

Appendix C.16

**Thor Lake Project – Hydrometallurgical Site – 2010 Geotechnical Field Program Summary.
Report NB11-00054**

MEMORANDUM

To:	David Swisher	Date:	January 26, 2011
Copy To:	Bill Mercer	File No.:	NB101-390/2-A.01
From:	Ryan Weir	Cont. No.:	NB11-00054
Re:	Thor Lake Project – Hydrometallurgical Site – 2010 Geotechnical Field Program Summary		

INTRODUCTION

Avalon Rare Metals Inc. (Avalon) is planning to develop a hydrometallurgical processing facility at Pine Point located 80 km east of the community of Hay River, NWT. The processing facility will support Avalon's Thor Lake Project (the Project); the mining of the Nechalacho Rare Earth Element Deposit located 100 km east southeast of Yellowknife, NWT. Figure 1 shows the locations of the Project and Pine Point.

Knight Piésold Ltd. (Knight Piésold) was retained to coordinate and supervise an initial geotechnical field program at the hydrometallurgical site, including excavating test pits, surface sampling, logging of soil, and material index testing. The objective of the 2010 geotechnical field program was to characterize foundation conditions at the proposed plant site area and also characterize potential borrow materials from the site that can be used for construction purposes. This memo supercedes our previous memo Cont. No. NB10-00673.

A total of nine test pits were successfully excavated at the proposed plant site area and eight surface samples taken from various locations around the hydrometallurgical site. Test pit and surface sample locations are shown on Figure 2. All work was completed under the direction and supervision of Knight Piésold field personnel between November 14 and 15, 2010.

GENERAL SITE OVERBURDEN CONDITIONS

Based on review of background data and site observations, overburden within the Pine Point area generally consists of the following:

- Within the upland areas in the vicinity of the proposed Hydrometallurgical Process Plant, the depth of organics is minimal, typically less than 50 cm.
- Beach ridges (coarse-textured alluvial or wave-washed till) form prominent linear features running parallel to contour or in an east–west trend within the area. The ridges mark the former extent of glacial Lake McConnell and provide a local abundant source of sand and gravel. Exposures of the sand and gravel on open pit slopes and within historic borrow pits suggest that the stratum is up to 3 to 4 m thick.
- Flat lacustrine plains overlain by peatlands (poorly drained muskeg up to 3 m deep) cover much of the area north of the proposed Hydrometallurgical Process Plant area and south of Great Slave Lake. Wetlands occur throughout this area.

- A basal glacial till deposit typically underlies the beach and organic deposits. The till stratum is exposed in historic open pit walls around the site and ranges from a few meters in depth to upwards of 30 to 40 m. Based on site visit observations, the till stratum appears to be relatively homogeneous consisting of a compact to dense clayey sand and silt with some gravel and small boulders.
- Based on work by others (Beak, 1980) and Knight Piesold observations, it is known that discontinuous permafrost in the Pine Point area is associated with low lying organic deposits associated with the flat lacustrine plains to the north of the proposed plant site. Traditional knowledge provided by Avalon indicates that historically there has been no permafrost encountered within the up-land areas where the previous Cominco plant site was located and the corresponding proposed location for the new Hydrometallurgical Plant Site.

FIELD PROGRAM DETAILS

The following is a detailed summary of the 2010 geotechnical field program.

Test Pit Program

The excavation of test pits was carried out with the intent of characterizing and sampling the surficial soils in the plant site area. Representative soil samples were submitted to the laboratory for material index testing.

The excavation work was subcontracted by Procore Drilling Ltd. (Procore) to Carter Industries Ltd. (Carter). The test pits were excavated by Carter using a CAT 416C backhoe. All test pits were located in previously disturbed areas. Test pits were excavated to the limits of the equipment or to a depth limited by groundwater conditions. Test pits were backfilled with the excavated material upon completion of logging and sampling activities.

A total of nine test pits were dug during the field program on November 15, 2010. One bucket sample was taken from each test pit (nine bucket samples in total) and submitted to the laboratory for material index testing. Test pit depths ranged from 1.61 to 2.12 m and averaged 1.92 m. Table 1 provides a summary of the test pit details, including handheld GPS UTM coordinates, total depth and start and end dates. Table 2 lists all samples taken from the test pits and submitted to the laboratory for index testing. Figure 2 shows the locations of the test pits completed on the Pine Point property. Appendix A2 provides the geotechnical logs for the test pits. Appendix B2 provides photo summaries of each test pit including general site conditions, test pit profile and excavated material.

Surface/Grab Sampling

The surface/grab sampling was carried out with the intent of characterizing and sampling the potential borrow materials from select locations around the hydrometallurgical site. Representative soil samples were submitted to the laboratory for material index testing.

Surface sampling was conducted using a pick and shovel from waste piles or surface exposures of sand and gravel, till and waste rock. All surface samples were taken from previously disturbed areas. A total of eight surface samples were taken: two sand and gravel samples, three till samples and three waste rock samples.

Logging and Sampling

Logging of soil in test pits consisted of general description of site conditions; depths; and general soil description, including observed particle size, particle shape, plasticity, colour, odour, compactness or consistency, structure, inclusions, moisture condition and an interpretation of the origin of the soil where applicable.

In Situ Testing

In situ testing during the field program consisted of taking temperature readings at various depths in select test pits using an infrared thermometer gun. Temperature readings are listed in Table 3 and graphically represented on Figure 3.

Laboratory Testing

Maskwa Engineering Ltd. (Maskwa) was contracted to perform material index testing on representative soil samples from test pits and surface/grab sampling. All laboratory material index testing reports are provided in Appendix C.

FIELD PROGRAM RESULTS

The following is a discussion of the field program results compiled by area or source.

Plant Site Results

The proposed plant site area will be located on a previously disturbed area as shown on Figure 2. The proposed area consists of a historic gravel borrow area stripped of vegetation and organics. Inspection of the site during previous site reconnaissance visits indicates that it consisted of east-west trending beach ridges which have been excavated for borrow in the past. The surficial materials exposed at the site primarily consist of exposed sand and gravel. Completion of one hydrogeological drillhole in the area (DH-2010-05) indicates that the overburden thickness is about 11 m with the top portion consisting of sand and gravel and the lower portion consisting of dense till. Details of the hydrogeological drillholes have been presented in Knight Piesold Memo Cont. No. NB10-00656 dated December 8, 2010.

A total of nine test pits were completed in the plant site area to characterize the near surface conditions. Logs for the plant site area test pits are included in Appendix A. Results of particle size analyses for the plant site area samples are provided in Appendix C.

Glaciolacustrine (Sand and Gravel)

Glaciolacustrine (beach) deposits of sand and gravel are present over most of the plant site area, mainly in the south and west, and extend vertically from surface to greater than 2.10 m (at TP-2010-03). The deposits are typically brown in colour. The gradation of the material is gravelly sand, trace silt based on the two samples that were tested (samples from TP-2010-06 and 08 shown on Figure 4). Observations on material in the bank of the test pits, indicates that there is some oversize up to 300 mm in size. An approximate grainsize curve accounting for oversize not sampled is shown on Figure 3. The moisture content of the material ranged from 3.5 to 12.9%. Based on observations during the test pit program the sand and gravel is judged to range from a compact to dense relative density.

Till Deposit

Till was found in the northeast portion of the plant site area and extend vertically from surface to greater than 2.12 m (at TP-2010-02). The deposits are brown in colour and consist of silty sand with some gravel and trace clay based on the two representative samples that were tested (samples from test pits TP-2010-06 and 08 as shown on Figure 4). The moisture content of the till material ranged from 8.4 to 16.0%. Based on observations during the test pitting, the till stratum is judged to have a compact to dense relative density.

Shallow Groundwater Conditions

Seepage was observed in four of the nine test pits, specifically those on the south side of the site. The seepage was recorded at depths ranging from 0.72 m in the west part of the plant site area to 1.75 m in the east part suggesting a gradient from west to east. This seepage may indicate a localized perched ground water table within the sand and gravel in the area, likely due to the till stratigraphic unit acting as an aquitard.

Potential Borrow Materials

Sand and Gravel Sample Results

A total of two surface samples were taken from sources of sand and gravel at the hydrometallurgical site. The samples were taken from a excavated face north of the N-38 pit and adjacent to the main east west road through the site. Results of test work for the sand and gravel sources are provided in Appendix C. As shown on Figure 5, the gradation of the material is sand and gravel with some silt based on the two samples that were tested. Based on observations during surface sampling, the oversize in the sand and gravel ranges in size up to 400 mm. An approximate grainsize curve inclusive of oversize is shown on Figure 5 and indicates that the material in the bank consists of a sandy gravel with some silt and cobbles and trace boulders. The moisture content of the material ranged from 5.2 to 5.8%. Modified Proctor testing on a composite of the two samples of sand and gravel yielded a maximum dry density of 2,322 kg/m³ and an optimum moisture content of 3.0%.

