Attachment 5

Knight Piésold
CONSULTING

MEMORANDUM

To:	Mr. David Swisher	Date:	November 16, 2011
Copy To:	Bill Mercer, Kevin Hawton	File No.:	NB101-390/2-A.01
From:	Cara Stapley	Cont. No.:	NB11-00527
Re:	Thor Lake Site - Phase 3 Site Investigations		

INTRODUCTION

As part of the Feasibility Study for the Avalon Rare Metals Inc. (Avalon) Thor Lake Project, Knight Piésold conducted a series of geotechnical investigations and hydrogeological monitoring well installations for the proposed Project site infrastructure locations including the Flotation Plant, Access Road/Pipeline Route, Tailings Management Facility and Polishing Pond. A project location map is provided on Figure 1 and a general project layout, detailing the proposed locations for the Project infrastructure, is shown on Figure 2.

This memo provides a summary of the investigation procedures, observations, results and installations completed for the phase 3 site investigations at the Thor Lake Project site. Results of the previous site investigation programs at the Thor Lake site were issued in:

- Memorandum “Thor Lake Project - 2010 Phase 1 Site Investigation Results and Recommendations” (Cont. No. NB10-00556, issued on January 25, 2011)
- “Report 1, Rev 0 “Phase 2 Site Investigations Summary Report”, issued on May 12, 2011

SITE INVESTIGATION DETAILS

The phase 3 site investigations were carried out to supplement previous work and to evaluate the soil and bedrock conditions, permafrost conditions and ground thermal regime associated with the proposed Thor Lake Project infrastructure. One hydrogeological drillhole was also completed to install a monitoring well at the location where the installation was unsuccessful during the phase 2 program. The phase 3 site investigations were completed for the following project components:

- Flotation Plant Site
- Airstrip Expansion
- Access Road/Pipeline Route
- Borrow
- Quarry
- Tailings Management Facility (TMF)
- Polishing Pond (PP)

The investigations consisted of site reconnaissance and bedrock mapping, excavation of shallow test pits, geotechnical drilling, collection of representative samples for index testing and characterization, installation of a thermistor, and installation of a groundwater monitoring well. The geotechnical and hydrogeological drillholes, as well as test pit locations are shown on Figure 2. The locations of the Flotation Plant site infrastructure shown are based on site layouts provided by Avalon and are subject to change. The following items have been included in this memo:

- Final drillhole and test pit locations
- Detailed drillhole logs (including instrumentation and monitoring well details)
- Test pit logs
- Sample summaries
- Laboratory testing results
- Available thermistor data

Site Reconnaissance and Bedrock Mapping

Site reconnaissance included the evaluation of proposed infrastructure locations to document ground conditions, surface water/drainage, bedrock outcrops, vegetation and topography. The Flotation Plant site, North Access Road/Pipeline Route, TMF/PP area and temporary separator dyke location were assessed. The areas where exposed bedrock was identified have been indicated on Figure 2.

Test Pits

A total of 44 test pits were completed using a Kubota Superseries2 U35 mini-excavator (38 test pits), or hand auger (6 test pits), under the direction of Knight Piésold between August 8 and 28, 2011. Test pit depths varied from 0 m (test pits on bedrock) to 2.4 m with an average depth of approximately 0.95 m. Notes pertinent to the test pits, such as pit wall stability, groundwater conditions and refusal (bedrock/permafrost, where applicable), are included on the test pit logs. The test pits were logged and photographed and backfilled following completion. Table 1 provides a summary of the test pits completed during the phase 3 site investigations, sorted by area, including approximate coordinates and elevations (from hand held GPS), depth of test pit and reason for stoppage. Temperature readings obtained from the pit walls are summarized on Table 2. The test pit logs are provided in Appendix A.

Geotechnical Drilling

The drilling was completed by Foraco Drilling (of Kamloops, BC) using a 25 HH Hydraulic diamond drill coring rig, generally equipped with HQ/HQ3 diameter drill rods (standard and triple tube). All work was completed under the direction of Knight Piésold between August 18 and 23, 2011. A total of 8 drillholes were completed, including 1 hydrogeological drillhole. Drillhole depths varied from 12.0 m (GT-14) to 24.05 m (GT-12) with an average drilled depth of approximately 15.4 m and a minimum of 5 m of rock coring to confirm bedrock. Soil and rock recovery was generally good to very good. Table 3 provides a summary of the geotechnical and hydrogeological drillholes completed during the phase 3 site investigations, sorted by area, including surveyed location coordinates and elevations (provided by Avalon), depth to bedrock and total depth drilled. The drillhole logs are provided in Appendix B.

SPTs were conducted at varying depths in the overburden at most of the drillhole locations. The results from these tests are clearly indicated, both numerically and graphically, on the drillhole logs.

Ground permeability testing (packer hydraulic conductivity testing) was completed in all TMF and PP drillhole locations. In-situ packer testing was conducted by Foraco Drilling under the direction of Knight Piésold personnel, using nitrogen inflatable packers. The tests were performed using the Lugeon method, typically isolating the bedrock zone after completion of drilling. The testing intervals and hydraulic conductivity results for all areas are summarized on Table 4.

Logging and Sampling

Soil logging was undertaken in accordance with the Canadian Foundation Engineering Manual (1992) and ASTM D2488-93 (Standard Practice for Description Identification of Soils [Visual Manual Procedure]). Frozen soils are classified in accordance with the method by Andersland and Ladanyi in "Frozen Ground Engineering" (2004). In some cases, the core was suspected to be washed and/or thawed by the drilling process and this has been indicated clearly in the drillhole logs (overburden and frozen soil descriptions).

Rock logging was conducted using the Visual-Manual Procedure and involved a general rock description including type, colour, strength, joint angles and weathering, as well as descriptors for calculating RMR (NoD, JRC and Js), as shown on the drillhole logs. The terminology used to describe rock types is based on field descriptions and consultation with the Avalon geologists at the Thor Lake site.

Overburden samples from test pits and drillholes were logged, photographed, placed in a plastic bag (double-bagged), sealed and labelled. Following completion of the site investigations program, select samples were shipped to North Bay, Ontario for laboratory testing. A summary of all soil samples collected from the test pits and drillholes is provided on Tables 5 and 6, respectively. All drill core not sampled was logged and photographed and placed in core boxes for storage in the Avalon core farm area. Selected photographs from the site investigations are included on Figures 3 and 4 and a digital copy of all photographs from the site investigations have been included as Appendix C (provided on CD).

Thermistors

One (1) thermistor was installed in geotechnical drillhole GT-16 as part of the phase 3 site investigations, as summarized on Table 7. The general installation details are included on the geotechnical drillhole log provided in Appendix B1. Permanent dataloggers have been installed at the three (3) thermistors installed during the phase 2 site investigations, but one of those dataloggers should be periodically moved to the GT-16 thermistor location so that ground temperature data may be collected on an ongoing basis at all four (4) locations. Avalon will continue to periodically collect data from the thermistors and provide it to Knight Piésold. Thermistors were also installed as part of the geomechanical site investigations (2010).

Monitoring Well

A Hydrogeological drillhole was completed with the primary purpose of installing a groundwater monitoring well that was not successfully installed during the phase 2 site investigations. The monitoring well was installed using standard materials and the screened section of the well was placed to intersect the most likely seepage path, given the material characteristics and permafrost conditions. The well was installed using 2" PVC (standard and slotted) surrounded by slow-release bentonite pellets, filter sand, grout and/or cement as required. A J-Plug cap and security casing was installed over the monitoring well to protect and identify it. The general installation details are included on the hydrogeological drillhole log provided in Appendix B2.

