

November 18, 2015

Government of Yukon  
Department of Energy, Mines and Resources  
Assessment and Abandoned Mines  
Box 2703  
Whitehorse, Yukon Y1A 2C6

ISSUED FOR USE  
FILE: W14103577-01  
Via Email: josee.perron@gov.yk.ca

**Attention:** Ms. Josée Perron, P.Eng.  
Senior Project Manager

**Subject:** 2015 Annual Geotechnical Inspection Report on Earth Structures  
Mount Nansen Site, YT

## 1.0 INTRODUCTION

As requested, Tetra Tech EBA Inc. (Tetra Tech EBA) has completed a geotechnical inspection of the earth structures located at the abandoned Mount Nansen mine site west of Carmacks, YT. The intent of the inspection was to provide a geotechnical engineering report on the stability of the tailings, water-retaining, and water diversion structures as part of the on-going care and maintenance program. The format of this inspection conforms to that recommended in the Surveillance - Engineering Inspections section of the Canadian Dam Association's (CDA) Dam Safety Guidelines (2013). The tailings dam is classified as "Significant" with respect to the consequences of failure per the CDA Guidelines, and engineering inspections are required on an annual basis. Similar inspections have been completed by Tetra Tech EBA in the past. The scope of work for this study was to include two site inspections in 2015 -- one in the spring (at or near freshet) with an interim report, and one in the fall, just before freeze-up for the final report. This letter presents the Annual Geotechnical Inspection Report that is based on these two inspections. A copy of the spring (June 11/15) inspection report is included in Appendix A.

This work was authorized by Josée Perron, P.Eng. of Yukon Government, Department of Energy, Mines and Resources, Assessment and Abandoned Mines Branch (YG-AAM) under EBA's Standing Offer Agreement, through Contract No. C0002 in May 2015.

## 2.0 OBSERVATIONS AND RECOMMENDATIONS

Mr. Richard Trimble, P.Eng. of Tetra Tech EBA's Whitehorse Office completed one-day inspections on June 11 and September 24, 2015. Both inspections were completed in the company of Jeff Moore from YG-AAM (along with Luca Poloni for the June inspection). The structures examined were:

- North Interceptor Ditch/Dome Creek Diversion Ditch/Combined Emergency Spillway;
- Tailings Dam; and
- Seepage Collection Dam.

Specific observations and recommendations are presented in the following sections of this letter, including selected photos. Other photos taken are available for review in EBA's files. Prior to the site visit, a site specific Health and Safety Plan was prepared and submitted to YG-AAM, followed by the completion of a Safety Orientation by Site Operations personnel on site (Denison Environmental Services), as well as the completion of a Tetra Tech EBA Safe Work Form before starting the site work.

## 2.1 NORTH INTERCEPTOR DITCH/DOME CREEK DIVERSION/EMERGENCY SPILLWAY

### Interceptor/Diversion Ditch

The ditches above and around the tailings pond, connecting to the combined spillway, were in similar conditions to previous year. In September 2015 it was observed that the previously completed dredging undertaken to remove accumulated silt/sand in the base to improve winter flows had lowered the grade of the ditch enough so that toe erosion on the left (west) side of the interceptor ditch above Dome Creek was observed (see Photo 1). Elsewhere, the slopes were acceptably flattened and in a stable condition. It is recommended that future winter ice removal be completed so that the base of the ditch is not lowered any further. This section of ditch should be re-examined in the spring to see if conditions have stabilized. – If not, the placement of riprap may be required to stabilize the toe of the slope on the west side.



**Photo 1:** Interceptor ditch above Dome Creek (looking downstream)– stable sideslopes on right side of ditch, but locally undercut (see circled area) on left side (September 24/15)

Erosion gullies created by water entering the interceptor ditch from the west were in the same condition as previous years, and should continue to be monitored. A photo of this area is presented in the June 2015 report attached in Appendix B – see Photo 2 in that report. These small erosion gullies are significant contributors to sand and silt deposits in the diversion ditch. Previously recommended and subsequently implemented channel blocks using riprap were not entirely successful at containing the eroded sand; however the volume of sand entering the ditch has been reduced. If monitoring and maintenance is not being provided, then a more permanent solution (geotextile placement and regular sand cleanout) may have to be considered.