Till Sample Results

A total of three surface samples were taken of potential sources of till from waste stockpiles located around the N-38 Pit. Results of test work for the till samples are provided in Appendix C. The gradation of the till is a silty sand with some gravel and trace clay as shown on Figure 6 for the three samples that were tested. Based on observations in the field, the oversize in the till generally ranges in size up to 200 mm. An approximate grainsize curve inclusive of oversize is shown on Figure 6 and indicates the till in-situ is a gravelly silty sand with trace clay and cobbles. The moisture content of the material ranged from 9.1 to 13.5%. Standard Proctor testing on a composite of all samples of till yielded maximum a dry density of 2,266 kg/m³ and an optimum moisture content of 6.1%.

Waste Rock Sample Results

A total of three surface samples were taken of waste rock from waste piles within the L-37 pit. Results of test results for the waste rock samples are provided in Appendix C.

The gradation of the material as shown on Figure 6 is mainly gravel based on the three samples that were tested. The data presented does not include oversized fractions observed in the field. Based on

field observations, the oversize is estimated to be range in size up 600 mm to 900 mm. An approximate grainsize curve inclusive of oversize shown on Figure 7 indicates that the material is a coarse gravel with cobbles and boulders in the bank.

CONCLUSIONS

The following are conclusions from the geotechnical field program:

Plant Site Area Foundation Conditions

1. The primary overburden stratigraphic layer encountered at the plant site area is a glaciolacustrine (beach deposit) sand and gravel. This layer extends from surface to greater than 2.12 m below surface. Based on observations during the test pit program the sand and gravel is judged to range from a compact to dense relative density.
2. It is judged that a basal till unit underlies the sand and gravel layer under the entire area. The till unit was found at surface to the northeast side of the site. Based on one hydrogeological hole completed at the plant site area the till unit is believed to overlie bedrock at about 11 m depth. The till stratum is judged to have a compact to dense relative density based on observations from the test pit program.
3. Based on observations during the test pit program it is apparent that there is a localized perched ground water table above the basal till within the surface sand and gravel deposit to the south side of the plant site area.
4. Measurement of near surface ground temperatures in some test pits indicates that there is no permafrost within the top 2 m. Based on site observations and site traditional knowledge provided by Avalon, it is very unlikely that any permafrost occurs within the Plant Site area.
5. Foundation design criteria for the Feasibility Study can be provided based on the information summarized herein.

Site Borrow Materials

1. It is evident from site reconnaissance that the naturally occurring sand and gravel deposits have been used as fills for roads and general fill materials. Samples tested from one deposit indicate that it consists of sandy gravel with some silt and cobbles and trace boulders. This material is suitable for general fills and processing to generate finer grained granular materials for road surfacing, drainage zones and foundation backfilling.
2. Testing results for samples of till from waste stockpiles adjacent to the N-38 Pit indicate that it is a well graded material consisting of gravelly silty sand with trace clay and cobbles. Due to the fines content (silt and clay), this material will likely have a relatively low permeability and will be suitable for low permeability zones if required for any water management structures. The till can also be considered as a secondary general fill material.
3. Samples of wasterock from the N-38 Pit were tested to determine grainsize characteristics. Results of the testing program and filed observations indicate that the waste rock consists of coarse gravel with cobbles and boulders in the bank. This material is suitable for general structural type fills and with processing can be used for rip-rap or finer grained granular fills for structural fills or drainage zones.


RECOMMENDATIONS

Based on the 2010 site investigation results, the following recommendations are provided:

1. Initial geotechnical parameters can be provided for the Plant Site foundation design related to the feasibility study upon receipt of proposed infrastructure layout and loading information.
2. Following the feasibility study, additional work that should be considered to support final detailed design for construction includes:
 - a. Additional drillholes using sonic drilling or other geotechnical investigation methods to allow relatively undisturbed samples to be retrieved from deeper within the overburden. Sonic drilling methods would be preferable to be able to penetrate through cobbles and boulders while limiting disturbance of in-situ materials. Retrieval of relatively undisturbed core and samples will also confirm permafrost conditions. Alternatively, a thermistor could be installed to confirm the ground temperature profile.
 - b. Installation of shallow piezometers or stand pipes within upper sand and gravel horizon to confirm extents and depth of potential perched groundwater table.
3. Initial index testing has been completed to characterize three types of borrow materials available at site for the Feasibility Study. Additional testing including concrete aggregate suitability, permeability etc. may be warranted for final detailed design requirements prior to construction.

We trust this provides you with the information you require at this time. We would be pleased to provide preliminary geotechnical recommendations for foundation design related to the feasibility study at your request.

Signed:


Ryan Weir, EIT
Geological Engineering

Approved:


Matthew Parfitt, P.Eng.
Specialist Engineer / Project Manager



Attachments:

Table 1 Rev 0	Summary of Test Pit and Surface Sampling Details
Table 2 Rev 0	Summary of Test Pit and Surface Samples
Table 3 Rev 0	List of Test Pit Temperature Readings
Table 4 Rev 0	General Soil Properties
Figure 1 Rev 0	Project Location Map
Figure 2 Rev 0	Site Plan
Figure 3 Rev 0	Test Pit Temperature Profiles
Figure 4 Rev 0	Particle Size Analysis – Plant Site
Figure 5 Rev 0	Particle Size Analysis – Sand and Gravel
Figure 6 Rev 0	Particle Size Analysis – Till
Figure 7 Rev 0	Particle Size Analysis – Waste Rock
Appendix A	Test Pit Logs
Appendix B	Photo Summaries
Appendix C	Laboratory Material Index Testing Reports

/mrp

TABLE 1

AVALON RARE METALS INC.
THOR LAKE PROJECT

GEOTECHNICAL FIELD PROGRAM SUMMARY
SUMMARY OF TEST PIT AND SURFACE SAMPLING DETAILS

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Site Identification	Site Coordinates ⁽¹⁾				Total Depth (m)	Measured Seepage Level (m)	Date and Time of Measured Seepage Level	Date Started / Completed
	Easting (m)	Northing (m)	Zone	Approximate Ground Elevation (m)				
Test Pits								
TP-2010-01	641,673	6,753,516	11V	208.2	1.90	-	-	15-Nov-10
TP-2010-02	641,832	6,753,541	11V	208.4	2.12	-	-	15-Nov-10
TP-2010-03	641,988	6,753,534	11V	209.0	2.10	-	-	15-Nov-10
TP-2010-04	642,109	6,753,627	11V	208.5	2.10	-	-	15-Nov-10
TP-2010-05	642,168	6,753,482	11V	210.5	2.05	1.75	11/15/2010 15:00	15-Nov-10
TP-2010-06	642,020	6,753,406	11V	211.0	1.61	1.20	11/15/2010 14:30	15-Nov-10
TP-2010-07	641,893	6,753,400	11V	210.8	1.84	0.72	11/15/2010 14:00	15-Nov-10
TP-2010-08	641,776	6,753,423	11V	210.5	1.90	-	-	15-Nov-10
TP-2010-09	641,713	6,753,308	11V	210.5	1.62	0.72	11/15/2010 12:50	15-Nov-10
Surface Sampling								
GR-1	641,069	6,751,248	11V	220.8	0.10	-	-	14-Nov-10
GR-2	641,663	6,751,372	11V	219.8	0.10	-	-	14-Nov-10
TI-1	641,228	6,750,822	11V	220.5	0.15	-	-	14-Nov-10
TI-2	641,446	6,750,747	11V	226.5	0.15	-	-	14-Nov-10
TI-3	640,953	6,750,030	11V	225.5	0.40	-	-	14-Nov-10
WR-1	641,009	6,750,461	11V	197.0	0.10	-	-	14-Nov-10
WR-2	641,225	6,750,357	11V	193.0	0.10	-	-	14-Nov-10
WR-3	640,939	6,750,175	11V	203.0	0.10	-	-	14-Nov-10

I:\1\01\00390\02\A\Correspondence\NB11-00054 - Updated Pine Point geotech summary\Tables 1, 2, 4.xls]Table 1

NOTE:

