Knight Piésold
CONSULTING

APPENDIX B

PHOTO SUMMARIES

Knight Piésold
CONSULTING

APPENDIX B1

TEST PITS

(Pages B1-1 to B1-9)

Photo 1 - TP-2010-01 looking north

Photo 2 - TP-2010-01 looking east

Photo 3 - TP-2010-01 looking south

Photo 4 - TP-2010-01 looking south

Photo 5 - TP-2010-01 profile (0.00 - 1.90 m)

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

AVALON RARE METALS INC.

THOR LAKE PROJECT

GEOTECHNICAL FIELD PROGRAM SUMMARY
TP-2010-01 PHOTO SUMMARY

Knight Piésold CONSULTING

P/A NO. NB101-390/2

REF. NO. NB11-00054

FIGURE B1-1

REV 0

Photo 1 - TP-2010-02 looking north

Photo 2 - TP-2010-02 looking east

Photo 3 - TP-2010-02 looking south

Photo 4 - TP-2010-02 looking south

Photo 5 - TP-2010-02 profile (0.00 - 2.12 m)

Photo 6 - TP-2010-02 stockpile

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

AVALON RARE METALS INC.

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GEOTECHNICAL FIELD PROGRAM SUMMARY
TP-2010-02 PHOTO SUMMARY

Knight Piésold CONSULTING

P/A NO. NB101-390/2

REF. NO. NB11-00054

FIGURE B1-2

REV 0

Photo 1 - TP-2010-03 looking north

Photo 2 - TP-2010-03 looking east

Photo 3 - TP-2010-03 looking south

Photo 4 - TP-2010-03 looking south

Photo 5 - TP-2010-03 profile (0.00 - 2.10 m)

Photo 6 - TP-2010-03 stockpile

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

AVALON RARE METALS INC.

THOR LAKE PROJECT

GEOTECHNICAL FIELD PROGRAM SUMMARY
TP-2010-03 PHOTO SUMMARY

Knight Piésold CONSULTING

P/A NO. NB101-390/2

REF. NO. NB11-00054

FIGURE B1-3

REV 0

Photo 1 - TP-2010-04 looking north

Photo 2 - TP-2010-04 looking east

Photo 3 - TP-2010-04 looking south

Photo 4 - TP-2010-04 looking south

Photo 5 - TP-2010-04 profile (0.00 - 2.10 m)

Photo 6 - TP-2010-04 stockpile

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

AVALON RARE METALS INC.

THOR LAKE PROJECT

GEOTECHNICAL FIELD PROGRAM SUMMARY
TP-2010-04 PHOTO SUMMARY

Knight Piésold CONSULTING

P/A NO. NB101-390/2

REF. NO. NB11-00054

FIGURE B1-4

REV 0

Photo 1 - TP-2010-05 looking north

Photo 2 - TP-2010-05 looking east

Photo 3 - TP-2010-05 profile (0.00 - 2.05 m)

Photo 4 - TP-2010-05 stockpile

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

AVALON RARE METALS INC.

THOR LAKE PROJECT

GEOTECHNICAL FIELD PROGRAM SUMMARY
TP-2010-05 PHOTO SUMMARY

Knight Piésold CONSULTING

P/A NO. NB101-390/2

REF. NO. NB11-00054

FIGURE B1-5

REV 0

Photo 1 - TP-2010-06 looking north

Photo 2 - TP-2010-06 looking east

Photo 3 - TP-2010-06 looking south

Photo 4 - TP-2010-06 looking south

Photo 5 - TP-2010-06 profile (0.00 - 1.61 m)

Photo 6 - TP-2010-06 stockpile

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

AVALON RARE METALS INC.

THOR LAKE PROJECT

GEOTECHNICAL FIELD PROGRAM SUMMARY
TP-2010-06 PHOTO SUMMARY

Knight Piésold CONSULTING

P/A NO. NB101-390/2

REF. NO. NB11-00054

FIGURE B1-6

REV 0

Photo 1 - TP-2010-07 looking north

Photo 2 - TP-2010-07 looking east

Photo 3 - TP-2010-07 looking south

Photo 4 - TP-2010-07 looking west

Photo 5 - TP-2010-07 profile (0.00 - 1.84 m)

Photo 6 - TP-2010-07 stockpile

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

AVALON RARE METALS INC.

THOR LAKE PROJECT

GEOTECHNICAL FIELD PROGRAM SUMMARY
TP-2010-07 PHOTO SUMMARY

Knight Piésold CONSULTING

P/A NO. NB101-390/2

REF. NO. NB11-00054

FIGURE B1-7

REV 0

Photo 1 - TP-2010-08 looking north

Photo 2 - TP-2010-08 looking east

Photo 3 - TP-2010-08 looking south

Photo 4 - TP-2010-08 looking west

Photo 5 - TP-2010-08 profile (0.00 - 1.90 m)

Photo 6 - TP-2010-08 stockpile

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

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THOR LAKE PROJECT

GEOTECHNICAL FIELD PROGRAM SUMMARY
TP-2010-08 PHOTO SUMMARY

Knight Piésold CONSULTING

P/A NO. NB101-390/2

REF. NO. NB11-00054

FIGURE B1-8

REV 0

Photo 1 - TP-2010-09 looking north

Photo 2 - TP-2010-09 looking east

Photo 3 - TP-2010-09 looking south

Photo 4 - TP-2010-09 looking west

Photo 5 - TP-2010-09 profile (0.00 - 1.62 m)

Photo 6 - TP-2010-09 stockpile

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

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THOR LAKE PROJECT

GEOTECHNICAL FIELD PROGRAM SUMMARY
TP-2010-09 PHOTO SUMMARY

Knight Piésold CONSULTING

P/A NO. NB101-390/2

REF. NO. NB11-00054

FIGURE B1-9

REV 0

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APPENDIX B2

SURFACE SAMPLING

(Page B2-1)

Photo 1 - GR-1 looking north

Photo 2 - Close-up of GR-1

Photo 3 - GR-2 looking north

Photo 4 - WR-1 looking west

Photo 5 - WR-2 looking north

Photo 6 - WR-3 looking southwest

Photo 7 - TI-1 looking west

Photo 8 - TI-3 looking southwest

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

AVALON RARE METALS INC.

