TECHNICAL MEMORANDUM

DATE October 5, 2010

PROJECT No. 10-1427-0032

TO Jay Cherian, Environmental Coordinator
Denison Environmental Services

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2010 ANNUAL GEOTECHNICAL DAM INSPECTION
PRELIMINARY GEOTECHNICAL ASSESSMENT
FARO MINE COMPLEX, FARO, YUKON

As requested by Denison Environmental Services (DES), Golder Associates Ltd. (Golder) on behalf of Keyeh Nejeh Golder Corporation (KNG) carried out a geotechnical site inspection of the Faro Mine Complex. The purpose of the geotechnical site inspection was to conduct an annual dam inspection of the mine facilities as defined in the DES proposal request dated August 24, 2010. Upon completion of the dam inspection, preliminary results were shared with DES and Yukon Government representatives.

The site inspection was carried out in accordance with the scope of work, terms and conditions as defined in our proposal dated September 2, 2010. Authorization to proceed with the work was issued by DES on September 13, 2010.

This technical memorandum summarizes the results of our geotechnical site inspection, including site observations, client discussions and provides our preliminary geotechnical comments and recommendations. It is understood that the results of this dam inspection will be summarized into the Faro Mine 2010 overall annual report to the Yukon Government.

1.0 BACKGROUND

Golder has been involved with design and construction of the tailings facilities at the Faro Mine since 1980 and provided annual inspection and instrumentation review until 1999. The annual inspections from 2000 to 2009 were carried out by BGC Engineering Inc. (BGC).

As part of a care and maintenance contract awarded by Yukon Government, Energy, Mines, and Resources (YGEMR) to DES in 2009, BGC carried out the most recent annual inspection in July 2009. The annual inspection results and data monitoring review are summarized in BGC (2009).

2.0 SITE OBSERVATIONS

The annual geotechnical dam inspection was carried out by Mr. W.J. (Bill) Purdy, P.Eng. of Golder on September 21 and 22, 2010. An introductory tour of the Faro Mine Complex infrastructure was conducted by Mr. Purdy in the presence of Ms. Cherian and independent follow-up inspections of selected structures were then completed by Mr. Purdy. Site observations of specific structures were recorded by camera and field notes.

In general, the fall dam inspection was carried out during relatively low flow conditions, which is considered typical for this time of year. As indicated in advance of the site inspection by Mr. John Brodie, P.Eng. as a geotechnical advisor to YGEMR for the Faro Mine Complex, the operating water levels in the tailings facility were drawn down well below normal operating conditions prior to shutting down and winterizing the pumpback system to the water treatment plant on August 30, 2010.

The weather conditions were sunny and warm on September 21st and overcast and cool on September 22nd, with daily temperatures ranging between about +2°C and +10°C during the day and -5°C over night. The ground conditions were bare and dry with no snow.

Site conditions at selected structure locations are illustrated in the attached photographs (Photos 1 to 10, inclusive). Site observations from the dam inspection are summarized on the attached Table 1 and details for each structure inspected are provided below.

2.1 Rose Creek Diversion Channel

The full 3.8 km length of the Rose Creek Diversion Channel (RCDC) was inspected and in general found to have stable channel bottom and side slope conditions. The channel gradient is relatively shallow and below the tailings impoundment level upstream of the Diversion Dam at about Stn. 1+000 (Photo 1). The channel gradient remains relatively flat and transitions above the tailings facility level until well down gradient of the Cross Valley Dam where the flow passes through a section of steeper gradient, rapid flow before returning to low gradient passive flow by the end of the diversion channel and returns to the natural Rose Creek channel.

In areas where the channel side slopes comprise granular soils, the channel side slopes are surfaced with rip rap comprising rounded cobble and boulder field stone. In general, the rock armour is in satisfactory condition.

At about Stn. 2+700, the RCDC transitions to a steeper gradient with more rapid flow and the channel is founded primarily in fractured to intact bedrock. The channel incorporates rock weirs comprising large blast rock placed across the channel width at regular intervals to help dissipate the rapid flow conditions in the steeper gradients. The rock weirs appear stable and the channel returns to slow flow conditions at the end of the RCDC.

DES is proceeding to remove vegetation from the diversion channel side slopes along the length of the RCDC to improve channel flow conditions. Channel vegetation removal operations were in progress at about Stn. 2+250 and appear satisfactory.