1. COORDINATES ARE APPROXIMATE AND WERE SURVEYED WITH A HANDHELD GPS OR ESTIMATED FROM DIGITAL MAPPING; DATUM IS NAD83.

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TABLE 2

AVALON RARE METALS INC.
THOR LAKE PROJECT

GEOTECHNICAL FIELD PROGRAM SUMMARY
SUMMARY OF TEST PIT AND SURFACE SAMPLES

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Sample ID	Depth From (m)	Depth To (m)	Oversize Fraction (%)	Field Observation / Laboratory Result
Test Pit Samples				
TP-2010-01 BU1	1.50	1.90	-	Gravelly SAND, fine sand to coarse gravel, trace cobbles, trace boulders, subangular to subrounded, well graded, brown, massive to stratified, dry to moist (glaciolacustrine).
TP-2010-02 BU1	1.72	2.12	-	SILT/CLAY, some fine to coarse sand, some fine to coarse gravel, trace cobbles, trace boulders, subangular to subrounded, well graded, brown, massive, dry to moist (glaciolacustrine).
TP-2010-03 BU1	1.70	2.10	-	SAND, some gravel, fine sand to coarse gravel, trace cobbles, trace boulders, subangular to subrounded, well graded, brown, massive, dry to moist (glaciolacustrine).
TP-2010-04 BU1	1.70	2.10	-	SAND, some silt/clay, trace cobbles, trace boulders, subangular to subrounded, well graded, brown, massive, dry to moist (glaciolacustrine).
TP-2010-05 BU1	1.65	2.05	-	SAND, some gravel, fine sand to coarse gravel, some silt, trace cobbles, subangular to subrounded, well graded, brown, massive, dry to saturated (glaciolacustrine).
TP-2010-06 BU1	1.21	1.61	-	SAND, fine to coarse, some fine to coarse gravel, trace silt, trace cobbles, subangular to subrounded, well graded, brown, dry to saturated (glaciolacustrine).
TP-2010-07 BU1	1.44	1.84	-	SAND AND GRAVEL, fine sand to coarse gravel, trace silt, trace cobbles, trace boulders, subangular to subrounded, well graded, brown, dry to saturated (glaciolacustrine).
TP-2010-08 BU1	1.50	1.90	-	SAND, some gravel, trace silt/clay, trace cobbles, trace boulders, subangular to subrounded, well graded, brown, massive to stratified (glaciolacustrine).
TP-2010-09 BU1	1.22	1.62	-	Gravelly SAND, fine sand to coarse gravel, trace cobbles, trace boulders, subangular to subrounded, well graded, brown, massive, dry to saturated (glaciolacustrine).
Surface Samples				
GR-1	0.05	0.10	-	GRAVEL, fine to coarse, some fine to coarse sand, trace cobbles, trace boulders, subangular to subrounded, well graded, brown, dense, massive (fill)
GR-2	0.05	0.10	-	GRAVEL, fine to coarse, some fine to coarse sand, trace cobbles, trace boulders, subangular to subrounded, well graded, brown, dense, massive (fill)
TI-1	0.05	0.15	-	Sandy SILT, fine to coarse, some clay, trace cobbles, trace boulders, subangular to subrounded, poorly graded, brown, dense, massive (waste stockpile)
TI-2	0.05	0.15	-	Sandy SILT, fine to coarse, some clay, trace fine to coarse gravel, trace cobbles, trace boulders, subangular to subrounded, poorly graded, brown, dense, massive (waste stockpile)
TI-3	0.05	0.40	-	Sandy SILT, fine to coarse, some clay, trace gravel, trace cobbles, trace boulders, subangular to subrounded, poorly graded, brown, dense, massive (waste stockpile)
WR-1	0.00	0.10	40	Cobbley/bouldery GRAVEL, trace gravel, trace sand, angular, poorly graded, white/grey/beige, dense, massive (waste rock)
WR-2	0.00	0.10	25	Cobbley/bouldery GRAVEL, trace sand, trace silt/clay angular, poorly graded, white/grey/beige, dense, massive (waste rock)
WR-3	0.00	0.10	35	Cobbley/bouldery GRAVEL, trace sand, trace silt/clay, angular, poorly graded, white/grey/beige, dense, massive (waste rock)

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TABLE 3

**AVALON RARE METALS INC.
THOR LAKE PROJECT**

**GEOTECHNICAL FIELD PROGRAM SUMMARY
TEST PIT TEMPERATURE DATA**

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Depth (m)	Test Pit and Temperatures (°C)								
	TP-2010-01	TP-2010-02	TP-2010-03	TP-2010-04	TP-2010-05	TP-2010-06	TP-2010-07	TP-2010-08	TP-2010-09
0.1	-	-5.9	-6.2	-5.9	-6.3	-2.7	-3.9	-	-2.4
0.2	-	-4.4	-5.2	-5.0	-5.4	-0.3	-3.9	-	-2.8
0.3	-	-3.2	-4.7	-4.2	-4.9	-1.3	-3.6	-	-2.1
0.4	-	-2.4	-3.2	-3.2	-5.1	-1.7	-1.6	-	-0.8
0.5	-	-1.7	-2.2	-2.1	-4.0	-0.1	-0.8	-	-0.7
0.6	-	-1.3	-1.7	-1.6	-2.9	0.3	0.3	-	-
0.7	-	-0.9	-1.8	-1.2	-2.7	0.1	0.4	-	-
0.8	-	-0.9	-1.3	-0.8	-2.5	-	1.4	-	-
0.9	-	-0.5	-0.9	-0.2	-2.2	0.4	1.8	-	-
1.0	-	-0.1	-0.1	0.1	-1.7	-	1.8	-	-
1.1	-	-	-	-	-1.6	-	1.8	-	-
1.2	-	0.5	-	-	-1.7	-	1.8	-	-
1.3	-	-	-	-	-	-	1.8	-	-
1.4	-	0.7	-	-	-0.7	-	1.8	-	-
1.5	-	-	-	-	-	-	1.8	-	-
1.6	-	1.0	-	-	-0.7	-	-	-	-
1.7	-	-	-	-	-0.5	-	-	-	-
1.8	-	1.1	-	-	0.0	-	-	-	-
1.9	-	-	-	-	-	-	-	-	-
2.0	-	1.7	-	-	0.3	-	-	-	-

I:\1\01\00390\02\A\Data\Work Files\WF02 - Pine Point SI Logs[Test Pit Temperature Data (version 1).xls]Table 3 - Test Pit Temperatures

NOTE:

1. TEMPERATURE READINGS TAKEN USING AN INFRARED THERMOMETER GUN.

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TABLE 4

**AVALON RARE METALS INC.
THOR LAKE PROJECT**

**GEOTECHNICAL FIELD PROGRAM SUMMARY
GENERAL SOIL PROPERTIES**

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Testing			Plant Site		Sand and Gravel Source	Till Source	Waste Rock Source
			Glaciolacustrine Deposits	Till Deposits			
Moisture Content Range (%)			3.5 - 12.9	8.4 - 16.0	5.2 - 5.8	9.1 - 13.5	-
Sieve Analysis (Particle Size Analysis)	Cobble/Boulder Range (%; >75 mm)		-	-	-	-	25 - 40
	Gravel Range (%; 75 to 4.75 mm)		26.0 - 31.5	19.2 - 25.0	50.7 - 56.1	22.4 - 32.4	60 - 74.9
	Sand Range (%; 4.75 to 0.075 mm)		64.4 - 68.6	39.2 - 45.5	30.9 - 37.1	31.9 - 35.3	0 - 0.1
	Silt Range (%; 0.075 to <0.002 mm)		4.1 - 5.4	29.6 - 41.6	12.2 - 13.0	28.0 - 35.0	
	Clay Range (%; <0.002 mm)					7.7 - 9.6	
Moisture Density Relationship	Standard Proctor ⁽²⁾	Max. Dry Density (kg/m ³)	-	-	-	2,266	-
		Optimum Moisture (%)	-	-	-	6.1	-
	Modified Proctor ⁽²⁾	Max. Dry Density (kg/m ³)	-	-	2,322	-	-
		Optimum Moisture (%)	-	-	3.0	-	-
Unified Soil Classification			SP	SM or SC	SM or SC	SM or SC	GP

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NOTES:

1. SOIL PROPERTIES SUMMARIZED FROM LABORATORY MATERIAL INDEX TESTING REPORTS COMPLETED BY MASKWA ENGINEERING LTD.
2. PROCTOR RESULTS REPORTED HAVE BEEN CORRECTED FOR THEIR RESPECTIVE OVERSIZED FRACTIONS.
3. PARTICLE SIZE ANALYSES FOR WASTE ROCK HAVE BEEN CORRECTED FOR THEIR RESPECTIVE OVERSIZED FRACTIONS OBSERVED IN THE FIELD.

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NOTES:

1. IMAGERY FROM NASA WORLD WIND.

AVALON RARE METALS INC.