Photo 2, below, shows the stable condition of the diversion ditch downstream of the Dome Creek intersection.



**Photo 2:** Re-contoured Diversion Ditch with stable sideslopes, looking downstream (September 24/15)

One area that has historically had oversteep slopes was immediately above and below the intersection of the interceptor ditch with Dome Creek and the Diversion Ditch. In September 2015, the sideslopes in this area were observed to have been flattened satisfactorily (see Photo 3, below).



**Photo 3:** Looking upstream at the re-contoured and stable sideslopes of Interceptor Ditch near intersection with Dome Creek and Diversion Ditch (September 24/15)

The primary concern with all these ditches is the effects of erosion at the toes of the banks that contribute to widening, grade flattening due to channel infill, oversteep slopes during periods of high water flow, and the transport of sediment that increases total suspended solids further downstream. If regular maintenance is not provided, then some base and slope armouring will be required.

As previously noted, it is recommended that ice removal in the winter be completed with minimal disturbance to the base of the existing ditches – the grade of the upper portion of the ditch near Dome Creek has been lowered substantially, and eventually this will affect future water flow. If this occurs, granular fill may be required to raise the grade of the upper section of ditch to restore original design conditions.

### **Emergency and Combined Spillway**

The combined emergency spillway/Dome Creek diversion channel was in a similar condition to previous years. Work that was completed in 2014 on the outlet from the tailings pond has created a stable configuration that is adequate to carry the design flows.



**Photo 4:** View of stable emergency spillway upstream of combined channel (September 24/15)

Some minor woody vegetation (willows, etc.) was growing in the combined emergency spillway channel further downstream. This should continue to be monitored and the vegetation will eventually have to be cut down if there is a potential for impeding water flow during flood events.



**Photo 5:** Willow and vegetation growth in the lower portion of combined emergency spillway and diversion channel (September 24/15)

The upper velocity check dam was observed to contain a section of missing riprap. It was recommended that this area be reconstructed to the design intent by placing/moving several boulders into the centre of the channel.

Immediately after the fall inspection, it is understood that this work was completed by site operations – this will be examined during the next inspection -- photographs supplied by YG-AAM indicate that the work was completed satisfactorily.



**Photo 6:** First velocity check dam in combined spillway diversion channel – add large boulders to fill the gap for effective water velocity control (September 24/15)

## 2.2 TAILINGS DAM

The tailings dam is considered stable in its present condition and no concerns are noted.



**Photo 7:** View of the level crest of tailings dam looking south (September 26/14)

The previously recommended repairs and maintenance measures have been completed.

On September 24/15 the water in the tailings pond was below the base of the installed staff gauge, but had just been previously surveyed by YG-AAM at an elevation of 1095.22 m. .

The following table summarizes the existing and design elevation details for the tailings pond, and the water level at the time of the inspection.

| Description                  | Elevation |
|------------------------------|-----------|
| Crest of Dam                 | 1099.6 m  |
| Top of Geocomposite Liner    | 1098.8 m  |
| Design Flood Water Elevation | 1098.6 m  |
| Spillway Invert              | 1097.8 m  |
| Maximum Operating Level      | 1097.8 m  |
| September 24/15 Water Level  | 1095.2 m  |

The current water level in the pond is low as compared to historical levels, and well below the spillway invert. From a geotechnical perspective, low water levels are good for stability.

### 2.3 SEEPAGE COLLECTION DAM

The water level on September 24/15 was read at 0.19 m on the staff gauge, which corresponds to an elevation of 1077.09 m – this provides a freeboard of about 2.0 m, a metre below the maximum operating level.

The pumping rate from the pond was read at 178 L/min, which is generally consistent with previously recorded pumping rates.

Some minor seepage was observed from the base of the riprap at the toe of the tailings dam, and from the north terrace at the seepage pond. Both of these seepage zones were observed as containing clear water, and the flow rates were consistent with that observed in previous years. Seeps at the downstream toe of the seepage dam, as sometimes noted in previous years, were not observed during the September inspection.

The removal of woody vegetation, and the clearing of ground squirrel burrows that had been previously recommended has been satisfactorily completed.