Laboratory Testing

Grab, bulk and SPT soil samples, collected from test pits, drill core and in-situ testing, respectively, were selected for laboratory index testing to allow general characterization and classification of the samples, including determination of ice content where applicable. Samples were tested by LVM Merlex in North Bay, Ontario. Classification testing included:

- Particle Size Analysis of Soils using Sieve and Hydrometer (ASTM D422)
- Atterberg Limits (ASTM D4318)
- Natural Moisture Content (ASTM D2216)
- Specific Gravity of Soil (ASTM D854-06)

Bulk unit weight approximations for drillhole samples were also made by Knight Piésold, using SPT and core sample dimensions and weights. The results of the laboratory test work were integrated into the test pit and drillhole logs.

SITE INVESTIGATION RESULTS

Project Infrastructure Locations

Various materials were encountered at the infrastructure locations. The composition of overburden materials varies significantly, ranging from organics to clay/silt to various gradations of sand and gravel. The phase 3 site investigations were conducted in the summer to evaluate the active layer and permafrost conditions in the infrastructure areas. Some areas, particularly those in organic rich and/or shaded areas, had shallow permafrost. Where overburden was found to be frozen, some of the soils were observed to be ice-rich. A summary of all index laboratory test results for the test pits and drillholes, organized by area, is provided on Tables 8 and 9, respectively. The laboratory test results report from Merlex is included in Appendix D. All of the investigation results have been used to produce stratigraphic sections of the proposed TMF and PP alignments, as shown on Figures 5 and 6.

A general description of each Project area, based on the results of the phase 3 site investigations is included below.

- **Flotation Plant Site**

  The Plant Site area is generally flat to gently sloping with variable tree cover, and has been partially impacted by the construction of a laydown area and access road for the past and current activities. A total of eight (8) test pits (TP-TL11-24, -25R, -26, -27R, -33, -34, -35 and -37) were completed in the vicinity of the Flotation Plant Site as shown on Figure 2. Site reconnaissance and bedrock mapping were also completed in the area, where intermittent bedrock outcrops were noted at surface. Overburden in the area was noted to be relatively shallow at the runoff collection sump location (1.1 m depth), and ranging in thickness from 0.7 m (at TP-TL11-33) to >2.4 m (at TP-TL11-27R) over the Plant Site area. The overburden was primarily comprised of an organic layer (peat) overlying sandy/gravelly soil with occasional silt/clay content as indicated on the logs in Appendix A and grain size distribution curves on Figure 7. Generally, bedrock appears to be closer to surface on the north and east sides of the Plant Site area and deeper on the west and south sides. On the west side of the area, the soils are more fine-grained with some clay content. Frozen soils were not encountered in test pits and thermistor data from GT-11 does not indicate the presence of frozen ground, so it is expected that the Plant Site infrastructure will be in an area of discontinuous permafrost. The area is generally underlain by good quality syenite bedrock with few discontinuities noted.

- **Airstrip Expansion**

  The area of the proposed airstrip expansion is fairly heavily treed and required clearing in order to access the test pit locations with the excavator. A total of three (3) test pits (TP-TL11-22, -23 and -23R) were completed in the vicinity of the Airstrip Expansion as shown on Figure 2. Overburden thickness at TP-TL11-23 is 1.0 m; however, bedrock was not encountered at the two more easterly test pit locations due to unstable pit walls (bedrock >1.1 m depth). The overburden consists of an organic layer (peat) overlying mainly fine soils TP-TL11-22 and -23 and sandy soil in TP-TL11-23R as indicated on the logs (Appendix A) and grain size curves on Figure 8. During excavation of TP-TL11-22, the soil was highly unstable and appeared to be liquefiable, as noted on the test pit log. Frozen soils were not noted in the test pits and the Airstrip area is expected to be in discontinuous permafrost.

- **Access Road/Pipeline Route**

  The Access Road/Pipeline Route covers a long stretch of land between the Flotation Plant Site area and the TMF. A portion of the route follows the existing site access road. One (1) test pit (TP-TL11-21) was completed along the proposed Access Road/Pipeline Route close to the existing airstrip location as shown on Figure 2. In addition to the test pit, detailed site reconnaissance was completed along the entire route, which included bedrock mapping and evaluation of surficial soils and surface water. Overburden thickness along the Access Road/Pipeline Route has been investigated to be at least 7 m in some areas (based on the previous drilling program); however there are many areas where overburden is shallow or non-existent. The type of overburden soil is variable, and some overburden soils were noted to be frozen and therefore it is suspected that discontinuous permafrost is present along the route. The results of the grain size analyses are plotted on Figure 9. The area is underlain by moderate to good quality syenite bedrock (based on the results of the drillholes near the Fred Lake drainage crossing during the Phase 2 site investigations).

- **Borrow**

  The potential borrow areas were identified across the project site during previous investigations, including one near the Flotation Plant Site, three along the access road/pipeline route and two within the TMF area. A total of six (6) test pits (BP-TL11-01, -02R, -03, -04, -05 and -06) were completed in potential Borrow areas as shown on Figure 2, with the primary purpose of identifying potential borrow material types and distribution. Overburden depths in the borrow pits ranged from 0 m (at BP-TL11-01) near the Flotation Plant Site to >2.1 m (at BP-TL11-02R) along the access road/pipeline route, near Fred Lake. The overburden in the test pits was variable and generally consists of organics overlying silty/sandy soil and bedrock as indicated in the logs (Appendix A) and presented in the grain size curves on Figure 10. Below-zero temperatures were encountered in the bottom of test pit BP-TL11-04, and generally it is assumed that the Project area lies over discontinuous permafrost.

  Generally, the borrow test pit locations indicated small amounts of potential borrow material that will likely be best used in the local area during construction. Other test pits that were excavated as part of the site investigations indicated additional small local borrow areas that may be viable. No significant deposits of good, granular borrow materials have been identified.

- **Quarry**

  The quarry area is located on exposed, sloping bedrock with sparse tree cover. One (1) drillhole (GT-12) was completed at a proposed Quarry location on the west side of the TMF as shown on Figure 2. The drillhole was located directly on the bedrock surface and encountered high quality altered syenite. The drillhole log is included in Appendix B1.

- **Tailings Management Facility**

  The TMF area covers a large footprint of land, so it has been broken up into main areas for descriptive purposes, below. A total of twenty-one (21) test pits (TP-TL11-01, -02, -03, -04, -09, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -20, -28, -29, -30, -31 and -32) and five (5) drillholes (GT-13, -14, -15, -18 and HG-3B) were completed in the vicinity of the TMF as shown on Figure 2. Some additional site reconnaissance was also carried out to identify bedrock and drainage conditions.

  The far northeast side of the proposed TMF is generally a gently sloping, heavily treed and overgrown area. Shallow bedrock was encountered (maximum 1.1 m depth at TP-TL11-29) here and overburden generally consists of peat, overlying sand/gravel and clayey silt.

  The main TMF embankment area, near the proposed location for the decant from the TMF to the Polishing Pond on the south side of the facility, is gently sloping, with some bedrock outcrops and boulders at surface and many trees. Surficial or shallow bedrock (<1.5 m depth) was encountered here, and overburden consists of a thin veneer of peat/organics (up to 0.1 m) overlying varying materials ranging from silty clay to sand and gravel.

  Drillhole HG-3B is located downstream of the proposed main embankment of the TMF on the southeastern side of the facility. The area is relatively flat with some stunted tree cover. At HG-3B approximately 1.8 m of visible ice-rich peat (frozen starting at 0.1 m depth) is underlain by 1.75 m of ice and silt/frozen clay, for a total overburden thickness of 3.55 m.

  Select areas on the western side of the TMF were investigated, where small embankments are expected to be required and little information was available. The investigated areas were generally flat and moderately treed, with much grass and many boulders or exposed bedrock present at surface. The overburden encountered consists of peat, followed by silt/sand (both thawed and frozen). Some portions of the western side of the TMF are close to swampy ground, however in the vicinity of the TMF alignment, there is plenty of exposed and shallow bedrock on which to construct the small saddle dams.