THOR LAKE PROJECT

GEOTECHNICAL FIELD PROGRAM SUMMARY
PROJECT LOCATION MAP

Knight Piésold
CONSULTING

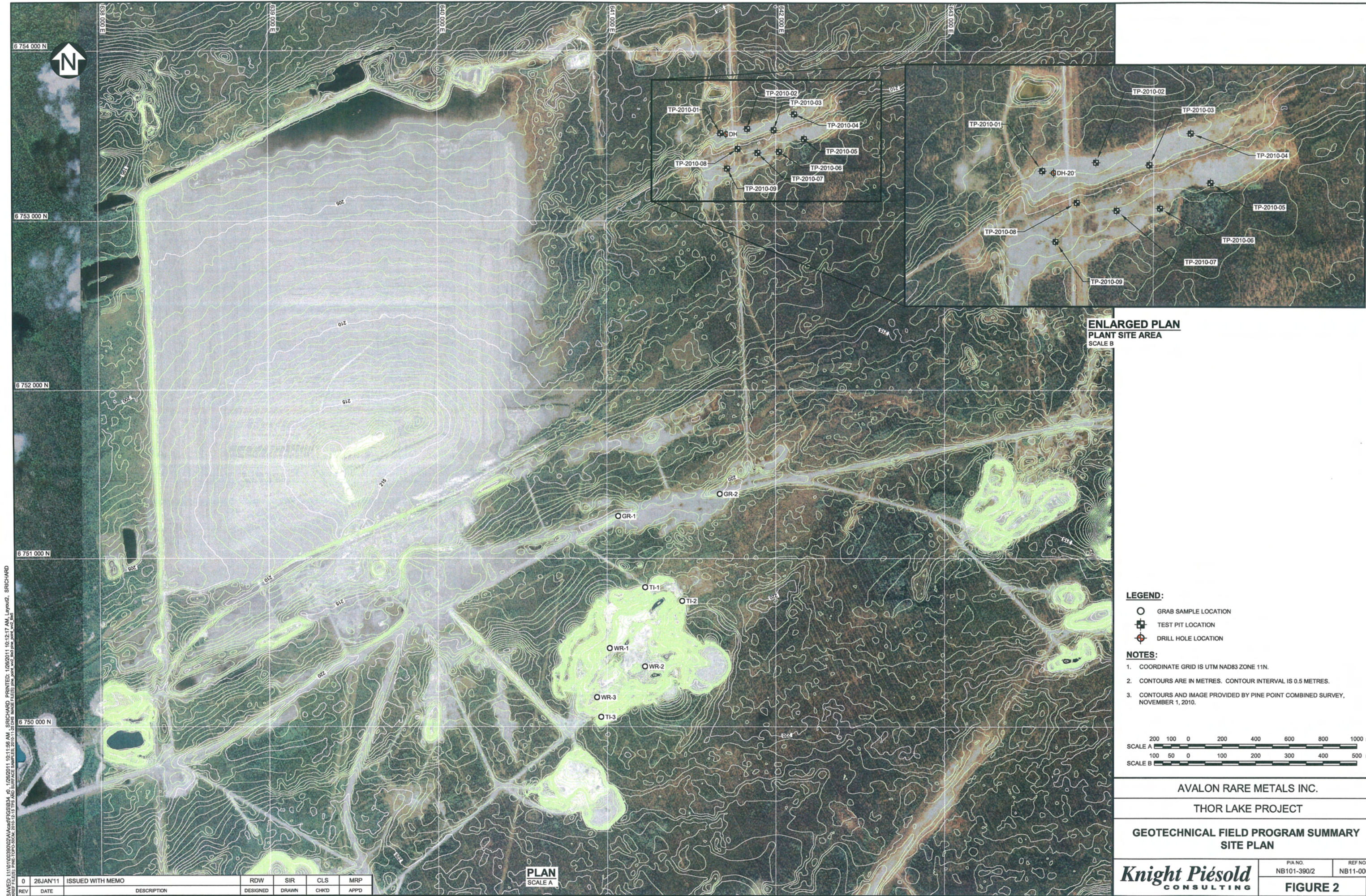
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REF NO.
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FIGURE 1

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XREF FILES: PINE-TOP2-550x2-2010-12-13 TFS AND SURFACE SAMPLES: 2010-11-25 DWS IMAGE FILES: pine_top2_550x2_2010-11-25.dws pine_top2_550x2_2010-11-25.dws

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REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHKD	APPD

PLAN
SCALE A

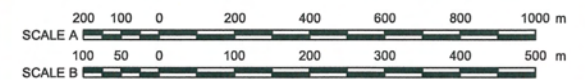
ENLARGED PLAN
PLANT SITE AREA
SCALE B

LEGEND:

- GRAB SAMPLE LOCATION
- ⊕ TEST PIT LOCATION
- ⊙ DRILL HOLE LOCATION

NOTES:

- COORDINATE GRID IS UTM NAD83 ZONE 11N.
- CONTOURS ARE IN METRES. CONTOUR INTERVAL IS 0.5 METRES.
- CONTOURS AND IMAGE PROVIDED BY PINE POINT COMBINED SURVEY, NOVEMBER 1, 2010.



AVALON RARE METALS INC.

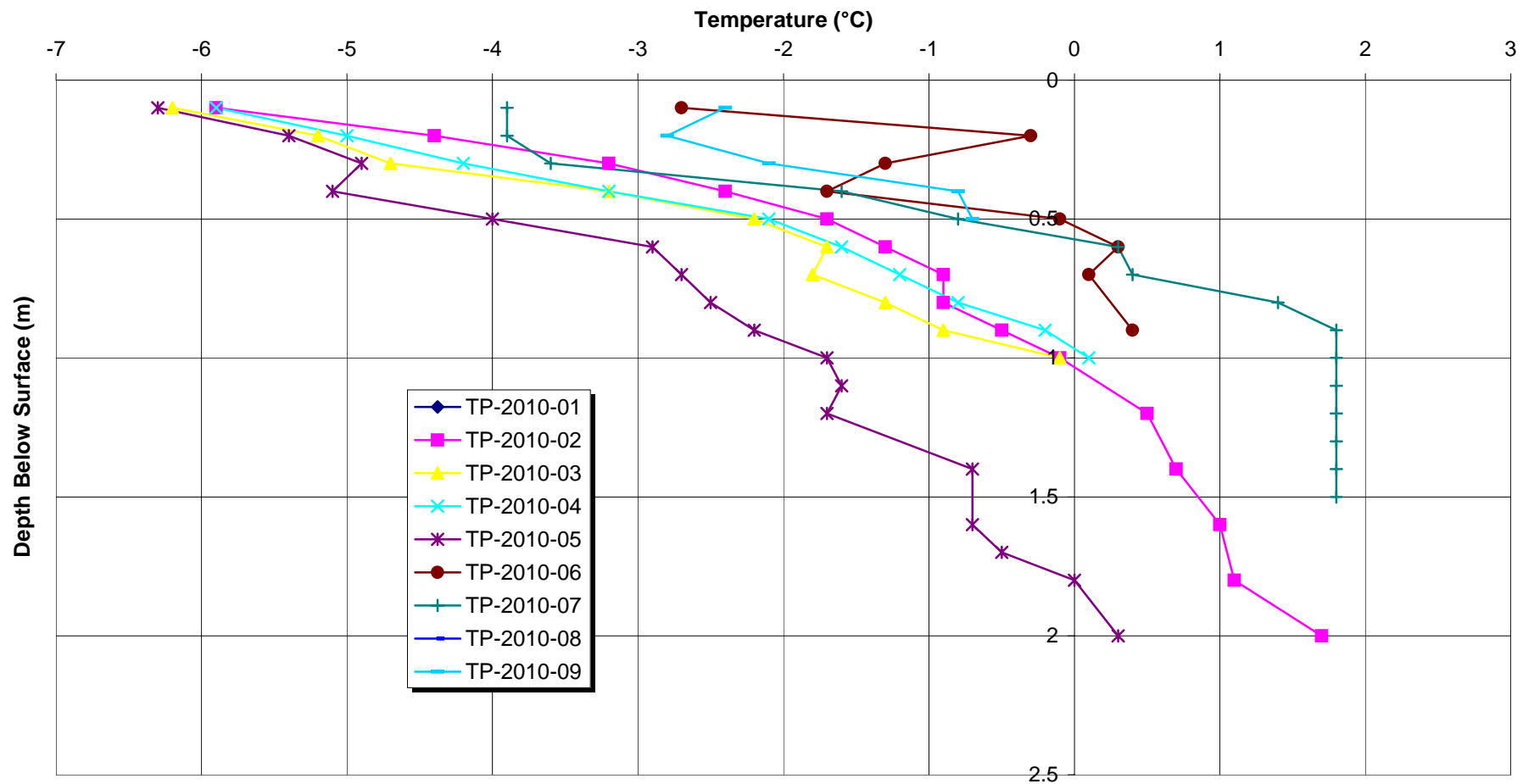
THOR LAKE PROJECT

GEOTECHNICAL FIELD PROGRAM SUMMARY
SITE PLAN

Knight Piesold
CONSULTING

PIA NO. NB101-390/2	REF NO. NB11-00054	REV 0
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FIGURE 2