THOR LAKE PROJECT

GEOTECHNICAL FIELD PROGRAM SUMMARY
SURFACE SAMPLING PHOTO SUMMARY

Knight Piésold CONSULTING

P/A NO. NB101-390/2

REF. NO. NB11-00054

FIGURE B2-1

REV 0

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APPENDIX C

LABORATORY MATERIAL INDEX TESTING REPORTS

(Pages C-1 to C-18)

MASKWA
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Water Content of Soil and Rock
ASTM D2216-05

SOIL MOISTURE CONTENT AND SAMPLE INFORMATION SHEET

PROJECT NUMBER	10-024	PROJECT	Pine Point Site Investigation
DATE	2-Dec-2010	LOCATION	Pine Point, NT
CLIENT	Knight Pieshold Consulting	SAMPLED BY	Ryan Weir, EIT

MOISTURE CONTENT

BOREHOLE #	GT-2010-01-BU1	GT-2010-01-BU2	GR-1	GR-2	TI-1	TI-2
DEPTH (m)	0.61 to 1.22	0.76 to 1.37	.05 to .10	.05 to .10	0.05 to 0.15	0.05 to 0.15
SAMPLE #	BU1	BU2	GR-1	GR-2	TI-1	TI-2
B WT OF MOIST SAMPLE + PAN (g)	1148.5	1121.7	4996.7	11345.0	5551.8	6681.0
C WT OF DRY SAMPLE + PAN (g)	1107.3	1096.3	4747.5	10786.9	5003.4	5934.2
D WT OF WATER (g)	41.2	25.4	249.2	558.1	548.4	746.8
E WT OF PAN (g)	409.2	408.7	0.0	1163.5	0.0	407.0
F WT OF DRY SAMPLE (g)	698.1	687.6	4747.5	9623.4	5003.4	5527.2
G MOISTURE CONTENT (%)	**5.9**	**3.7**	**5.2**	**5.8**	**11.0**	**13.5**

MOISTURE CONTENT

BOREHOLE #	TI-3	TP-2010-01-BU1	TP-2010-02-BU1	TP-2010-03-BU1	TP-2010-04-BU1	TP-2010-05-BU1
DEPTH (m)	0.05 to 0.40	1.50 to 1.90	1.72 to 2.12	1.70 to 2.10	1.70 to 2.10	1.65 to 2.05
SAMPLE #	TI-3	1	2	3	4	5
B WT OF MOIST SAMPLE + PAN (g)	5531.7	1164.4	5509.7	1056.0	6960.9	1057.8
C WT OF DRY SAMPLE + PAN (g)	5103.3	1137.7	5064.7	1028.4	6512.8	968.5
D WT OF WATER (g)	428.4	26.7	445.0	27.6	448.1	89.3
E WT OF PAN (g)	408.9	410.1	408.7	408.4	1163.5	408.8
F WT OF DRY SAMPLE (g)	4694.4	727.6	4656.0	620.0	5349.3	559.7
G MOISTURE CONTENT (%)	**9.1**	**3.7**	**9.6**	**4.5**	**8.4**	**16.0**

MOISTURE CONTENT

BOREHOLE #	TP-2010-06-BU1	TP-2010-07-BU1	TP-2010-08-BU1	TP-2010-09-BU1
DEPTH (m)	1.21 to 1.61	1.44 to 1.84	1.50 to 1.90	1.22 to 1.62
SAMPLE #	6	7	8	9
B WT OF MOIST SAMPLE + PAN (g)	5320.5	1017.9	9475.4	991.7
C WT OF DRY SAMPLE + PAN (g)	4760.3	962.2	9192.0	945.6
D WT OF WATER (g)	560.2	55.7	283.4	46.1
E WT OF PAN (g)	408.1	408.3	1163.5	407.5
F WT OF DRY SAMPLE (g)	4352.2	553.9	8028.5	538.1
G MOISTURE CONTENT (%)	**12.9**	**10.1**	**3.5**	**8.6**

MASKWA
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Sieve Analysis of Fine and Course Aggregates
ASTM C136 / CSA A23.2-2a

Project #:	10-024	Source	Test Pit	Lot No.	n/a
Title	Pine Point Site Investigation	Quantity (m3)	n/a	Sample.	TP-2010-02-BU1
Client	Knight Pieshold Consulting	Load Count	n/a		

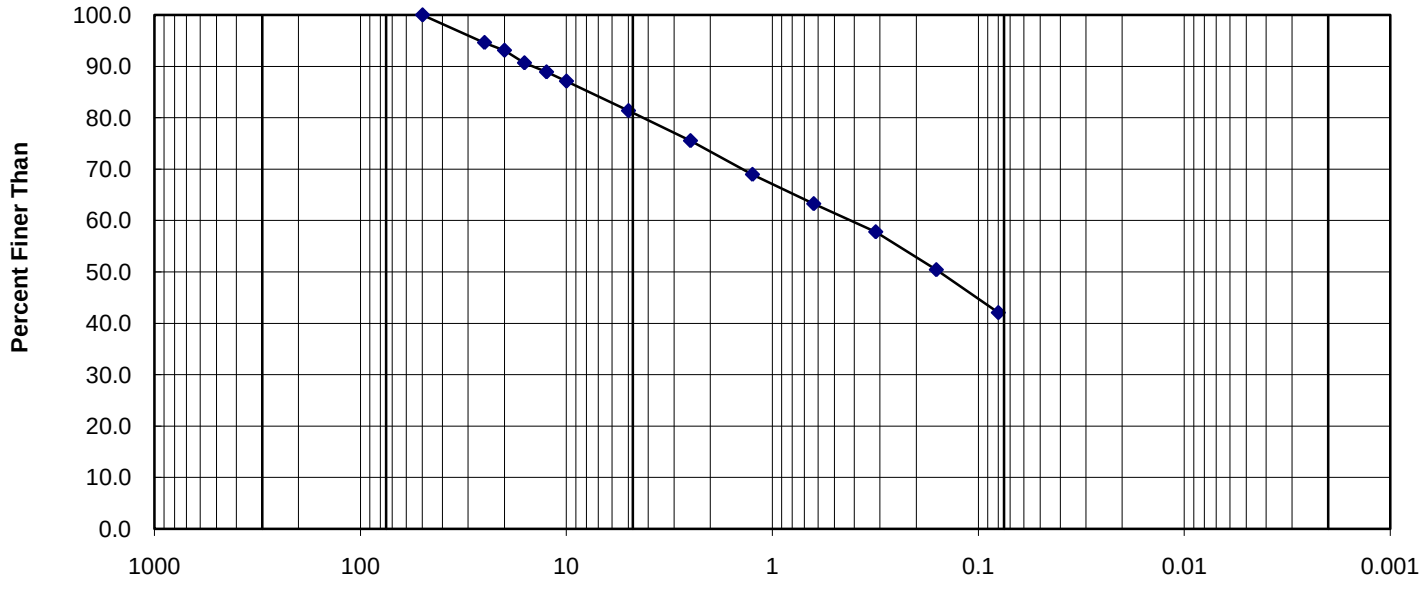
Sample Location: Pine Point, NT

Sample Description: Silt/Clay, some sand, some gravel

Fractured Face %: n/a
In situ Water Content %: 9.6
Date Tested: December 3, 2010
Tested By: T. Bourque

Remarks:
Sample retrieved by the client.