  There is potential to refine the TMF embankment alignment on the southwest side of the facility, and the proposed re-alignment is generally located on or near a bedrock ridge, with sparse to moderate organic cover and trees. Surficial or shallow bedrock was encountered here, with the minimal overburden consisting of peat and sand/gravel. No permafrost was noted in the area of the potential realignment.

  The temporary separator dyke area, which extends through the centre of the TMF basin between Ring and Buck Lakes, is fairly swampy and has thick brush and shrubs. The overburden thickness is suspected to be deepest in the centre of the basin, as shown on the section (Figure 6). Generally, the area has thick peat cover and shallow permafrost. On the south side of the separator dyke alignment, bedrock refusal (shallow) was encountered, although the overlying silt/sand soil was frozen.

The area is generally underlain by good quality syenite or diabase bedrock, with very few discontinuities observed. In the bedrock at HG-3B, one significant soft zone (washed away during drilling) was encountered in the bedrock between 4.3 and 5.1 m depth. Packer permeability testing conducted in the TMF drillholes indicates that the permeability of the bedrock ranges from 2E-06 cm/s to no take during the test (very low permeability), as shown on Table 4.

The results of the grain size analyses for the TMF area are plotted on Figure 11. Test pit logs are included in Appendix A and drillhole logs are included in Appendix B.

- **Polishing Pond**

The area of the proposed PP in generally low-lying and flat, with many short trees and grasses. Portions of the alignment fall on exposed bedrock, such as the area near TP-TL11-06. An existing access trail has been cut in the area of the proposed PP, which covers some swampy ground. A total of five (5) test pits (TP-TL11-05, -06, -06B, -07 and -08) and two (2) drillholes (GT-16 and -17) were completed in the vicinity of the PP as shown on Figure 2. Overburden in the area of the proposed embankments was noted to be deeper than that found at the TMF, ranging in thickness from 0 to 5.2 m with the deeper overburden generally in the vicinity of Drizzle and Murky Lakes (previous site investigations found overburden up to 6.1 m depth). The peat/organics in the area was found to range between 0.1 and 1.4 m in thickness. Below the peat layer, the overburden generally consists of ice and silt/clay with intermittent sand seams throughout. The results of the grain size analyses are plotted on Figure 12. Visible ice was noted to be present at the majority of the locations, with some significant ice lenses noted; indicating the presence of permafrost in the PP area.

The PP area is underlain by good quality syenite/diabase bedrock with very few discontinuities observed. Packer permeability testing conducted in the bedrock at both drillhole locations indicated that the rock had no take (very low permeability), as shown on Table 4.

Test pit logs are included in Appendix A and drillhole logs are included in Appendix B1.

Thermistors

Three (3) thermistor strings were installed in drillholes GT-2, GT-7RD and GT-11 during the phase 2 site investigations and one (1) thermistor string was installed in drillhole GT-16 during the phase 3 site investigations, to monitor the ground thermal regime. Thermistor details for GT-16 have been included on the geotechnical drillhole log included in Appendix B1. These shallow thermistor installations will complement the data collected from the thermistor strings that were installed during the 2010 geomechanical program in the mine site area.

Collection of thermistor data (historical and instantaneous) was successfully completed on October 27, 2011 by KPL personnel. It appears that all geotechnical dataloggers are now functioning correctly. Data collection at GT-2 and GT-7RD has been in place since the end of August, 2011. Instantaneous data was collected at GT-11 and GT-16 because a datalogger was not installed permanently at either of these locations. On October 27, 2011 a datalogger was permanently installed at GT-11.

Data collected from the four geotechnical thermistor strings is presented on Figures 13 through 16. The results indicate that permafrost conditions exist at GT-2, GT-7RD and GT-16, and do not exist at GT-11. The thermistor information supports the information gathered during site reconnaissance, drilling and test pitting. The depth and temperature of the active layer can be seen changing over time, in particular for

GT-2 and GT-7RD which show the changes in the active layer from warm to cold corresponding with changes in the outside air temperature (warm to cold) over the reading period of late August to late October.

Data collected from the geomechanical thermistors was previously presented in Knight Piésold memorandum "Thor Lake Project – Summary of Thermistor Data" (Cont. No. NB11-00092, issued on February 16, 2011).

Ongoing, regular monitoring of all geotechnical and geomechanical thermistors is recommended in order to better characterize the thermal regime of the mine site and proposed Project infrastructure locations.

Monitoring Well

During the phase 3 site investigations, one (1) monitoring well was successfully installed (HG-3B) close to the location where the installation of well HG-3 failed during the phase 2 program. This monitoring well is located downstream of proposed TMF infrastructure, in order to be used to collect baseline data and allow ongoing monitoring of groundwater quality associated with development and operations. The monitoring well was installed using standard materials and methods, and a protective casing was placed over the well to secure and identify it.

CONCLUSIONS

Conclusions from the phase 3 site investigations program are provided below.

1. The phase 3 geotechnical site investigations were carried out to further evaluate the general soil, bedrock and thermal conditions associated with the proposed Flotation Plant Site, Airstrip Expansion, Access Road/Pipeline Route, Tailings Management Facility and Polishing Pond; to evaluate potential borrow and quarry locations; to install a monitoring well at HG-3B; and to evaluate the approximate permeability of the bedrock in key locations along the perimeter of the TMF and Polishing Pond.

2. A total of 44 test pits and 8 drillholes were completed. One thermistor was installed and one monitoring well was installed. Additionally, site reconnaissance was completed for the Flotation Plant Site, Access Road/Pipeline Route and select areas of the TMF and Polishing Pond.

3. The general findings for the investigated areas are as follows:

    - Flotation Plant Site - The overburden in the area was noted to be relatively shallow, with the deepest overburden on the west and south sides of the site. Many areas of the Plant site have exposed bedrock. Based on the thermistor information and test pit data, the Plant Site area is expected to be in discontinuous permafrost. It is anticipated that the majority of infrastructure in this area can be easily founded on bedrock.
    - Airstrip Expansion - The overburden in this area was noted to be unstable upon excavation, and some behaved as liquefiable upon disturbance. Portions of this area have overburden that is greater than 2.1 m thick. Depending on the ultimate grade for the airstrip, additional investigations (i.e. drilling) may be required to determine stability and consolidation characteristics of the foundations.
    - Access Road/Pipeline Route - This route was investigated mainly through site reconnaissance. Since the route covers a long distance, the surficial characteristics vary widely. Generally, the route was found to be suitable, with one major drainage crossing at the Fred Lake Drainage

outlet, which was investigated during the phase 2 site investigations. The access road/pipeline route is expected to cover an area of discontinuous permafrost.

- Borrow - Potential borrow locations were identified in many areas of the site and were investigated with test pits. Generally the findings indicate small deposits of borrow material that will likely be suitable for use in local construction of access roads only.
- Quarry - The proposed quarry area is dominated by exposed bedrock at surface. The drillhole indicated that high quality altered syenite bedrock is present in the area. Other potential quarry sites within the confines of the TMF perimeter embankments may also be investigated in the future as viable sources of rockfill.
- Tailings Management Facility - The TMF covers a large area and the various aspects of the TMF were investigated using test pits and drillholes. The main TMF embankment on the east side and the temporary separator dyke in the central basin are located in the areas where the deepest overburden was encountered. Permafrost was also noted in both of these locations. The south and west portions of the TMF, including the potential alternate alignment, are generally located in areas of shallow bedrock and limited/discontinuous permafrost.
- Polishing Pond - Overburden in the area of the proposed embankments and directly downstream of the polishing pond was noted to be deeper than that found at the TMF, with the deeper overburden generally in the vicinity of Drizzle and Murky Lakes. The peat/organics in the area was found to be relatively thick and the overburden generally consists of fine grained soils with intermittent sand and gravel seams throughout. Visible ice was noted to be present at the majority of the locations, with some significant ice lenses noted; indicating the presence of permafrost in the area.