**NOTE:**

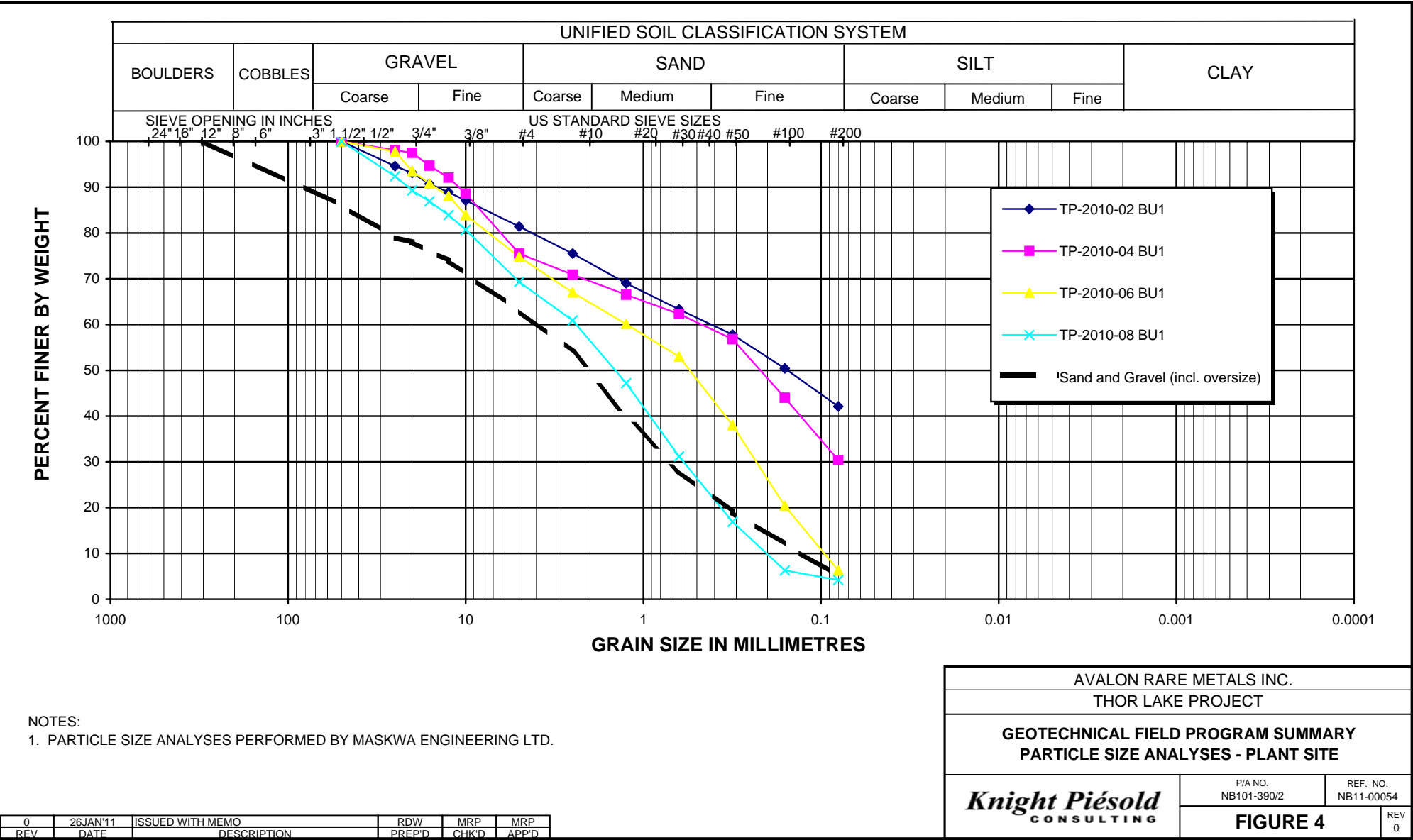
1. TEMPERATURE READINGS TAKEN USING AN INFRARED THERMOMETER GUN ON NOVEMBER 15, 2010.

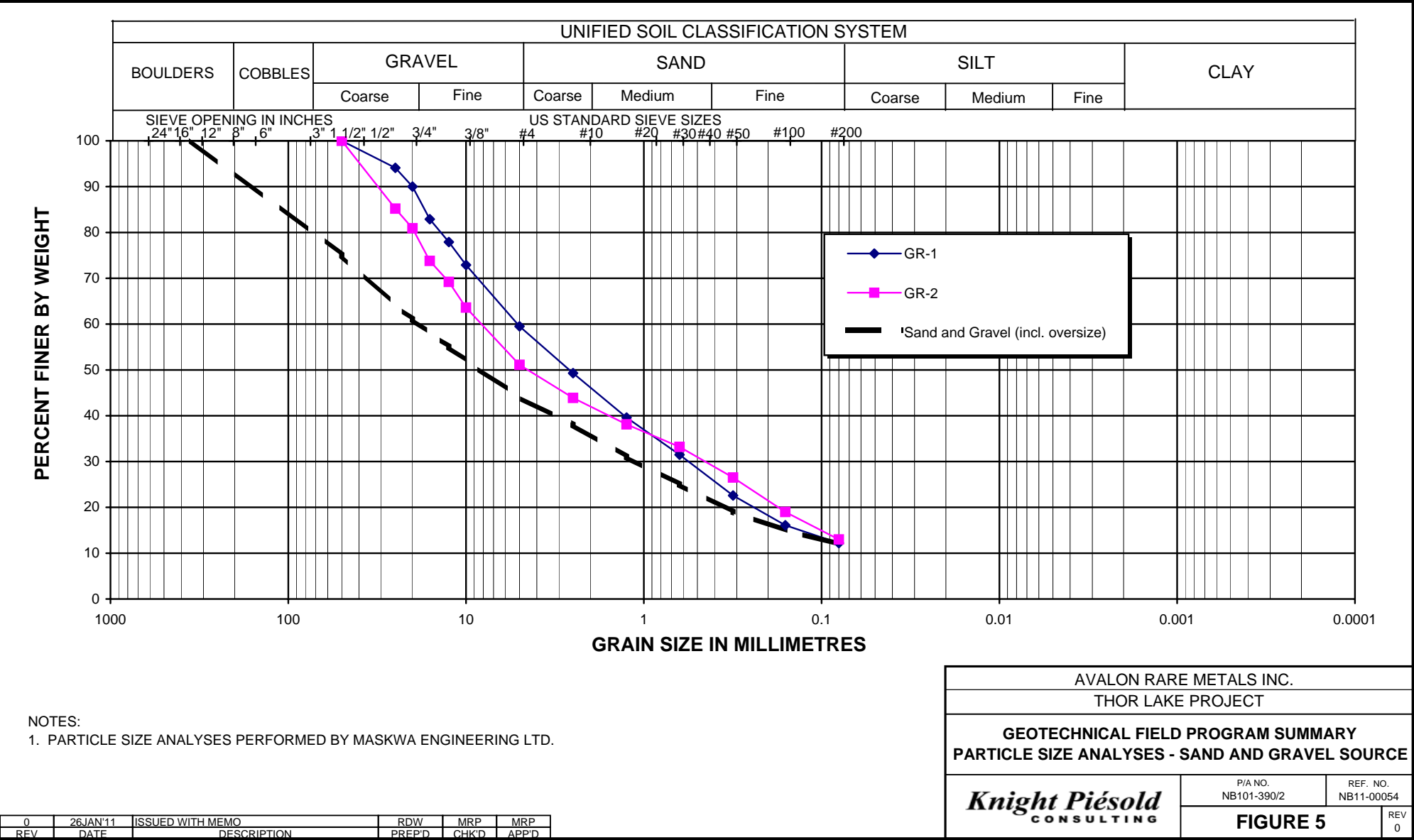
AVALON RARE METALS INC.

