	488982	7087503	
KV41	Lightning Creek u/s bridge at Keno City	Q	485429	7086764	QZ06-074, QZ07-078
KV44	Bellekeno 625 Seep	A	487361	7087195	QZ07-078
KV47	Porcupine Diversion Ditch	Q	474516	7088026	QZ06-074
KV48	Hinton Creek u/s Calumet Drive	Q	482819	7087198	QZ06-074
KV49	Hinton Creek u/s Christal Creek	Q	483582	7087009	QZ06-074
KV50	Christal Creek u/s Hinton Creek	Q	483575	7086897	QZ06-074
KV51	Christal Creek d/s Hinton Creek	Q	483600	7087010	QZ06-074
KV52	Natural spring to Christal Lake at Old Mackeno pump house	Q	483756	7087869	QZ06-074
KV54	Erickson Gulch at Road to Lucky Queen	Q	485834	7088993	QZ06-074
KV55	Sandy Creek at Silver Trail Highway	Q	478532	7089677	QZ06-074
KV56	Star Creek at Silver Trail Highway	Q	478051	7089277	QZ06-074
KV57	Haldane Creek at South McQuesten Road	Q	461852	7086760	QZ06-074
KV58	Seepage at toe of #3 dam	Q	Unfixed	Unfixed	QZ06-074
KV59	Galena Creek at mouth (just u/s of Flat Creek)	Q	471126	7087018	QZ06-074
KV60	Galena Creek u/s of Silver King adit	Q	476604	7086892	QZ06-074
KV61	Porcupine Gulch at Calumet Road Crossing	Q	476607	7086895	QZ06-074
KV62	Brefalt Creek upstream of Porcupine Diversion	Q	476217	7086807	QZ06-074
KV63	Flat Creek upstream of Porcupine Diversion	Q	474644	7087814	QZ06-074
KV64	Flat Creek at Silver Trail Highway	Q	474906	7086535	QZ06-074
KV65	Thunder Gulch upstream of Bellekeno	Q	487464	7086873	QZ06-074, QZ07-078
KV69	Valley Tailings Decant and Seepage u/s Flat Creek	Q	474099	7088181	
KV70	Flat Creek 20m u/s KV69	Q	474140	7088260	
KV71	Flat Creek 20m d/s KV69	Q	474046	7088203	
KV72	South McQuesten River at McQuesten Lake	Q	482492	7104476	
KV73	Cache Creek at access road d/s McQuesten Lake	Q	482846	7103594	
KV76	Thunder Gulch d/s of Bellekeno 625 Adit	Q	487414	7087118	QZ07-078
KV77	Thunder Gulch u/s of Bellekeno East	Q	487742	7086013	QZ07-078
KV78	Onek Waste Rock Storage Facility	A	485726	7087518	QZ07-078
KV79	Christal Creek d/s of Mackeno Tailings	Q	483796	7087919	
KV80	Christal Creek u/s of Mackeno Tailings	Q	483790	7087869	

SITE	SITE DESCRIPTION	EXTERNAL MONITORING FREQUENCY	EASTING	NORTHING	WATER LICENCE
Adit Discharges					
KV17	Husky South West Adit	Q	485332	7092431	QZ06-074
KV18	Bermingham Adit	Q	478689	7087226	QZ06-074
KV19	Ruby Adit	Q	478504	7087748	QZ06-074
KV20	No Cash 500 Adit	Q	477728	7088508	QZ06-074
KV33	Keno 700 Adit	Q	490000	7089499	QZ06-074
KV34	Lucky Queen Adit	Q	486456	7090518	QZ06-074
KV35	Sadie Ladue Adit	Q	485832	7092768	QZ06-074
KV36	Flame and Moth	Q	483836	7086820	QZ06-074
KV45	Onek Adit	Q	485101	7087288	QZ06-074, QZ07-078
KV53	UN Adit	Q	481595	7089322	QZ06-074
KV66	Klondike Keno Adit	Q	485599	7090833	QZ06-074
KV67	Keno 200 Adit	Q	489496	7089983	QZ06-074
KV68	Brewis Red Lake Adit	Q	486789	7090194	QZ06-074

TABLE OF CONCORDANCE

Old UKHM #	UKHM #	LES SITE #	ACG #	NPG #	KV#	SITE DESCRIPTION
S-21	UK1	LES 1			**KV-1**	South McQuesten River u/s Christal Creek
S-10	UK2	LES 2			**KV-2**	South McQuesten River at Pumphouse
S-26	UK5	LES 3			**KV-3**	South McQuesten River u/s Flat Creek
S-11	UK3	LES 4			**KV-4**	South McQuesten River d/s Flat Creek
		LES 5			**KV-5**	South McQuesten River 9 km downstream Flat Creek
S-18	UK6	LES 6	ACG-WQ-05	NPG-05	**KV-6**	Christal Creek @ Keno Highway
S-19	UK7	LES 7			**KV-7**	Christal Creek @ Hanson Road
	UK8	LES 7B			**KV-8**	Christal Creek @ mouth
S-9	UK9	LES 9	ACG-WQ-09		**KV-9**	Flat Creek u/s South McQuesten River
			ACG-WQ-08a		**KV-10**	Valley Tailings Pond #1 Decant
			ACG-WQ-08b		**KV-11**	Valley Tailings Pond #2 Decant
S-1	UK13	LES 72	ACG-WQ-08c		**KV-12**	Valley Tailings Pond #3 Decant
S-13	UK14	LES 12	ACG-WQ-03b	NPG-03	**KV-13**	Silver King Adit
S-13A		LES 12A	ACG-WQ-03		**KV-14**	Silver King Treatment Pond #2 Decant
	UK4				**KV-15**	South McQuesten River at Bridge below Haggart Creek
			ACG-WQ-11 Site A		**KV-16**	Christal Creek 600 m d/s Silver Trail Highway
S-17	UK15	LES14			**KV-17**	Husky South West Adit
S-3	UK24	LES 18			**KV-18**	Bermingham Adit
S-15	UK17	LES 19			**KV-19**	Ruby Adit
S-4	UK25	LES 20			**KV-20**	No Cash 500 Adit
		LES 21			**KV-21**	No Cash Creek @ Keno Highway
S-27	UK27	LES 32			**KV-27**	Galkeno 300 Adit
			ACG-WQ-12		**KV-28**	Galkeno 300 Treatment Pond Decant
	UK27a		ACG-WQ-10		**KV-29**	Silver Trail Culvert #4
			ACG-WQ-11 Site D		**KV-30**	Christal Creek 825m d/s Silver Trail Highway
S-5	UK20	LES 31 or 31E	ACG-WQ-04b	NPG-04	**KV-31**	Galkeno 900 Adit
S-20		LES 31B	ACG-WQ-04a		**KV-32**	Galkeno 900 Treatment Pond Decant
S-6	UK21	LES 38			**KV-33**	Keno 700 Adit
S-14	UK28				**KV-34**	Lucky Queen Adit
S-7	UK26	LES 35			**KV-35**	Sadie Ladue Adit
					KV-36	Flame and Moth
S-22	UK11	LES 37			**KV-37**	Lightning Creek u/s Hope Gulch
		LES STN38			**KV-38**	Lightning Creek u/s Thunder Gulch
		LES 48			**KV-39**	Hope Gulch u/s Lightning Creek
		LES STN37			**KV-40**	Charity Gulch u/s Lightning Creek
S-24	UK12	LES 41			**KV-41**	Lightning Creek u/s bridge @ Keno City
S-12	UK18	LES 39	ACG-WQ-07b		**KV-42**	Bellekeno 600 Adit
S-12a		LES 39A	ACG-WQ-07	NPG-07	**KV-43**	Bellekeno 600 Treatment Pond Decant
S-5A	UK18A	LES 39B	ACG-WQ-07c		**KV-44**	Bellekeno 600 Seep
S-8	UK19	LES 40	ACG-WQ-06	NPG-06	**KV-45**	Onek Adit
S-23	UK10	LES 47			**KV-47**	Porcupine Diversion Ditch
					KV-48	Hinton Creek u/s Calumet Drive
					KV-49	Hinton Creek u/s Christal Creek
					KV-50	Christal Creek u/s Hinton Creek
					KV-51	Christal Creek d/s Hinton Creek
		LES 53			**KV-52**	Natural spring to Christal Lake at Old Mackeno pump house
S2		LES 30			**KV-53**	UN Adit
		LES 34			**KV-54**	Erickson Gulch at Road to Lucky Queen
		LES 63			**KV-55**	Sandy Creek at Silver Trail Highway
		LES 76			**KV-56**	Star Creek at Silver Trail Highway
		LES 10			**KV-57**	Haldane Creek at South McQuesten Road
		LES 73			**KV-58**	Seepage at toe of #3 dam
		LES 57			**KV-59**	Galena Creek at mouth (just upstream of Flat Creek)
		LES11	ACG-WQ-01		**KV-60**	Galena Creek upstream of Silver King adit
		LES 67			**KV-61**	Porcupine Gulch at Calumet Road Crossing
		LES 45			**KV-62**	Brefalt Creek upstream of Porcupine Diversion
		LES 46			**KV-63**	Flat Creek upstream of Porcupine Diversion
		LES 8			**KV-64**	Flat Creek at Silver Trail Highway
		LES 52			**KV-65**	Thunder Gulch upstream of Bellekeno
					KV-66	Klondike Keno Adit
					KV-67	Keno 200 Adit
					KV-68	Brewis Red Lake Adit
					KV-69	Valley Tailings Decant and Seepage u/s Flat Creek
					KV-70	Flat Creek 20m u/s KV-69
					KV-71	Flat Creek 20m d/s KV-69
					KV-72	South McQuesten River at McQuesten Lake
					KV-73	Cache Creek at access road d/s McQuesten Lake
					KV-74	Bellekeno East -Adit
					KV-75	Bellekeno East Pond decant
					KV-76	Thunder Gulch downstream of Bellekeno 625 Adit
					KV-77	Thunder Gulch u/s of Bellekeno East
					KV-78	Onek waste rock storage facility
					KV-79	Mackeno d/s tailings
					KV-80	Mackeno u/s tailings

