Environment Canada **Environnement Canada**

Environmental Protection Branch
Qimugjuk Building 969 P.O. Box 1870
Iqaluit, NU X0A 0H0
Tel: (867) 975-4639
Fax: (867) 975-4645

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Phyllis Beaulieu
Manager of Licensing
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU X0B 1J0
Tel: (867) 360-6338
Fax: (867) 360-6369 *Via Email at licensing@nwb.nunavut.ca*

Dear Ms. Beaulieu:

RE: NWB1LUP – Kinross Gold Corporation – Lupin Gold Mine Abandonment and Reclamation Plan for the Tailings Containment Area

Environment Canada (EC) is in receipt of your letters dated September 8, 2005 and September 14, 2005 requesting preliminary technical comments on the Kinross Gold Corporation Lupin Gold Mine Abandonment and Restoration (A&R) Plan and general comments on the proposed process for the approval of this plan. Environment Canada would like to thank the Nunavut Water Board (NWB) for the opportunity to provide comments on the plan.

Please note that it is EC's understanding that technical comments are currently only be requested for the A&R Plan for the Tailings Containment Area (TCA). As such, EC has only reviewed this portion of the A&R Plan. Technical comments on the rest of the A&R Plan for the entire mine site will be provided when requested by the NWB.

The following specialist advice has been provided pursuant to Environment Canada's mandated responsibilities for the enforcement of the *Canadian Environmental Protection Act*, Section 36(3) of the *Fisheries Act*, the *Migratory Birds Convention Act,* and the *Species at Risk Act*.

1.0 Preliminary Technical Comments

Overall, the TCA A&R Plan is rather general and lacks the specific details required to fully assess potential impacts on water quality, migratory birds and species at risk. While the report provides a good overview of the various research reports that have been conducted under the current water license, there is little discussion as to how the results of the research have influenced the current TCA A&R Plan.

1.1 Saturated Granular Cover

The Plan states that as part of ongoing restoration work, approximately 880,000 m^2 of exposed tailings in the completed cells have been covered with between 0.5 to 2.0 m of esker material. However, as a result of research into global warming trends, the decision was made to switch from a tailings management strategy that relied on permafrost encapsulation to a strategy of encapsulation beneath a 1 m partially saturated granular cover.

- It is unclear as to whether the 880,000 m^2 of tailings that have already been covered as result of ongoing restoration work were covered with saturated granular cover. If not, EC

recommends that the proponent apply a saturated cover to the previously reclaimed tailings to provide the same level of protection across the TCA.

- The proponent should clarify why there is such variation in the depth of cover material placed over the previously reclaimed tailings. Environment Canada recommends that if a saturated granular cover was applied, a minimum thickness of 1 m be maintained.

The TCA A&R Plan states that there is a limited potential for pore water expulsion from the TCA as a result of leaching of pore water caused by infiltration through the active layer within the tailings and cover. However, the probability of this occurring is dependent on climate, the amount of rainfall and timing.

- In order to verify the proponent's assumption that the lateral pore water flow through the active layer and over the crest of the frozen core dam will be limited, it is necessary to know the height of the frozen core within the dam. Environment Canada requests that this information be provided in the TCA A&R Plan.
- Environment Canada recommends that the discussion of infiltration take into consideration extreme rainfall events and climate warming scenarios. The information presented in Section 5.4 of the A&R Plan only seems to take normal climatic conditions into consideration.

1.2 TCA Infrastructure

Section 6.1 of the TCA A&R Plan provides information regarding the decommissioning and removal of the infrastructure associated with the TCA. In regards to the Arsenic Treatment Facility, no information is provided regarding potential contamination of adjacent soils or the concrete pad inside the building. This information should be presented and if applicable, remediation strategies presented.

Information should be presented regarding the residual levels of contaminants that will remain in the dump stations located along the tailings line route after the removal of the small amount of tailings material. Given the potential for acid generation from the tailings, will the 1 metre cover be sufficient to prevent the contamination of the surrounding landscape as a result of infiltration of water?