Minor seepage was observed from the RCDC at base of spoil piles and flowing into the Cross Valley Dam (CVD) Polishing Pond. The spoil piles appeared stable at the time of inspection.

2.2 North Valley Wall Interceptor Ditch

The North Valley Wall Interceptor Ditch (NVWID) inspection completed with DES was limited to the upper portion located above the mill site due to vegetation growth along the middle and lower portions of the diversion channel. The NVWID receives flow from the Upper Guardhouse Creek and appears to be well founded in fractured to intact bedrock at beginning of the diversion channel.

The channel gradient varies from relatively flat to moderate conditions, with ponded water developing in areas where the channel bottom undulates or is obstructed. Sedimentation is developing down gradient of the new water supply well access road crossing due to uncontrolled sediment erosion (Photo 2). Consideration should be given to address the erosion conditions that are developing along the new fresh water supply access road which crosses the NVWID, as defined in Section 4.

In general, the NVWID channel bottom and side slope conditions within the upper channel portion appear stable at time of inspection.

2.3 Intermediate Dam

The Intermediate Dam (ID) is an internal tailings dam designed to retain tailings, supernatant water and run-off water within the tailings facility. At the time of inspection, the impoundment water level was operating below the rip rap protection provided on the upstream slope. There was at the time of the inspection no apparent evidence of upstream slope instability of the underlying sand and gravel shell material or rip rap degradation (Photo 3).

Apart from some minor evidence of surface cracking, the dam crest appears stable and intact at the time of inspection.

The downstream slope is experiencing extensive surficial soil erosion, with no apparent movements of underlying downstream shell material (Photo 4). The surficial soil erosion conditions comprises a series of shallow soil rills across the entire dam width from the base of slope up to at least two-thirds of the dam's downstream slope height. In addition, there are shallow soil scarps developing on the lower dam slope across the southern portion of the dam length. The shallow soil scarps extend from the base of slope up to at least half of the dam slope height across the southern two-thirds of the dam length. The shallow soil rills and shallow scarps have eroded the downstream surface to a depth of less than 0.3 m and the deeper soil scarps range between about 0.3 m and 1 m deep.

The back scarp and eroded soil conditions appear to comprise silty sand and gravel. The eroded soil has been transported down slope and deposited at the toe of slope on the downstream bench. Evidence of the underlying drainage blanket was not observed.

Further geotechnical evaluation of the downstream slope conditions should be considered to address the observed soil erosion slope conditions. Short and long term recommendations are summarized in Section 4.

2.4 Cross Valley Dam

The Cross Valley Dam (CVD) is designed for a 60-day retention capacity polishing pond comprising seepage and discharge water from the tailings storage facility. Similar to the operating water level in the pond of the Intermediate Dam, the polishing pond water level was operating below the CVD rip rap surface at the time of the fall inspection. There was no apparent evidence at the time of the inspection of upstream slope instability of the underlying sand and gravel shell material or rip rap degradation (Photo 5).

The dam crest is in satisfactory condition. However, three longitudinal tension cracks were observed along the southern portion of the dam crest, indicative of differential movement of the underlying soil conditions resulting from the zoned dam construction. The downstream slope appears stable and in satisfactory condition (Photo 6).

2.5 Secondary Tailings Impoundment

The Secondary Tailings Impoundment (STI) area was inspected. The dam crest, upstream and downstream slopes conditions appear stable at the time of inspection. The lower road conditions appear satisfactory. There was no evidence of seepage along the Secondary Dam downstream toe towards the RCDC (Photo 7).

2.6 Faro Creek Diversion Channel

The Faro Creek Diversion Channel (FCDC) diverts creek channel flow from head waters north of the Faro Pit around the east side of the mine site. At the time of the site inspection, the seasonally, low flow conditions enable good access to view the diversion channel bottom and side slope conditions. In general, the side slopes are armoured with rip rap material comprising rounded cobble and boulder field stone. A portion of the rip rap channel near the head water diversion is underlain by a layer of synthetic liner and appears intact to limit seepage flow from the diversion channel, which is marked by white poles (Photo 8).

Minor seepage from the FCDC was observed to occur at the base of access road dyke and flows into the drainage basin above waste rock dumps.

There is evidence that a lower channel portion was previously underlain with a synthetic liner adjacent to the Faro Pit, but is no longer functioning to limit seepage flow from the diversion channel.