ALEXCO

Environmental Monitoring Program 2009 Update

Figure 3-1
Water Quality Sample Station Locations

Legend

Water Quality
- Station Name / Historic Station Number / Site Description
- Water Quality Station
- Other Water Quality Station

Mine Workings
- Adit
- Shaft (to surface - connection to underground not determined)
- Valley Tailings
- Pit

Topography
- Town
- Silver Trail
- Secondary Road
- Limited-use road
- Trail
- Watercourse
- Waterbody

Notes:
This map is for illustrative purposes only.
This is not a legal document.
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Projection: UTM Zone 8 NAD83
Scale 1:30,000 when plotted at A0 page size.

ACCESS CONSULTING GROUP

Drawn By: HD

Checked by:

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3.2 TREATMENTS SITES /EFFLUENT DISCHARGES

Treatment sites include effluent discharge points which are intended to monitor individual effluent discharges associated with the water treatment facilities at Silver King 100, Bellekeno 625, Galkeno 900, Galkeno 300, and the Valley Tailings Area. Mine waters are treated using conventional lime treatment technology and settling ponds to precipitate metals and control solids release. Regular on-site monitoring of both the raw adit waters and treated effluent discharges will be conducted for controlling treatment processes and in accordance with Water Licences QZ06-074 and QZ07-078 (see Table 3-1). A summary of the monitoring program for treatment sites including both on-site measurements and external laboratory analysis is shown in Table 3-2. Figure 3-1 shows the locations for these sites.

Table 3-2 Treatment Sites Monitoring Schedule

Site No.	Description	On-site								External Lab							
		Inspect	Flow	pH	Temp.	Cond.	Total Zinc	Ammonia	Turbidity	Total ICP Metals	Dissolved ICP Metals	Ammonia -N	Hardness	pH	Cond.	TSS	LT50
KV12	Valley Tailings Pond #3 Decant	D	D	D	D	D	D			M	M		M	M	M	M	M
KV13	Silver King Adit	D	D	D	D	D	D			M	M		M	M	M	M	
KV14	Silver King Treatment Pond #2 Decant	D	D	D	D	D	D			M	M		M	M	M	M	M
KV27	Galkeno 300 Adit	D	D	D	D	D	D			M	M		M	M	M	M	
KV28	Galkeno 300 Treatment Pond Decant	D	D	D	D	D	D			M	M		M	M	M	M	M
KV31	Galkeno 900 Adit	D	D	D	D	D	D			M	M		M	M	M	M	
KV32	Galkeno 900 Treatment Pond Decant	D	D	D	D	D	D			M	M		M	M	M	M	M
KV42	Bellekeno 625 Adit	D	D	D	D	D	D	D	D	M	M	M	M	M	M	M	
KV43	Bellekeno 625 Treatment Pond Decant	D	D	D	D	D	D	D	D	M	M	M	M	M	M	M	M
KV74	Bellekeno East Adit	D	C	D	D	D	D	D	D	M	M	M	M	M	M	M	
KV75	Bellekeno East Settling Pond Decant	D	D	D	D	D	D	D	D	M	M	M	M	M	M	M	M

Codes:

D = Daily
M = Monthly
C = Continuous

ICP Metals include: Aluminum, Antimony, Arsenic, Barium, Beryllium, Bismuth, Boron, Cadmium, Calcium, Chromium Cobalt, Copper, Iron, Lead, Lithium, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium Silicon, Silver, Sodium, Strontium, Sulfur, Thallium, Tin, Titanium, Uranium, Vanadium, Zinc and Zirconium

3.3 SURVEILLANCE SITES

Surveillance sites include receiving waters and other locations within the background or receiving environment. Regular on-site monitoring of surveillance sites will be conducted to track water quality and quantity in accordance with Water Licences QZ06-074 and QZ07-078 (see Table 3-1). A summary of the monitoring program for surveillance sites including both on-site measurements and external laboratory analysis is shown in Table 3-3. Figure 3-1 shows the locations for these sites.