1.3 Water Quality

The current June 2005 version of TCA A&R Plan does not provide information regarding the existing water quality in the TCA. The NWB directed the proponent to ensure that the TCA A&R Plan was a stand-alone document, however, the water quality data is contained in a previous version of the TCA A&R Plan dated January 2005. This information should be incorporated into the most current version of the A&R Plan.

The water quality data provided in the January 2005 TCA A&R Plan is difficult to follow. For instance, in reporting the water quality in Ponds 1 and 2, the report only states that "Water quality parameter values of the license listed parameters in Ponds 1 and 2 vary from a half to one fiftieth of the values in the esker-saturated zone" (page 74). However, the actual data is not provided. Furthermore, the January 2005 report presents a mixture of averaged data for certain sampling points and original data from other sampling locations. Environment Canada recommends that the proponent provide, in a consistent format that allows for easy comparison between sampling locations, the water quality data obtained from:

- Pore water quality in esker cover pores measured in pipes;
- Pore water quality from test pits;
- Ponded water in Cell 1;
- Ponds 1 and Cell 2; and
- End results from the siphon location in Pond 2.

The data reported in the document does not list any results for Oil and Grease parameters. The results of monitoring of this parameter should also be presented. Additionally, the results presented

for the water quality in Ponds 1 and 2 does not include total suspended solids. The results of the monitoring of this parameter should also be reported.

The Plan seems to rely on retention of water in Ponds 1 and 2 as the primary method of ensuring water quality standards are met. However, no information is given regarding what the retention times in these ponds will be once the various dams are breached. The proponent should provide assurance that water quality will be acceptable in a post-closure scenario. In order to address a scenario the water quality results are not as predicted, EC recommends that a contingency plan for further water quality treatment be developed.

1.3.1 Monitoring
The Plan lacks detailed information regarding the proposed Reclamation Phase monitoring period (2 years) and the Closure Phase monitoring period (5 years). Terminology such as "frequent", "periodic", "regular" and "timely" are used to describe monitoring frequencies. Environment Canada recommends that the proponent develop a more concrete plan for monitoring activities within Reclamation and Closure phase and the Closure phase. Echo Bay Mines Ltd. should also clarify what water quality guidelines are referred to in Section 6.4, page 35, paragraph 2, which states "Prior to activation of the spillway, an evaluation of the water chemistry will be made to ensure that when outflow occurs, ***all water quality guidelines are met***. (emphasis added)".

The proponent has proposed a two year monitoring period for the Reclamation Period phase and a five year monitoring period for the Closure Period phase. However, it is noted that Reclamation Phase is listed as having a start date in 2005. Environment Canada requests information regarding what monitoring was completed during the 2005 field season.

For each of the proposed monitoring phases, the monitoring plan should include information regarding proposed monitoring locations, parameters to be sampled and/or monitored, frequency of sampling, and reporting format and frequencies.

1.3.2 Proposed Monitoring
In the absence of any proposed detailed water quality monitoring plan by the proponent, EC is please to provide the Nunavut Water Board (NWB) with the following recommendations.

(A) Reclamation Phase
The proponent has stated that during the Reclamation Phase (2005-2006), all of the monitoring requirements and frequencies stipulated by NWB1LUP0008 will be carried out. Provided that the planned monitoring includes all of the sampling outlined in the Surveillance Network Program outlined in Schedule 1 of NWB1LUP0008, and not just the regulated parameters, EC is satisfied with the proposal. Additionally, biological, effluent and water quality monitoring as required by EC's Environmental Effects Monitoring (EEM) Program will be carried out. The proponent should indicate how often and in what format results will be reported to the NWB.

(B) Closure Phase
Echo Bay Mines Ltd. is proposing a five year monitoring period for the Closure Phase (2007-2011). However, no justification for this timeframe is provided. Environment Canada recommends that given the use of a saturated granular cover in the TCA, which is a relatively novel technology, the monitoring period during the Closure Phase should extended until 2013, with a provision that the monitoring frequency be reduced if warranted by the results. As the saturated granular cover technique was initiated in 2003, monitoring the TCA until 2013 would provide ten years of data regarding its performance.