**Photo 8:** View (looking south) of seepage collection dam crest showing stable condition (September 24/15)

The following table summarizes the existing and design elevation details for the seepage collection pond, and the water level at the time of the inspection.

| Description                 | Elevation |
|-----------------------------|-----------|
| Crest of Dam                | 1079.1 m  |
| Top of 38 mil Arctic Liner  | 1078.7 m  |
| Maximum Operating Level     | 1078.1 m  |
| September 24/15 Water Level | 1077.1 m  |

No stability concerns are noted as a result of the 2015 inspections of the pond.

### 3.0 SUMMARY OF RECOMMENDATIONS

The following Table has been prepared to summarize the recommendations from this and previous annual geotechnical inspections. This table will be updated annually, with items noted as “completed” being removed from subsequent versions of the Table, and the others carried forward if still applicable.

**Table 1: Summary and Status of Maintenance Items from 2015 Annual Geotechnical Inspections**

| Item Description   | Recommended Maintenance   | Status  |
|--|---|---|
| North Interceptor, Diversion Ditch and Combined Emergency Spillway | Continue to monitor steep sideslopes and sand/silt buildup. Flatten sideslopes as required. Minimize the clean out of sand in base of ditch, as this creates over-steep slopes and reduces the ditch grade.<br>Monitor woody vegetation growth in the combined emergency spillway – removal will be required when vegetation is deemed to be a potential blockage threat during design flows.<br>Fill gap in first velocity check dam by strategically relocating several large boulders. | Satisfactory maintenance has been completed, and monitoring is continuing |
| Tailings Dam   | Stable – no issues to report.<br>Continue to read instrumentation on a monthly basis.   | On-going  |
| Seepage Collection Dam   | Visually monitor seepage entering the pond from toe of tailings dam and from base of north terrace. If water becomes silty, notify a geotechnical engineer immediately.<br>Continue to read instrumentation on a monthly basis.   | On-going  |
| Pumping of Seepage Collection Pond                                 | Continue to record pumping rates from seepage collection pond, and notify a geotechnical engineer if the rates required to maintain a constant water pond elevation significantly increase (+25%).  | On-going  |

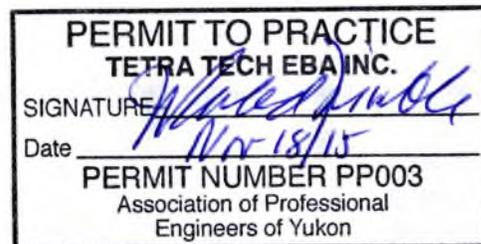
## 4.0 LIMITATIONS OF REPORT

This report and its contents are intended for the sole use of the Government of Yukon, Energy Mines and Resources and their agents. Tetra Tech EBA does not accept any responsibility for the accuracy of any of the data, the analysis, or the recommendations contained or referenced in the report when the report is used or relied upon by any Party other than Government of Yukon, Energy Mines and Resources or for any Project other than the site described herein. Any such unauthorized use of this report is at the sole risk of the user. Use of this report is subject to the terms and conditions stated in the attached General Conditions.

## 5.0 CLOSURE

We trust this report meets your present requirements. The inspections reported herein are specifically related to geotechnical observations completed by the author regarding the north interceptor ditch/Dome Creek diversion/emergency spillway, tailings pond, and seepage collection pond at the time of the inspections. Should geotechnical stability issues be noted by site personnel during other routine inspections, EBA should be notified as these observations may affect the conclusions presented in this report. Should you have any questions or comments, please contact the undersigned.

Sincerely,  
Tetra Tech EBA Inc.



J. Richard Trimble, P.Eng., FEC  
Principal Consultant, Arctic Region  
Direct Line: 867.668.9216  
richard.trimble@tetrattech.com

# APPENDIX A

## TETRA TECH EBA'S GENERAL CONDITIONS

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# GENERAL CONDITIONS

## GEOTECHNICAL REPORT

This report incorporates and is subject to these "General Conditions".

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### 1.0 USE OF REPORT AND OWNERSHIP

This geotechnical report pertains to a specific site, a specific development and a specific scope of work. It is not applicable to any other sites nor should it be relied upon for types of development other than that to which it refers. Any variation from the site or development would necessitate a supplementary geotechnical assessment.