Table 3-3 Surveillance Sites Monitoring Schedule

Site No.	Description	On-site					External Lab									
		Inspect	Flow	pH	Temp.	Cond.	Total ICP Metals	Dissolved ICP Metals	Ammonia -N	Hardness	pH	Cond.	TSS	LT50	Sediment Program	Benthic Program
KV1	South McQuesten River u/s Christal Creek	M	M	M	M	M	M	M		M	M	M	M		BA	BA
KV2	South McQuesten River at Pumphouse	Q	Q	Q	Q	Q	Q	Q		Q	Q	Q	Q			
KV3	South McQuesten River u/s Flat Creek	Q	Q	Q	Q	Q	Q	Q		Q	Q	Q	Q		BA	BA
KV4	South McQuesten River 350 m d/s Flat Creek	Q	Q	Q	Q	Q	Q	Q		Q	Q	Q	Q		BA	BA
KV5	South McQuesten River 9 km d/s Flat Creek	Q	Q	Q	Q	Q	Q	Q		Q	Q	Q	Q			
KV6	Christal Creek at Keno Highway	M	M	M	M	M	M	M		M	M	M	M		BA	BA
KV7	Christal Creek at Hanson Road	M	M	M	M	M	M	M		M	M	M	M			
KV8	Christal Creek at mouth	M	M	M	M	M	M	M		M	M	M	M			
KV9	Flat Creek u/s South McQuesten River	Q	Q	Q	Q	Q	Q	Q		Q	Q	Q	Q		BA	BA
KV10	Valley Tailings Pond #1 Decant	Q	Q	Q	Q	Q	Q	Q		Q	Q	Q	Q			
KV11	Valley Tailings Pond #2 Decant	Q	Q	Q	Q	Q	Q	Q		Q	Q	Q	Q			
KV15	South McQuesten River at Bridge below Haggart Creek	Q	Q	Q	Q	Q	Q	Q		Q	Q	Q	Q			
KV16	Christal Creek 600 m d/s Silver Trail Highway	Q	Q	Q	Q	Q	Q	Q		Q	Q	Q	Q			
KV21	No Cash Creek at Keno Highway	Q	Q	Q	Q	Q	Q	Q		Q	Q	Q	Q			
KV29	Silver Trail Culvert #4	M	M	M	M	M		M		M	M	M	M	M		
KV30	Christal Creek 625 m d/s Silver Trail Highway	Q	Q	Q	Q	Q	Q	Q		Q	Q	Q	Q			
KV37	Lightning Creek u/s Hope Gulch	Q	Q	Q	Q	Q	Q	Q		Q	Q	Q	Q			
KV38	Lightning Creek u/s Thunder Gulch	Q	Q	Q	Q	Q	Q	Q		Q	Q	Q	Q		A	
KV39	Hope Gulch u/s Lightning Creek	Q	Q	Q	Q	Q	Q	Q		Q	Q	Q	Q			
KV40	Charity Gulch u/s Lightning Creek	Q	Q	Q	Q	Q	Q	Q		Q	Q	Q	Q			
KV41	Lightning Creek u/s bridge at Keno City	Q	Q	Q	Q	Q	Q	Q		Q	Q	Q	Q		A	
KV44	Bellekeno 625 Seep	Ms	Ms	Ms	Ms	Ms	A	A		A	A	A	A			
KV47	Porcupine Diversion Ditch	Q	Q	Q	Q	Q	Q	Q		Q	Q	Q	Q			
KV48	Hinton Creek u/s Calumet Drive	Q	Q	Q	Q	Q	Q	Q		Q	Q	Q	Q			
KV49	Hinton Creek u/s Christal Creek	Q	Q	Q	Q	Q	Q	Q		Q	Q	Q	Q			
KV50	Christal Creek u/s Hinton Creek	Q	Q	Q	Q	Q	Q	Q		Q	Q	Q	Q			
KV51	Christal Creek d/s Hinton Creek	Q	Q	Q	Q	Q	Q	Q		Q	Q	Q	Q			
KV52	Natural spring to Christal Lake at Old Mackeno pump house	Q	Q	Q	Q	Q	Q	Q		Q	Q	Q	Q			
KV54	Erickson Gulch at Road to Lucky Queen	Q	Q	Q	Q	Q	Q	Q		Q	Q	Q	Q			
KV55	Sandy Creek at Silver Trail Highway	Q	Q	Q	Q	Q	Q	Q		Q	Q	Q	Q			
KV56	Star Creek at Silver Trail Highway	Q	Q	Q	Q	Q	Q	Q		Q	Q	Q	Q			
KV57	Haldane Creek at South McQuesten Road	Q	Q	Q	Q	Q	Q	Q		Q	Q	Q	Q			
KV58	Seepage at toe of #3 dam	Q	Q	Q	Q	Q	Q	Q		Q	Q	Q	Q			
KV59	Galena Creek at mouth (just u/s of Flat Creek)	Q	Q	Q	Q	Q	Q	Q		Q	Q	Q	Q			
KV60	Galena Creek u/s of Silver King adit	Q	Q	Q	Q	Q	Q	Q		Q	Q	Q	Q			
KV61	Porcupine Gulch at Calumet Road Crossing	Q	Q	Q	Q	Q	Q	Q		Q	Q	Q	Q			
KV62	Brefalt Creek u/s of Porcupine Diversion	Q	Q	Q	Q	Q	Q	Q		Q	Q	Q	Q			
KV63	Flat Creek upstream of Porcupine Diversion	Q	Q	Q	Q	Q	Q	Q		Q	Q	Q	Q			
KV64	Flat Creek at Silver Trail Highway	Q	Q	Q	Q	Q	Q	Q		Q	Q	Q	Q			
KV65	Thunder Gulch upstream of Bellekeno	Q	Q	Q	Q	Q	Q	Q		Q	Q	Q	Q			
KV69	Valley Tailings Decant and Seepage u/s Flat Creek	Q	Q	Q	Q	Q	Q	Q		Q	Q	Q	Q			
KV70	Flat Creek 20 m u/s KV69	Q	Q	Q	Q	Q	Q	Q		Q	Q	Q	Q			
KV71	Flat Creek 20 m d/s KV69	Q	Q	Q	Q	Q	Q	Q		Q	Q	Q	Q			
KV72	South McQuesten River at McQuesten Lake	Q	Q	Q	Q	Q	Q	Q		Q	Q	Q	Q			
KV73	Cache Creek at access road d/s McQuesten Lake	Q	Q	Q	Q	Q	Q	Q		Q	Q	Q	Q			
KV76	Thunder Gulch d/s of Bellekeno 625 Adit	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q			
KV77	Thunder Gulch u/s of Bellekeno East	Q	Q	Q	Q	Q	Q	Q		Q	Q	Q	Q			
KV78	Onek Waste Rock Storage Facility	Ms	-	Ms	Ms	Ms	A	A		A	A	A	A			
KV79	Christal Creek d/s of Mackeno Tailings	Q	Q	Q	Q	Q	Q	Q		Q	Q	Q	Q			
KV80	Christal Creek u/s of Mackeno Tailings	Q	Q	Q	Q	Q	Q	Q		Q	Q	Q	Q			

Codes:

BA - Every Second Year
A - Annually
Q = Four times a Year May/July/October/February
M= Monthly
Ms = Monthly from May to October

ICP Metals include: Aluminum, Antimony, Arsenic, Barium, Beryllium, Bismuth, Boron, Cadmium, Calcium, Chromium Cobalt, Copper, Iron, Lead, Lithium, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium Silicon, Silver, Sodium, Strontium, Sulfur, Thallium, Tin, Titanium, Uranium, Vanadium, Zinc and Zirconium

3.4 ADIT DISCHARGES

A number of historic mine workings exist on the property and are routinely inspected by site personnel for site security, physical stability and drainage. Observations are recorded on an inspection checklist provided in Appendix A.

Many of these adits drain directly to ground or to drainages that eventually report to ground. No known effects to final receiving waters have been identified from these drainages.

The older workings are monitored on a quarterly (May/July/October/February) basis to track the effluent quality and flows from these adits. The large water chemistry database already developed for these sites (see Access Mining Consultants Ltd., June 3, 1996. *United Keno Hill Mines Limited, Report No. UKH/96/01, Site Characterization*), has been updated and will continue to be maintained to monitor for changes in water chemistry. The information will be used for closure planning purposes and linked with future studies for closure (groundwater monitoring and rock characterization).