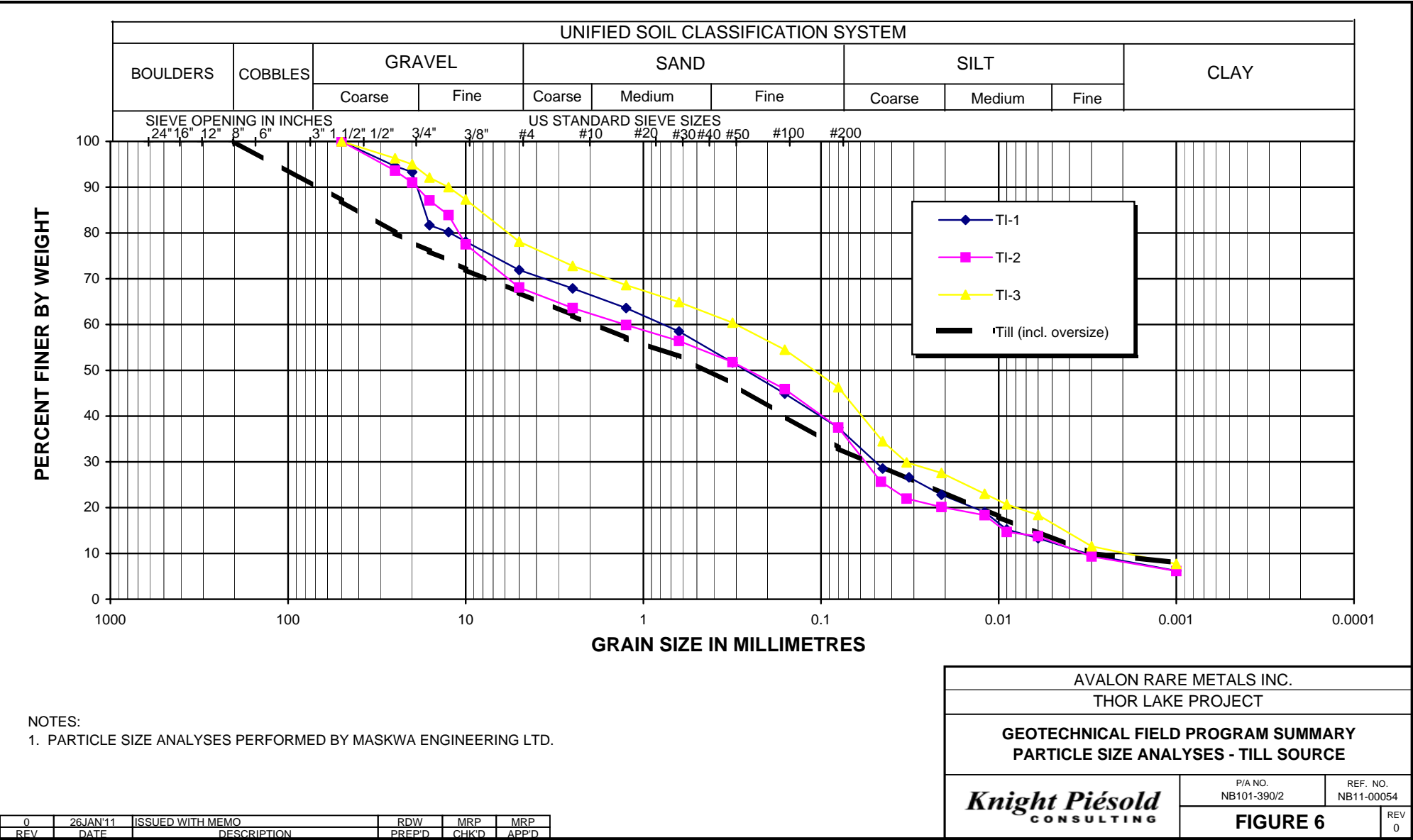
THOR LAKE PROJECT

**GEOTECHNICAL FIELD PROGRAM SUMMARY
TEST PIT TEMPERATURE PROFILES*****Knight Piésold***
CONSULTINGP/A NO.
NB101-390/2REF. NO.
NB11-00054**FIGURE 3**REV
0


0	26JAN'11	ISSUED WITH MEMO	RDW	CLS	MRP
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D









AVALON RARE METALS INC.		
THOR LAKE PROJECT		
GEOTECHNICAL FIELD PROGRAM SUMMARY PARTICLE SIZE ANALYSES - WASTE ROCK SOURCE		
	P/A NO. NB101-390/2	REF. NO. NB11-00054
	FIGURE 7	

APPENDIX A

TEST PIT LOGS

(Pages A-1 to A-9)

Project: THOR LAKE PROJECT

Contractor: CARTER INDUSTRIES LTD.

Location: PINE POINT, NORTH OF N38 PIT

Coordinates: 6,753,516 N, 641,673 E

Test Pit No.: TP-2010-01

Page: 1 of 1

Excavator Type: CAT 416C

Date Started: Nov 15, 10

Total Depth: 1.90 m

Date Completed: Nov 15, 10

Elevation: 208.20 m

Logged by: RDW

Reviewed by: CLS

DEPTH - (m)	ELEVATION - (m)	SAMPLES	SAMPLE NO.	GRAPHIC LOG	WATER LEVEL	MATERIAL DESCRIPTION	COMMENTS
208.0						GLACIOLACUSTRINE DEPOSIT (SAND AND GRAVEL) (0 to 1.9) Gravelly SAND, fine sand to coarse gravel, trace cobbles, trace boulders, subangular to subrounded, well graded, brown, massive to stratified, dry to moist (beach ridge).	Test pit excavated with CAT 416C backhoe. Test pit stopped due to sloughing and reaching limits of equipment. No seepage observed. Temperatures not collected due to length of time that test pit was open and cooling of test pit walls.
1.0							
207.0						End of Test Pit: 1.9 m	
2.0							
206.0							
3.0							
205.0							
4.0							
204.0							

SAMPLING SYMBOLS:



GRAB



BLOCK

AVALON RARE METALS INC.
THOR LAKE PROJECT

Knight Piésold
CONSULTING

Project No.	Ref. No.	Rev.
NB101-390/2	NB11-00054	0

FIGURE A-1

I:\110100390\02\DATA\WORK FILES\WF02 - PINE POINT SI LOGS\TEST PIT LOGS.GPJ
I:\0\GINT\LIBRARY\KP LIB\GLB, TEST PIT LOG, SIERRA GORDA_EEB, KP DATA TEMPLATE.GDT, Jan 26, 11

Project: THOR LAKE PROJECT

Contractor: CARTER INDUSTRIES LTD.

Location: PINE POINT, NORTH OF N38 PIT

Coordinates: 6,753,541 N, 641,832 E

Test Pit No.: TP-2010-02

Excavator Type: CAT 416C

Total Depth: 2.12 m

Elevation: 208.40 m

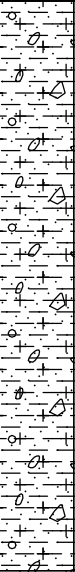
Page: 1 of 1

Date Started: Nov 15, 10

Date Completed: Nov 15, 10

Logged by: RDW

Reviewed by: CLS

DEPTH - (m)	ELEVATION - (m)	SAMPLES	SAMPLE NO.	GRAPHIC LOG	WATER LEVEL	MATERIAL DESCRIPTION	COMMENTS
208.0						TILL (SILTY SAND, SOME GRAVEL, SOME CLAY) (0 to 2.12) Silty SAND, fine to coarse, some fine to coarse gravel, some clay, trace cobbles, trace boulders, subangular to subrounded, well graded, brown, massive, dry to moist (till).	Test pit excavated with CAT 416C backhoe. Test pit stopped due to sloughing and reaching limits of equipment. No seepage observed. Temperatures collected from approximately 0.1 to 2.0 m inclusive.
1.0							
207.0							
2.0		GB	BU1			End of Test Pit: 2.12 m	
206.0							
3.0							
205.0							
4.0							
204.0							

SAMPLING SYMBOLS:



GRAB



BLOCK

AVALON RARE METALS INC.
THOR LAKE PROJECT

Knight Piésold
CONSULTING

Project No. NB101-390/2	Ref. No. NB11-00054	Rev. 0
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FIGURE A-2

I:\110100390\2\DATA\WORK FILES\WF02 - PINE POINT SI LOGS\TEST PIT LOGS.GPJ
I:\0\GINT\LIBRARY\KP LIB\GLB, TEST PIT LOG, SIERRA GORDA_EEB, KP DATA TEMPLATE.GDT, Jan 26, 11

Project: THOR LAKE PROJECT

Contractor: CARTER INDUSTRIES LTD.

Location: PINE POINT, NORTH OF N38 PIT

Coordinates: 6,753,534 N, 641,988 E

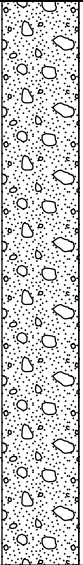
Test Pit No.: TP-2010-03 **Page:** 1 of 1

Excavator Type: CAT 416C Date Started: Nov 15, 10

Total Depth: 2.10 m Date Completed: Nov 15, 10

Elevation: 209.00 m Logged by: RDW

Reviewed by: CLS

DEPTH - (m)	ELEVATION - (m)	SAMPLES	SAMPLE NO.	GRAPHIC LOG	WATER LEVEL	MATERIAL DESCRIPTION	COMMENTS
1.0	208.0					GLACIOLACUSTRINE DEPOSIT (SAND AND GRAVEL) (0 to 2.1) SAND, some gravel, fine sand to coarse gravel, trace cobbles, trace boulders, subangular to subrounded, well graded, brown, massive, dry to moist (beach ridge).	Test pit excavated with CAT 416C backhoe. Test pit stopped due to sloughing and reaching limits of equipment. No seepage observed. Temperatures collected from approximately 0.1 to 1.0 m inclusive.
2.0	207.0	GB	BU1				
3.0	206.0					End of Test Pit: 2.1 m	
4.0	205.0						

SAMPLING SYMBOLS:



GRAB



BLOCK

AVALON RARE METALS INC.
THOR LAKE PROJECT

Knight Piésold
CONSULTING

Project No.	Ref. No.	Rev.
NB101-390/2	NB11-00054	0

FIGURE A-3

I:\110100390\02\DATA\WORK FILES\WF02 - PINE POINT SI LOGS\TEST PIT LOGS.GPJ
I:\0\GINT\LIBRARY\KP LIB.GLB, TEST PIT LOG, SIERRA GORDA_EEB, KP DATA TEMPLATE.GDT, Jan 26, 11

Project: THOR LAKE PROJECT

Test Pit No.: TP-2010-04

Page: 1 of 1

Contractor: CARTER INDUSTRIES LTD.