This report and the recommendations contained in it are intended for the sole use of EBA's Client. EBA does not accept any responsibility for the accuracy of any of the data, the analyses or the recommendations contained or referenced in the report when the report is used or relied upon by any party other than EBA's Client unless otherwise authorized in writing by EBA. Any unauthorized use of the report is at the sole risk of the user.

This report is subject to copyright and shall not be reproduced either wholly or in part without the prior, written permission of EBA. Additional copies of the report, if required, may be obtained upon request.

### 2.0 ALTERNATE REPORT FORMAT

Where EBA submits both electronic file and hard copy versions of reports, drawings and other project-related documents and deliverables (collectively termed EBA's instruments of professional service), only the signed and/or sealed versions shall be considered final and legally binding. The original signed and/or sealed version archived by EBA shall be deemed to be the original for the Project.

Both electronic file and hard copy versions of EBA's instruments of professional service shall not, under any circumstances, no matter who owns or uses them, be altered by any party except EBA. EBA's instruments of professional service will be used only and exactly as submitted by EBA.

Electronic files submitted by EBA have been prepared and submitted using specific software and hardware systems. EBA makes no representation about the compatibility of these files with the Client's current or future software and hardware systems.

### 3.0 ENVIRONMENTAL AND REGULATORY ISSUES

Unless stipulated in the report, EBA has not been retained to investigate, address or consider and has not investigated, addressed or considered any environmental or regulatory issues associated with development on the subject site.

### 4.0 NATURE AND EXACTNESS OF SOIL AND ROCK DESCRIPTIONS

Classification and identification of soils and rocks are based upon commonly accepted systems and methods employed in professional geotechnical practice. This report contains descriptions of the systems and methods used. Where deviations from the system or method prevail, they are specifically mentioned.

Classification and identification of geological units are judgmental in nature as to both type and condition. EBA does not warrant conditions represented herein as exact, but infers accuracy only to the extent that is common in practice.

Where subsurface conditions encountered during development are different from those described in this report, qualified geotechnical personnel should revisit the site and review recommendations in light of the actual conditions encountered.

### 5.0 LOGS OF TESTHOLES

The testhole logs are a compilation of conditions and classification of soils and rocks as obtained from field observations and laboratory testing of selected samples. Soil and rock zones have been interpreted. Change from one geological zone to the other, indicated on the logs as a distinct line, can be, in fact, transitional. The extent of transition is interpretive. Any circumstance which requires precise definition of soil or rock zone transition elevations may require further investigation and review.

### 6.0 STRATIGRAPHIC AND GEOLOGICAL INFORMATION

The stratigraphic and geological information indicated on drawings contained in this report are inferred from logs of test holes and/or soil/rock exposures. Stratigraphy is known only at the locations of the test hole or exposure. Actual geology and stratigraphy between test holes and/or exposures may vary from that shown on these drawings. Natural variations in geological conditions are inherent and are a function of the historic environment. EBA does not represent the conditions illustrated as exact but recognizes that variations will exist. Where knowledge of more precise locations of geological units is necessary, additional investigation and review may be necessary.

## 7.0 PROTECTION OF EXPOSED GROUND

Excavation and construction operations expose geological materials to climatic elements (freeze/thaw, wet/dry) and/or mechanical disturbance which can cause severe deterioration. Unless otherwise specifically indicated in this report, the walls and floors of excavations must be protected from the elements, particularly moisture, desiccation, frost action and construction traffic.

## 8.0 SUPPORT OF ADJACENT GROUND AND STRUCTURES

Unless otherwise specifically advised, support of ground and structures adjacent to the anticipated construction and preservation of adjacent ground and structures from the adverse impact of construction activity is required.

## 9.0 INFLUENCE OF CONSTRUCTION ACTIVITY

There is a direct correlation between construction activity and structural performance of adjacent buildings and other installations. The influence of all anticipated construction activities should be considered by the contractor, owner, architect and prime engineer in consultation with a geotechnical engineer when the final design and construction techniques are known.