There is evidence along the length of the diversion channel that the soil back slope has experienced unstable conditions and repaired with blast rock to maintain stable channel side slope conditions (Photo 9).

In general, the existing rock armour and lined channel conditions observed along the length of the FCDC are satisfactory.

2.7 North Fork Rock Drain

The North Fork Rock Drain (NFRD) was inspected and the head pond water level condition was found to be well below the wood debris on slope. The embankment crest and side slope conditions appeared stable at time of inspection. The downstream drainage conditions comprised three drainage channels which braided into one channel downstream at the water monitor and sample location. The head pond conditions and rock drain performance appeared satisfactory at time of inspection.

2.8 K8 Creek Rock Drain

The K8 Creek Rock Drain (K8CRD) is situated about 2.5 km east of the NFRD. The road embankment has stable crest and side slope conditions. Rock drain performance and downstream drainage conditions were acceptable at time of inspection.

3.0 CLIENT DISCUSSIONS

Client discussions carried out during the site inspection between DES and Golder representatives are summarized as follows:

- Golder representative conducted a site orientation upon arrive to site.
- DES confirmed that there has been low snow pack this year and the site is currently experiencing low flow runoff conditions in all creeks and diversion channels.
- DES confirmed critical annual monitoring periods are May, June and September.
- DES will submit monthly monitoring data for review and comment by Golder starting in September 2010.
- DES provided the following site data:
  - Water level elevation records including Intermediate Pond and Polishing Pond to September 20, 2010.
  - Past project correspondence regarding Intermediate and Cross Valley Dams.
  - Bathymetric image in PDF format of the Intermediate and Cross Valley impoundments.
  - Typical monthly inspection report for the Tailings Management Area (TMA) and Faro Pit and Waste Rock areas.
- For historical reference, DES confirmed remedial repairs at the Faro Mine Complex during the last decade have been minimal and included:
  - Vegetation removal and re-grading of the Intermediate Dam downstream slope;
  - Regrading of longitudinal surface cracks on crest of Cross Valley Dam;
  - Liner installation and channel repair in upper portion of FCDC as delineated by staff gauges;
  - Back slope instability repair of FCDC at channel bend down gradient of Flow Monitoring Station FDC-3 and adjacent to the Faro Pit;
  - Regrading of Lower Road down gradient of Secondary Tailings Impoundment; and
  - Minor channel rip rap maintenance of FCDC and RCDC.

Upon completion of the site inspection, Golder met with DES and Yukon Government representatives to review the site observation and preliminary geotechnical assessment. The results of the meeting are summarized below.

4.0 PRELIMINARY GEOTECHNICAL COMMENTS AND RECOMMENDATIONS

Based on the results of the fall dam inspection and client discussions, our geotechnical comments and recommendations are summarized as follows:

- In general, the Faro Mine Complex infrastructure which are covered by this inspection effort including tailings dams and diversion channels are considered geotechnically stable and are performing satisfactorily during the current low storage impoundment and low creek and diversion channel flow conditions.
- It is recommended that DES continue to monitor the structures by way of visual inspections and collection of instrumentation readings on a regular basis and in accordance with the current monitoring schedule.
- The vegetation removal activities, which are currently underway within the Rose Creek Diversion Channel, appear reasonable and should be carried out to the end of the channel, as planned.
- It is recommended that an inspection of the Faro Mine Complex infrastructure including tailings dams and diversion channels, should be carried out next spring by a geotechnical engineer to assess the geotechnical performance of the structures during the annual seasonally high flow and runoff conditions.
- The sedimentation and ponded channel conditions observed in the upper portion of the North Valley Wall Interceptor Ditch should continue to be monitored. Consideration should be given to address the erosion conditions that are developing along the new fresh water supply access road which crosses the NVWID, such as ditch lining and/or rip rap protection to limit further sedimentation degradation of the diversion channel. Furthermore, the observed ponded water conditions should be monitored as there is evidence of toe erosion occurring along the channel side slopes, which may require regrading of the drainage channel gradient in the upper channel portion.
- The middle and lower portions of the NVWID are becoming overgrown with vegetation which should be monitored for channel flow obstructions and repaired, if required.
- The current operating impoundment water level conditions upstream of the Intermediate Dam and Cross Valley Dam should be monitored for potential soil erosion of the upstream shell material below rip rap surface and rip rap degradation if the new operating water levels are to be maintained.
- It is recommended that the soil erosion conditions observed on the downstream slope of the Intermediate Dam should be assessed by a geotechnical engineer. The soil erosion conditions should continue to be monitored for potential further erosion, slope creep and/or possible slope instability. While no overall slope instability mechanisms were identified during this site inspection, there is a risk that if the slope is left unattended, the observed shallow soil instabilities may become detrimental to the overall integrity of the downstream slope of the Intermediate Dam and should be addressed within the next few years.
- From our discussions with DES, it is considered too late this year to remove and/or re-grade the observed unstable soil conditions on the downstream slope of the Intermediate Dam. Therefore it is recommended that consideration should be given to addressing the observed instability conditions within the next few years, subject to the timing and scope of future regrading requirements that may be considered by the closure plan for this structure.
- As part of the geotechnical review of the Intermediate Dam conditions, it is recommended that short term and long term dam remediation measures are identified and scheduled to repair and stabilize the observed unstable dam slope conditions.