Excavator Type: CAT 416C

Date Started: Nov 15, 10

Location: PINE POINT, NORTH OF N38 PIT

Total Depth: 2.10 m

Date Completed: Nov 15, 10

Coordinates: 6,753,627 N, 642,109 E

Elevation: 208.50 m

Logged by: RDW

Reviewed by: CLS

DEPTH - (m)	ELEVATION - (m)	SAMPLES	SAMPLE NO.	GRAPHIC LOG	WATER LEVEL	MATERIAL DESCRIPTION	COMMENTS
208.0						TILL (SILTY SAND, SOME GRAVEL, SOME CLAY) (0 to 2.1) SAND, some silt/clay, trace cobbles, trace boulders, subangular to subrounded, well graded, brown, massive, dry to moist (till).	Test pit excavated with CAT 416C backhoe. Test pit stopped due to sloughing and reaching limits of equipment. No seepage observed. Temperatures collected from approximately 0.1 to 1.0 m inclusive.
1.0							
207.0						End of Test Pit: 2.1 m	
2.0		GB	BU1				
206.0							
3.0							
205.0							
4.0							
204.0							

SAMPLING SYMBOLS:



GRAB



BLOCK

**AVALON RARE METALS INC.
THOR LAKE PROJECT**

Knight Piésold
CONSULTING

Project No.
NB101-390/2

Ref. No.
NB11-00054

Rev.
0

FIGURE A-4

I:\110100390\2\DATA\WORK FILES\WF02 - PINE POINT SI LOGS\TEST PIT LOGS.GPJ
I:\0\GINT\LIBRARY\KP LIB.GLB, TEST PIT LOG, SIERRA GORDA_EEB, KP DATA TEMPLATE.GDT, Jan 26, 11

Project: THOR LAKE PROJECT

Contractor: CARTER INDUSTRIES LTD.

Location: PINE POINT, NORTH OF N38 PIT

Coordinates: 6,753,482 N, 642,168 E

Test Pit No.: TP-2010-05

Excavator Type: CAT 416C

Total Depth: 2.05 m

Elevation: 210.50 m

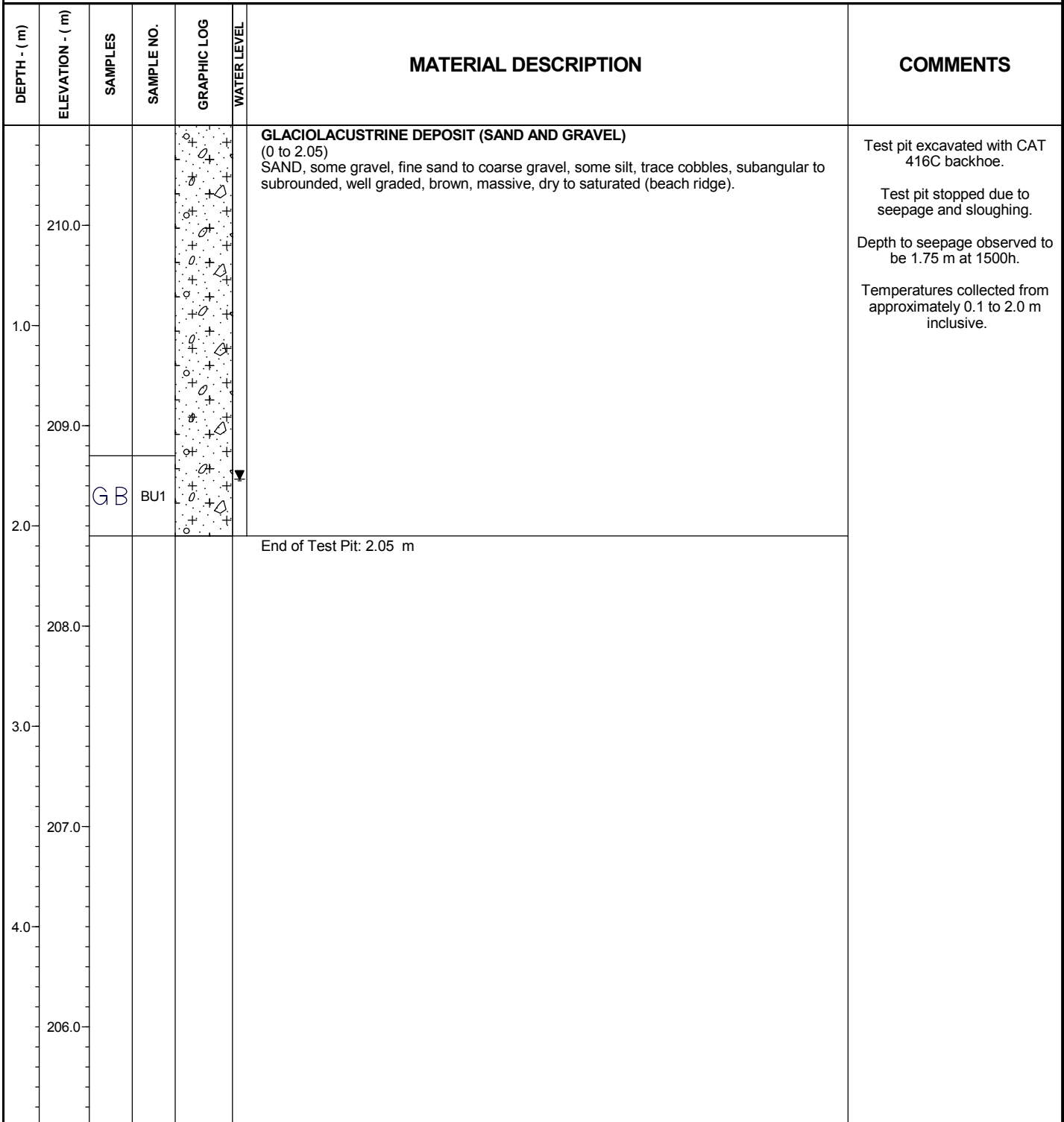
Page: 1 of 1

Date Started: Nov 15, 10

Date Completed: Nov 15, 10

Logged by: RDW

Reviewed by: CLS



SAMPLING SYMBOLS:



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Project No. NB101-390/2	Ref. No. NB11-00054	Rev. 0
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FIGURE A-5

I:\110100390\2\ADATA\WORK FILES\WF02 - PINE POINT SI LOGS\TEST PIT LOGS.GPJ
I:\0\GINT\LIBRARY\KP LIB.GLB, TEST PIT LOG, SIERRA GORDA_EEB, KP DATA TEMPLATE.GDT, Jan 26, 11

Project: THOR LAKE PROJECT

Contractor: CARTER INDUSTRIES LTD.

Location: PINE POINT, NORTH OF N38 PIT

Coordinates: 6,753,406 N , 642,020 E

Test Pit No.: TP-2010-06

Excavator Type: CAT 416C

Total Depth: 1.61 m

Elevation: 211.00 m

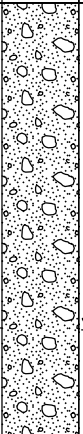

Page: 1 of 1

Date Started: Nov 15, 10

Date Completed: Nov 15, 10

Logged by: RDW

Reviewed by: CLS

DEPTH - (m)	ELEVATION - (m)	SAMPLES	SAMPLE NO.	GRAPHIC LOG	WATER LEVEL	MATERIAL DESCRIPTION	COMMENTS
1.0	210.0	GB	BU1			GLACIOLACUSTRINE DEPOSIT (SAND AND GRAVEL) (0 to 1.61) SAND, fine to coarse, some fine to coarse gravel, trace silt, trace cobbles, subangular to subrounded, well graded, brown, dry to saturated (beach ridge).	Test pit excavated with CAT 416C backhoe. Test pit stopped due to sloughing and reaching limits of equipment. Depth to frost observed to be 0.3 m. Depth to seepage observed to be 1.2 m at 1430h. Temperatures collected from approximately 0.1 to 0.9 m inclusive.
2.0	209.0					End of Test Pit: 1.61 m	
3.0	208.0						
4.0	207.0						

SAMPLING SYMBOLS:



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THOR LAKE PROJECT

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Project No. NB101-390/2	Ref. No. NB11-00054	Rev. 0
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FIGURE A-6

I:\110100390\02\DATA\WORK FILES\WF02 - PINE POINT SI LOGS\TEST PIT LOGS.GPJ
I:\0\GINT\LIBRARY\KP LIB.GLB, TEST PIT LOG, SIERRA GORDA_EEB, KP DATA TEMPLATE.GDT, Jan 26, 11

Project: THOR LAKE PROJECT

Contractor: CARTER INDUSTRIES LTD.

