

Environmental Protection Operations Directorate, Pacific & Yukon Region
91782 Alaska Hwy
Whitehorse, Yukon
Y1A 5B7

June 7, 2010

Carola Scheu
Manager, Water Board Secretariat
Suite 106 - 419 Range Road
Whitehorse, Yukon
Y1A 3V1

Dear Carola:

RE: Bellekeno Mine Development, Keno Hill Silver District, Yukon Type A Water License Application; QZ09-092

Environment Canada has completed its review of the above referenced licence application. The following attachment provides Environment Canada's intervention comments regarding Water License Application QZ09-092.

With respect to the licence application and project proposal; Environment Canada wishes to draw the Board's, and the applicant's, attention to the advice Environment Canada has provided previously. Based on Environment Canada's review of the Dry Stack Tailings Facility (DSTF) design description, it is Environment Canada's assessment that the DSTF is unlikely to meet the requirements of sections 19 and 6 of the Metal Mining Effluent Regulations (MMER)¹ (also see Appendix A). Specifically:

- Section 19 of the MMER requires, among other things, the operator to monitor the effluent flow rate to within 15% accuracy, while;
- Section 6 of the MMER prohibits the combination of effluent with water or any other effluent for the purpose of dilution before it is deposited.

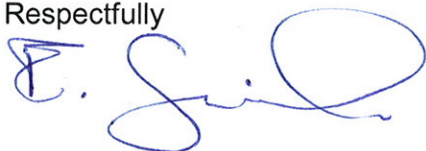
In Environment Canada's opinion, the applicant has failed to provide the level of detail necessary to demonstrate that the above conditions will be met. Environment Canada requests that these details be provided accordingly. Such information would also facilitate and focus the consideration of potential project impacts and appropriate mitigation and monitoring measures.

¹ letter to YG EMR, & cc: Clynton Nauman; Alexco Keno Hill Mining Corp. and Elsa Reclamation & Development Company Ltd., subsidiaries of Alexco Resource Corp.



Please contact Eric Soprovich at (867) 667-3410 if you have any questions regarding this intervention or otherwise seek clarification upon any matter.

Respectfully

A handwritten signature in blue ink, appearing to read 'E. Soprovich', with a large loop at the end.

Eric Soprovich, B.Sc. (geol.) MNRM
Head, Public and Natural Resources Sector Unit

cc: ERDC/Alexco – B.Thrall / ACG – R. McIntyre
FN of NND – Chief Simon Mervyn
DFO - Briar Young
GY – Randy Lamb

June 7, 2010

**Environment Canada
Intervention to Yukon Water Board**

**Type A Water Licence QZ09-092
Bellekeno Mine Development,
Keno Hill Silver District
Alexco Resource Canada Corp.**

Mandate

Environment Canada's primary legislative authority to control water pollution, including mining effluent, is the pollution-prevention provision of the *Fisheries Act* [ss.36 (3)] which prohibits the deposit of deleterious substances into waters frequented by fish. The *Metal Mining Effluent Regulations (MMER)* of the Act aims to ensure that metal mines operating in Canada control their liquid effluents to at least meet national minimum prescribed standards. The *MMER* applies to all effluents (as defined in subsection 1 (1) of that regulation) containing a deleterious substance in the operations area for a project, in accordance with the application of those regulations.

Fisheries Resource

The Keno Hill Silver District encompasses development on three major hillsides – Galena Hill, Sourdough Hill, and Keno Hill – and adjacent valleys and valley-sides. The Bellekeno development is focused on Keno Hill where the headwaters and tributaries to Lightning Creek, a tributary to Duncan Creek which is part of the Mayo River drainage, originate and develop. The following summarizes our current understanding of the fisheries resources in this area.

Previous fisheries studies² on the creeks in question included work on Flat Creek, from below the settling ponds to its confluence with the South McQuesten River, and work on Lightning Creek, from slightly upstream of Thunder Gulch to Duncan Creek. Eleven different fish species were found within the creeks and associated river systems included: arctic grayling, slimy sculpin, round whitefish, northern pike, arctic lamprey, chinook salmon, longnose sucker, least cisco, and lake chub. Slimy sculpin were the most widely distributed fish species in the study area, and arctic grayling the most abundant.