No specific details are given regarding the contents of the Closure Phase monitoring plan. The Plan states that water quality and geotechnical assessments of the spillways will be conducted monthly during June – September for the first two years of the Closure Phase (2007-2008). If the results of this sampling are acceptable, Echo Bay Mines Ltd. proposes to conduct sampling twice yearly in June and September from 2009-2011. However, no details are given regarding the parameters to be monitored or sampling locations.

Environment Canada recommends that the following parameters be monitored over the course of the recommended Closure Phase (2007-2013), with a provision that the monitoring frequency be decreased if results warrant:

SNP Station	Parameter		Frequency
SNP 925-10 (Discharge from Pond #2 at Dam 1A)	Total Metals	Cyanide	Monthly sampling during open water periods
		Lead	
		Cadmium	
		Nickel	
		Arsenic	
		Zinc	
		Copper	
	TSS		
	pH		
	Alkalinity		
	Hardness		
	Ammonia		
	ICP-MS Scan		Once per year
	Acute lethality testing		Once per year
SNP 925-20 (West end of Seep Creek before discharge into Unnamed Lake)	Total Metals	Cyanide	Monthly sampling during open water periods
		Lead	
		Cadmium	
		Nickel	
		Arsenic	
		Zinc	
		Copper	
	Ammonia		
	pH		
	Alkalinity		
	Hardness		
	TSS		

SNP Station	Parameter		Frequency
SNP 925-22 (Inner Sun Bay near centre)	Total Metals	Cyanide	Once per year
		Lead	
		Cadmium	
		Nickel	
		Arsenic	
		Zinc	
		Copper	
	Ammonia		
	pH		
	Alkalinity		
	Hardness		
	TSS		
SNP 925-24 (Inner Sun Bay near narrows)	Total Metals	Cyanide	Once per year
		Lead	
		Cadmium	
		Nickel	
		Arsenic	
		Zinc	
		Copper	
	Ammonia		
	pH		
	Alkalinity		
	Hardness		
	TSS		
SNP 925-25 (Outer Sun Bay)	Total Metals	Cyanide	Once per year
		Lead	
		Cadmium	
		Nickel	
		Arsenic	
		Zinc	
		Copper	
		Copper	
	pH		
	Alkalinity		
	Hardness		
	TSS		
	Ammonia		

2.0 Proposed Approval Process

Environment Canada has no issue at this time with the cancellation of the existing Type A water license and the issuance of a Type B license to cover the reclamation and closure activities at the Lupin Gold Mine. Environment Canada supports the NWB's proposition to hold a short public hearing to hear from interested parties in regards to the approval of the Type B water license. Such a process would be in keeping with previous practices regarding the closure and reclamation of active mine sites. In order to avoid scheduling conflicts, EC encourages the NWB to keep in mind potential conflicts with public hearings likely to be scheduled by the Nunavut Impact Review Board when setting dates for Lupin A&R Plan hearing. Further, in order to make efficient use of time and resources, EC recommends that the public hearing, if held, encompass the entire A&R Plan.

Environment Canada appreciates the opportunity to provide comments to the NWB regarding the proposed A&R plan for the TCA, as well as the process for the approval of the entire A&R Plan for the Lupin Gold Mine. We hope that these comments are useful in your decision-making process. Please do not hesitate to contact me with any questions or comments with regards to the foregoing at (867) 975-4639 or by email at colette.spagnuolo@ec.gc.ca.

Yours truly,

Original signed by

Colette Spagnuolo
Environmental Assessment / Contaminated Sites Specialist

cc: (Stephen Harbicht, Head, Assessment and Monitoring, Environment Canada, Yellowknife)
(Anne Wilson, Water Quality Specialist, Environment Canada, Yellowknife)