Location: PINE POINT, NORTH OF N38 PIT

Coordinates: 6,753,400 N , 641,893 E

Test Pit No.: TP-2010-07

Excavator Type: CAT 416C

Total Depth: 1.84 m

Elevation: 210.80 m

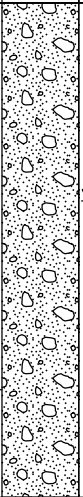
Page: 1 of 1

Date Started: Nov 15, 10

Date Completed: Nov 15, 10

Logged by: RDW

Reviewed by: CLS

DEPTH - (m)	ELEVATION - (m)	SAMPLES	SAMPLE NO.	GRAPHIC LOG	WATER LEVEL	MATERIAL DESCRIPTION	COMMENTS
	210.0					GLACIOLACUSTRINE DEPOSIT (SAND AND GRAVEL) (0 to 1.84) SAND AND GRAVEL, fine sand to coarse gravel, trace silt, trace cobbles, trace boulders, subangular to subrounded, well graded, brown, dry to saturated (beach ridge).	Test pit excavated with CAT 416C backhoe. Test pit stopped due to seepage and sloughing. Depth to frost observed to be 0.3 m. Depth to seepage observed to be 0.72 m at 1400h. Temperatures collected from approximately 0.1 to 1.5 m inclusive using infrared thermometer gun.
1.0							
	209.0	GB	BU1			End of Test Pit: 1.84 m	
2.0							
	208.0						
3.0							
	207.0						
4.0							
	206.0						

SAMPLING SYMBOLS:



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FIGURE A-7

I:\110100390\2\DATA\WORK FILES\WF02 - PINE POINT SI LOGS\TEST PIT LOGS.GPJ
I:\0\GINT\LIBRARY\KP LIB\GLB, TEST PIT LOG, SIERRA GORDA_EEB, KP DATA TEMPLATE.GDT, Jan 26, 11

Project: THOR LAKE PROJECT

Contractor: CARTER INDUSTRIES LTD.

Location: PINE POINT, NORTH OF N38 PIT

Coordinates: 6,753,423 N, 641,776 E

Test Pit No.: TP-2010-08**Page:** 1 of 1

Excavator Type: CAT 416C

Date Started: Nov 15, 10

Total Depth: 1.90 m

Date Completed: Nov 15, 10

Elevation: 210.50 m

Logged by: RDW

Reviewed by: CLS

DEPTH - (m)	ELEVATION - (m)	SAMPLES	SAMPLE NO.	GRAPHIC LOG	WATER LEVEL	MATERIAL DESCRIPTION	COMMENTS
210.0						GLACIOLACUSTRINE DEPOSIT (SAND AND GRAVEL) (0 to 1.9) SAND, some gravel, trace silt/clay, trace cobbles, trace boulders, subangular to subrounded, well graded, brown, massive to stratified (beach ridge).	Test pit excavated with CAT 416C backhoe. Test pit stopped due to sloughing and reaching limits of equipment. No seepage observed. Temperatures not collected due to length of time that test pit was open and cooling of test pit walls.
1.0							
209.0		GB	BU1			End of Test Pit: 1.9 m	
2.0							
208.0							
3.0							
207.0							
4.0							
206.0							

SAMPLING SYMBOLS:

GRAB



BLOCK

AVALON RARE METALS INC.
THOR LAKE PROJECT***Knight Piésold***
CONSULTING

Project No.	Ref. No.	Rev.
NB101-390/2	NB11-00054	0

FIGURE A-8I:\110100390\02\DATA\WORK FILES\WF02 - PINE POINT SI LOGS\TEST PIT LOGS.GPJ
I:\0\GINT\LIBRARY\KP LIB\GLB, TEST PIT LOG, SIERRA GORDA_EEB, KP DATA TEMPLATE.GDT, Jan 26, 11

Project: THOR LAKE PROJECT

Contractor: CARTER INDUSTRIES LTD.

Location: PINE POINT, NORTH OF N38 PIT

Coordinates: 6,753,308 N, 641,713 E

Test Pit No.: TP-2010-09

Excavator Type: CAT 416C

Total Depth: 1.62 m

Elevation: 210.50 m

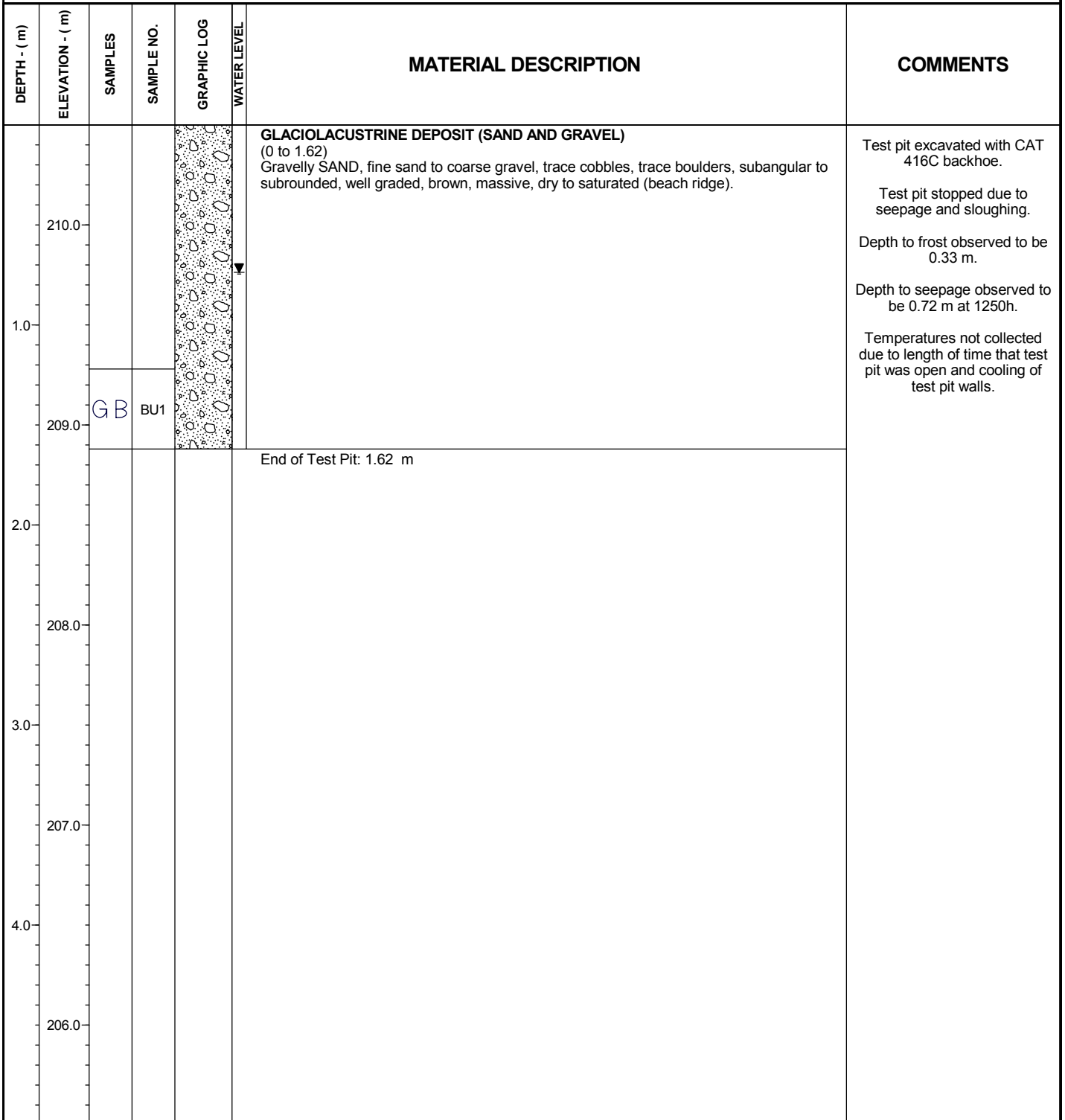
Page: 1 of 1

Date Started: Nov 15, 10

Date Completed: Nov 15, 10

Logged by: RDW

Reviewed by: CLS



SAMPLING SYMBOLS:



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Project No. NB101-390/2	Ref. No. NB11-00054	Rev. 0
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FIGURE A-9

I:\110100390\02\DATA\WORK FILES\WF02 - PINE POINT SI LOGS\TEST PIT LOGS.GPJ
I:\0\GINT\LIBRARY\KP LIB.GLB, TEST PIT LOG, SIERRA GORDA_EEB, KP DATA TEMPLATE.GDT, Jan 26, 11