## 10.0 OBSERVATIONS DURING CONSTRUCTION

Because of the nature of geological deposits, the judgmental nature of geotechnical engineering, as well as the potential of adverse circumstances arising from construction activity, observations during site preparation, excavation and construction should be carried out by a geotechnical engineer. These observations may then serve as the basis for confirmation and/or alteration of geotechnical recommendations or design guidelines presented herein.

## 11.0 DRAINAGE SYSTEMS

Where temporary or permanent drainage systems are installed within or around a structure, the systems which will be installed must protect the structure from loss of ground due to internal erosion and must be designed so as to assure continued performance of the drains. Specific design detail of such systems should be developed or reviewed by the geotechnical engineer. Unless otherwise specified, it is a condition of this report that effective temporary and permanent drainage systems are required and that they must be considered in relation to project purpose and function.

## 12.0 BEARING CAPACITY

Design bearing capacities, loads and allowable stresses quoted in this report relate to a specific soil or rock type and condition. Construction activity and environmental circumstances can materially change the condition of soil or rock. The elevation at which a soil or rock type occurs is variable. It is a requirement of this report that structural elements be founded in and/or upon geological materials of the type and in the condition assumed. Sufficient observations should be made by qualified geotechnical personnel during construction to assure that the soil and/or rock conditions assumed in this report in fact exist at the site.

## 13.0 SAMPLES

EBA will retain all soil and rock samples for 30 days after this report is issued. Further storage or transfer of samples can be made at the Client's expense upon written request, otherwise samples will be discarded.

## 14.0 INFORMATION PROVIDED TO EBA BY OTHERS

During the performance of the work and the preparation of the report, EBA may rely on information provided by persons other than the Client. While EBA endeavours to verify the accuracy of such information when instructed to do so by the Client, EBA accepts no responsibility for the accuracy or the reliability of such information which may affect the report.

# APPENDIX B

## TETRA TECH EBA JUNE 2015 INSPECTION REPORT

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July 30, 2015

ISSUED FOR USE  
OUR FILE: W14103577-01

Government of Yukon  
Department of Energy, Mines and Resources  
Box 2703  
Whitehorse, Yukon Y1A 2C6

**Attention:** Ms. Josée Perron, P.Eng.  
Senior Project Manager, Assessment and Abandoned Mines

**Subject:** June 2015 Geotechnical Inspection of Earth Structures  
Mount Nansen Site, YT.

## 1.0 INTRODUCTION

As requested, Tetra Tech EBA Inc. (EBA) has completed a geotechnical inspection of the earth structures located at the abandoned Mount Nansen mine site west of Carmacks, YT. The intent of the inspection was to provide a geotechnical engineering report on the stability of the tailings, water-retaining, and water diversion structures as part of the on-going care and maintenance program. The format and content of the inspection generally conforms to that recommended in the Canadian Dam Association's (CDA) *Dam Safety Guidelines* (2007). Similar inspections have been completed by EBA in the past. The scope of work for this study was to include two site inspections in 2015 (one near freshet in the spring (June), and one just before freeze-up in the fall (September)) per EBA's proposal dated April 27, 2015. The work was subsequently authorized under Contract C00028549 on May 6/15. This letter presents an interim report based on the June inspection, which will be combined with the September inspection to prepare the Annual Geotechnical Inspection Report.

## 2.0 OBSERVATIONS AND RECOMMENDATIONS

Mr. Richard Trimble, P.Eng. of EBA's Whitehorse Office completed a one-day inspection on June 11, 2015 in the company of Jeff Moore and Luca Poloni from the Yukon Government, Assessment and Abandoned Mines (YG-AAM). The structures examined were:

- North Interceptor Ditch/Dome Creek Diversion Ditch/Emergency Spillway
- Tailings Dam
- Seepage Collection Dam

Specific observations and recommendations are presented in the following sections of this letter, including selected photos. Other photos taken are available for review in EBA's files. Prior to the site visit, a site specific Health and Safety Plan was prepared and submitted to YG-AAM to forward to the site maintenance personnel, followed by the completion of onsite safety orientation and testing prior to accessing the site(s).

### 2.1 NORTH INTERCEPTOR DITCH/DOME CREEK DIVERSION/EMERGENCY SPILLWAY

#### 2.1.1 Interceptor Ditch

The ditches above and around the tailings pond, connecting to the emergency spillway are intended to keep runoff water out of the tailings area, and were generally in a better condition than observed in previous years.