- As input for further geotechnical evaluation of the Intermediate Dam downstream slope conditions, the following items should be considered:
  - The actual cause of the instabilities can not be determined without further geotechnical testing and analysis. From preliminary site observations only, it is possible that the observed instabilities may be a result of seasonal freeze-thaw cycling of the downstream dam materials and may worsen next spring. It is anticipated that as the frozen soils thaw in spring time, the surficial silty soils become saturated and unstable overlying intact and/or frozen, thaw stable downstream shell conditions, resulting in surficial soil ground movements down slope.
  - In the short term, consideration should be given to delineate the extent of the existing soil erosion conditions now and monitor the downstream slope for any potential change in slope conditions through next spring and summer. Other geotechnical activities to delineate the cause and affect of the observed slope instabilities should be considered, which may include test pitting, sampling and laboratory testing of the eroded surficial soil underlying downstream shell conditions.
  - DES should continue to monitor the collection of unstable sediment deposition conditions overlying the existing drainage measures on the lower bench observed at the base of the downstream slope, as the collection of this material may limit future performance of the drainage layer and affect the overall stability of the Intermediate Dam.
  - As a long term measure, it is recommended that a geotechnical review of the Intermediate Dam should be carried out as input to the care and maintenance operating conditions and annual monitoring program for this structure. The geotechnical review should include an update of the geotechnical stability analysis using the current dam shape, changed downstream slope configuration and operating water level conditions to assess the potential change in dam performance and overall dam integrity.
- It is recommended that the longitudinal tension cracks observed on the crest of the Cross Valley Dam should continue to be monitored and re-grading of the granular surface is carried out during seasonably warm conditions to minimize surface water infiltration.
- In general, the rock armour and lined channel conditions observed in the Rose Creek and the Faro Creek Diversion Channels appear stable and are performing satisfactorily. It is recommended that visual monitoring for any change in rip rap and/ seepage loss conditions are recorded and instrumentation monitoring activities are continued.
- It is recommended that the upstream slope, head pond and downstream drainage conditions are monitored at the Faro Creek and K8 Creek Rock Drains locations for potential change in embankment slope erosion, blocked and/or changed drainage conditions are observed.

The above information is based on our site observations and client discussions obtained during the recent dam inspection and will form part of our final report in March 2011. It is anticipated that upon geotechnical review of the instrumentation data and further input from the DES, our final report may include additional geotechnical comments and recommendations.

5.0 CLOSURE

We trust that the above information is sufficient for your present needs. We would be please to review the result of our site inspection with your project team at your convenience. Should you have any questions or require additional information, please do not hesitate to contact us.

GOLDER ASSOCIATES LTD.

W.J. (Bill) Purdy, P.Eng.
Associate

John Hull, P.Eng.
Principal

WJP/JAH

Attachments: Table 1: Faro Mine Complex, Geotechnical Dam Inspection Summary, September 2010
Appendix A: Site Inspection Photographs 1 to 10

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REFERENCE

BGC Engineering Inc., 2009. Denison Environmental Services, 2009 Annual Geotechnical Evaluation and Instrument Review, Volumes 1 and 2 of 2, Various Facilities at Faro Mine, Yukon. Final Report No. 0762-002-05 dated February 26, 2010.