4. Typically underlying the overburden soil is good to very good quality syenite bedrock or diabase bedrock, with generally few discontinuities and rare thin broken zones. Rock mass characteristics were collected for the bedrock in order to estimate RMR for consideration in foundation design and hydrogeological considerations. Based on the results of the permeability packer testing, the bedrock is suspected to have very low permeability.

5. A thermistor was installed in drillhole GT-16. The instrumentation will be used to monitor ground temperatures in order to better understand the permafrost characteristics of the site. The data will be continually collected from all of the four (4) geotechnical thermistor locations. The data will compliment data already collected from the geomechanical thermistors installed near the mine site.

RECOMMENDATIONS

Recommendations based on the results of the phase 3 site investigations are as follows:

1. The site investigations completed to date are considered adequate for use in the feasibility study. Additional site investigations may be required in conjunction with the detailed design, particularly for any infrastructure locations that change from those currently planned and investigated.

2. Dataloggers/thermistors that have been installed as part of the phase 2 or phase 3 site investigations should be visited regularly to ensure that the batteries are working and to collect ground temperature data. Ground temperature data that is collected should be forwarded to Knight Piésold for evaluation. This data will ultimately be utilized in the completion of detailed designs for the Project.

3. The installed groundwater monitoring wells should continue to be checked and sampled to provide background information for baseline studies.

Should you have any questions or comments regarding this information, please contact us.

REGISTERED PROFESSIONAL ENGINEER
K.E. HAWTON
LICENSEE
NOV 16 2011
NWT/NU

Signed: _____
Cara Stapley, P.Eng.
Project Engineer

Approved: _____
Kevin Hawton, P.Eng.
Senior Engineer

PERMIT TO PRACTICE
KNIGHT PIESOLD LTD.
Signature _____
Date NOV 16 2011
PERMIT NUMBER: P 547
The Association of Professional Engineers, Geologists and Geophysicists of NWT/NU

References:

1. Andersland and Ladanyi, "Frozen Ground Engineering", John Wiley & Sons, 2004.
2. ASTM D2488, "Standard Practice for Description Identification of Soils (Visual Manual Procedure)", 1993.
3. Canadian Geotechnical Society, "Canadian Foundation Engineering Manual", Richmond, B.C., 1992.
4. Knight Piésold Ltd., Thor Lake Project - 2010 Phase 1 Site Investigation Results and Recommendations memorandum (Cont. No. NB10-00556), January 25, 2011.
5. Knight Piésold Ltd., Thor Lake Project - Summary of Thermistor Data memorandum (Cont. No. NB11-00092), February 16, 2011.
6. Knight Piésold Ltd., Phase 2 Site Investigations Summary Report, Rev 0, May 12, 2011.

Attachments:

Table 1 Rev 0 Test Pit Details
Table 2 Rev 0 Test Pit Temperature Data
Table 3 Rev 0 Geotechnical and Hydrogeological Drillhole Details
Table 4 Rev 0 Summary of Packer Test Results
Table 5 Rev 0 Summary of Soil Samples from Test Pits
Table 6 Rev 0 Summary of Soil Samples from Drillholes
Table 7 Rev 0 Summary of Thermistor Installation Details in Geotechnical Drillholes
Table 8 Rev 0 Summary of Index Test Results from Test Pit Soil Samples
Table 9 Rev 0 Summary of Index Test Results from Drillhole Soil Samples
Figure 1 Rev 0 Project Location Map
Figure 2 Rev 0 Drillhole and Test Pit Locations
Figure 3 Rev 0 Select Photos from Site Investigations (Sheet 1 of 2)
Figure 4 Rev 0 Select Photos from Site Investigations (Sheet 2 of 2)
Figure 5 Rev 0 TMF Embankments - Profile
Figure 6 Rev 0 TMF & PP Embankments - Profiles
Figure 7 Rev 0 Flotation Plant Site - Grain Size Distribution Results
Figure 8 Rev 0 Airstrip Expansion - Grain Size Distribution Results
Figure 9 Rev 0 Access Road/Pipeline Route - Grain Size Distribution Results
Figure 10 Rev 0 Borrow - Grain Size Distribution Results

Figure 11 Rev 0	Tailings Management Facility - Grain Size Distribution Results
Figure 12 Rev 0	Polishing Pond - Grain Size Distribution Results
Figure 13 Rev 0	GT-2 - Select Thermistor Data
Figure 14 Rev 0	GT-7RD - Select Thermistor Data
Figure 15 Rev 0	GT-11 - Select Thermistor Data
Figure 16 Rev 0	GT-16 - Select Thermistor Data
Appendix A	Test Pit Logs
Appendix B	Drillhole Logs
	B1 - Geotechnical Drillhole Logs
	B2 - Hydrogeological Drillhole Logs
Appendix C	Photos (on CD)
Appendix D	Merlex Engineering Laboratory Results Report

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Knight Piésold CONSULTING

TABLE 1

AVALON RARE METALS INC.
THOR LAKE PROJECT

PHASE 3 SITE INVESTIGATIONS
TEST PIT DETAILS

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Test Pit Number	Test Pit Coordinates [1]			Depth of Test Pit	Reason for Stoppage	Date Completed
	Northing (m)	Easting (m)	Elevation (m)	(m)		
Flotation Plant Site						
TP-TL11-24	6,886,190	414,874	249.8	1.10	Bedrock	17-Aug-11
TP-TL11-25R	6,886,081	415,239	255.4	0.80	Bedrock	18-Aug-11
TP-TL11-26	6,885,934	415,350	258.0	1.30	Bedrock	18-Aug-11
TP-TL11-27R	6,885,845	415,231	256.0	2.40	Excavator Limit/Instability	18-Aug-11
TP-TL11-33	6,885,911	415,098	255.4	0.70	Suspected Bedrock	28-Aug-11
TP-TL11-34	6,886,132	415,154	253.7	2.00	Suspected Bedrock	28-Aug-11
TP-TL11-35	6,886,128	415,077	254.3	1.70	Unstable Hole Walls	28-Aug-11
TP-TL11-37	6,885,961	415,028	255.4	0.80	Suspected Cobbles	28-Aug-11
Airstrip Expansion						
TP-TL11-22	6,886,376	414,855	241.6	1.10	Unstable Pit Walls	17-Aug-11
TP-TL11-23	6,886,262	414,511	241.1	1.00	Bedrock	18-Aug-11
TP-TL11-23R	6,886,300	414,517	240.0	2.10	Unstable Pit Walls	18-Aug-11
Access Road/Pipeline Route						
TP-TL11-21	6,886,543	415,336	243.0	1.90	Excavator Limit	17-Aug-11
Borrow						
BP-TL11-01	6,886,340	415,274	248.7	0.00	No Digging	17-Aug-11
BP-TL11-02R	6,887,271	415,640	243.3	2.10	Excavator Limit	17-Aug-11
BP-TL11-03	6,889,157	417,507	249.4	0.60	Bedrock	11-Aug-11
BP-TL11-04	6,888,873	418,069	246.0	1.30	Bedrock	9-Aug-11
BP-TL11-05	6,887,487	415,799	247.4	2.00	Bedrock	17-Aug-11
BP-TL11-06	6,887,476	415,764	247.1	2.00	Excavator Limit	17-Aug-11
Tailings Management Facility						
TP-TL11-01	6,889,253	418,673	252.6	0.65	Bedrock	8-Aug-11
TP-TL11-02	6,888,919	417,955	249.2	0.76	Bedrock	9-Aug-11
TP-TL11-03	6,888,869	418,003	249.8	0.93	Bedrock	9-Aug-11
TP-TL11-04	6,888,828	417,982	253.4	0.00	No Digging	9-Aug-11
TP-TL11-09	6,888,260	417,555	253.0	1.40	Suspected Bedrock	10-Aug-11
TP-TL11-10	6,888,180	417,705	254.5	0.00	No Digging	8-Aug-11
TP-TL11-11	6,888,121	417,586	255.0	0.00	No Digging	8-Aug-11
TP-TL11-12	6,888,101	417,414	255.0	0.80	Bedrock	10-Aug-11
TP-TL11-13	6,888,149	417,280	256.1	1.00	Bedrock	10-Aug-11
TP-TL11-14	6,888,195	417,133	260.0	0.00	No Digging	10-Aug-11
TP-TL11-15	6,888,221	417,068	253.7	0.00	No Digging	10-Aug-11
TP-TL11-16	6,888,830	417,029	254.5	0.50	Permafrost	11-Aug-11
TP-TL11-17	6,889,095	417,533	249.2	0.47	Permafrost	11-Aug-11
TP-TL11-18	6,888,959	417,595	247.5	0.45	Permafrost	11-Aug-11
TP-TL11-19	6,888,803	417,630	248.9	1.10	Bedrock	10-Aug-11
TP-TL11-20	6,888,778	417,676	250.2	0.60	Bedrock	10-Aug-11
TP-TL11-28	6,889,338	418,752	258.2	0.90	Bedrock	26-Aug-11
TP-TL11-29	6,889,286	418,720	253.9	1.10	Bedrock	26-Aug-11
TP-TL11-30	6,888,907	418,018	248.5	0.85	Bedrock	26-Aug-11
TP-TL11-31	6,889,000	418,221	250.9	0.75	Bedrock	26-Aug-11
TP-TL11-32	6,888,675	417,753	253.3	0.65	Bedrock	26-Aug-11
Polishing Pond						
TP-TL11-05	6,888,960	418,356	245.7	0.85	Permafrost	8-Aug-11
TP-TL11-06	6,888,718	418,412	248.4	0.00	No Digging	8-Aug-11
TP-TL11-06B	6,888,755	418,373	245.0	0.65	Permafrost	8-Aug-11
TP-TL11-07	6,888,604	418,356	245.0	0.20	Permafrost	8-Aug-11
TP-TL11-08	6,888,503	418,106	245.2	1.63	Bedrock	8-Aug-11