Regular on-site monitoring of adit discharges will be conducted to track changes in water quality or quantity and in accordance with Water Licence QZ06-074 (see Table 3-1). A summary of the monitoring program for adit discharges including both on-site measurements and external laboratory analysis is shown in Table 3-4. Figure 3-1 shows the locations for these adits.

Table 3-4 Adit Discharges Monitoring Schedule

Site No.	Description	On-site					External Lab					
		Inspect	Flow	pH Units	Temp.	Cond.	Total ICP Metals	Dissolved ICP Metals	Hardness	pH Units	Cond.	TSS
KV17	Husky South West Adit	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
KV18	Bermingham Adit	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
KV19	Ruby Adit	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
KV20	No Cash 500 Adit	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
KV33	Keno 700 Adit	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
KV34	Lucky Queen Adit	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
KV35	Sadie Ladue Adit	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
KV36	Flame and Moth	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
KV45	Onek Adit	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
KV53	UN Adit	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
KV66	Klondike Keno Adit	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
KV67	Keno 200 Adit	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
KV68	Brewis Red Lake Adit	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q

Codes:

Q = Four times a Year May/July/October/February

ICP Metals include: Aluminum, Antimony, Arsenic, Barium, Beryllium, Bismuth, Boron, Cadmium, Calcium, Chromium Cobalt, Copper, Iron, Lead, Lithium, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium Silicon, Silver, Sodium, Strontium, Sulfur, Thallium, Tin, Titanium, Uranium, Vanadium, Zinc and Zirconium

4.0 AQUATIC RESOURCES

4.1 CREEK SEDIMENTS

Sediment sampling occurs to monitor impacts from mine drainages on local stream sediments. Every two years during summer low flow five sites on the South McQuesten River, Christal and Flat Creeks are sampled for sediments in conjunction with a benthic invertebrate monitoring program. Additionally, sediment samples are collected annually from two sites in Lightning Creek. The sediment sampling program for these surveillance sites is outlined in Table 3-3. Results from this program will be reported in an Annual Report and include an evaluation against previously recorded stream sediment data.

4.1.1 Sampling Protocol

Sediment sampling will be carried out as follows:

a) Sediment samples will be collected in replicates of three from the active channel, directly into high density plastic sample jars, using an aluminum or Teflon scoop;

b) Samples will be dried and screened, using sieves at ASTM mesh numbers 10, 20, 40, 60, 100, 140 and 270 (ASTM -E11-61) and the fraction weights recorded;

c) A sub-sample composed of material passing through the 100 mesh number sieve will be analyzed for metals by a 33 element ICP scan. Loss on ignition will also be determined by heating the sample to 600^{o}C.

4.2 BENTHIC INVERTEBRATES

The benthic invertebrate program is performed in conjunction with the sediment sampling program every two years at five sites on the South McQuesten River, Christal and Flat Creeks (Table 3-3). Data will be analyzed using a variety of indices and compared with existing information and reported in the Annual Report.

4.2.1 Sampling Protocol

Benthic invertebrate sampling will be carried out as follows:

a) Three replicate samples will be taken by a circular Hess sampler (0.0934 m^2) or Waters and Knapp sampler (0.089 m^2) equipped with a 250 μm mesh net;

b) Samples will be preserved with 10% formalin solution, and identified to the lowest possible taxon (usually genus) and counted;

c) Stream information collected at the time of the benthos collection will include velocity, depth, temperature, substrate conditions and riparian conditons.

5.0 METEROLOGICAL

An automated meteorological station was installed on Galena Hill above Hector adit in June 2007. The station measures air temperature, relative humidity, barometric pressure, rainfall, wind speed and direction, solar radiation, and soil temperature. A Yukon Government monitored snow course station also exists in the area.

KENO HILL SILVER DISTRICT

ENVIRONMENTAL MONITORING PROGRAM

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APPENDIX A

INSPECTION CHECKLISTS

Weekly Site Inspection Checklist - Open Water Season
Keno Hill Silver District, Yukon

Inspection Conducted the Week of: _____

Site Name	Silver King Adit		Husky S.W. Adit		Elsa		Husky Mine		Valley Tailings		Pump House		Dixie Adit		Ruby Adit		No Cash 500 Adit		Hector Adit		Bermingham 100 Adit		Galkeno 300 Adit		Galkeno 900 Adit		Onek 400 Adit		Bellekeno 100 Adit		Bellekeno 625 Adit		Keno 700 Adit		Shamrock "J" Raise		Lucky Queen Adit		Wernecke Camp		Klondike Keno Adit		Keno 200 Adit		Brewis Red Lake Adit	
Number of Sites	**1**		**2**		**3**		**4**		**5**		**6**		**7**		**8**		**9**		**10**		**11**		**12**		**13**		**14**		**15**		**16**		**17**		**18**		**19**		**20**		**21**		**22**		**23**	
KV Site Number	**KV13**		**KV17**												**KV19**		**KV20**				**KV18**		**KV27**		**KV31**		**KV45**				**KV42**		**KV33**				**KV34**				**KV66**		**KV67**		**KV68**	
A) Site Security & Public Safety																																														
1) Are access points secure? - doors, grates, windows, fencing, etc.	Y	N	Y	N	Y	N	Y	N			Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N							Y	N		
2) Are gates locked?	Y	N	Y	N	Y	N	Y	N					Y	N																	Y	N														
3) Are there any new holes?	Y	N	Y	N	Y	N	Y	N					Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N
4) Has hole changed?	Y	N	Y	N	Y	N	Y	N											Y	N	Y	N	Y	N											Y	N			Y	N			Y	N		
5) Checked signage?	Y	N	Y	N	Y	N	Y	N					Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N					Y	N			Y	N		
B) Water																																														
1) Is there any water flow?	Y	N	Y	N	Y	N	Y	N	Y	N			Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N			Y	N			Y	N	Y	N	Y	N
2) Is there a noticeable change in flow (since last inspection)?	Y	N	Y	N	Y	N	Y	N	Y	N			Y	N	Y	N	Y	N			Y	N	Y	N	Y	N	Y	N			Y	N	Y	N			Y	N			Y	N			Y	N
3) Do you observe an ice plug?	Y	N	Y	N	Y	N	Y	N					Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N			Y	N			Y	N			Y	N
4) Water clarity - clean or dirty?	Clean	Dirty	Clean	Dirty	Clean	Dirty	Clean	Dirty	Clean	Dirty			Clean	Dirty	Clean	Dirty	Clean	Dirty			Clean	Dirty	Clean	Dirty	Clean	Dirty	Clean	Dirty			Clean	Dirty	Clean	Dirty			Clean	Dirty			Clean	Dirty			Clean	Dirty
5) pH?																																														
6) Conductivity?																																														
C) Dams and Ponds																																														
1) Is there any seepage along downstream side of structure?	Y	N							Y	N													Y	N	Y	N					Y	N														
2) Checked culverts/decants (free of blockages, damage, etc)?	Y	N							Y	N													Y	N	Y	N					Y	N														
4) Is there evidence of up-welling downstream?	Y	N							Y	N															Y	N					Y	N														
5) Are there any new slumps, cracks, etc.?	Y	N							Y	N													Y	N	Y	N					Y	N														
D) Infrastructure																																														
1) Are there any NEW damaged power poles/lines?	Y	N			Y	N									Y	N							Y	N	Y	N	Y	N			Y	N														
2) Is there evidence of forced entry to any structure?	Y	N	Y	N	Y	N	Y	N			Y	N	Y	N	Y	N	Y	N			Y	N	Y	N	Y	N			Y	N	Y	N									Y	N		
3) Is there any new damage to building(s)?	Y	N	Y	N	Y	N	Y	N			Y	N	Y	N	Y	N	Y	N			Y	N	Y	N	Y	N			Y	N	Y	N									Y	N		
E) Other																																														
1) Pictures taken?	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N
2) Date and Time of Inspection (am/pm).																																														
3) Inspector to initial upon completion.																																														