Table 1: Faro Mine Complex, Geotechnical Dam Inspection Summary, September 2010

Structure	Description	Observations	Recommendations
Rose Creek Diversion Channel (RCDC)	■ Diverts creek channel flow around south side of tailings impoundment area. ■ Approximately 3,800 m long with relatively flat to moderate stream channel gradients.	■ Seasonally, low flow conditions. ■ Stable channel and side slope conditions. ■ Satisfactory rock armour conditions. ■ Channel vegetation removal operations in progress and satisfactory. ■ Minor seepage apparent from RCDC at base of spoil piles into CVD Polishing Pond.	■ Channel bottom, dyke side slope and back slope conditions appear stable at time of inspection. ■ Complete vegetation removal activities. ■ Document seepage locations from RCDC into tailings impoundment area after fresh snow fall conditions. ■ Continue to monitor instrumentation. ■ Conduct geotechnical inspection of RCDC next spring during peak flow conditions.
North Valley Wall Interceptor Ditch (NVWID)	■ Diverts creek channel flow from north side of valley around tailings impoundment area. ■ Approximately 3,000 m long with relatively flat stream channel gradients in upper channel portion.	■ Seasonally, low flow conditions. ■ Stable channel and side slope conditions. ■ Sedimentation developing down gradient from well access road crossing. ■ Ponded water in upper channel portion due to varied channel gradients. ■ Moderate vegetation growth in central to lower channel portion. ■ Unable to view lower channel portion.	■ Channel bottom and side slope conditions for upper channel portion appear stable at time of inspection. ■ Monitor channel sedimentation conditions down gradient from well access road crossing. ■ Review channel gradients to limit side slope erosion from ponding conditions. ■ Monitor channel vegetation conditions in lower portion, may require thinning or removal if stream flow is compromised.
Intermediate Dam (ID)	■ Internal tailings dam, retains tailings, supernatant water and run-off water. ■ Crest approximately 650 m long, 7 m wide and 32 m high. ■ Dam crest at El. 1049.2 m and spillway channel at El. 1047.7 m.	■ Stable crest, upstream slope and spillway channel conditions. ■ Impoundment water level operating below rip rap protection. ■ Downstream slope experiencing extensive surficial soil erosion, with no apparent movements of underlying downstream shell material.	■ Continue to monitor instrumentation. ■ Monitor upstream slope for potential soil erosion of upstream shell material below rip rap surface and rip rap degradation. ■ Delineate extent of existing soil erosion on downstream slope and monitor for potential change in slope conditions.

Table 1 (cont'd): Faro Mine Complex, Geotechnical Dam Inspection Summary, September 2010

Structure	Description	Observations	Recommendations
Intermediate Dam (ID) (cont'd)		■ Sediment from downstream slope erosion is covering drainage measures on lower bench.	■ Monitor sediment deposition over drainage measures on lower bench. ■ Update geotechnical stability analysis based on current dam conditions, including resultant downstream slope and operating water levels. ■ Short term and long term remediation measures required to repair and stabilize dam slope conditions.
Cross Valley Dam (CVD)	■ Polishing pond dam designed for 60 day retention capacity of seepage and discharge water from tailings storage facility. ■ Crest approximately 500 m long, 7 m wide and 17 m high. ■ Dam crest at El. 1033.1 m and spillway channel at El. 1031.7 m.	■ Stable crest, upstream and downstream slopes and spillway channel conditions. ■ Tension cracks evident on the dam crest. ■ Impoundment water level operating below rip rap protection.	■ Continue to monitor instrumentation. ■ Monitor tension cracks in dam crest. ■ Monitor upstream slope for potential soil erosion of upstream shell material below rip rap surface and rip rap degradation.
Secondary Tailings Impoundment (STI)	■ Perimeter tailings dam, retains tailings, supernatant water and run-off water. ■ Crest approximately 1120 m long, 6 m wide and 28 m high. ■ Dam crest varies from El. 1060.2 m to El. 1063.3 m.	■ Stable crest, upstream and downstream slopes conditions. ■ No evidence of seepage along the Secondary Dam downstream toe. ■ Lower road conditions are satisfactory.	■ Continue to monitor instrumentation.
Faro Creek Diversion Channel (FCDC)	■ Diverts creek channel flow from head waters north of the Faro Pit around the east side of the mine site.	■ Seasonally, low flow conditions. ■ Stable channel and side slope conditions. ■ Satisfactory rock armour and lined channel conditions.	■ Continue to monitor instrumentation. ■ Continue to monitor rip rap and lined channel conditions.