I:\1\01\00390\02\A\Correspondence\NB11-00527 - TLS Phase 3 SI\[Tables 1, 3 to 9.xls]Table 1

NOTES:

1. TEST PIT COORDINATES DETERMINED USING HAND HELD GPS AND ARE APPROXIMATE.
2. TEST PIT ELEVATIONS ESTIMATED FROM AVAILABLE CONTOUR INFORMATION AND ARE APPROXIMATE.

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	16NOV'11	ISSUED WITH MEMO NB11-00527	ML	CLS	KEH

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TABLE 2

AVALON RARE METALS INC.
THOR LAKE PROJECT

PHASE 3 SITE INVESTIGATIONS
TEST PIT TEMPERATURE DATA

Print Nov/16/11 14:11:18

Test Pit Number	Date	0.10	0.20	0.25	0.30	0.40	0.47	0.50	0.60	0.65	0.70	0.76	0.80	0.85	0.93	1.00	1.30	1.40	1.50	1.70	2.00
Flotation Plant Site																					
TP-TL11-33	28-Aug-11										7.0										
TP-TL11-34	28-Aug-11																		5.0		5.0
TP-TL11-35	28-Aug-11																			5.4	
TP-TL11-37	28-Aug-11												5.0								
Airstrip Expansion																					
TP-TL11-22	17-Aug-11															1.5					
TP-TL11-23R	18-Aug-11																	4.2			
Borrow																					
BP-TL11-03	11-Aug-11		4.6			3.6			3.2												
BP-TL11-04	9-Aug-11		7.0					4.0								0.8	-0.1				
Tailings Management Facility																					
TP-TL11-02	9-Aug-11											6.7									
TP-TL11-03	9-Aug-11														2.8						
TP-TL11-09	10-Aug-11	4.0						2.1								-0.1		-0.3			
TP-TL11-12	10-Aug-11					7.5							5.7								
TP-TL11-13	10-Aug-11	7.4						3.3								1.0					
TP-TL11-16	11-Aug-11	3.0			0.1			-0.2													
TP-TL11-17	11-Aug-11					0.8	-0.1														
TP-TL11-18	11-Aug-11			4.9		1.6															
TP-TL11-19	10-Aug-11	4.8						2.5								-0.1					
TP-TL11-20	10-Aug-11								7.2												
Polishing Pond																					
TP-TL11-05	8-Aug-11	4.8			3.3			1.6			0.0			-0.5							
TP-TL11-06B	8-Aug-11									0.0											
TP-TL11-07	8-Aug-11		0.0																		

I:\1\01\00390\02\A\Correspondence\NB11-00527 - TLS Phase 3 SI\Table 2.xls

NOTES:

1. DATA IN TABLE IS MEASURED TEMPERATURE IN DEGREES CELSIUS (^{o}C). BLANK SPACES INDICATE NO DATA WAS COLLECTED.
2. TEMPERATURE DATA WAS COLLECTED FROM TEST PIT ON DATE INDICATED AND REPRESENTS TEMPERATURES ONLY AT A SINGLE POINT IN TIME.

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	16NOV'11	ISSUED WITH MEMO NB11-00527	ML	CLS	KEH

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TABLE 3

AVALON RARE METALS INC.
THOR LAKE PROJECT

PHASE 3 SITE INVESTIGATIONS
GEOTECHNICAL AND HYDROGEOLOGICAL DRILLHOLE DETAILS

Print Nov/18/11 9:05:14

Drillhole Number	Drillhole Coordinates [1]			Depth to Bedrock (m)	Depth of Drillhole (m)	Date Drilled	Date Completed
	Northing (m)	Easting (m)	Elevation (m)				
Quarry							
GT-12	6,888,531	416,866	267.7	0.00	24.05	23-Aug-11	23-Aug-11
Tailings Management Facility							
GT-13	6,889,143	417,212	250.1	1.07	14.00	23-Aug-11	23-Aug-11
GT-14	6,889,085	418,503	245.9	1.50	12.00	19-Aug-11	19-Aug-11
GT-15	6,888,980	418,077	250.1	0.00	14.10	20-Aug-11	20-Aug-11
GT-18	6,888,448	417,848	251.3	1.00	14.10	22-Aug-11	22-Aug-11
HG-3B	6,888,983	418,489	244.3	3.55	14.15	18-Aug-11	18-Aug-11
Polishing Pond							
GT-16	6,888,859	418,386	244.7	3.57	14.14	20-Aug-11	20-Aug-11
GT-17	6,888,549	418,243	244.2	5.20	16.90	21-Aug-11	21-Aug-11

I:\1\01\00390\02\A\Correspondence\NB11-00527 - TLS Phase 3 SI\[Tables 1, 3 to 9.xls]Table 3

NOTES:

1. DRILLHOLE COORDINATES AND ELEVATIONS PROVIDED BY AVALON (SURVEYED).

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	16NOV'11	ISSUED WITH MEMO NB11-00527	ML	CLS	KEH

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TABLE 4

AVALON RARE METALS INC.
THOR LAKE PROJECT

PHASE 3 SITE INVESTIGATIONS
SUMMARY OF PACKER TEST RESULTS

Print Nov/18/11 11:59:17

Drillhole Number	Test #	Testing Interval		Average Permeability	RQD of Rock in Testing Interval	Rock Type in Testing Interval
		Top (m)	Bottom (m)	(cm/s)		
Tailings Management Facility						
GT-13	1	3.35	14.0	No Take	89-95%	Syenite
GT-14	1	1.5	12.0	1.0E-06	72-100%	Syenite/Diabase
GT-15	1	1.5	14.1	1.44E-06	75-100%	Altered Syenite/Diabase
GT-18	1	1.3	14.1	2.3E-07	76-100%	Syenite
HG-3B	1	4.7	14.15	No Take	55-100%	Syenite/Altered Syenite
Polishing Pond						
GT-16	1	4.0	14.14	No Take	89-100%	Syenite/Diabase
GT-17	1	5.9	16.9	No Take	74-96%	Syenite

I:\1\01\00390\02\A\Correspondence\NB11-00527 - TLS Phase 3 SI\[Tables 1, 3 to 9.xls]Table 4

NOTES:

1. WHERE 'NO TAKE' IS INDICATED FOR THE PERMEABILITY, THE FLOWMETER DID NOT REGISTER ANY FLOW INTO THE TEST ZONE USING VARIOUS TEST PRESSURES (INDICATES VERY LOW PERMEABILITY ROCK).
2. AVERAGE PERMEABILITY CALCULATIONS WERE MADE USING ESTIMATED WATER LEVEL MEASUREMENTS COLLECTED DURING THE WATER QUALITY SAMPLING EVENT IN OCTOBER 2011.

