

June 15, 2012

Yukon Government  
Suite 2C-4114-4th Ave  
PO Box 2703 (K-149)  
Whitehorse, YT  
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**Ms. Karen Furlong, EIT  
Project Manager**

Dear Ms. Furlong:

**Faro Mine Remediation Project  
Drawdown Rate of Intermediate Pond**

This letter presents our review and recommendations regarding the potential increase of the drawdown rate of the Intermediate Pond at Faro.

## **1 RELEVANT DOCUMENTS**

We understand that the maximum drawdown rate of the Intermediate Pond has been limited to 25 mm/day historically. We have reviewed the following two memoranda on the subject:

- BGC 2008. Intermediate Dam Trigger Levels, May 15; and,
- BGC 2009. Support for 2009 Freshet, Sept. 25.

The former summarized stability analyses carried out to establish piezometric incident levels for the downstream slope stability under steady seepage condition as well as for the upstream slope stability under rapid drawdown condition. Table 1, extracted from the memorandum, outlines the rapid drawdown incident levels, provided that the piezometric levels for piezometers located beneath the dam crest and downstream toe are kept within the following ranges:

- Beneath dam crest: P96-1: El. 1027.8 to 1031.7 m; and  
P96-2: El. 1029.4 to 1031.9 m.
- Beneath d/s dam toe: Within historical operating range.

The latter reviewed allowable drawdown rates for the Cross Valley and Intermediate Dams. Table 1 was again given in this memorandum as rapid drawdown incident levels. It further reviewed the guidance given by Mr. Gerry Ferris on April 3, 2009, where the maximum rate of drawdown was kept

as 25 mm/day. A revised recommendation appears to have removed the maximum rate of drawdown, as long as limits on total drawdown from the initial pond elevation shown in Table 1 are respected.

**Table 1 Rapid Drawdown Incident Levels**

Incident Level	Pond elevation range for different incident levels (m, amsl) (drawdown from initial elevation, m)	
Starting tailings pond elevation (m, amsl)	1047.7	1046.5
Normal	1047.7 to 1047.4 (0 to 0.3)	1046.5 to 1046 (0 to 0.5)
Alert	1047.4 to 1046.8 (0.3 to 0.9)	1046 to 1044.3 (0.5 to 2.2)
Emergency	1046.8 to 1045.8 (0.9 to 1.9)	1044.3 to 1043.5 <sup>2</sup> (2.2 to 3)
Failure <sup>1</sup>	1045.8 TO 1044.9 (1,9 to 2.8)	

1. Below this elevation, the Factor of Safety is less than unity.
2. Entire pond is drained at elevation 1043.5 m.

## 2 DISCUSSION

We understand that Faro controls the level of Intermediate Pond by pumping water from the pond to Faro water treatment plant. Treated water is then discharged to the Polishing Pond from where water is released through the siphon outlet to the downstream channel. The annual operation of the Faro treatment plant is governed by the allowable drawdown rate of the Intermediate Pond. At the end of water treatment season, the pond level is drawn down to the lowest level to maximize the pond storage for the following year.

The current target drawdown level of the Intermediate Pond is El. 1043.0 m. Therefore, it seems to be advantageous to attempt to operate the pond level in the range of El. 1043 m to El. 1046.5 m, as far as practical. According to Table 1, if drawdown starts from pond level at El. 1046.5 m, the incident level could be kept within the range of “normal” to “emergency” without encroaching on the “failure” level.

## 3 RECOMMENDATIONS

We understand that Yukon government would like to increase the drawdown rate of the Intermediate Pond to facilitate yearly operation of care and maintenance activities. Upon the review of above two BGC memoranda, we summarize our recommendations as follows:

- There are many factors that affect dam stability. While we appreciate the wish of the Yukon Government to increase the drawdown rate, we feel that we should proceed cautiously with the increase on an incremental basis. We should not stress the dam more severely than necessary to avoid precipitating a dam incident.

- For 2012, we recommend that Faro starts drawdown of the Intermediate Pond, when the pond level reaches El. 1046.5 m, and attempts to operate the pond level in the range between El. 1046.5 m and El. 1043 m.
- Although BGC (2009) removed the maximum drawdown rate in its revised recommendation, we feel that it would be prudent to relax the drawdown rate incrementally. We recommend that the maximum drawdown rate be increased from 25 mm/day to 40 mm/day on an experimental basis for 2012.
- Table 1 pond levels should be used to govern the degree of monitoring of the Intermediate Dam as required by the site Operations, Maintenance and Surveillance Manual (BGC 2008), and Emergency Response Plan (BGC 2008).
- We recommend that all piezometers at the Intermediate Dam be monitored on a monthly basis, with Piezometers P96-1 and P96-2 monitored weekly.
- During the experiment of increased drawdown rate, we will be relying on the site observation of dam performance to judge whether the increased rate is acceptable or not. Thus, weekly communication of site observations by e-mail including photos (as needed) will be required on a routine basis.
- Because the technical background of the site personnel is not geotechnical, it is important for them to be vigilant in looking for unusual dam behaviours, such as cracks, slope slumps, differential movements along the crest and dam slopes, etc. If anything appears to be different from what they have observed before, they should take photos both in close up and at distance to show the full picture of the observed condition. These photos should be sent to us immediately with additional notes by site personnel. Further telephone discussions may be necessary to clarify the observed phenomena, and their impacts.
- In an event any unfavourable performance of the dam is observed, we should be immediately notified, and the pond drawdown should be stopped.
- Consideration should also be given to run in situ filtration tests on the impervious core at several test pits along the dam crest in the summer to assess how fast the core material actually drains.

We are looking forward to assisting you in increasing gradually the drawdown rate of the Intermediate Pond at Faro.

Yours truly,

**KLOHN CRIPPEN BERGER LTD.**

*Robert C. Lo* June 15, 2012

Robert C. Lo, P.Eng.  
Project Manager



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