Table 1 (cont'd): Faro Mine Complex, Geotechnical Dam Inspection Summary, September 2010

Structure	Description	Observations	Recommendations
Faro Creek Diversion Channel (FCDC) (cont'd)	■ Approximately 1,500 m long with relatively flat to moderate stream channel gradient conditions.	■ Minor seepage apparent at base of dyke from FCDC into valley above waste rock dumps.	■ Continue to monitor seepage conditions.
North Fork Rock Drain (NFRD)	■ Mine haul road stream crossing constructed from coarse waste rock fill and rock drain. ■ Embankment approximately 55 m high and 25 m crest width.	■ Seasonally, low flow conditions. ■ Stable crest and side slope conditions. ■ Head pond water level well below wood debris on slope. ■ Downstream drainage conditions acceptable with three drainage channels observed braiding to one channel downstream at water monitor and sample location.	■ Head pond conditions and rock drain performance satisfactory. ■ Continue to monitor pond level and downstream flow conditions. ■ Continue to monitor instrumentation.
K8 Creek Rock Drain (K8CRD)	■ Mine haul road stream crossing constructed from coarse waste rock fill and rock drain. ■ Embankment approximately 55 m high and 25 m crest width.	■ Seasonally, low flow conditions. ■ Stable crest and side slope conditions. ■ Downstream drainage conditions acceptable.	■ Rock drain performance satisfactory. ■ Continue to monitor drainage performance.

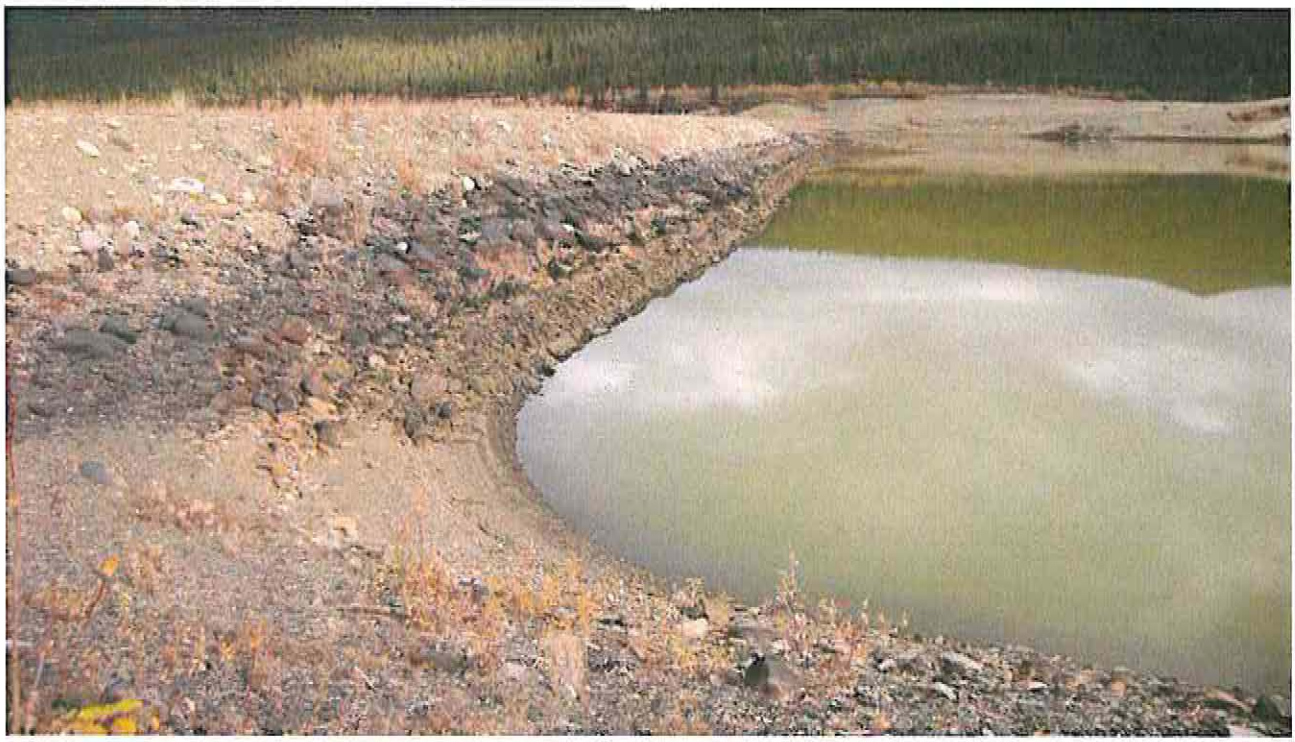
APPENDIX A
Site Inspection Photographs 1 to 10