Chinook salmon have been recorded on the South McQuesten River up to Haggart creek where a potential barrier to upstream movement of salmon had developed in the form of a log jam. In 2004 a bypass channel was created to ensure the potential for upstream migration of salmon, and Chinook salmon continue to use the area.

² Sparling, P. and M. Connor, White Mountain Environmental Consulting., 1995. Appendix V – Fish and Fish Habitat Assessment Conducted near Elsa, Yukon for United Keno Hill Mines Ltd. August 1994 – September 1995.

The Stewart sub-basin, of which the South McQuesten and the Mayo River are part, has been identified by Milligan et al (1985)³ as an important producer of Chinook salmon. Members of the First Nation of Nacho Nyak Dun also have a long history of use of fishery resources within this area which includes both freshwater and anadromous species.

Discussion

The present licence application before the Yukon Water Board, for development of the Bellekeno Mine, presents some unique considerations with respect to another water licence and related activities in the UKH area. The activities described in the application include not only those specific to the project itself, but the proposal also overlaps activities presently being undertaken by a subsidiary of the licence applicant (to undertake care & maintenance of the UKHM site, including water collection & treatment at the Bellekeno 625 Adit and water collection and treatment of the Galkeno 900 and 300 adits). Any part of the operational area for this project will become subject to the MMER. In the interest of clarity, we would appreciate the Board's consideration that there not be multiple licenses or licensees overlapping project components.

Currently, the Keno Hill mine site area care and maintenance program, which operates under Water License QZ06-074, is substantially or entirely funded through the Federal Contaminated Sites Action Program (FCSAP) which was developed to provide a long-term mechanism to address those federal contaminated sites which present the largest human health and ecological risks. Although responsibility for the actual management and remediation of federal contaminated sites rests with responsible custodial departments, the overall program is administered jointly by Environment Canada and the Treasury Board Secretariat.

Introduction

The licence application is for underground development and operation of the Bellekeno mine and construction and operation of a conventional flotation mill at the Flame and Moth site for processing of materials from the Bellekeno mine. This project includes activities such as water collection; management and treatment; construction and operation of ore stockpiles and waste rock dumps; as well as dry stack tailings disposal and underground backfill with pyritic tailings and waste rock.

As indicated previously, the review of this project with an overprint with another water licence in an area with known federal responsibility for site closure; has resulted with unique "considerations" in project review and provision of advice to the Yukon Water Board. Environment Canada respectfully submits the recommendations below for the Board's consideration.

³ Milligan, P.A., Rublee, W.O., Cornett, D.D. and R.A.C. Johnston. 1985. The distribution and abundance of Chinook salmon (*Oncorhynchus tshawytscha*) in the upper Yukon River basin as determined by a radio-tagging and spaghetti tagging program: 1982-1983. Canadian Technical Report of Fisheries and Aquatic Sciences No. 1352. Pp. 161.

Specific Recommendations

Licence Term –

Recommendation: Licence term of 15 years.

Rationale: *EC is amenable to the requested licence term of 15 years. The 15 year period should allow for the five year development period plus provide for closure activities and post-project monitoring for waste discharges. This should provide enough time such that adequate knowledge is gained from the project and post-project timeframe to enable prediction of long term flows, contaminant release, and potential long term effects on the receiving environment. If the proponent finds that monitoring indicates a potential exists for a post closure long-term effect, then the proponent should apply to the Board at that time for an application to amend their licence to undertake further studies and/or monitoring to ensure the closed site is chemically and physically stable prior to the final monitoring period.*

Reporting –

Recommendation: The Licensee should provide data electronically and include all data collected as part of this license. In addition to any other digital format used to present the data (e.g. .pdf format), it would be helpful to all stakeholders, including regulatory agencies, if the data is reported in a format that would facilitate analysis and interpretation (e.g. electronic spreadsheet).