The effects of ice excavation and cleanout to keep the ditch flowing over the previous winter were evident, as was recent maintenance completed by the site contractor. See Photos below.

The primary concern with these ditches is the effects of erosion on the toes of the banks – this will have to be monitored and corrective actions taken after spring freshet or after large rainfall/runoff events. These corrective actions might include flattening the slopes to 1.5:1 and possible riprap placement at the toe of the slope if over-steepening occurs.



**Photo 1:**

Stable ditch slopes just south of Dome Creek intersection, looking downstream (June 11/15)

For all maintenance activities, care should be taken to maintain the width of the access road to be at least 6 m in this area. The excavated material from the upstream side could be re-used as fill on the downstream side to maintain the road width.

Erosion gullies from water entering the interceptor ditch were in the same condition as previous years and should continue to be monitored. These small erosion gullies are significant contributors to sand and silt deposits in the diversion ditch. Riprap has been placed at all these gullies, as previously recommended (see Photo 2). This hasn't been entirely effective in minimizing sand migration into the ditch, but does provide some stability to the sideslopes at these locations. A complete sand/silt barrier at these locations would require additional annual maintenance to clean out materials on the other side of the ditch, which is not considered necessary at this time.



**Photo 2:**

Armouring to minimize sand deposition from contributory gullies into channel bottom upstream of Dome Creek intersection looking west (June 11/15)

### 2.1.2 Diversion Ditch

The diversion ditch was in an acceptable and stable condition – no work is required at this time other than regular maintenance to remove silt/sand in the spring and fall of each year, as required to maintain flow and sideslope stability. Photo 3 shows the typical condition of the diversion ditch.



**Photo 3:** Typical condition of the Dome Creek diversion ditch looking upstream (June 11/15)

### 2.1.3 Combined Diversion Ditch and Emergency Spillway

The emergency spillway was in an acceptable and stable condition following repairs to several deficiencies that were identified during the inspection in the fall of 2014.

One “velocity check” requires the addition of several boulders to maintain its effectiveness during periods of high flow. Photo 4 shows this area. It is understood that this work was completed shortly after the site visit, and will be reported by the author during the fall 2015 inspection.



**Photo 4:**

Velocity check just below bridge requires the addition of several large boulders (in channel at centre of photo) to maintain its effectiveness during periods of high flow – looking north (June 11/15).

## 2.2 TAILINGS DAM

The water level in the tailings pond was well below the maximum operating level elevation, and lower than has been noted in previous years. The dam itself is considered to be in a stable condition with a large upstream tailings beach. No evidence of previously noted instabilities or seepage on the north abutment was observed, and there were no signs of significant erosion or permafrost thaw features that could affect stability. The surface of the dam was flattened in 2014, and this has assisted in visual monitoring. Vegetation has been adequately removed from all locations noted in previous inspections.



**Photo 5:**

View to the south along centerline of tailings dam (June 11/15)

The water in the pond was recorded at 1.07 m on the installed staff gauge(s) which corresponds to an elevation of 1095.20 m (per June 2015 elevation survey completed by YG-AAM). This places the water at about 2.60 m below the design “pond operating level” of 1097.80 m. With respect to geotechnical stability, low water levels are always good to see.

## 2.3 SEEPAGE COLLECTION DAM

The water in the seepage collection pond was recorded at a level of 0.19 m on the staff gauge, and the pumping rate was 161 L/min at the time of the inspection. This pond elevation is close to the usual operating level of the pond over the past year, and according to the onsite maintenance personnel, it is necessary to pump at varying rates over the year to keep it at about this level. The corresponding elevation for the staff gauge reading is about 1077.09 m (per June 2015 elevation survey completed by YG-AAM) or about 1.01 m below the design operating level of 1078.10 m. Photo 6 shows the berm and edge of the pond at the time of the inspection.



**Photo 6:**

View of Seepage Collection Pond berm, looking north (June 11/15).

The three minor seeps that have been noted in previous years on the downstream face of the dam were observed as primarily wet spots on the ground surface, rather than actual seeps with flowing water. The other seeps flowing into the dam from the north abutment were also still observed, with similar volumes of clear water flowing – this is not a cause for concern. The two seeps from the base of the riprap on the upstream side of the pond were also observed this year, similar to previous years. The seepage water was clear, so no cause for concern.

The ground squirrel holes and burrows along the dam crest that were noted in previous years have been filled in, and it is understood that techniques used by Orkin Canada have been effective in mitigating the ground squirrel issues at this location.

All woody vegetation, including roots, has been removed from the crest of the dam and the upstream face, and within the top 5 m of the downstream face as noted in previous inspection reports.

No stability concerns are noted as a result of this pond inspection.

### 3.0 SUMMARY OF RECOMMENDATIONS

The following Table has been prepared to summarize the recommendations from the current geotechnical inspection. This table will be updated annually, with items noted as “completed” being removed from subsequent versions of the Table, and the others carried forward, if still applicable.

**Table 1: Summary and Status of Maintenance Items from 2013 and June 2014 Geotechnical Inspections**

| Item Description  | Recommended Maintenance   | Status              |
|---|---|---------------------|
| <b><u>From 2014 Report</u></b>                            |   |                     |
| North Interceptor, Diversion Ditch and Emergency Spillway | Monitor the condition of bank sideslopes on a regular basis, and if undercut/over-steepened by erosion, then either repair or provide armour consisting of non-woven geotextile and riprap. | Continue Monitoring |
| Tailings Dam  | Continue to visually monitor permafrost thaw settlement on the downstream face near the south abutment.   | Continue Monitoring |
| Seepage Collection Dam                                    | Monitor seepage zones from toe of tailings dam and from base of north terrace. If water becomes silty, notify a geotechnical engineer immediately.  | On-going            |
|   | Continue to record pumping rates from seepage collection pond, and notify a geotechnical engineer if the rates significantly increase to maintain a constant water pond elevation.          | On-going            |
|   | Remove/relocate ground squirrels and backfill their burrows/nests to minimize potential for liner damage or the creation of seepage channels.   | Completed           |
|   | Remove woody vegetation, including roots, from the crest and upstream face, and on the downstream face for a distance of 5 m from the crest as measured on the face.                        | Completed           |

| Item Description  | Recommended Maintenance  | Status                  |
|---|--|-------------------------|
| <b><u>June 2015 Recommendations</u></b>                   |  |                         |
| North Interceptor, Diversion Ditch and Emergency Spillway | Repair first “velocity check” below the bridge by adding several large riprap boulders to the centre of the channel.   | To be completed in 2015 |
| Tailings Dam  | No work required.  | n/a                     |
| Seepage Collection Dam                                    | Monitor seepage zones from below riprap at toe of tailings dam, from base of north terrace, and at the three previously identified locations on the downstream face of the dam. If seepage volumes significantly increase from that observed, or if water becomes silty, notify a geotechnical engineer immediately. | On-going                |
|   | Continue to record pumping rates from seepage collection pond, and notify a geotechnical engineer if the rates significantly increase to maintain a constant water pond elevation.   | On-going                |

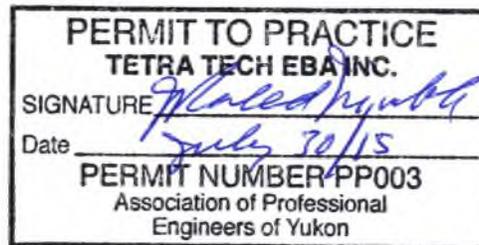
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## 5.0 CLOSURE

We trust this report meets your present requirements. The inspections reported herein are specifically related to geotechnical observations completed by the author regarding the north interceptor ditch/Dome Creek diversion/emergency spillway, tailings pond, and seepage collection pond at the time of the inspections. Should geotechnical stability issues be noted by site personnel during other routine inspections, EBA should be notified as these observations may affect the conclusions presented in this report. Should you have any questions or comments, or require any additional information, please contact the undersigned.

Sincerely,  
Tetra Tech EBA Inc.



J. Richard Trimble, P.Eng., FEC  
Principal Consultant, Arctic Region  
Direct Line: 867.668.9216  
Email: richard.trimble@tetrattech.com