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	16NOV'11	ISSUED WITH MEMO NB11-00527	ML	CLS	KEH

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TABLE 5

AVALON RARE METALS INC.
THOR LAKE PROJECT

PHASE 3 SITE INVESTIGATIONS
SUMMARY OF SOIL SAMPLES FROM TEST PITS

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Drillhole Number	Sample Number	Sample Type	Depth		General Soil Description
			From (m)	To (m)	
Flotation Plant Site					
TP-TL11-24	Bu-1	Bulk	0.50	1.10	Silty Sand
TP-TL11-25R	Bu-1	Bulk	0.30	0.60	Gravelly Silty Sand
TP-TL11-26	Bu-1	Bulk	0.60	0.80	Gravelly Sand
TP-TL11-26	Bu-2	Bulk	0.80	1.10	Sandy Gravel
TP-TL11-27R	Bu-1	Bulk	1.00	1.30	Sand and Silt
Airstrip Expansion					
TP-TL11-22	Bu-1	Bulk	0.50	1.10	Sandy Silt
TP-TL11-23	Bu-1	Bulk	0.50	0.90	Clay and Silt
TP-TL11-23R	Bu-1	Bulk	1.00	1.25	Sand
Access Road/Pipeline Route					
TP-TL11-21	Bu-1	Bulk	0.15	1.20	Silt and Sand
TP-TL11-21	Bu-2	Bulk	1.20	1.90	Gravelly Sand
Borrow					
BP-TL11-02R	Bu-1	Bulk	1.00	2.10	Gravelly Sandy Silt
BP-TL11-03	Bu-1	Bulk	0.30	0.60	Clayey Silt
BP-TL11-04	Bu-1	Bulk	0.10	0.50	Sandy Silt
BP-TL11-04	Bu-2	Bulk	0.50	1.30	Silty Clay
BP-TL11-05	Bu-1	Bulk	1.00	2.00	Gravelly Sand and Silt
BP-TL11-06	Bu-1	Bulk	1.00	2.00	Gravelly Sand
Tailings Management Facility					
TP-TL11-02	Bu-1	Bulk	0.07	0.76	Silty Sand
TP-TL11-03	Bu-1	Bulk	0.13	0.33	Sand and Gravel
TP-TL11-03	Bu-2	Bulk	0.33	0.93	Silty Clay
TP-TL11-09	Bu-1	Bulk	0.15	1.00	Clayey Silt
TP-TL11-12	Bu-1	Bulk	0.10	0.57	Sand and Gravel
TP-TL11-12	Bu-2	Bulk	0.57	0.80	Sand
TP-TL11-13	Bu-1	Bulk	0.30	0.90	Gravelly Sand
TP-TL11-16	Bu-1	Bulk	0.25	0.40	Silt and Sand
TP-TL11-19	Bu-1	Bulk	0.10	0.50	Sand and Silt
TP-TL11-20	Bu-1	Bulk	0.05	0.60	Silty Sand
TP-TL11-30	Bu-1	Bulk	0.50	0.70	Sandy Silt
TP-TL11-31	Bu-1	Bulk	0.50	0.75	Silt and Sand
TP-TL11-32	Bu-1	Bulk	0.40	0.65	Sand and Silt
Polishing Pond					
TP-TL11-05	Bu-1	Bulk	0.45	0.85	Frozen Silty Gravelly Sand
TP-TL11-08	Bu-1	Bulk	0.60	1.20	Silt and Clay
TP-TL11-08	Bu-2	Bulk	1.20	1.63	Silt and Clay

I:\1\01\00390\02\A\Correspondence\NB11-00527 - TLS Phase 3 SI\[Tables 1, 3 to 9.xls]Table 5

NOTES:
1. BULK SAMPLES COLLECTED FROM TEST PITS.

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	16NOV'11	ISSUED WITH MEMO NB11-00527	ML	CLS	KEH

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TABLE 6

AVALON RARE METALS INC.
THOR LAKE PROJECT

PHASE 3 SITE INVESTIGATIONS
SUMMARY OF SOIL SAMPLES FROM DRILLHOLES

Print Nov/16/11 13:52:17

Drillhole Number	Sample Number	Sample Type	Depth		General Soil Description
			From (m)	To (m)	
Tailings Management Facility					
GT-18	SPT-1	SS	0.45	0.60	Sand
GT-18	SPT-2	SS	0.6	0.95	Sand
Polishing Pond					
GT-16	SPT-1	SS	0.45	0.60	Peat
GT-16	SPT-2	SS	0.60	1.20	Peat
GT-16	SPT-3	SS	1.42	1.80	Ice, Clay and Silt
GT-16	Run 4	Bulk	1.90	2.90	Ice, Silt and Clay
GT-17	SPT-2	SS	1.15	1.35	Ice and Clayey Silt
GT-17	SPT-3A	SS	1.50	1.80	Ice and Clayey Silt
GT-17	SPT-3B	SS	1.80	2.10	Ice and Clayey Silt
GT-17	SPT-4	SS	2.10	2.70	Ice, Silt and Clay
GT-17	SPT-5	SS	2.70	3.30	Ice, Silt and Clay
GT-17	SPT-6	SS	3.30	3.90	Ice, Silt and Clay
GT-17	SPT-7	SS	4.10	4.35	Ice and Clayey Silt
GT-17	Run 1	Bulk	4.35	4.90	Ice and Clayey Silt

I:\1\01\00390\02\A\Correspondence\NB11-00527 - TLS Phase 3 SI\[Tables 1, 3 to 9.xls]Table 6

NOTES:

1. SAMPLES COLLECTED DURING THE DRILLING PROGRAM. SS SAMPLES COLLECTED FROM STANDARD PENETRATION TESTING AND BULK SAMPLES COLLECTED DIRECTLY FROM DRILLED SOIL CORE.