Rationale: *The Water Use License Terms proposed by the proponent states that monitoring data shall be submitted “in digital form that is readable using commonly available software”. However, much of the data reported electronically for similar projects is often provided in .pdf document format which is suitable for presentation but cannot be readily handled for review and comparison to previously reported monitoring data. Data presented in spreadsheet format and searchable .pdf documents provide the most value to regulators such as EC by allowing efficient review and analysis, and incorporation into compliance databases where such may exist.*

Recommendation: As constructed design details, including the coordinates and a figure showing the location of all constructed ponds including but not limited to: the mill site and DSTF collection pond, mill site treatment pond, polishing ponds, mine site (i.e. Bellekeno) water collection and treatment ponds, Galkeno 900 retention and treatment ponds should be provided prior to use of the ponds for mine operation. All points of discharge within the system or to a final point or points of control should be detailed on the as constructed design plan.

Rationale: *The application documents are unclear in terms of pond locations, uses and naming conventions. For example, some text and figures refer to the Mill site polishing pond which was not found in the reviewed material. Figures showing the final DSTF and mill site only show one collection pond and no treatment pond. Subsections 21.b) and 21.g) of the Proposed Water Use License also describes several ponds. For clarity and consistency, naming conventions along with final construction details should be provided. There also seems to be discrepancy between the text and figures in terms of*

pond size. It is our understanding that the mill site collection pond should be sized to be approximately 10,000 m³ (p. 6-24, section 6.1.5.5). However, using the area of the pond scaled from figure 6-8 of the main application document yields a pond area of roughly 50m x 25m = 1250m³. This suggests that the pond would have to be more than 8.0m in depth assuming vertical sides. The pond surface area exposed to direct precipitation is significant in terms of the pond water balance. This does not seem to have been considered in the water balance in terms of the available storage capacity during high precipitation events. Even though the pond is sized to handle extreme runoff events, details about pond water management or the overall site water management have not been provided (i.e. the pond may still overtop if water is not managed properly) creating uncertainty in determining whether the pond is sized appropriately for the management of contaminated water.

Water Balance and Water Management -

Recommendation: The Licensee should provide a water management plan, based on an updated water balance that presents at a minimum, monthly predictions of flows (i.e. treated flows, adit flows, underground mining flows, fresh make-up water, wastewater, site runoff, dry stack facility runoff and seepage, waste rock runoff, precipitation volumes, snow accumulation, and other reasonable inputs/outputs) and available storage capacity in water management structures (i.e. ponds) for all phases of mine development from mill construction through operation and closure and for the range of anticipated operational scenarios such as extraction from Christal Lake vs. treated Galkeno 900 or Christal Creek for mill operation. The water management plan and associated revised water balance should be submitted to the Board within six months of signing of this licence and should be updated and submitted annually thereafter.

Rationale: Water management plans are tools which are key to assisting the mine operators in managing mine site water, mitigating impacts and complying with applicable regulatory requirements. A robust water balance is essential for the development of such plans at mine sites and allows for reliable predictions of water quantity and quality of released effluents to understand potential impacts on the receiving environment and therefore mitigation measures the operator may wish to apply. The project proposal for the Bellekeno mine does not present a detailed water management plan for the site. The proponent only discusses conceptually, in broad terms, what water conveyance structures might look like and offers several options for obtaining make-up water. The water balance that is presented is mostly based on mean annual predictions of flow and runoff and is presented at best on a quarterly basis using mean annual values.

Environment Canada believes that a robust water balance for this project should at a minimum: utilize monthly time steps to capture freshet events as well as periods of minimal site runoff such as during winter; accurately represent different site conditions as the project evolves (e.g. variations in runoff volumes associated with the different phases of development of the dry stack tailings facility and eventual closure), and consider variations in adit discharge both seasonal and as the mine is developed. For a conservative assessment of impacts from the mine project, sensitivity and uncertainty analyses (e.g. design for 1:100 year event) should be performed to address and quantify the potential variability in model parameters such as rainfall, runoff coefficients, timing of freshet events, climate change, etc. The water balance should incorporate conditions that are either above or below average in order to demonstrate the range of expected

conditions. As the project progresses: site conditions such as pond levels, internal flows and meteorology should be monitored and used to validate and refine the model and the associated water management plan. Environment Canada is currently developing guidance for water and mass balance models for the mining industry, specifically applicable to Yukon. A draft copy of this documentation has previously been provided to the Board for review.

Sludge Management -

Recommendation: The Licensee should provide a Sludge Management Plan specific to the Bellekeno mine development; including design details, construction diagrams and locations of any proposed sludge disposal areas other than the DSTF should be approved prior to deposition of sludge.

