February 11, 2015 Reference No. 1410944-005-L-Rev1-8000

Karen Furlong, Project Manager
Government of Yukon
Faro Mine Remediation Project
Assessment and Abandoned Mines
Suite 2C-4114-4th Ave
PO Box 2703 (K-419)
Whitehorse, YT
Y1A 2C6

REVIEW OF FARO PIT EAST RIM STABILITY MONITORING TECHNICAL MEMORANDUM

Dear Karen,

As requested by Yukon Government (YG), Golder Associates Ltd. (Golder) has carried out a review of the draft technical memorandum prepared by Klohn Crippen Berger (KCB) regarding the Faro Pit East Rim Stability Monitoring. This letter report summarizes our comments and suggested edits.

We understand that concerns have been raised regarding potential pit slope instability in the North and South Instability Zones related to the current high water levels and the planned pit lake drawdown in the Faro Pit. We have carried out a high-level assessment of the likelihood of an overall slope instability related to high lake levels or drawdown. The considerations and results are discussed below.

The elevated lake level per se is not a concern with respect to causing potential slope instability, because the pressure exerted by the pore water within the slope is offset by the pressure the lake water exerts on the slope. Hence, there is little net change in the effective stress in the slope and in the stability of the slope. Our experience with flooding open pits supports this conclusion.

Drawdown of the lake water level can create a temporary condition where elevated pore water pressures exist within the slope. Theoretically, these unbalanced elevated pore pressures can contribute to slope instability. However, in the case of the East Wall of the Faro Pit, there are a number of mitigating circumstances that significantly reduce the likelihood of developing instability, and these are discussed in the following bullets.

- If pumping is to begin this year and be completed by April 2016, pumping rates similar to those used previously will be adequate to reach the target lake elevation. The previous pumping rates have not resulted in instability. Therefore, we expect that if a similar rate is used in the current drawdown, it is not likely to result in instability.
- The planned drawdown will lower the lake level from approximately 1,152.4 metres elevation to 1,149 metres elevation, or by about 3.5 metres. This change in lake elevation with respect to the full height of the slope is minimal. Based on old mining records, the full vertical extent of the North Instability Zone, for

Golder Associates Ltd.
Suite 200 - 2920 Virtual Way, Vancouver, BC, V5M 0C4
Tel: +1 (604) 296 4200 Fax: +1 (604) 298 5253 www.golder.com
Golder Associates: Operations in Africa, Asia, Australasia, Europe, North America and South America

example, is approximately 230 metres from the bottom of the pit to the top of the slide material. Therefore, a change of only 3.5 metres in lake elevation, even with rapid drawdown, is not likely to significantly impact the groundwater conditions within the slide debris or the stability of the debris.

- While the slide material in the Grum Pit is mainly overburden and the instability zone is active, the slide material and the east wall of the Faro Pit both consist of rock, and the instability zones have exhibited little to no activity over the last several years.
- Finally, we have observed drawdown of pit lakes at other mines sites, including pits with instability zones, and have not observed instability resulting from the drawdown.

In view of the above considerations, we consider that the likelihood of overall slope instability resulting from the pit lake drawdown to be very low, and that the increased monitoring is likely not necessary. However, the consequences of overall slope instability to the closure plan are considered to be high, and for this reason, the increased monitoring is a prudent precautionary measure, especially during the lake drawdown.

The following table summarizes our comments and edits that pertain to specific sections in the memorandum. The page, paragraph or bullet, and sentence number from the original document is included for reference.

Table 1: Comments and Suggested Edits

Item	Page	Paragraph	Sentence	Suggested Edit		Comment
				From	To	
1	1	1	1	Faro Pit East Rim Stability	Faro Pit East Rim Slope Stability	Change this instance and all others to be clear that we are discussing *slope* stability.
2	1	1	2	Golder	Golder Associates Ltd. (Golder)	
3	5	1	3	From May 2013 the lake level continued to rise passing the recommended maximum level of El. 1144.3 m...	-	Note that the maximum water elevation is not a Golder recommendation related to slope stability. It would be helpful to the reader to give the basis for maximum water level, and explain that it is not tied to slope stability, to eliminate concerns that the slope might be in jeopardy because the water level is currently above the recommended maximum elevation.
4	5	2	2	...and will go through several draw-down phases, which are unfavorable from the pit-wall stability point of view.	...and will go through several draw-down phases. From a pit-wall stability point of view, a drawdown could be a concern.	
5	5	3	3	...we are not sure whether the back slope of the Faro Creek Diversion Channel...	...we are not sure whether the back slope behind the Faro Creek Diversion Channel...	
6	5	3	3	...has been checked by a geotechnical engineer or geologist for the existence of cracks along the back slope crest.	-	Golder inspected the slope behind the FCDC in 2002 and did not observe any cracks. The area between the FCDC and the crest of the East Wall is examined by Golder during each of our site visits. No cracks have been observed between the FCDC and crest of the East Wall.