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	16NOV'11	ISSUED WITH MEMO NB11-00527	ML	CLS	KEH

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TABLE 7

AVALON RARE METALS INC.
THOR LAKE PROJECT

PHASE 3 SITE INVESTIGATIONS
SUMMARY OF THERMISTOR INSTALLATION DETAILS IN GEOTECHNICAL DRILLHOLES

Print Nov/16/11 13:52:17

	Drillhole No.	GT-2	GT-7RD	GT-11	GT-16
	Serial No.	TS3110	TS3109	TS3108	TS3172
	Length (m)	17	17	17	17
	Stickup (m)	1.35	1.95	1.85	2.86
Thermistor Nodule No. / Nodule Depth (m)	1	0.65	0.05	0.15	-0.86
	2	0.90	0.30	0.40	-0.61
	3	1.15	0.55	0.65	-0.36
	4	1.40	0.80	0.90	-0.11
	5	1.65	1.05	1.15	0.14
	6	1.90	1.30	1.40	0.39
	7	2.15	1.55	1.65	0.64
	8	2.65	2.05	2.15	1.14
	9	3.15	2.55	2.65	1.64
	10	3.65	3.05	3.15	2.14
	11	4.15	3.55	3.65	2.64
	12	4.65	4.05	4.15	3.14
	13	5.65	5.05	5.15	4.14
	14	6.65	6.05	6.15	5.14
	15	7.65	7.05	7.15	6.14
	16	8.65	8.05	8.15	7.14
	17	10.65	10.05	10.15	9.14
	18	12.65	12.05	12.15	11.14
	19	15.65	15.05	15.15	14.14

I:\1\01\00390\02\A\Correspondence\NB11-00527 - TLS Phase 3 SI\[Tables 1, 3 to 9.xls]Table 7

NOTES:

1. THERMISTOR NODE DEPTHS DETERMINED PRIOR TO INSTALLATION BY VERIFYING HOLE DEPTH AND MARKING PVC (ON WHICH THERMISTORS WERE ATTACHED FOR INSTALLATION). DEPTHS VERIFIED BY MEASURING STICKUP.
2. THERMISTORS GT-2, GT-7RD AND GT-11 WERE PREVIOUSLY INSTALLED AS PART OF THE 2011 PHASE 2 SITE INVESTIGATIONS PROGRAM.

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	16NOV'11	ISSUED WITH MEMO NB11-00527	ML	CLS	KEH

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TABLE 8

AVALON RARE METALS INC.
THOR LAKE PROJECT

PHASE 3 SITE INVESTIGATIONS
SUMMARY OF INDEX TEST RESULTS FROM TEST PIT SOIL SAMPLES

Print Nov/18/11 9:05:14

Drillhole Number	Sample Number	Depth		Gravel	Sand	Silt	Clay	Specific Gravity	Natural Moisture Content	Atterberg Limits		
		From	To	(75 to 4.75 mm)	(4.75 to 0.075 mm)	(0.075 to 0.002 mm)	(<0.002 mm)			Liquid Limit	Plastic Limit	Plasticity Index
		(m)	(m)	(%)	(%)	(%)	(%)		(%)	(%)	(%)	(%)
Flotation Plant Site												
TP-TL11-24	Bu-1	0.50	1.10	1.90	59.00	31.1	8.00	-	13.02	-	-	-
TP-TL11-25R	Bu-1	0.30	0.60	31.90	42.90	21	4.2	-	12.67	-	-	-
TP-TL11-26	Bu-1	0.60	0.80	28.80	69.5	1.7		-	2.99	-	-	-
TP-TL11-26	Bu-2	0.80	1.10	71.80	26.3	1.9		2.7	3.82	-	-	-
TP-TL11-27R	Bu-1	1.00	1.30	2.40	51.70	40.6	5.3	-	10.27	-	-	-
Airstrip Expansion												
TP-TL11-22	Bu-1	0.50	1.10	3.00	34.60	55.3	7.10	-	18.2	NP	NP	NP
TP-TL11-23	Bu-1	0.50	0.90	-	-	-	-	-	24.28	30.5	17.1	13.4
TP-TL11-23R	Bu-1	1.00	1.25	0.00	90.00	8.8	1.2	-	25.79	-	-	-
Access Road/Pipeline Route												
TP-TL11-21	Bu-1	0.15	1.20	8.10	43.20	45.7	3.00	-	12.89	-	-	-
TP-TL11-21	Bu-2	1.20	1.90	34.40	54.1	11.5		-	4.47	-	-	-
Borrow												
BP-TL11-02R	Bu-1	1.00	2.10	29.70	24.80	41.9	3.60	-	9.91	-	-	-
BP-TL11-03	Bu-1	0.30	0.60	0.20	14.10	52.7	33.0	-	24.09	28.5	16.6	11.9
BP-TL11-04	Bu-1	0.10	0.50	-	-	-	-	-	15.52	-	-	-
BP-TL11-04	Bu-2	0.50	1.30	-	-	-	-	-	15.95	-	-	-
BP-TL11-05	Bu-1	1.00	2.00	25.80	36.40	35.5	2.3	-	9.77	-	-	-
BP-TL11-06	Bu-1	1.00	2.00	21.70	57.00	17.9	3.4	2.749	7.24	-	-	-
Tailings Management Facility												
TP-TL11-02	Bu-1	0.07	0.76	6.50	49.10	32.4	12.0	-	16.43	-	-	-
TP-TL11-03	Bu-1	0.13	0.33	-	-	-	-	-	-	-	-	-
TP-TL11-03	Bu-2	0.33	0.93	-	-	-	-	-	-	-	-	-
TP-TL11-09	Bu-1	0.15	1.00	0.20	15.40	54.4	30.0	-	15.33	22.70	13.50	9.20
TP-TL11-12	Bu-1	0.10	0.57	38.20	56.3	5.5		-	4.42	-	-	-
TP-TL11-12	Bu-2	0.57	0.80	3.10	84.7	12.2		2.73	6.77	-	-	-
TP-TL11-13	Bu-1	0.30	0.90	21.20	76.9	1.9		-	5.92	-	-	-
TP-TL11-16	Bu-1	0.25	0.40	2.20	45.80	47	5.0	-	9.94	NP	NP	NP
TP-TL11-19	Bu-1	0.10	0.50	10.00	42.00	41	7.0	-	11.05	-	-	-
TP-TL11-20	Bu-1	0.05	0.60	3.70	62.3	34.0		-	6.57	-	-	-
TP-TL11-30	Bu-1	0.50	0.70	6.50	23.30	55.2	15.0	-	11.47	20.60	5.40	15.20
TP-TL11-31	Bu-1	0.50	0.75	11.40	39.60	40	9.0	-	10.33	-	-	-
TP-TL11-32	Bu-1	0.40	0.65	-	-	-	-	-	7.85	-	-	-
Polishing Pond												
TP-TL11-05	Bu-1	0.45	0.85	20.80	48.7	30.5		-	20.05	28.2	16.3	11.9
TP-TL11-08	Bu-1	0.60	1.20	0.20	9.6	90.2		-	20.94	-	-	-
TP-TL11-08	Bu-2	1.20	1.63	1.40	9.5	89.1		-	16.64	21.38	20.12	1.26

I:\1\01\00390\02\A\Correspondence\NB11-00527 - TLS Phase 3 SI\[Tables 1, 3 to 9.xls]Table 8

NOTES:
1. LABORATORY TESTING RESULTS OF SOIL SAMPLES PROVIDED BY MERLEX ENGINEERING.

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	16NOV11	ISSUED WITH MEMO NB11-00527	ML	CLS	KEH