Rationale: *The sludge management plan provided in the application material is for the overall UKH site closure and is not specific to this proposed project. It includes references to the Valley Tailings Area, the Sime Pit and presents sludge characterization of the Galkeno 300 treatment sludge which are not components of the Bellekeno project.*

The proposed license states that the Licensee would be authorized to “deposit waste in the form of sludge to the sludge holding cell of the Valley Tailings Storage Area or other approved disposal locations in the Sludge Management Plan”. However, the application material states that water treatment sludge from the Bellekeno 625 site and the Flame and Moth site will be disposed of in the Dry Stack Tailings Facility. Furthermore, clarification is needed to ensure that any alternate sludge disposal location or method is designed and constructed in a manner that is consistent with minimizing chemical and physical instability of the sludge and the potential for impact to aquatic resources.

The proponent should undertake sludge stability testing of the sludge prior to deposition in the DSTF or any other disposal site. The Board may want to consider a license term that specifies that the proponent request an amendment to the License to allow deposition of sludge within the DSTF depending on testing results.

Effluent Standards –

Recommendation: Based on a consideration of site-specific environmental factors and potential cumulative effects, discharge of effluent from the Bellekeno 625 treatment system should be managed so as to avoid loadings that would translate into a concentration in the receiving environment that is higher than the Total Zinc CCME guidelines for the protection of aquatic life at the confluence of Thunder Gulch and Lightning Creek.

Rationale: *The licensee’s proposal in exhibit 1.3.6.7, section 5.4.1.4 discusses the inapplicability of using CCME guideline values for the site. The report goes on to described the various alternatives to derive site specific water quality objectives and the rational for why this approach would not provide adequate values for the site. The licensee proposes alternative approaches for the SSWQO development, as described in*

the report Water Quality Assessment Report for United Keno Hill Mines prepared by Minnow Environmental Inc, (exhibit 1.3.6.7).

Our evaluation of the data in exhibit 1.3.6.7 indicates that the background concentration in Lightning Creek (station KV-37, Lightning Creek u/s Hope Gulch) for total Zinc, based on 95th percentile, is 0.009 mg/l (n=14).

The company indicates that the CCME guidelines values cannot be met at the site because of historical contamination. Station KV-38 (Lightning Creek u/s Thunder Gulch) has an average of 0.028 mg/l T.Zn and a 95th percentile of 0.047 mg/l (n=10). That station is influenced by contaminated drainage from the historical mine site Keno 700 adit which reports to Hope Gulch.

Effluent from the Bellekeno 625 adit should not contribute to the cumulative effects of historical contaminants in the system. The UKH historical abandoned mine site is under care and maintenance through the Federal Contaminated Sites Action Plan until such time as proper reclamation objectives and approaches are undertaken. Long-term objectives for the UKH area are spoken to under the Devolution Transfer Agreement section 6.11:

CCME Guidelines which take into consideration links to the food chain and the use of the surrounding land and waters shall be used to determine whether there are hazards to human health or the environment.

Furthermore the report provided as exhibit 1.3.6.7 presents a methodology for developing background (baseline) water quality data for the mining district based on combining water quality data from KV-1 and KV-37 instead of developing separate background water quality in each case for the South McQuesten River and for the Lightning Creek/ Duncan Creek watersheds. We consider this approach not appropriate for the project site under review.

The Yukon placer secretariat has conducted various surveys in the area. The South McQuesten River watershed and the Mayo Lake watershed (Lightning creek is part of Mayo Lake watershed) are described as two separate watersheds (Adaptive Management Report 2009, Yukon Placer Secretariat) (see attached documents in Appendix B). The evaluation of the South McQuesten River has also been evaluated for its aquatic health and has been deemed as being potentially stressed.