Note: Please Provide Comments/Concerns/Observed Changes, if Necessary:

ALEXCO

Site Inspection Checklist - Winter Conditions
Keno Hill Silver District, Yukon

Inspection Conducted the Week of: _____

Site Name	Silver King Adit		Elsa		Valley Tailings		Elsa Townsite Infrastructure		Dixie Adit		Ruby Adit		Hector Adit		Galkeno 300 Adit		Galkeno 900 Adit		Onek 400 Adit		Bellekeno 625 Adit	
Number of Sites	1		2		3		4		5		6		7		8		9		10		11	
KV Site Number	KV13										KV19				KV27		KV31		KV45		KV42	
A) Site Security & Public Safety																						
1) Are access points secure? - doors, grates, windows, fencing, etc.	Y	N	Y	N			Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N
2) Are gates locked?	Y	N	Y	N			Y	N													Y	N
3) Are there any new holes?	Y	N	Y	N			Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N
5) Checked signage?																						
B) Water																						
1) Is there any water flow?	Y	N	Y	N	Y	N			Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N
2) Is there a noticeable change in flow (since last inspection)?	Y	N	Y	N	Y	N					Y	N			Y	N	Y	N	Y	N	Y	N
3) Do you observe an ice plug?	Y	N	Y	N							Y	N			Y	N	Y	N	Y	N	Y	N
4) Water clarity - clean or dirty?	Clean	Dirty	Clean	Dirty							Clean	Dirty			Clean	Dirty	Clean	Dirty	Clean	Dirty	Clean	Dirty
5) pH?																						
6) Conductivity?																						
C) Dams and Ponds																						
1) Is there any seepage along downstream side of structure?	Y	N			Y	N									Y	N	Y	N			Y	N
2) Checked culverts/decants (free of blockages, damage, etc)	Y	N			Y	N									Y	N	Y	N			Y	N
4) Is there evidence of up-welling downstream?	Y	N			Y	N											Y	N			Y	N
5) Are there any new slumps, cracks, etc.?	Y	N			Y	N									Y	N	Y	N			Y	N
D) Infrastructure																						
1) Are there any NEW damaged power poles/lines?	Y	N	Y	N			Y	N			Y	N					Y	N	Y	N	Y	N
2) Is there evidence of forced entry to any structure?	Y	N	Y	N			Y	N	Y	N					Y	N	Y	N			Y	N
3) Is there any new damage to building(s)?	Y	N	Y	N			Y	N							Y	N	Y	N			Y	N
E) Other																						
1) Pictures taken?	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N
2) Date and Time of Inspection (am/pm).																						
3) Inspector to initial upon completion.																						

Note: Please Provide Comments/Concerns/Observed Changes, if Necessary:

ALEXCO

KENO HILL SILVER DISTRICT

ENVIRONMENTAL MONITORING PROGRAM

2009 UPDATE

APPENDIX B

PHYSICAL INSPECTION AND REPORTING PLAN

Alexco Resource Canada Corp.

Physical Inspection and Reporting Plan

Water Use Licence QZ07-078

October 2008

Prepared by:

ACCESS
CONSULTING GROUP

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APPENDICES

1.0 INTRODUCTION

1.1 *Purpose of Plan*

This plan is submitted to fulfill the condition set out in Part D Section 23 of Water Licence QZ07-078 issued to Alexco Resource Canada Corp on October 3, 2008:

> *"Within 30 days of the effective date of this licence, the licensee shall submit to the board a physical inspection and reporting plan for all water retaining structures and water conveying structures. The physical inspection and reporting plan shall include at a minimum, but necessarily be limited to, the following:*
>
> *a) The plan shall indicate, that at a minimum, the frequency of inspection and reporting will be conducted at least on a weekly basis for all water structures.*
>
> *b) The plan shall include, but not necessarily be limited to, Bellekeno 625 settling ponds, Bellekeno East settling Ponds, Onek waste rock storage facility, and surface pipelines between and near Bellekeno East and Bellekeno 625."*

This plan outlines the Physical Inspection and Reporting methodology that will be used during the advanced exploration and preliminary development activities at the Bellekeno Mine on the Keno Hill property.

2.0 MINE LOCATION AND DESCRIPTION

The Bellekeno mine area is located approximately 3 km east of Keno City within the Keno Hill Silver District. The Keno Hill Silver District is located in central Yukon Territory, 354 km (by air) due north of Whitehorse.

The portal at Bellekeno East is located on a steep slope above Thunder Gulch, a narrow tributary of Lightening Creek.

3.0 PHYSICAL INSPECTION LOCATIONS

As per Part D, Section 23b of the Water Licence QZ07-078, the areas to be inspected include:

- Bellekeno 625 settling ponds;
- Bellekeno East decline settling ponds;
- Onek waste rock storage facility; and
- Surface pipelines between and near Bellekeno East decline and Bellekeno 625.

Also, as per section 38 of the Water Licence QZ07-078:

> *"During Dewatering of Bellekeno mine, the Licensee shall, on a weekly basis, observe the condition of the channel of Thunder Gulch and Lightning Creek downstream of Bellekeno 625 treatment plant and provide a detailed report to the board identifying any physical issues relating to the dewatering flows".*

4.0 PHYSICAL INSPECTION SCHEDULE

The Physical inspection for the above structures will be conducted on a weekly basis.

5.0 PHYSICAL INSPECTION METHOD

The purpose of the physical inspection is to observe and record sufficient information to permit development of a course of action; repair or rehabilitation if it is required.

The Physical Inspection will comprise of completing visual inspection methods by competent field technicians on the Bellekeno 625 settling ponds, the Bellekeno east decline settling ponds, Onek Waste Rock Facility, and the surface pipelines between and near Bellekeno East decline and Bellekeno 625. During dewatering of Bellekeno mine, the condition of the channel of Thunder Gulch and Lightning Creek downstream of Bellekeno 625 treatment plant will be physically inspected. Inspection checklists will be filled out on a weekly basis to ensure structural integrity of mine components and that

runoff and discharge is being appropriately managed (see Appendix I). The following rating system will be used in the field reporting to evaluate the structural integrity of the areas to be physically inspected:

Excellent	"As New" Condition.
Good	System or element is sound and performing its function; although it shows signs of use and may require some minor repairs, mostly routine.
Fair	System or element is still performing adequately at this time, but needs "priority" and/or "routine" repair to prevent future deterioration and to restore it to good condition. A fair rating will be reported to site manager after the inspection.
Poor	System or element cannot be relied upon to continue to perform its original function without "immediate" and/or "priority" repairs. A poor rating will be reported to site manager after the inspection.

If issues are identified during the weekly inspections of structures, works and installations (e.g. waste rock storage area, overburden stockpiles, embankments, diversion ditches, sediment ponds, and pipelines) the site manager will be informed immediately and the appropriate mitigative measures will be implemented. An inspection by a qualified geotechnical engineer would be undertaken for physical stability if necessary. Additional erosion and sediment controls may need to be implemented as required.

If geotechnical inspections are required, they will be carried out during the summer months when the surface and sides of the various rock-fill structures are not obscured by snow.