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TABLE 9

AVALON RARE METALS INC.
THOR LAKE PROJECT

PHASE 3 SITE INVESTIGATIONS
SUMMARY OF INDEX TEST RESULTS FROM DRILLHOLE SOIL SAMPLES

Print Nov/18/11 9:14:52

Drillhole Number	Sample Number	Depth		Gravel	Sand	Silt	Clay	Natural Moisture Content	Bulk Density	Atterberg Limits		
		From	To	(75 to 4.75 mm)	(4.75 to 0.075 mm)	(0.075 to 0.002 mm)	(<0.002 mm)			Liquid Limit	Plastic Limit	Plasticity Index
		(m)	(m)	(%)	(%)	(%)	(%)	(%)	(kg/m^3)	(%)	(%)	(%)
Tailings Management Facility												
GT-18	SPT-1	0.45	0.60	-	-	-	-	19.13	1280.3	-	-	-
GT-18	SPT-2	0.60	0.95	-	-	-	-	18.05	1353.9	-	-	-
Polishing Pond												
GT-16	SPT-1	0.45	0.60	-	-	-	-	382.31	984.0	-	-	-
GT-16	SPT-2	0.60	1.20	-	-	-	-	526.86	919.4	-	-	-
GT-16	SPT-3	1.42	1.80	0.0	4.6	45.4	50.0	42.93	1546.3	26.17	15.76	10.41
GT-16	Run 4	1.90	2.90	0.0	7.9	55.1	37.0	21.01	888.0	28.90	15.60	13.30
GT-17	SPT-2	1.15	1.35	-	-	-	-	23.47	1533.4	-	-	-
GT-17	SPT-3A	1.50	1.80	-	-	-	-	54.33	1094.3	-	-	-
GT-17	SPT-3B	1.80	2.10	0.0	4.0	74.0	22.0	25.41	1454.0	-	-	-
GT-17	SPT-4	2.10	2.70	-	-	-	-	52.54	1302.3	-	-	-
GT-17	SPT-5	2.70	3.30	0.0	5.2	52.8	42.0	46.13	1505.6	32.00	17.80	14.20
GT-17	SPT-6	3.30	3.90	-	-	-	-	45.22	1697.3	-	-	-
GT-17	SPT-7	4.10	4.35	1.4	6.1	65.0	27.5	44.79	2284.8	27.3	17.3	10.0
GT-17	Run 1	4.35	4.90	-	-	-	-	33.72	-	-	-	-

I:\1\01\00390\02\A\Correspondence\NB11-00527 - TLS Phase 3 SI\[Tables 1, 3 to 9.xls]Table 9

NOTES:
1. LABORATORY TESTING RESULTS OF SOIL SAMPLES PROVIDED BY MERLEX ENGINEERING.

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	16NOV'11	ISSUED WITH MEMO NB11-00527	ML	CLS	KEH

NTS

NTS

NOTES:

1. IMAGERY FROM NASA WORLD WIND.

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	17NOV'11	ISSUED WITH MEMO	CLS	SIR	KEH	KEH

AVALON RARE METALS INC.

THOR LAKE PROJECT

PHASE 3 SITE INVESTIGATIONS
PROJECT LOCATION MAP

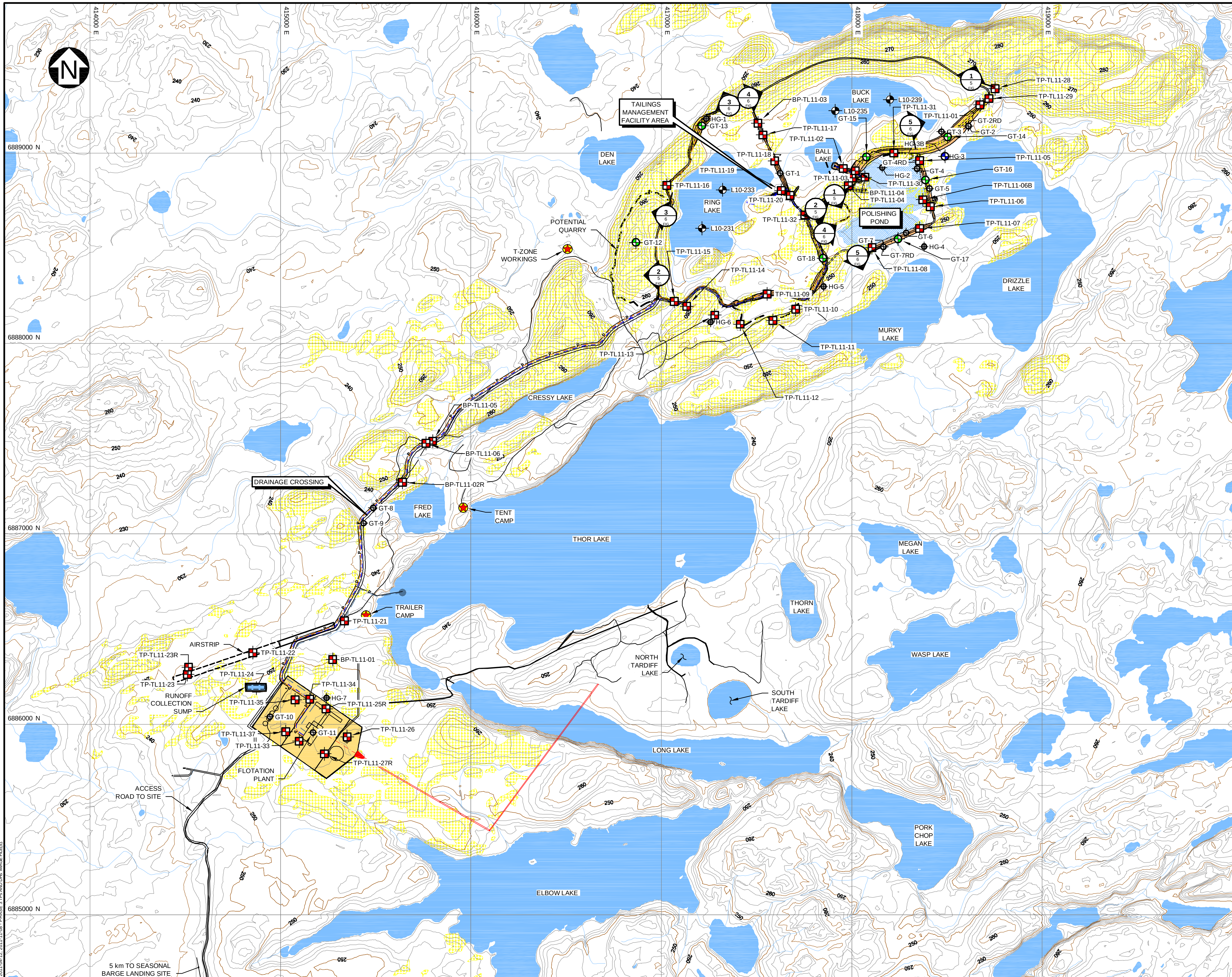
Knight Piésold CONSULTING

P/A NO. NB101-390/2

REF NO. NB11-00527

FIGURE 1

REV 0



LEGEND:

- WATER
- EMBANKMENT
- PLANT/CAMP
- EXPOSED BEDROCK (BASED ON AIR PHOTO INTERPRETATION AND SURFACE MAPPING)
- EXISTING ACCESS ROAD
- PROPOSED ROAD
- RAMP
- AVALON DRILLHOLE
- PHASE 2 GEOTECHNICAL DRILLHOLE
- PHASE 2 HYDOGEOLOGICAL DRILLHOLE
- PHASE 3 TEST PITS
- PHASE 3 GEOTECHNICAL DRILLHOLE
- PHASE 3 HYDOGEOLOGICAL DRILLHOLE

NOTES:

1. COORDINATE GRID IS UTM (NAD83) ZONE 12N AND IS IN METRES.
2. PLAN BASED ON INFORMATION PROVIDED BY AVALON RARE METALS INC.
3. CONTOURS ARE IN METRES. CONTOUR INTERVAL IS 2 METRES.
4. TAILINGS MANAGEMENT FACILITY FINAL LAYOUT (YEAR 20) DETERMINED FROM WATER/SOLIDS BALANCE ANALYSIS.
5. DRILLHOLE LOCATION AND COORDINATES PROVIDED BY AVALON. LOCATIONS OF GT-2RD AND GT-7 WERE NOT SURVEYED AND ARE THEREFORE APPROXIMATE.

SCALE 200 100 0 200 400 600 800 1000 m

AVALON RARE METALS INC.

THOR LAKE PROJECT

PHASE 3 SITE INVESTIGATIONS DRILLHOLE AND TEST PIT LOCATIONS

Knight Piésold CONSULTING

P/A NO.	REF NO.
NB101-390/2	NB11-00527

FIGURE 2 REV 0

REV	DATE	DESCRIPTION	PREPARED	DRAWN	CHK'D	APP'D
0	16NOV11	ISSUED WITH MEMO	CLS	NWL	KEH	KEH