Sieve Size (mm)	Percent Passing	Specification Custom
50	100.0	
25	94.6	
20	93.1	
16	90.7	
12.5	88.9	
10	87.1	
5	81.4	
2.5	75.5	
1.25	69.0	
0.63	63.3	
0.315	57.8	
0.16	50.4	
0.08	42.1	



Boulders	Cobbles	Gravel		Sand			Silt	Clay
		Coarse	Fine	Coarse	Medium	Fine		

Gravel % 24.5 Sand % 33.5 Silt/Clay % 42.1

Reviewed By: _____

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Maskwa Engineering Operates in Hay River, Yellowknife and Fort Smith

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ENGINEERING LTD.

Sieve Analysis of Fine and Course Aggregates
ASTM C136 / CSA A23.2-2a

Project #:	10-024	Source	Test Pit	Lot No.	n/a
Title	Pine Point Site Investigation	Quantity (m3)	n/a	Sample.	TP-2010-04-BU1
Client	Knight Pieshold Consulting	Load Count	n/a		

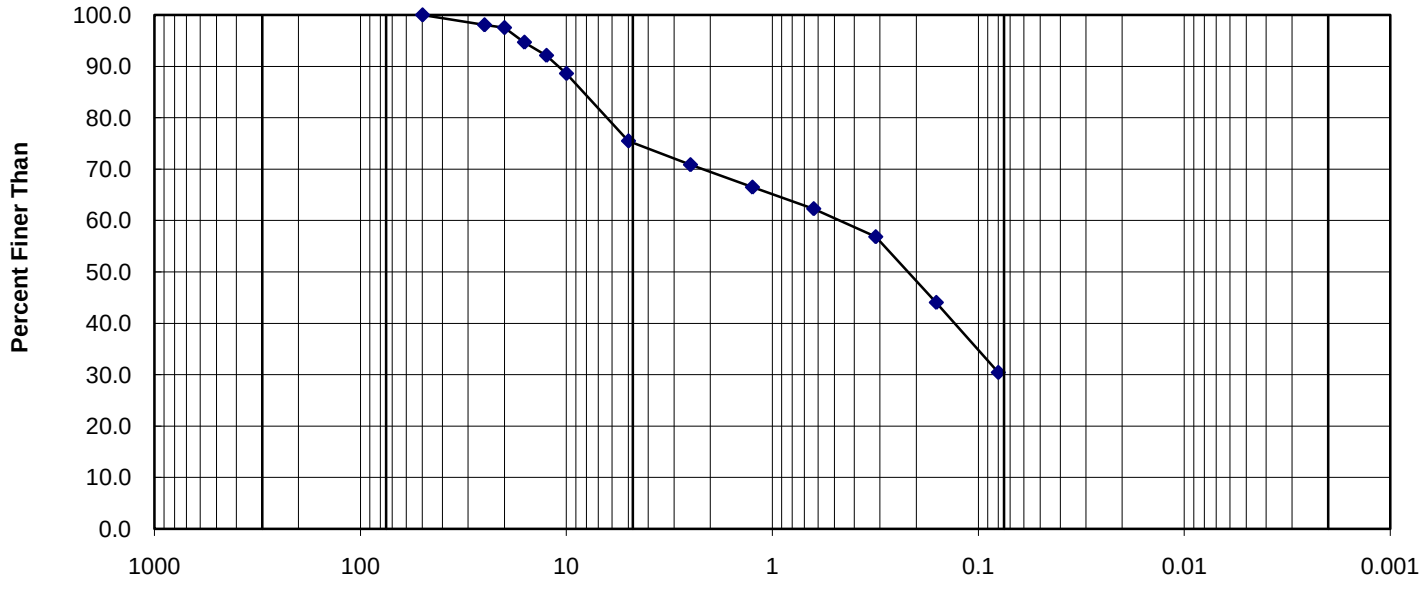
Sample Location: Pine Point, NT

Sample Description: Sand, some silt/clay, trace gravel

Fractured Face %: n/a
In situ Water Content %: 8.4
Date Tested: December 3, 2010
Tested By: T. Bourque

Remarks:
Sample retrieved by the client.

Sieve Size (mm)	Percent Passing	Specification Custom
50	100.0	
25	98.1	
20	97.5	
16	94.7	
12.5	92.1	
10	88.6	
5	75.5	
2.5	70.9	
1.25	66.5	
0.63	62.3	
0.315	56.8	
0.16	44.0	
0.08	30.4	



Boulders	Cobbles	Gravel		Sand			Silt	Clay
		Coarse	Fine	Coarse	Medium	Fine		

Gravel %	29.1	Sand %	40.4	Silt/Clay %	30.4

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ASTM C136 / CSA A23.2-2a

Project #:	10-024	Source	Test Pit	Lot No.	n/a
Title	Pine Point Site Investigation	Quantity (m3)	n/a	Sample.	TP-2010-06-BU1
Client	Knight Pieshold Consulting	Load Count	n/a		