6.0 REPORTING

As per Sections 18 and 19 of the Water Licence QZ07-078:

> *"18. Unless otherwise specified in this licence, all monitoring data, reports, plans, studies, study results, designs or manual shall be submitted to the Board in an unbound form that is reproducible by standard photocopier and shall be accompanied by 5 copies."*
> And
> *"19. All monitoring data, reports, plans, studies, study results, designs or manuals shall be submitted in digital form on compact disk using an IBM compatible format that is readable using commonly available software".*

The results of the weekly physical inspections of the Bellekeno 625 settling ponds, the Bellekeno east decline settling ponds, Onek Waste Rock Facility, and the surface pipelines between and near Bellekeno East decline and Bellekeno 625, will be summarized and incorporated into the Water Licence QZ07-078 water quality annual reports (as per section 15 e of the licence). Requirements of the annual reports are outlined in sections 14 and 15 of the Water Licence QZ07-078. Section 37 of the Water Licence QZ07-078 requires "*Actions taken or planned in response to any identified issues and/or to prevent recurrence must be reported annually as part of the annual report".*

The weekly physical inspection checklists will be kept on file internally for proof of inspections and for reference as required.

Section 38 of the water licence requires a detailed report submitted to the Yukon Water Board identifying any physical issues relating to the dewatering flows from the Bellekeno mine (Thunder Gulch and Lightning Creek channels downstream of Bellekeno 625 treatment plant). Section 38 also requires "*Any mitigative measures undertaken shall also be detailed in that report and submitted to the board following dewatering activities at Bellekeno mine. This report shall be provided to the board as part of the monthly report required by this licence".* The monthly report required during dewatering of the

Bellekeno mine will be incorporated into the monthly water quality report required by this licence (QZ07-078). The monthly reporting requirements are outlined in section 16 and 17 of the Water Licence QZ07-078.

Alexco Resource Canada Corp.

Physical Inspection and Reporting Plan

Water Use Licence QZ07-078

Appendix I

Checklist Open Season

Checklist OPEN SEASON

Inspection Conducted the Week of: _____

		Bellekeno 625 Settling Ponds		Bellekeno East Decline Settling Ponds		Onek Waste Rock Storage Facility		Surface Pipelines between BK East and BK625		Thunder Gulch Channel During Dewatering		Lightning Creek Channel During Dewatering			
		Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N
A	**Site Security and Public Safety**														
1	Are access points (doors, grates, windows, fencing, etc.) ajar or insecure?														
2	Are any gates unlocked?														
3	Do access points have any new holes?														
4	Have any old holes changed?														
5	Has signage been removed/damaged?														
B	**Water**														
1	Is there any water flow?														
2	Is there a noticeable change in flow (since last inspection)?														
3	Are there ice plugs?														
4	Any loose material or exposed liner?														
C	**Dams and Ponds Physical Inspection**														
1	Is there any seepage along the downstream side of the structure?														
2	Do culverts and decants exhibit blockages, damage, etc?														
3	Is there evidence of upwelling downstream?														
4	Are there any new slumps, cracks, etc? any movement?														
5	Was the toe and crest of the pond checked?														
D	**Infrastructure**														
1	Are there any newly damaged or signs of wear on poles, lines or pipelines?														
2	Any Pipeline Leaks?														
3	Is there evidence of forced entry to any structure?														
4	Is there new minor damage to any buildings?														
5	Have there been any structural failures or collapses?														
E	**Site Engineering/Geotechnical Stability**														
1	Are there signs of ground subsidence in the surrounding area?														
2	Are there signs that a rockfall or landslide has occurred in the area?														
F	**Other**														
1	Were pictures taken?														
2	Date and time of inspection														
3	Inspector initials														
F	**Overall Condition**														

Excellent, Good, Fair or poor

Provide, when applicable, comments, concerns and/or observed changes:

KENO HILL SILVER DISTRICT

ENVIRONMENTAL MONITORING PROGRAM

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APPENDIX C

FLOW MONITORING PLAN

Alexco Resource Canada Corp.

Bellekeno Underground Development
Flow Monitoring Plan

Water Use Licence QZ07-078

October 2008

Prepared by:

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Tables

Figures

Appendices

1.0 INTRODUCTION

1.1 *Purpose of Plan*

This plan is submitted to fulfill the condition set out in Part D Section 26 of Water Licence QZ07-078 issued to Alexco Resource Canada Corp on October 3, 2008:

> *"The Licensee shall, within 30 days of the effective date of this licence, submit a plan for monitoring flows at monitoring stations described in this licence, which require flow measurement. At a minimum, the plan shall indicate the methodology to be used at each monitoring station."*

This plan outlines the flow monitoring methodology that will be used during the advanced exploration and preliminary development activities at the Bellekeno Mine on the Keno Hill property.

2.0 MINE LOCATION AND DESCRIPTION

The Bellekeno mine area is located approximately 3 km east of Keno City within the Keno Hill Silver District. The Keno Hill Silver District is located in central Yukon Territory, 354 km (by air) due north of Whitehorse.

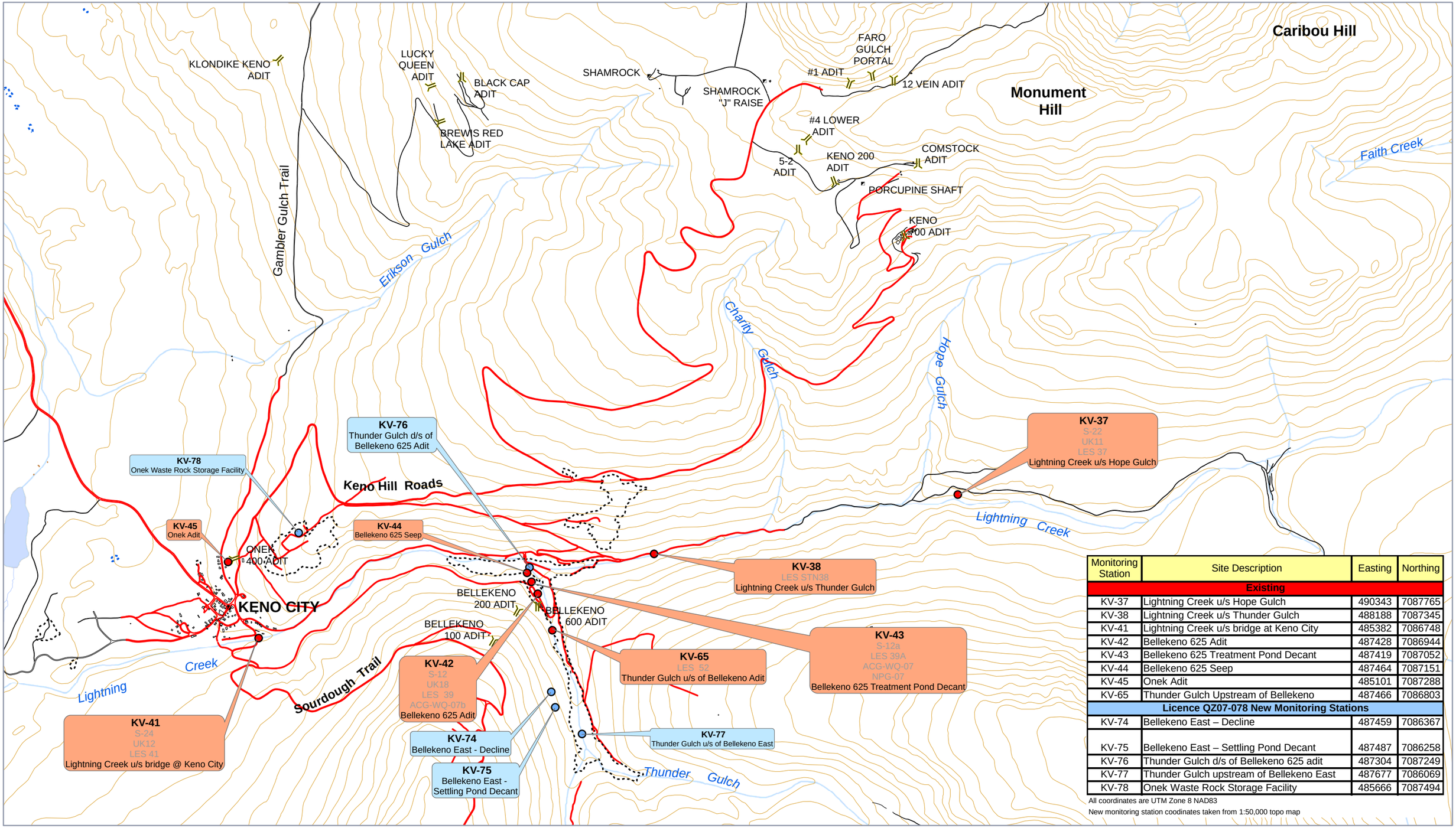
The portal at Bellekeno East is located on a steep slope above Thunder Gulch, a narrow tributary of Lightening Creek.