Photograph 1: Vegetation removal progress near Stn. 2+500 of Rose Creek Diversion Channel

Photograph 2: Sedimentation downstream of well access crossing of North Valley Wall Interceptor Ditch

Photograph 3: Upstream drawdown operating conditions at Intermediate Dam

Photograph 4: Downstream drawdown operating conditions at Intermediate Dam



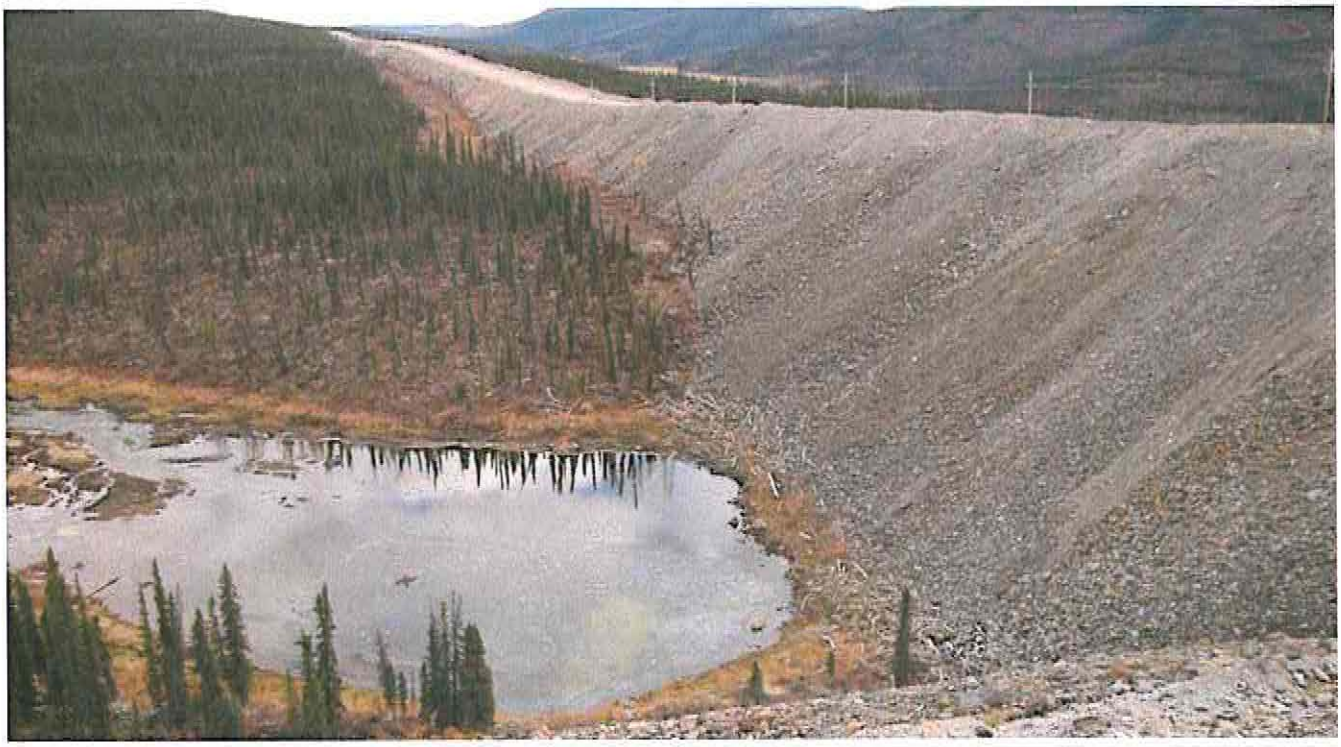
Photograph 5: Upstream drawdown operating conditions at Cross Valley Dam

Photograph 6: Downstream conditions at Cross Valley Dam

Photograph 7: Downstream conditions at Secondary Tailings Impoundment at Diversion Dam

Photograph 8: Downstream view of lined channel conditions of Faro Creek Diversion Channel

Photograph 9: Downstream view of stabilized channel conditions of Faro Creek Diversion Channel



Photograph 10: Upstream view of head pond conditions at North Fork Rock Drain