**REFERENCE CONDITION APPROACH (RCA) RESULTS FOR TEST SITES
2009**

| | | | | | |
|---------|--------------------|-----------------|---|----------------------|---|
| YPS-387 | Group 4 (95.6%) | McQuesten River | Haggart Creek (Dublin Gulch) | potentially stressed | One family was present that was not expected to be present, Two families were less abundant than expected and one was far more abundant than expected. |
| YPS-388 | Group 4 (94.4%) | McQuesten River | Moderate -moderate section of Haggart Creek | potentially stressed | Two families that were expected to be present were absent, a family that was not expected to be present was found, and three families were more abundant than expected. |
| YPS-389 | Group 4 (94.7%) | McQuesten River | Seattle Creek | potentially stressed | Two families that were expected to be present were absent, a family that was not expected to be present was found, and one family was far more abundant than expected. |
| YPS-390 | Group 4 (90.4%) | McQuesten River | South McQuesten River | potentially stressed | Five families were less abundant than expected and several families that were not expected to be present were observed, some in high numbers. |

Make-up Water Intake -

Recommendation: Within 6 months of signing of this licence, the licensee should provide to the Board a study detailing the potential impact to Christal Lake of withdrawing water at the allowable rate required for the milling operation. Mitigation measures should be identified in that plan. (Monitoring of water levels in Christal Lake is discussed in the following sections).

Rationale: *The applicant has not provided information on lake hydrology, the effect of abstracting water from Christal Lake, and potential impact to water quality in the receiving environment including Christal Creek. Christal Lake is a shallow lake which already contains metal-enriched sediment and partially-exposed tailings from the historic MacKeno mill. The applicant proposes to extract water directly from either treated Galkeno 900 effluent, Christal Creek or Christal Lake as make-up water for the Flame and Moth mill operation. Christal Lake is a shallow surface water lake and the potential impact from water extraction (i.e. on lake levels and volumes with respect to chemical loadings and mixing) has not been discussed in the application or examined through the water balance (i.e. changes in volume within the lake, critical periods such as low flow, low water levels). The potential need to limit extraction rates have not been discussed and should be addressed prior to extracting water from or discharging effluent to Christal Lake. It may be that the proposed water requirements will not result in significant changes in Christal Lake water levels but an understanding of lake hydrology is necessary for water balance modeling and water quality modeling in the receiving environment.*

Monitoring Lake Levels -

Recommendation: The Licensee should monitor water levels in Christal Lake on a daily basis (i.e. using continuous monitoring equipment such as a level logger) and perform bi-weekly manual measurements of water level (i.e. at a surveyed a staff gauge) and ice thickness during frozen conditions. This data should be verified on a monthly basis and reported annually.

Rationale: *Christal Lake is a relatively shallow (a few meters) body of water and will be the receiving water body for discharge from the mill site and may be a source of fresh make-up water for milling operations. As such, it is important to have a good understanding of the lake hydrology and mixing patterns in order to determine mixing and loading patterns and to better understand the effect of seasonal fluctuations and water extraction and loading patterns on the lake. Water levels combined with lake bathymetry allow determination of storage volume within the lake and allow loading predictions. We note that a one year characterization study of Christal Lake is proposed under the sediment and benthic invertebrate monitoring section 31 of the proposed Water Use License. The proposed water level monitoring herein should be implemented throughout the duration of mine operations.*

Groundwater Monitoring –

Recommendation: The licensee should provide a detailed groundwater monitoring program plan for the monitoring of potential impacts on groundwater quality from mine project components including but not limited to the dry stack tailings facility, the mill site, the mine site, waste rock dumps and Keno landfill should be developed and submitted to the Board within six months of signing of the licence. The primary objective of the plan should be the early detection of groundwater impacts and potential for resulting impact to the receiving environment. The Licensee should implement the plan prior to starting the placement of tailings in the DSTF or waste rock into the waste rock dumps. This plan should include determining the existing and/or potential groundwater impacts from the existing Keno City dump which might be located upgradient of the mill site. The findings

of the groundwater monitoring plan should be used to modify the terms of the license to include and specify groundwater monitoring points, monitoring schedule and parameters. The plan should be developed by a qualified professional.

The Board may consider requesting that the Licensee apply for an amendment to include groundwater monitoring locations in the license.