3.0 MONITORING STATION LOCATIONS

Schedule A, Part I of the Water Licence QZ07-078 identifies 13 specific water monitoring stations required for flow monitoring. Eight locations are being monitored for Water Quality under the Care & Maintenance Water Licence QZ07-074 (as denoted by an asterisk [*] on Table 1). Table 1 provides the site designations, descriptions and locations. Figure 1 illustrates the existing and new flow monitoring locations. (Please note that GPS Coordinates are approximate).

Table 1 Existing and New Flow Monitoring Locations under Water Licence QZ07-078

Monitoring Station	Site Description	Easting	Northing
Existing			
KV-37*	Lightning Creek u/s Hope Gulch	490343	7087765
KV-38*	Lightning Creek u/s Thunder Gulch	488188	7087345
KV-41*	Lightning Creek u/s bridge at Keno City	485382	7086748
KV-42*	Bellekeno 625 Adit	487428	7086944
KV-43*	Bellekeno 625 Treatment Pond Decant	487419	7087052
KV-44*	Bellekeno 625 Seep	487464	7087151
KV-45*	Onek Adit	485101	7087288
KV-65*	Thunder Gulch Upstream of Bellekeno	487466	7086803
Licence QZ07-078 New Monitoring Stations			
KV-74	Bellekeno East – Decline	487459	7086367
KV-75	Bellekeno East – Settling Pond Decant	487487	7086258
KV-76	Thunder Gulch d/s of Bellekeno 625 adit	487304	7087249
KV-77	Thunder Gulch upstream of Bellekeno East	487677	7086069
KV-78	Onek Waste Rock Storage Facility	485666	7087494



Monitoring Station	Site Description	Easting	Northing
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KV-37	Lightning Creek u/s Hope Gulch	490343	7087765
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KV-78	Onek Waste Rock Storage Facility	485666	7087494

All coordinates are UTM Zone 8 NAD83

New monitoring station coodinates taken from 1:50,000 topo map

N

1:25,000
(when plotted on 11x17 inch sheet)

0 250 500 1,000 1,500 2,000 m

Legend

Water Quality
- Station Name / Site Description — Existing Flow Monitoring Location
- Site Description — Proposed Flow Monitoring Location

Mine Workings
- Adit
- Shaft (to surface - connection to underground not determined)
- Pit

Topography
- Town
- Public Road
- Exploration Road
- Contour
- Watercourse
- Waterbody

Notes:
This map is for illustrative purposes only.
This is not a legal document.
National Topographic Data Base (NTDB) compiled by Natural Resources Canada at a scale of 1:50,000. Cadastral data compiled by Natural Resources Canada. Reproduced under license from © Her Majesty the Queen in Right of Canada, Department of Natural Resources Canada. All rights reserved.
Projection: UTM Zone 8 NAD83
NTS Sheet 105M/14

ALEXCO
ACCESS CONSULTING GROUP

FLOW MONITORING PLAN

EXISTING AND PROPOSED FLOW MONITORING LOCATIONS

Drawn By: HD	Date: October 2008	**FIGURE 1**
Checked by: KN	File: D:\Project\AllProjects\ALEX-05-01\MonitoringPrograms\FlowMonPlan\Oct08\Fig1_FlowMonPlan.mxd	

4.0 MONITORING SCHEDULE

Throughout the term of the licence, the timeline for the monitoring of the flow stations will be conducted according to Schedule A, Part III, *On-site Monitoring Schedules of the Water Licence QZ07-078*. The flow monitoring program will consist of continuous, daily, monthly (May to October), and quarterly monitoring. The schedule will be as follows:

Continuous Monitoring:	KV-42 and KV-74
Daily Monitoring:	KV-43 and KV-75
Monthly (May to October) Monitoring:	KV-44
Quarterly Monitoring:	KV-37, KV-38, KV-41, KV-45, KV-65, KV-76 and KV-77
Not Specified in Schedule A, Part III:	KV-78

The culverts at KV-78 (the Onek Waste Rock Storage Facility) will be monitored monthly using a Heron Instruments Dipper-T probe to determine the accumulation amount of water within the storage facility. During pumping of clean, tested water from the Onek Waste Rock Storage Facility, the continuous flow will be calculated by monitoring the pump discharge rate, or if vacuum trucks are used to empty the culvert, the flow will be calculated on the basis of volume of solution removed by the trucks.

The Bellekeno East decline (KV-74) will not have a continuous flow. The decline will be inspected daily for flow and if any water is pumped from the Bellekeno East decline, the flow will be calculated by monitoring the pumping rate.

5.0 FLOW MONITORING METHODS

Flow monitoring will be conducted in accordance with the *Manual of Standard Operating Procedures for Hydrometric Surveys in British Columbia*, dated November 2, 1998. Depending on the flow condition (i.e. stream vs. adit piped flow), one of the following flow monitoring methods will be implemented at each monitoring station.

5.1 *Current Meter*

A current meter measures velocity at various points along the width of the stream. The manual of operation provided with the meter would be followed and the general current meter use and flow measurement procedure from this protocol would be followed.

Please note that text surrounded by quotation marks was taken from the "*Water Measurement Manual*" (U.S. Department of the Interior, 1984).

"*The essential features of conventional current meters are a wheel, which rotates when immersed in flowing water, and a device for determining the number of revolutions of the wheel.*" The relationship between the velocity of the water and number of revolutions of the wheel per unit time for various velocities would be provided by the manufacture of the device. The instrument would be calibrated by the manufacturer prior to its shipment.

The current meter would be calibrated every year prior to its use. As part of the calibration process, a relationship between the speed of rotation of the meter and the water velocity would be developed. The relationship is called a rating table. The relationship would be developed after each calibration and the curve is supplied with the meter. (a rating table from another current meter will not be used.)

Since there is a variety of equipment available to conduct flow measurements, it has been assumed that a Price-type current meter with top setting wading rod would be used to conduct the measurements. The Price-type current meter and top setting wading rod are commonly used in the Yukon. In addition, the following procedure would be for the "*sixth-tenths-depth*" measurements, in which the velocity at sixth-tenths of the stream depth is assumed to represent the average velocity through the vertical water column.