Item	Page	Paragraph	Sentence	Suggested Edit		Comment
				From	To	
7	6	1	last	...as follows during the period of high lake level at the Faro Pit.	...as follows during the period of high lake level at the Faro Pit, and more importantly during drawdown.	
8	6	7	1	Conduct general inspection from vehicle...	Conduct daily general inspection from vehicle...	
9	6	8	1	Conduct detailed inspection on foot...	Conduct daily detailed inspections during the drawdown phase on foot...	See discussion in report regarding inspection activities that require access to the slope.
10	7	Table 1	Title	Checklist of In-depth Inspection of Faro Pit East Rim during High Lake-Level Stage.	Checklist of In-depth Inspection of Faro Pit East Rim during High Lake-Level Stage and Drawdown Phases.	
11	7	Table 1	Column Headers	No Change	No Change (Y/N)	
12	7	Table 1	Column Headers	Observed Changes	If Y, Observed Changes.	
14	8	1	1 and 2	-	-	See discussion in report regarding drawdown only when there is no snow on the ground.
15	8	1	4 and 5	-	-	See discussion in report regarding inspection activities that require access to the slope.

With respect to items 9 and 15 in Table 1, KCB's memorandum recommends walking the slope to carry out visual inspections. However, recent conversations with YG have been focused on evaluating options to keep TEES staff off the slope due to safety concerns. While we believe that it is safe to carry out the visual inspections provided that the slope is first evaluated from a distance, the recommendation to do so is counter to the objective indicated by YG. Given the potential concerns with respect to slope stability due to drawdown, however, there may be justification for asking TEES to visually inspect the crest of the slope. Cracks at the crest may be the first signs of slope instability.

With respect to item 14, cracks at the crest may not be visible during the winter and early spring when snow is on the ground. KCB also notes that the visual inspection will not be as thorough during winter months. Golder recommends that the drawdown phases only occur when thorough visual inspections can be carried out, i.e., when there is no snow on the ground. This would require that pumping occur from about April to October 2015, or for about seven months, with possibly an extra month available in spring 2016. Despite the shortened time period for pumping, which may require an increased pumping rate to meet the target lake elevation of 1,149 metres by April 2016, it is not likely that the increased rate would result in an unfavourable drawdown condition. Appropriate monitoring can then be carried out to allow for advance warning of any potential slope instability.

We trust this letter report satisfies your current requirements, and we appreciate this opportunity to continue to provide our support to the Yukon Government. If you have any questions or require further assistance, please do not hesitate to contact us.

Yours very truly,

GOLDER ASSOCIATES LTD.

Jennifer Ramesch, M.Sc.
Geotechnical Specialist, Mining Division

Al Chance, P.Eng.
Principal, Mining Division

PROFESSIONAL ENGINEER
YUKON TERRITORY
JOHN A. HULL
11/15

John Hull, P.Eng.
Senior Consultant

JJR/AVC/JH/jc/bb/it

Attachment: Study Limitations

o:\final\2014\dynamics numbers - mining division\1410944\1410944-005-tm-rev1-8000\1410944-005-l-rev1-8000-review of faro pit east rim stability monitoring 11feb_15.docx

STUDY LIMITATIONS

Golder Associates Ltd. (Golder) has prepared this document in a manner consistent with that level of care and skill ordinarily exercised by members of the engineering and science professions currently practising under similar conditions in the jurisdiction in which the services are provided, subject to the time limits and physical constraints applicable to this document. No warranty, express or implied, is made.

This document, including all text, data, tables, plans, figures, drawings and other documents contained herein, has been prepared by Golder for the sole benefit of the Government of Yukon. It represents Golder's professional judgement based on the knowledge and information available at the time of completion. Golder is not responsible for any unauthorized use or modification of this document. All third parties relying on this document do so at their own risk.

The factual data, interpretations, suggestions, recommendations and opinions expressed in this document pertain to the specific project, site conditions, design objective, development and purpose described to Golder by the Government of Yukon, and are not applicable to any other project or site location. In order to properly understand the factual data, interpretations, suggestions, recommendations and opinions expressed in this document, reference must be made to the entire document.

This document, including all text, data, tables, plans, figures, drawings and other documents contained herein, as well as all electronic media prepared by Golder are considered its professional work product and shall remain the copyright property of Golder. Government of Yukon may make copies of the document in such quantities as are reasonably necessary for those parties conducting business specifically related to the subject of this document or in support of or in response to regulatory inquiries and proceedings. Electronic media is susceptible to unauthorized modification, deterioration and incompatibility and therefore no party can rely solely on the electronic media versions of this document.