Rationale: *There is presently insufficient data about groundwater conditions at the proposed mill site and mine sites to determine the potential impacts from the placement of the DSTF, waste rock dumps and existing Keno dump to determine whether there will be impact to water quality and the receiving environment. The establishment of a groundwater monitoring network in both the shallow overburden sediments and deeper bedrock aquifer will allow long-term monitoring of groundwater quality and detection of groundwater impacts from mine site components and activities. Under the current design concept of an unlined dry stack tailings facility: some porewater and other water will flow from the drainage system (i.e. gravel blanket) underlying the DSTF and infiltrate into the groundwater. Therefore, it is possible that groundwater downgradient of the facility will be negatively impacted.*

Furthermore, it has been noted by the proponent (SRK, 2010 Bellekeno Groundwater Program report, page ii) that groundwater quality at the proposed mill area "[...] may indicate influence of the city dump [...]". It is also noted that the Proposed Water Use License (Part E, Subsection 29.c) includes reference to procedures and standards for groundwater sampling from monitoring wells but that no reference to groundwater monitoring points is found in the document.

Meteorological Monitoring -

Recommendation: - Meteorological monitoring data should be reported monthly and a summary of all data for the period or record of the monitoring station should be presented in the annual report.

Rationale: - *Accurate and reliable precipitation records are essential for the development of a reliable water balance which are key elements for water management at the site (this in turn provides insight to release of effluent – quantity and quality – and potential for impact to the receiving environment). The proponent has established a meteorological station on Galena Hill in the summer of 2007 (Section 3.3.1 of the licence application). This information is key to developing the site specific water balance for the site. The data collected should be reviewed regularly and used to update the site specific water balance and guide water management decisions. Regular reporting of this data will help to ensure that the data is reviewed and that potential problems with the station are identified and that valuable data is collected.*

Seepage Monitoring -

Recommendation: The Licensee should conduct a seepage inspection and monitoring program monthly (April to October) and at least once during winter months to include newly constructed: roadways, pads and lay down areas, waste rock storage, mill area and dry stack tailings facility. The relevant monitoring parameters should include at a

minimum: visual observations and photographs, geographical coordinates, flow; field temperature; field Conductivity / Specific Conductance; field pH; Total and Dissolved ICP Metals; Alkalinity; Acidity.

Rationale: We note that the applicant is proposing surveillance for waste rock in subsections 36 a) through f) (p.7 of the document, note: some section numbers are duplicated and not continuous) of their proposed License. The proposed program should be expanded to include a monitoring event during winter and to also include the DSTF and other possible sources of contaminated water effluent. The program helps to "close the loop" on the field screening of "potential AML" / "non AML" (i.e. ARD/ML contaminant release) and adequate segregation of these wastes under the waste rock management plan and would provide early indication of potential contaminant issues such as dry stack tailings facility seepage which may need to be watched more closely and/or possibly resolved and addressed at or prior to project closure. This program would also contribute valuable data for overall site understanding and allow refinement of the site water management plan. Where indicated, the seepage monitoring program could result with the addition of final discharge points as required under the MMER, in consultation with Environment Canada.

We agree with this monitoring and encourage the Board to formalize such a program into the licence terms and conditions and suggest the recommended requirement could be incorporated into an overall seepage monitoring program.

Laboratory Requirements -

Recommendation: With respect to the Surveillance Program, we recommend that the Board require that all samples collected in relation to a regulatory requirement ("external analysis") be analyzed at a CAEAL-accredited external laboratory.

Rationale: Section 27. (p. 6 of 13) of the Proposed Water Use License only states that the "effluent water quality" parameters listed in this licence shall be provided by a laboratory accredited by CAEAL. The applicant is able to perform analyses for some water parameters, and has indicated with other programs on the UKH site that daily samples of treatment influent/effluent, intended for management of the treatment systems, would be analyzed for zinc at the on-site laboratory. While we consider this approach reasonable for internal control purposes; for other samples (W, M, Q, A) intended for regulatory purposes; we underline the importance of the controlled atmosphere, free of potential airborne metal dusts or other sources of contamination, provided by an external dedicated environmental laboratory. CAEAL-accredited laboratories are subjected to stringent QA/QC programs, including inter-laboratory checks, to ensure reliability of the analyses. It is very likely that the applicant intends to send samples (other than daily zinc analysis for treatment management purposes, for instance) from the monitoring program to an external laboratory. We wish to underline the importance of utilizing a CAEAL-accredited laboratory for these important samples.

Reports –

Recommendation: A site specific adaptive management plan (AMP) for the Bellekeno Mine project should be developed to deal with potential project specific issues, clearly

defining specific and reasonable triggers for this project. The AMP should include the following components:

- the results of environmental audits or other evaluation activities;
- the results of environmental monitoring
- the results of monitoring of the performance or condition of environmental infrastructure, such as containment structures, water management systems or treatment facilities;
- technological developments; and
- changing environmental conditions.

Rationale: *In section 7.7 of the application, the proponent briefly presents an AMP that is applicable to the overall UKH site-wide closure. The text makes reference to components that are not part of the Bellekeno proposed project such as the use and monitoring of the Sime Pit, Valley Tailings Area and Waste Dump for sludge management. Furthermore, no mention was found in the reviewed documents about AMP monitoring of the DSTF. As such, this AMP is not site-specific for this operation.*

A site specific AMP should be in place to show how the proponent would deal with potential increases in water discharge during advancement of the Bellekeno mine workings and any potential issues with water treatment. Expectations of water to be encountered during the advancement are not fully detailed in the report, but the AMP could outline specific contingencies to deal with such water quantity/quality issues. For example, the AMP should outline triggers for changes in groundwater quality and changes in DSTF drainage flows or seepage quality.

ARD / ML -

Recommendation: The Board should consider a licence clause which reads:

If mine waste rock is utilized for construction of roadways, pads, lay down areas, and related features; then only non-ARD/ML generating ("non AML") waste rock shall be used for that purpose.

Any waste rock to be used for construction proposed shall be geochemically stable such that ARD/ML is not a concern for the use of this material for general construction.

Rationale: *A component of the licence application revolves around the screening and segregation of waste rock, and use of geochemically-suitable waste rock for construction of roadways and other project features. Failure to adequately screen waste rock used for road construction could result with additional final discharge points under the MMER should ARD/ML processes develop. The recommendation /clause formalizes the requirement in the licence.*

“Appendix A”

**Letter to Proponent (Licence Applicant)
and YG on Dry Stack Tailings Facility
Conceptual Design**

ENVIRONMENTAL STEWARDSHIP BRANCH
Environmental Protection Operations
91782 Alaska Highway
Whitehorse, Yukon
Y1A 5B7

January 7, 2010

File no: 4484-37/U65

Ms. Arlene Kyle
Mine Licencing Officer
Mineral Resources Branch, EMR
Yukon Government
400-211 Main Street
Whitehorse, Yukon

RE: EC select review comments regarding submission of Environmental Protection Plans and Operational Plans (11 plan submissions -- as per e-mail December 10, 2009 from Yukon Government, EMR to Environment Canada) for Alexco Keno Hill Mining Corp, Bellekeno Mine Project – QML-0009.

Environment Canada (EC) has taken the opportunity for a compressed review of a select portion of those above-mentioned project plans (i.e.: Mine Development and Operations Plan, December 2009; Mill Development and Operations Plan, November 2009; Waste Management Plan, November 2009; Monitoring and Surveillance Plan, November 2009) as provided on the Yukon Government Energy Mines & Resources Public Registry and updated during the review period, and would like to submit the following comments. Environment Canada has had the previous opportunity to provide comments regarding this project through the adequacy review stage of the environmental assessment and note that many of our previous concerns with the project have not yet been adequately addressed. As such; some of the issues highlighted below are reiterations of previous concerns brought forward by Environment Canada .

Environment Canada's primary legislative authority to control water pollution, including mining effluent, is the pollution-prevention provision of the *Fisheries Act* [s.36 (3)] which prohibits the deposit of deleterious substances into waters frequented by fish. The *Metal Mining Effluent Regulations (MMER)* of the Act aims to ensure that metal mines operating in Canada control their liquid effluents to meet prescribed standards. The *MMER* applies to all effluents (as defined in section 1.(1) of that regulation) containing a deleterious substance in the operations area for a project, in accordance with the application of those regulations.

Certain characteristics of this project proposal which deal with water management at the site, particularly the collection of effluent and potential for combining effluent with water prior to it being deposited (mainly but not exclusively from the tailings storage facility) we believe will be in contravention with the *MMER* -- notably given the level of information (in some cases lack of detail) provided in the documents provided for review. While aspects of our concerns regarding adequate collection and monitoring of effluents were expressed during the review of previous documents; it is increasingly important that Yukon Government, Energy Mines & Resources and the proponent recognize the possible implications of a violation under these regulations. Our specific concerns related to *MMER* compliance are:

- I. Section 19 of the *MMER* requires the operator to monitor the effluent flow rate to within 15% accuracy. The Mill Development and Operations Plan (section 5.0) states that 6.6 t/hr of bulk tailings will report to the dry stack tailings facility at 85% solids (perhaps around 20% gravimetric moisture content as experienced at other site with similar solids ratio), equating to an estimated 1.1 m³/hr (Water Balance; drawing A00-09-012) of process water reporting to the dry stack tailings as residual contained water. Furthermore, the proponent suggests that (dewatered) sludge from the Bellekeno adit treatment system will also report to dry stack tailings facility (section 5.0 Waste Management Plan). Given various events such as precipitation events: some water reporting to the dry stack tailings facility will report as surface flow as indicated in the report and while there is the indication that the operator will collect and monitor this flow it is uncertain just how they plan to do so (in section 10.1 of the Monitoring and Surveillance Plan there is indication via text that there will be a singular final discharge point at the Flame & Moth millsite). An unspecified proportion of the residual pore water is expected to report as seepage; as tailings porewater is displaced by overlying water added to the dry stack tailings via precipitation, additional dewatering of sludge (section 5.0 Waste Management Plan), and other inputs typical to such systems (consider also the area is poorly drained and no shallow groundwater investigation has occurred, and in addition permafrost encountered would melt likely providing additional water to the dry stack tailings via capillary actions). Metal concentrations in tailings porewater are expected to be consistent with the lixiviant or tailings water assay as reported on Table 3-21 of the Mill Development and Operations Plan (e.g. with zinc concentrations in the 20mg/L (dissolved) range and copper reporting at 0.64 mg/L (dissolved)) -- both these plus other metals reported in that table are deleterious substances as defined under the *Fisheries Act* and specifically as listed in Schedule 4 of the *MMER*. There is no indication in any of the reports received, or in other information EC has seen, that the operator is planning to collect/monitor all effluent pathways from the tailings: while surface interception and monitoring is suggested, there is no seepage monitoring indicated either in text or in accompanying plans. Under the proposed design in the Mill Operations and Development Plan and the other supporting plans recently received; this seepage containing Schedule 4 substances will not meet the requirements of Section 19 of the *MMER*.
- II. Section 6 of the *MMER* prohibits the combination of effluent with water or any other effluent for the purpose of dilution before it is deposited. The proponent (operator)

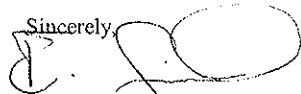
indicates that surface flow over the tailings surface will report to a surface collection/diversion system surrounding the dry stack tailings. It isn't clear whether this will occur as a channelled or diffuse source, nor whether monitoring would occur at a point after interaction of tailings effluent with what may be expected to be contributions from an upgradient dilute surface water source. Additionally, EC could not find any indication that the proponent will collect and monitor porewater seepage infiltrating through the dry stack tailings as it passes to the groundwater table, mixing with the natural groundwater source, eventually reporting to surface water in a more dilute form. In this regard, the proposal does not provide an acceptable mitigative approach as it would also contravene this section of the regulations.

The mine licence design should provide sufficient information to Environment Canada that under the *MMER* the totality of the effluent discharged can be monitored within 15% accuracy and that all the Schedule 4 parameters as well as acute toxicity will be met for discharges from each identified final discharge point.

Additional specific technical comments on various aspects of the reviewed plans, in the context of our review comments above may be forthcoming as an addendum to this letter. Relative to Environment Canada's advice related to our mandate and regulations; and the progression of the licencing/permitting process: EC expects to be able to provide additional advice related to water issues at a later date once the company submits a water licence application for the Bellekeno Mine project

In closing, thank you again for the opportunity to review the above documents. Please contact the undersigned at (867) 667-3410 if there are any questions or clarifications needed regarding this submission.

Sincerely,



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Wade Comin, EC Enforcement Branch

“Appendix B”

Yukon Placer Secretariat Watershed Maps