This procedure has been prepared under the assumption that a person wading across the stream would undertake the flow measurements. For detailed procedures on conducting flow measurements from a boat or bridge refer to the "*Water Measurement Manual*" published by the U.S. Department of the Interior (1984).

The flow measurement procedure would consist of the following steps:

- Locating the monitoring station, the stations would be clearly marked.
- The number of depth and velocity measurements would be determined to conduct across the stream or river. There would be at least 20 flow measurements across the channel. However, the number of measurements may be reduced for the very small streams if the distance between the measurements becomes less than 30 centimetres (U.S. Department of the Interior, 1984). There should be no flow measurement representing more than 10% of the overall channel flow. The width across the channel would be obtained by measuring from a fixed reference point on one bank to the other.
- A measuring tape or marked cable would be used to spread across the channel to outline the locations where depth and velocity measurements will be conducted.
- The water depth would be measured at each location using the wading rod. The rod would be graduated to 0.02 metres with the zero mark at the bottom of the rod. The depth is the point at which the level water surface intersects the rod. Observations would be made to the nearest 0.01 metre.
- Velocity would be measured at sixth-tenths (0.6) of the depth from the water surface. The height of the current meter would be adjusted to sixth-tenths of the depth. The manufacturer manual would be followed on how to adjust the current meter to the proper depth.
- The number of spins per unit time at each location would be measured. Either a set of headphones or a digital counter would be used to count the number of revolutions while timing is being conducted. The timing would be started immediately after the current meter has spun past the point where it records a complete revolution (i.e. a scratch sound using the earphones or number change on the digital reader). Also it would be ensured that the rotations are measured for a minimum of forty seconds.
- The location from the left bank (while facing upstream), depth and number of revolutions per unit time on a field data sheet (please refer to Appendix I for a blank field data sheet) would be recorded.
- The location of the person taking the flow measurements is important. They would face upstream and stand at least thirty centimetres downstream of the rod. The rod would be held vertically with the meter pointing in the direction of flow.

- The measurements would continue to be taken across the stream or river in equally spaced intervals until the right bank is reached.

5.2 *V-notch Sharp Crested Weir*

A V-notch sharp-crested weir measures volumetric flow rates of a stream. The weir would be designed and constructed to meet 2005 ASTM Standard D5242-92 – Standard Test Method for Open-Channel Flow Measurement of Water and Thin-Plate Weirs. Operation and installation of the weir would be in accordance with Environment Canada's *Guidance Document for Flow Measurement of Metal Mining Effluents* (EPS2/MM/4 – April, 2001). The purpose of the weir would be to calm creek waters and allow stilled water to be decanted through a specifically shaped notch within the weir. Water level-discharge relationships could then be applied to the specific shaped notch in order to calculate an instantaneous volumetric flow rate.

5.3 *Bucket and Stop Watch*

Volumetric analysis or the *'bucket and stopwatch method'* can be an extremely precise and accurate method that simply involves the collection of discharged water in a container of known volume for a measured period of time. This is a simple method for measuring small amounts of water where all of the flow can be concentrated (such as naturally within a rock cascade, a temporary dam with a pipe, or a discharge pipe from a settling pond). The method could also be used in larger streams which have flow concentrated or partitioned by culverts, pipes or weirs. A short, wide container is more suitable to fit under the falling water than a tall narrow one. The container volume should be such that it takes at least 3 seconds to fill. It is important that the bucket is held upright and that multiple (>3) readings are taken to reduce measurement error. An alternative approach is to hold down and open a heavy-gauge plastic garbage bag on the stream bed, time its filling, and empty the bag contents into a measuring container. The bag can also be weighed and the volume calculated if the density of the water is known.

Stream discharge (Q) in L/s would be calculated as:

Q = V/t where V is the contained volume (L) during time t (s).

Reference: Hauer & Lamberti, 1996. Methods in stream ecology. Academic Press.

5.4 *Continuous Flows*

Continuous flows are required at the Bellekeno 625 Adit (KV-42) and the Bellekeno East Decline (KV-74). The decline will be inspected daily for flow and if any water is pumped from the Bellekeno East decline, the flow will be calculated by monitoring the pumping rate.

The Bellekeno 625 Adit (KV-42) discharge is currently being treated by lime in a treatment shed prior to entering the settling ponds. A calibrated digital flow meter would be installed in the line to give continuous flow measurements. A daily average would be reported as well as the flow during at the time of monitoring. The digital flow meter would be installed, calibrated, maintained and used as per the manufactures specifications.

5.5 *Dipping Probe*

As previously mentioned, the culverts at KV-78 (the Onek Waste Rock Storage Facility) will be monitored monthly using a Heron Instruments Dipper-T probe to determine the accumulation amount of water within the storage facility. The Heron probe gives a solid beep when water is encountered. The base of the culvert and the water level would be measured to a designated point at the top of the culvert. The increase and decrease in the water volume could be calculated using the height of the water column. During pumping of clean, tested water from the Onek Waste Rock Storage Facility, the continuous flow will be calculated by monitoring the pump discharge rate.

6.0 REPORTING

A daily field report form (see Appendix I) will be filled out by competent and qualified field technicians while completing the daily flow monitoring (KV-42, KV-43, KV-74 and KV-75) and daily water quality testing. The daily average and the flow at the time of monitoring will be reported for stations that require continuous flow monitoring. Sites that require quarterly flow monitoring (KV-37, KV-38, KV-41, KV-45, KV-65, KV-76 ANF KV-77) as

well as the stations that require monthly monitoring (KV-44 and KV-78) will be recorded in the field during the Water Quality sampling program.

As per Section 18 and 19 of the QZ07-078 Water Licence:

> *"18. Unless otherwise specified in this licence, all monitoring data, reports, plans, studies, study results, designs or manual shall be submitted to the Board in an unbound form that is reproducible by standard photocopier and shall be accompanied by 5 copies."*
> And
> *"19. All monitoring data, reports, plans, studies, study results, designs or manuals shall be submitted in digital form on compact disk using an IBM compatible format that is readable using commonly available software".*

The flow monitoring data collected will be incorporated into the Water Licence QZ07-078 water quality monthly and annual reports. Requirements of the monthly and annual reports are outlined in Sections 14, 15, 16 and 17 of the Water Licence QZ07-078.

Alexco Resource Canada Corp.

Bellekeno Underground Development
Flow Monitoring Plan

Water Use Licence QZ07-078

APPENDIX I

Daily Field Report Form

Date: _____

Daily Field Report

Operator: _____

		KV-13	KV-14	KV-31	KV-32	KV-42	KV-43	KV-74	KV-75
Parameter	**Units**	**Silver King 100 Adit**	**Silver King 100 Decant**	**Galkeno 900 Adit**	**Galkeno 900 Decant**	**Bellekeno 625 Adit**	**Bellekeno 625 Decant**	**Bellekeno East Decline**	**Bellekeno East Decant**
Time	HH:MM (24h)								
Air Temperature	°C								
Water Temperature	°C								
pH	pH units								
Conductivity	µS								
Ammonia	mg/L								
Turbidity	NTU								
Flow Rate	sec/5 gal								
Lime Added - Flow Rate	sec/L								
Mix Tank Hz	Hz								
Mix Tank pH	pH								
Target pH	pH								
Lime Pump RPM	RPM								
Bioreactor Cell									
Freeboard	in								
Totalizer Reading	L/sec								
Water Temperature	°C								
Visual and smell impression in tank (sheen, odor, etc.)	G/B/U								
pH	pH units								
Conductivity	µS								
Dissolved Oxygen	mg/L								
Redox potential	V								

Comments: