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March 23, 2007

Yukon Water Board  
Suite 106, 419 Range Road  
Whitehorse, Yukon Y1A 3V1

**Attention: Ms. Kelly Boutilier, Licencing Officer, Yukon Water Board**

Dear Ms. Boutilier:

**Re: Water Use Application QZ06-074, Keno Hill Mines – Additional Information**

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On behalf of Elsa Reclamation and Development Company Ltd. (ERDC), Access Consulting Group is providing the following information in response to the Yukon Water Board (YWB) request for information dated December 11, 2006 regarding Water Use Application QZ06-074 in support of ERDC's Care and Maintenance Activities at the Keno Hill Mines. Information requests are summarized and provided in italicized text, with a response provided to each request below.

In addition, we are also providing supplementary information to the YWB in support of our application as a result of the Yukon Environmental and Socio-economic Assessment Board (YESAB) assessment. As such, ERDC is replacing our Schedule 4 application with the one attached to update our proposed licence expiry date. Section 7.2 of our application (page 7-1) should be revised to "a licence expiry date of 5 years from the effective date is requested (June 18, 2012) if the licence effective date is June 2007".

Additional supplementary information in support of our application is presented after our specific responses to the YWB's request.

Item 1

*a) details of the repairs that have been conducted to the dams in the Valley Tailings Area as a result of the June 2005 EBA inspection report*

The following works were completed to address EBA's June 2005 recommendations:

- Access road – low spot on access road filled with 600 mm of mine waste. Road surface ripped to 100 mm depth, material placed in 300 mm lifts and compacted, and upstream side of road rip rap armored.
- Dam #1 – three spots on downstream toe berm raised with free draining fill and compacted. Power poles removed prior to works.
- Dam #2 – subsidence noted at south end of dam along with tension cracks was repaired. Dam surface scarified, and filled with compacted glacial till and re-surfaced. Tension cracks scarified and re-compacted. No works were completed on the decant structure.
- Dam #3 - small toe berm constructed on downstream side of the south leg of the dam with clean mine waste rock and existing overflow pipe extended and riprap placed at decant outlet.

The physical works were completed in July/August 2005 by Ewing Transport and inspected by Access Consulting Group to ensure that the physical works recommended in EBA's June 2005 inspection report were undertaken in accordance with EBA's recommendations.

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b) *annual inspection report for June 2006 for the Valley Tailings Area*

An annual inspection was not completed by EBA Engineering Consultants Ltd. (EBA) in 2006 due to time and weather condition constraints. However, please refer to Attachment 1, which provides a January 2007 letter from EBA with their opinion "...that the tailings retention dams at Keno Hill mine are stable in their present condition and currently do not pose any hazard."

c) *additional rationale for a type B licence as opposed to a type A, based on the Waters Regulation (Schedule 7).*

ERDC has sought legal advice regarding our rationale for a Type B water use licence. Please see Attachment No. 2 which presents a letter from Fasken Martineau DuMoulin LLP outlining our rationale for a Type B water use licence.

Item 2

*Requested Water Use*

Please note that the water stored in the settling ponds is a waste as defined under the Yukon Waters Act.

*Page 3-34 is blank – Figure 3-15 not included.*

Figure 3-15 is included in Attachment No. 3. We believe that the figure exists on the digital information provided to the YWB as part of our application.

a) *details of the maximum water storage volume for each settling pond*

Wastewater storage volumes for each of the treatment settlement ponds was provided in the Water Use Licence application, Table 3-3, page 3-10 and listed below:

Bellekeno 600

- Pond 1 ~ 1,000 m<sup>3</sup>
- Pond 2 ~ 1,600 m<sup>3</sup>

Silver King 100

- Pond 1 ~ 1,000 m<sup>3</sup>
- Pond 2 ~ 1,600 m<sup>3</sup>

Galkeno 300

- Pond 1 ~ 1,778 m<sup>3</sup>

Galkeno 900

- Pond 1 ~ 1,200 m<sup>3</sup>

b) *a plan of the Galkeno 300 site, depicting at a minimum the adit and settling/treatment pond*

Water Use Licence application, Figure 3-15, page 3-34 provides a site plan for Galkeno 300. A more recent site plan based on the 2006 air photo is presented in Attachment No. 3.

c) *inspection reports for the settling ponds/treatment systems for each of the sites referenced above (Bellekeno 600, Silver King 100, Galkeno 300, Galkeno 900).*

Attachment No. 4 includes final inspection reports and as built drawings prepared by EBA Engineering Consultants Ltd. for the constructed settling facilities at Bellekeno 600, Galkeno 900 and Galkeno 300. As the Silver King 100 settling facility was constructed in 1994, we have been unable to locate construction inspection reports or as built drawings, however we understand from our file review that the Silver King settling facility was sized and constructed in a similar fashion as the Bellekeno 600 settling ponds.

All settling facilities are inspected by site personnel on a daily basis to ensure that the decants are free flowing, adequate pond freeboard is maintained, pond berms and liners are stable and intact, and where pond fencing is installed, fences are stable.

As part of EBA's 2007 geotechnical inspection, all treatment settling facilities will be inspected.

d) *additional rationale for a type B licence as opposed to a type A, based on the Regulation criteria referenced in #1 of this letter.*

Please see Attachment No. 2 which provides additional rationale for a Type B water use licence.

e) *design drawings in plan and profile of the settling ponds for each site.*

Attachment No. 4 provides design drawings in plan and profile for settling facilities for Bellekeno 600, Galkeno 900, and Galkeno 300. We have not been able to locate design drawings for the Silver King 100 settling facilities, but understand that the facility was constructed based on the Bellekeno 600 facility design.

### Item 3

*Please provide information regarding potential standards that could be met during the first 5-year period.*

ERDC's project proposal requested that transitional water quality discharge standards apply to the care and maintenance treatment sites (section 7.4.2). As result of the YESAB environmental and socio-economic assessment, ERDC is revising our proposal to the YWB for the care and maintenance effluent discharge standards. The revised standards which are proposed are based on standards for grab, composite and monthly arithmetic mean concentration standards. This method of effluent discharge licensing is consistent with regulations established under the Fisheries Act Metal Mining Effluent Regulations for operating metal mines and allows for occasional treatment system upset and correction to ensure overall system performance. Although these regulations do not directly apply to ERDC's operation, the approach to regulating discharge limits based on maximum monthly mean, composite and grab concentrations are accepted industry practices. Please note that the previous water use licence discharge standards for the Keno Hill property (maximum grab concentrations) are similar to the proposed maximum monthly mean concentration standards. ERDC's proposed discharge standards are shown in the table below.

Parameter	Maximum Monthly Mean Concentration Standards	Maximum Composite Concentration Standards	Maximum Grab Concentration Standards
pH	6.0-9.5 units	6.0-9.5 units	6.0-9.5 units
Suspended solids	15 mg/l	22.5 mg/l	30 mg/l
Toxicity (LT <sub>50</sub> 96hr @ 100%)	100% (pH non adjusted)	100% (pH non adjusted)	100% (pH non adjusted)
Arsenic (Total)	0.5 mg/l	0.75 mg/l	1.0 mg/l
Copper (Total)	0.3 mg/l	0.45 mg/l	0.6 mg/l
Lead (Total)	0.2 mg/l	0.3 mg/l	0.4 mg/l
Nickel (Total)	0.5 mg/l	0.75 mg/l	1.0 mg/l
Zinc (Total)	0.5 mg/l	0.75 mg/l	1.0 mg/l

Section 7.4.2 of ERDC's water use licence application is revised as follows:

All effluent from the treatment facilities in samples collected at the final point of discharge under the proposed monitoring regime in Section 6.0, will meet proposed discharge criteria and be non-toxic as determined by the 96-hr LT<sub>50</sub> rainbow trout (*Onchorynchus mykiss*) static bioassay at 100% concentration.

It is also requested that the proposed discharge criteria for the Galkeno 300 discharge not become effective until September 30, 2007 so that treatment improvements can be completed during the summer and the system tested and fully operational.

Item 4

*Approval has been requested to discharge wastewater from several old mine workings (including Husky Southwest, No Cash 500, Ruby, Onek, Flame and Moth, Bermingham, Sadie Ladue, Lucky Queen and Keno 700), however no discharge quality standards have been proposed. Please provide the information required by the proposed standards for these locations and details of any treatment that is proposed to meet those standards.*

Historically there has never been any water treatment conducted at the old mine workings including Husky Southwest, No Cash 500, Ruby, Onek, Flame and Moth, Bermingham, Sadie Ladue, Lucky Queen and Keno 700. The following table, based on Table 2-1 in our application has been revised to clarify the points of discharge and the receiving drainage areas for effluent discharging from the adits of these particular old mine works. None of the adits for these locations reports directly to a receiving stream or to surface waters that are fish bearing. All adits discharge to ground, however it is not known if these adits drain to groundwater and then to a receiving drainage area. Investigations to determine the flow pathways for these works are contemplated as part of the closure plan.

Old Mine Working	Adit Discharge	Receiving Drainage Area
Husky Southwest	To ground	Flat Creek
No Cash 500	To ground	No Cash Creek
Ruby	To ground	No Cash Creek
Onek	To ground	Christal Creek
Flame and Moth	No discharge	Christal Lake
Birmingham	To ground	No Cash Creek
Sadie Ladue	To ground	Gambler Lake
Lucky Queen	To ground	Christal Creek
Keno 700	To ground	Hope Gulch

Note: No Cash Creek reports to ground

ERDC is in the process of developing a site wide closure plan for the entire Keno Hill area that will address all historical mine workings and their drainages. As part of the closure planning, studies will be undertaken and treatment alternatives will be investigated to support preferred treatment approaches aimed at mitigating potential adverse effects of adit effluent discharges at all these locations. Specific treatment or remedial measures will be assessed and long term closure alternatives will be proposed for each site as part of closure plan development. It is expected that the proposed discharge standards and development of site specific receiving water quality criteria for site wide downstream receiving waters will be used to guide closure plan development and water management at these sites.

In addition, each of these sites is presently inspected on a routine basis and monitored for water quality and flows. Any public health and safety issues or physical instabilities are noted and corrective measures undertaken as required. These inspections and monitoring will continue during the care and maintenance period and will be reported to the YWB.

During the interim care and maintenance period, an Adaptive Management Plan (AMP) has been developed to ensure that the mine workings are monitored and that management plans and responses are in place to address changes at these sites. The AMP for the mine workings will be submitted to the YWB under separate cover.

#### Item 5

*With regard to the locations where approval has been sought to discharge waste, the application indicates that "The criteria that ERDC will use for care and maintenance treatment locations for the water licence will be adits whose wastewater discharges directly in watercourses that are considered fish bearing or flow directly into fish bearing waters..." As these criteria do not reflect the definition of waste as established under the Waters Act, please advise why they have been chosen to apply to the application.*

ERDC has proposed effluent discharge standards for the locations where water treatment systems are operated (Silver King 100, Galkeno 900, Galkeno 300 and Bellekeno 600 adits and the Valley Tailings area) as noted in item 3 above. We have also indicated that these same standards will form the basis for closure plan development and assessment for the old mine workings discharges. However, we have also requested that these standards apply as guidelines to these old workings until a closure plan has been developed, assessed through community and stakeholder consultations and brought back to the YWB for licence approval.

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The definition of waste in the Waters Act is as follows:

“a) any substance that, if added to water, would degrade or alter, or form part of a process of degradation or alteration of, the quality of the water to an extent that is detrimental to its use by people or by any animal, fish, or plant, ...”

Because this definition expressly specifies degradation and alteration of water quality to the extent the water quality would be detrimental to fish, and ERDC in this application seeks only to treat areas where wastewater from the old mine works could enter and affect fish bearing waters, ERDC’s application is reasonable and the criteria it has proposed for the license it seeks by way of this application are consistent with the definition of waste as set out in the Waters Act.

**Item 6**

*The application proposes that a sludge management plan will be developed within 120 days of the effective date of the licence. Please advise why it is not possible to prepare and submit such a plan as part of the application.*

Additional information was provided to the YESAB DO as part of the assessment and details for sludge handling and storage are presented below.

Table 3-3 in the water licence application provides the settling pond size and desludging frequencies for each treatment area. Historically, desludging involved complete dewatering and desludging of each pond and this volume would represent worst case sludge volumes. Refined annual sludge volume estimates are listed below which better represent actual volumes of sludges produced at each treatment location:

Treatment Site	Total Settling Pond Size (m <sup>3</sup> )	Lime Use (tonnes/yr)	Desludging Frequency	Annual Sludge Volume*(m <sup>3</sup> )
Silver King	2,600	33.48	Annual	50.4
Galkeno 900	1,200	38.04	Annual	57.4
Galkeno 300	1,778	103.44	Daily	1620.4
Bellekeno 600	2,600	19.2	Annual	29.0
<b>TOTAL</b>				<b>1757.2</b>

\*Note: Sludge volume = lime use x 116% /lime specific gravity (1540 kg/ m<sup>3</sup>). Assume that lime use rate increased by 16% to account to present sludge density. Field observations indicate that sludge density is approx 50% after it has been decanted in the sludge cells.

The valley tailings area (VTA) sludge storage area (single cell, see Figure 3-3) has a capacity of 30,400 m<sup>3</sup>. Based on sludge volumes presented above, the VTA single sludge storage capacity is approximately 17 years. Additional storage cells are also located next to the present storage cell and are available for future use. The sludge storage cells are located behind the VTA No. 1 Dam catchment area and no seepage is expected from the sludge storage cells. If there is seepage from the sludge storage area, it is contained within the VTA and would contain excess pH and provide additional treatment. The decant from the No. 1 dam is monitored daily for flows, and if flowing measured for pH and Zn. The Simes waste rock / sludge storage area is approximately 600 m<sup>3</sup> and has been used to handle sludge from the Galkeno 300 site (see Attachment No. 3 for updated Galkeno 300 site plan).

This site would be cleaned of sludges periodically and removed to the VTA. There is no known seepage from the Simes waste rock / sludge storage area as the area is lined. However, the toe of the waste rock area is periodically inspected down gradient for seepage and sampled if necessary for zinc and pH.

In addition, the following measures have also been implemented:

- Sludge recirculation pump is installed in Galkeno 300 treatment pond to recirculate sludges to installed lime mix tank for reuse. Sludge pump will allow for periodic removal of sludges from this treatment pond directly to the vacuum truck for disposal;
- New vacuum truck used to haul lime slurry to treatment sites which will allow for periodic vacuum suction of treatment pond sludges (Silver King, Galkeno 300, Galkeno 900, and Bellekeno 600 sites) for back haul to existing sludge storage area located in the valley tailings area. This will minimize full scale shut down of treatment settling ponds for sludge clean out; and
- Sludge handling and storage plans are intended to improve sludge handling methods, reduce water treatment plant and settling pond down time during sludge clean out events, which will improve overall down gradient water quality and improve system cost effectiveness.

ERDC is also investigating the direct pumping of Galkeno 300 sludges to the old Simes open pit for future sludge disposal. Sludges would be pumped from the Galkeno 300 treatment ponds via 4" - 6" pipeline to the open pit for long term storage. Before proposed new disposal locations are used, the site would be evaluated and suitability demonstrated and the information presented to the Board.

#### Item 7

*Please provide plans for the temporary and/or permanent decommissioning or abandonment of the proposed undertaking.*

As discussed in the water licence application, care and maintenance at the existing treatment facilities will be undertaken until a closure plan has been developed, assessed and approved for the entire Keno Hill site. Until such time, the following provides an outline of the decommissioning activities that would be undertaken at the care and maintenance treatment sites should that occur prior to closure plan implementation.

If at some point in the future it is determined that the existing care and maintenance water treatment sites (Silver King, Galkeno 900, Galkeno 300 and Bellekeno 600) are no longer required, site decommissioning would commence. The site decommissioned will involve the following:

- Removal of all foreign materials from the site (building, tank, signs, fencing, scrap metal, etc.);
- Recontouring and scarification of the site surface to facilitate natural revegetation;
- Sampling and testing of any sludge material for contaminants;
- Removal of any in adit hydraulic structures;
- Recontouring of the site settling ponds, including removal of pond sludges to the valley tailings area, and liners and scarification of surface to facilitate natural revegetation;
- Filing of final plans to appropriate regulatory agencies with the locations of any subsurface features;
- Reconstruction of adit decant channels;
- Blockage of adit opening to protect human health and safety and prevent wildlife access; and

- Signage will be posted at the site indicating the presence of an adit outfall and discharge channel.

#### Item 8

*The Information Sheet indicates that it is the applicant's responsibility to include specific references (i.e. section and page numbers) to studies or reports where the response can be located. Please provide this information (on the attached copies of the Information Sheet).*

Please see Attachment No. 5 which provides an updated Information Sheet that provides specific references to the requested information.

#### Item 9

*Yukon Water Board Project Confirmation Form*

Attachment No. 6 provides the completed Project Confirmation Form.

#### Supporting Supplementary Information

The following supplementary information is provided in support of our application as contained in Attachment No. 7.

#### YESAB Responses:

ERDC provided the YESAB DO with supplementary information requests to support the assessment. This information is contained in Attachment No. 7a and supports the water licence application and includes the following:

- ERDC Supplementary Information Request – YESAB – November 1, 2006 (ERDC November 10, 2006);
- ERDC Supplementary Information Request – YESAB – November 30, 2006 (ERDC January 15, 2007); and
- ERDC General Response to YESAB Comments Received dated February 7, 2007 (ERDC February 2007).

The ERDC November 10, 2006 and January 15, 2007 documents provide additional supporting environmental assessment documentation to that included in the water licence application. This information includes additional water quality data summaries and a mass loading update and comparison for total zinc and sulphate for the entire Keno Hill district which includes both the South McQuesten and Lightning Creek drainages. The information supports the environmental assessment for the project, in particular the assessment of environmental effects of the project on surface receiving water quality.

The ERDC February 2007 document outlines ERDC commitments to provide the YWB with the results of the Water Treatment Improvement Study, an Old Mine Workings Adaptive Management Plan (to be submitted under separate cover), updated closure plan tasks, revised effluent discharge criteria (see

item YWB Item 4 above) and solid waste disposal. A summary of the Water Treatment Improvement Study is included in Attachment No. 7b and provides supporting rationale and water treatment improvements to be implemented at the existing adit treatment locations.

Water Treatment Improvement Study:

As stated above, ERDC has completed a Water Treatment Improvement Study and a summary of this report is included in Attachment No. 7b. This study, prepared for Government of Yukon, Energy Mines and Resources, Assessment and Abandoned Mines Branch (EMR AAMB), investigated the current water treatment systems and provides a justification and rationale for recommended improvements to the treatment systems. This study was not intended to select and recommend final options and treatment approaches for long-term closure of the Keno Hill property, but rather a study to concentrate on improving the existing treatment systems in the near term (~5 years) as well as provide information for alternative treatment approaches for consideration as a final closure system.

The study summary outlines the proposed modifications that will be made to the existing adit treatment systems to ensure that ERDC meets the requirements for effluent discharge standards.

Summary

We trust that this letter provides the information as requested in your December 11, 2006 letter and clarifies ERDC's commitments and requested changes to the water licence application. Should you have any questions, we would be pleased to discuss them with you. Please contact our office at 867-668-6463.

Sincerely,  
ACCESS CONSULTING GROUP



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