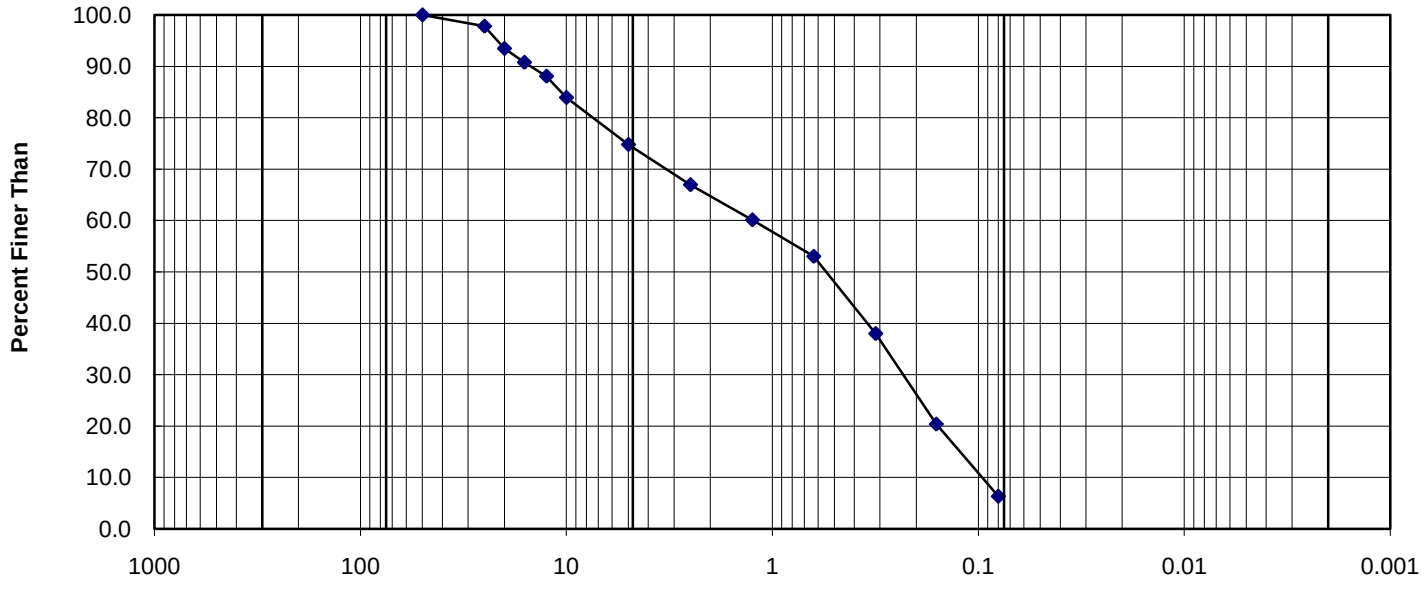
Sample Location: Pine Point, NT

Sample Description: Sand, some gravel, trace silt

Fractured Face %: n/a
In situ Water Content %: 12.9
Date Tested: December 3, 2010
Tested By: T. Bourque

Remarks:
Sample retrieved by the client.

Sieve Size (mm)	Percent Passing	Specification Custom
50	100.0	
25	97.8	
20	93.5	
16	90.8	
12.5	88.1	
10	83.9	
5	74.8	
2.5	67.0	
1.25	60.1	
0.63	53.0	
0.315	38.0	
0.16	20.4	
0.08	6.3	



Boulders	Cobbles	Gravel		Sand			Silt	Clay
		Coarse	Fine	Coarse	Medium	Fine		

Gravel %	33.0	Sand %	60.6	Silt/Clay %	6.3

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ASTM C136 / CSA A23.2-2a

Project #:	10-024	Source	Test Pit	Lot No.	n/a
Title	Pine Point Site Investigation	Quantity (m3)	n/a	Sample.	TP-2010-08-BU1
Client	Knight Pieshold Consulting	Load Count	n/a		

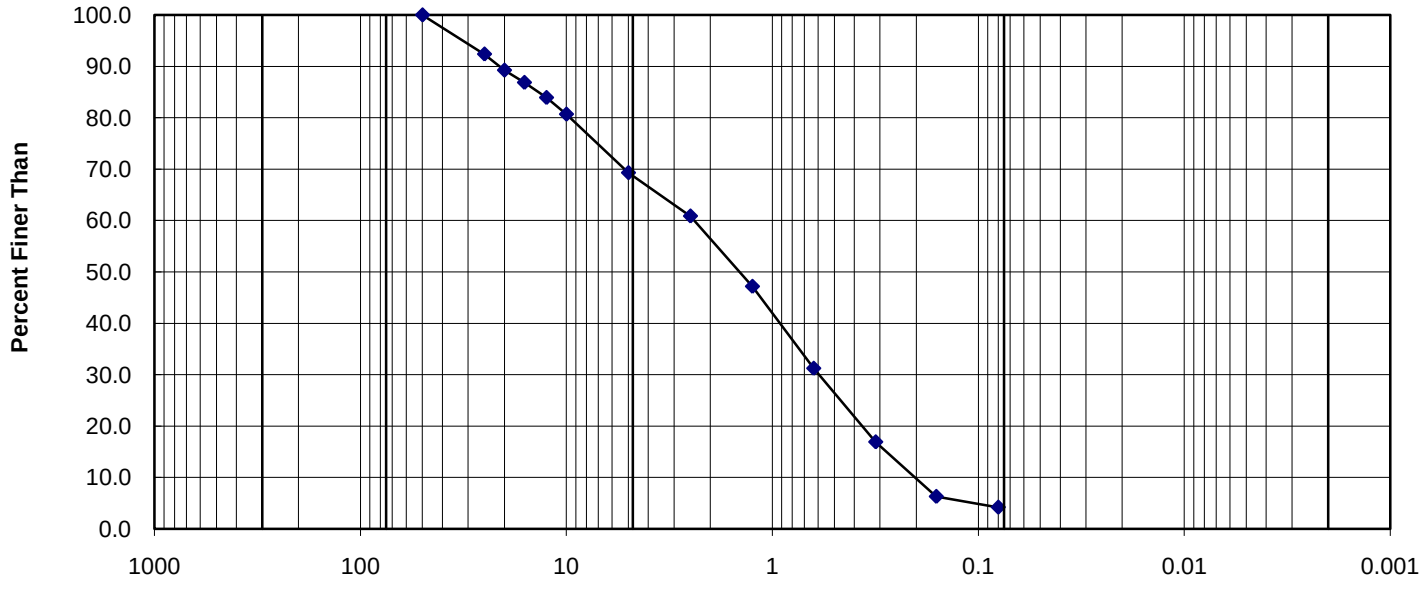
Sample Location: Pine Point, NT

Sample Description: Sand, some gravel, trace silt/clay

Fractured Face %: n/a
In situ Water Content %: 3.5
Date Tested: December 3, 2010
Tested By: T. Bourque

Remarks:
Sample retrieved by the client.

Sieve Size (mm)	Percent Passing	Specification Custom
50	100.0	
25	92.4	
20	89.3	
16	86.9	
12.5	83.9	
10	80.7	
5	69.3	
2.5	60.9	
1.25	47.2	
0.63	31.2	
0.315	16.9	
0.16	6.3	
0.08	4.2	



Boulders	Cobbles	Gravel		Sand			Silt	Clay
		Coarse	Fine	Coarse	Medium	Fine		

Gravel % 39.1 Sand % 56.7 Silt/Clay % 4.2

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Sieve Analysis of Fine and Course Aggregates
ASTM C136 / CSA A23.2-2a

Project #:	10-024	Source	Surface Sample	Lot No.	n/a
Title	Pine Point Site Investigation	Quantity (m3)	n/a	Sample.	GR-1
Client	Knight Pieshold Consulting	Load Count	n/a		

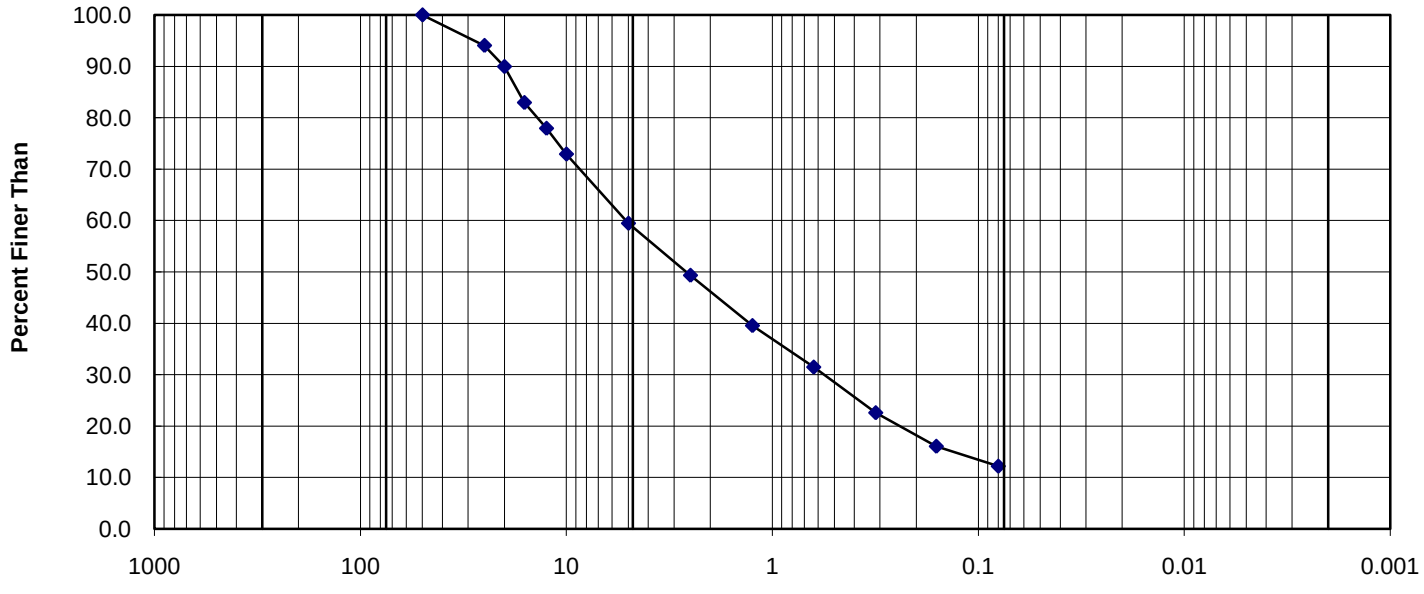
Sample Location: Pine Point, NT

Sample Description: Gravel, some sand, trace cobbles

Fractured Face %: n/a
In situ Water Content %: 5.2
Date Tested: December 6, 2010
Tested By: A. Heron

Remarks:
Sample retrieved by the client.

Sieve Size (mm)	Percent Passing	Specification Custom
50	100.0	
25	94.1	
20	90.0	
16	82.9	
12.5	77.9	
10	72.9	
5	59.5	
2.5	49.3	
1.25	39.6	
0.63	31.5	
0.315	22.6	
0.16	16.1	
0.08	12.2	



Boulders	Cobbles	Gravel		Sand			Silt	Clay
		Coarse	Fine	Coarse	Medium	Fine		

Gravel % 50.7 Sand % 37.1 Silt/Clay % 12.2

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Project #:	10-024	Source	Surface Sample	Lot No.	n/a
Title	Pine Point Site Investigation	Quantity (m3)	n/a	Sample.	GR-2
Client	Knight Pieshold Consulting	Load Count	n/a		

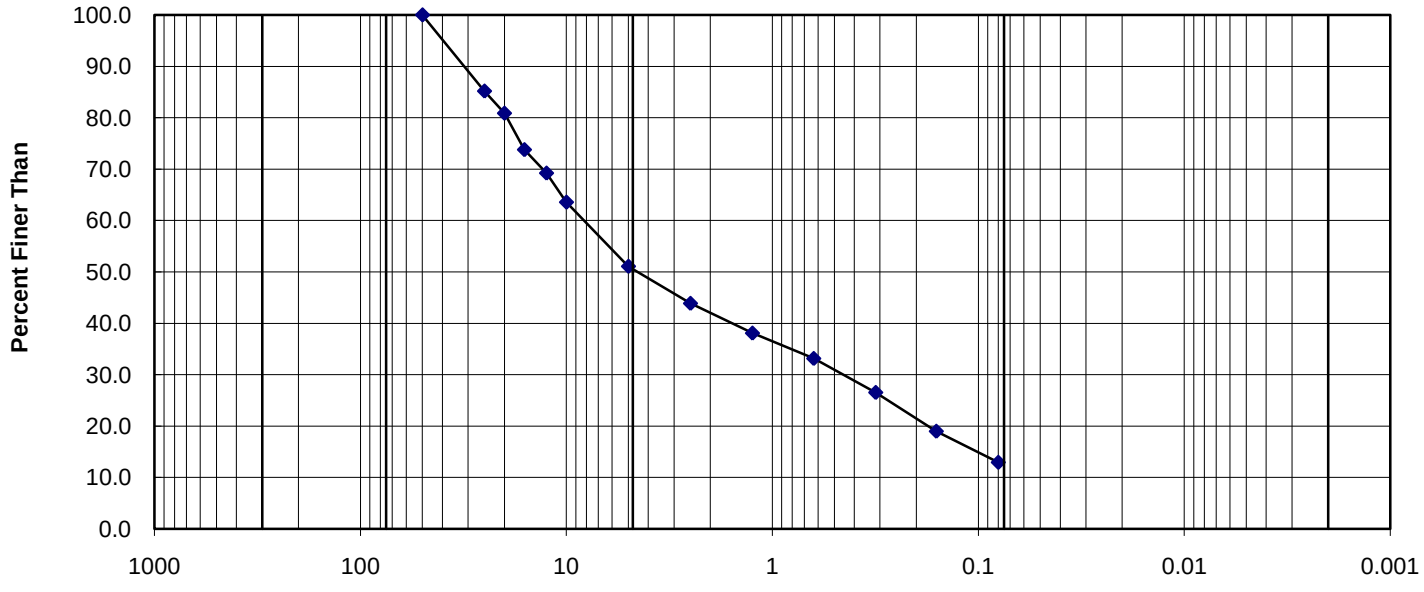
Sample Location: Pine Point, NT

Sample Description: Gravel, some sand, trace cobbles

Fractured Face %: n/a
In situ Water Content %: 5.8
Date Tested: December 6, 2010
Tested By: A. Heron

Remarks:
Sample retrieved by the client.

Sieve Size (mm)	Percent Passing	Specification Custom
50	100.0	
25	85.2	
20	80.9	
16	73.8	
12.5	69.2	
10	63.6	
5	51.1	
2.5	43.9	
1.25	38.1	
0.63	33.2	
0.315	26.5	
0.16	19.0	
0.08	13.0	



Boulders	Cobbles	Gravel		Sand			Silt	Clay
		Coarse	Fine	Coarse	Medium	Fine		

Gravel %	56.1	Sand %	30.9	Silt/Clay %	13.0

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Sieve Analysis of Fine and Course Aggregates
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Project #:	10-024	Source	Surface Sample	Lot No.	n/a
Title	Pine Point Site Investigation	Quantity (m3)	n/a	Sample.	TI-1
Client	Knight Pieshold Consulting	Load Count	n/a		

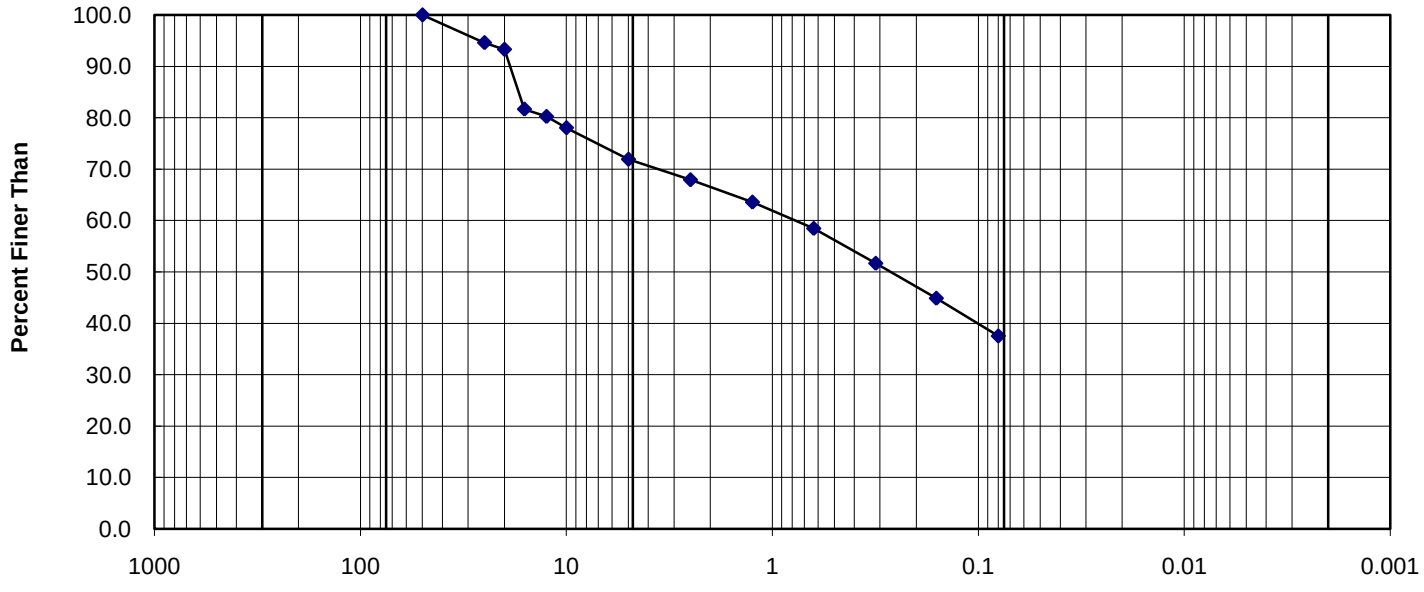
Sample Location: Pine Point, NT

Sample Description: Silt/Clay, some gravel, some sand

Fractured Face %: n/a
In situ Water Content %: 11.0
Date Tested: December 6, 2010
Tested By: T.Bourque

Remarks:
Sample retrieved by the client.

Sieve Size (mm)	Percent Passing	Specification Custom
50	100.0	
25	94.6	
20	93.3	
16	81.7	
12.5	80.2	
10	78.1	
5	71.9	
2.5	67.9	
1.25	63.6	
0.63	58.5	
0.315	51.7	
0.16	44.9	
0.08	37.5	



Boulders	Cobbles	Gravel		Sand			Silt	Clay
		Coarse	Fine	Coarse	Medium	Fine		

Gravel %	32.1	Sand %	30.4	Silt/Clay %	37.5

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Grain Size Analysis

(Mechanical & Hydrometer)

ASTM D422

Project No: 10-204 Sample No. TI-1

Short Title: Pine Point Site Investigation

Location: Pine Point, NT

Location: 641277e, 6750827n

Borehole # n/a

Tested By: T. Bourque Date: December 7, 2010

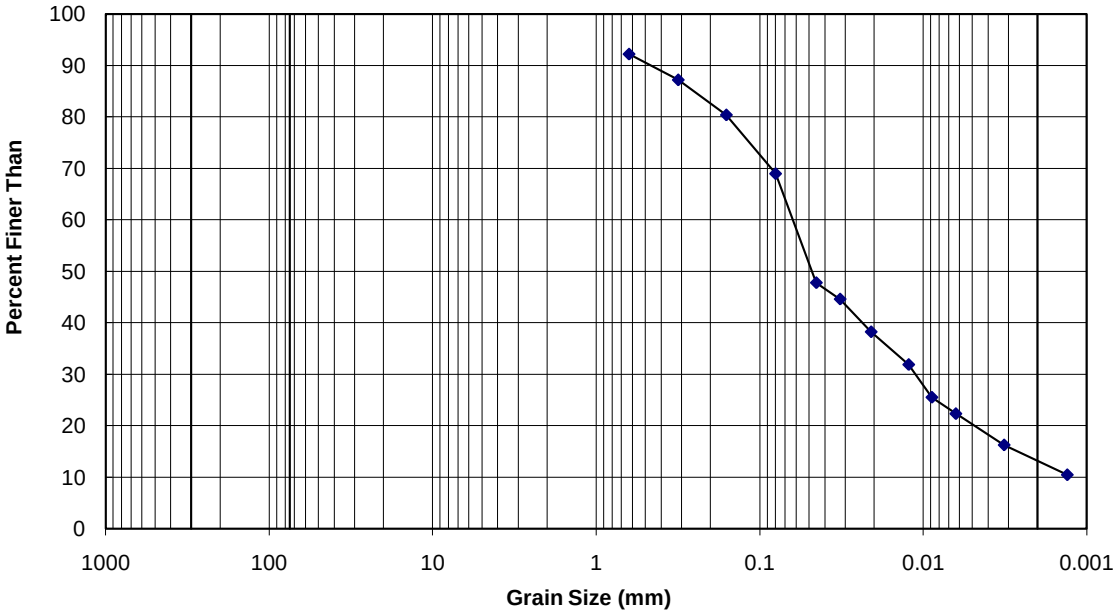
Depth 0.5 to 0.15

Source: Surface Sample

Description of Sample: sandy, silt, some clay

Date Sampled: November 14, 2010

Graphical Analysis



BOULDERS	COBBLES	GRAVEL		SAND			SILT	CLAY
		Coarse	Fine	Coarse	Medium	Fine		

% Gravel % Sand 34.7 % Silt 52.8 % Clay 12.5

Grain Size Analysis Results:

Opening (mm)	Percent Passing (%)
2.00	100.0
1.25	97.0
0.63	92.2
0.315	87.2
0.160	80.4
0.080	69.0
0.045	47.8
0.032	44.6
0.021	38.2
0.012	31.9
0.009	25.5
0.006	22.3
0.003	16.2
0.001	10.4

Comments

Natural water content 11.0

Reviewed by:

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ENGINEERING LTD.

Sieve Analysis of Fine and Course Aggregates
ASTM C136 / CSA A23.2-2a

Project #:	10-024	Source	Surface Sample	Lot No.	n/a
Title	Pine Point Site Investigation	Quantity (m3)	n/a	Sample.	TI-2
Client	Knight Pieshold Consulting	Load Count	n/a		

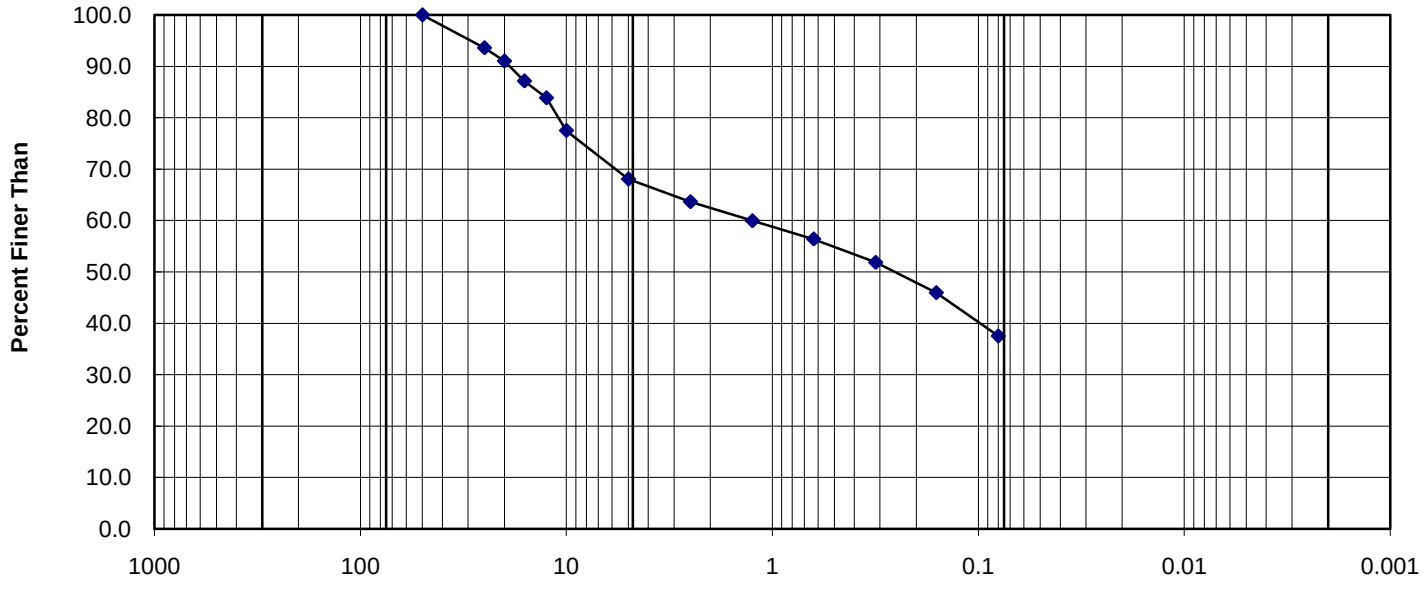
Sample Location: Pine Point, NT

Sample Description: Silt/Clay, some gravel, some sand

Fractured Face %: n/a
In situ Water Content %: 13.5
Date Tested: December 6, 2010
Tested By: T.Bourque

Remarks:
Sample retrieved by the client.

Sieve Size (mm)	Percent Passing	Specification Custom
50	100.0	
25	93.6	
20	91.0	
16	87.1	
12.5	83.9	
10	77.5	
5	68.1	
2.5	63.6	
1.25	59.9	
0.63	56.4	
0.315	51.8	
0.16	45.9	
0.08	37.5	



Boulders	Cobbles	Gravel		Sand			Silt	Clay
		Coarse	Fine	Coarse	Medium	Fine		

Gravel % 36.4 Sand % 26.1 Silt/Clay % 37.5

Reviewed By: _____

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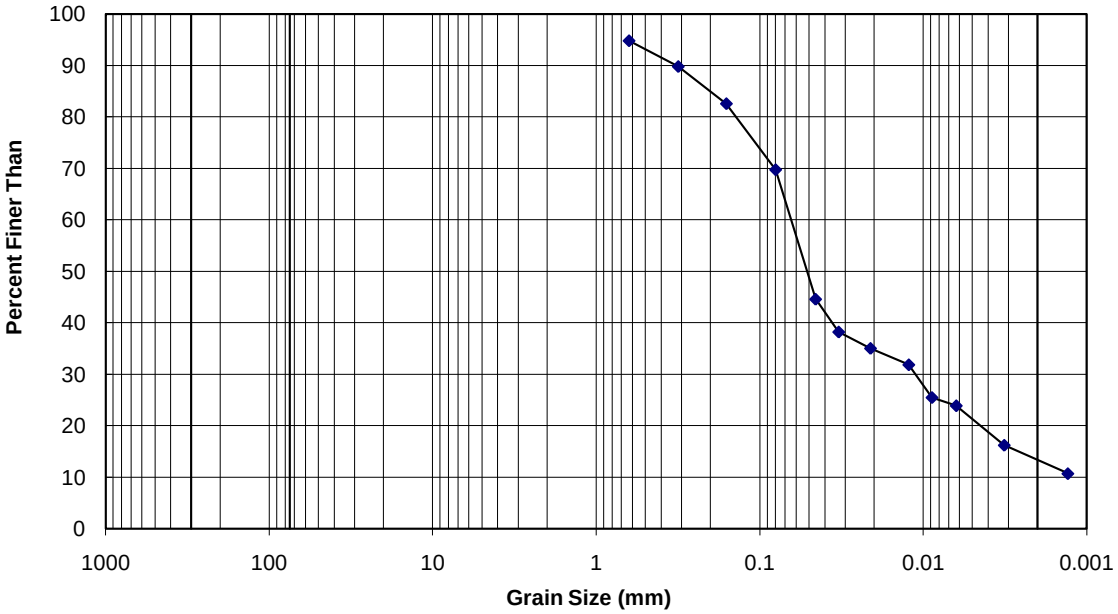
Grain Size Analysis

(Mechanical & Hydrometer)
ASTM D422

Project No: 10-204 Sample No. TI-2
Short Title: Pine Point Site Investigation
Location: Pine Point, NT
Location: 641446e, 6750747n
Borehole # n/a
Tested By: T. Bourque Date: December 7, 2010

Depth 0.5 to 0.15
Source: Surface Sample
Description of Sample: sandy, silt, some clay
Date Sampled: November 14, 2010

Graphical Analysis



BOULDERS	COBBLES	GRAVEL		SAND			SILT	CLAY
		Coarse	Fine	Coarse	Medium	Fine		

% Gravel % Sand 34.6 % Silt 52.6 % Clay 12.7

Grain Size Analysis Results:

Opening (mm)	Percent Passing (%)
2.00	100.0
1.25	98.0
0.63	94.8
0.315	89.8
0.160	82.6
0.080	69.7
0.046	44.6
0.033	38.2
0.021	35.0
0.012	31.9
0.009	25.5
0.006	23.9
0.003	16.2
0.001	10.7

Comments

Natural water content 13.5

Reviewed by:

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Sieve Analysis of Fine and Course Aggregates
ASTM C136 / CSA A23.2-2a

Project #:	10-024	Source	Surface Sample	Lot No.	n/a
Title	Pine Point Site Investigation	Quantity (m3)	n/a	Sample.	TI-3
Client	Knight Pieshold Consulting	Load Count	n/a		

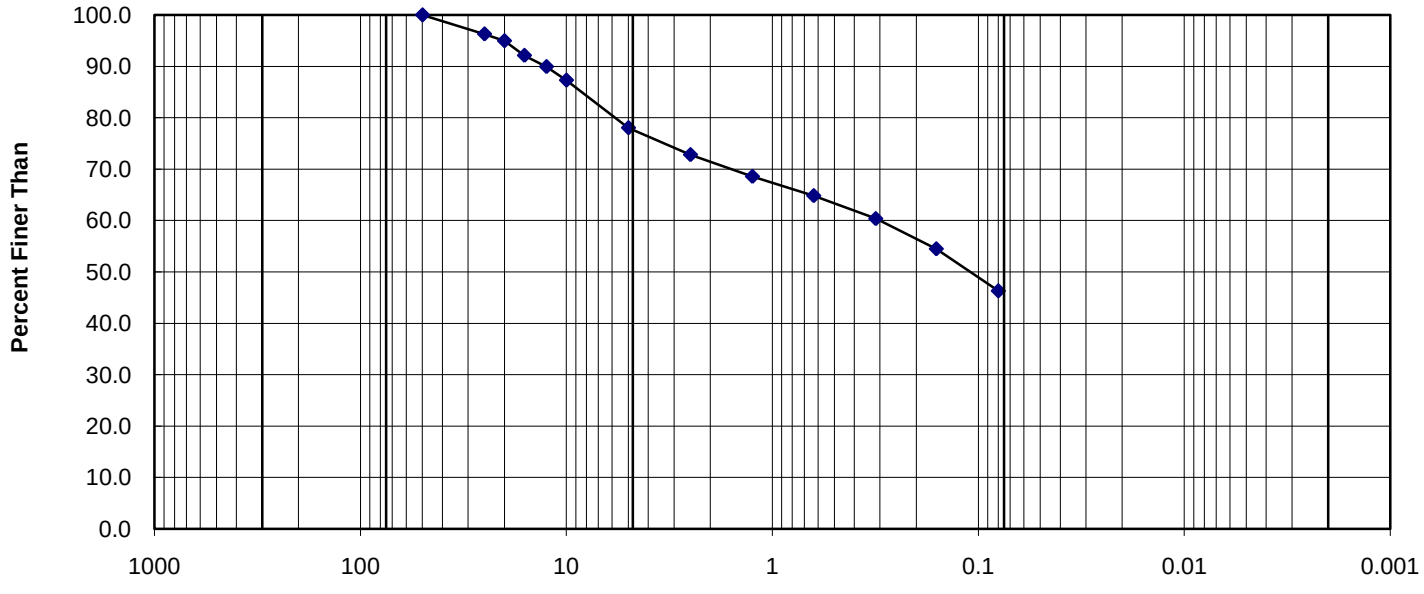
Sample Location: Pine Point, NT

Sample Description: Silt/Clay, some gravel, some sand

Fractured Face %: n/a
In situ Water Content %: 9.2
Date Tested: December 6, 2010
Tested By: T.Bourque

Remarks:
Sample retrieved by the client.

Sieve Size (mm)	Percent Passing	Specification Custom
50	100.0	
25	96.3	
20	95.0	
16	92.1	
12.5	90.0	
10	87.3	
5	78.1	
2.5	72.8	
1.25	68.6	
0.63	64.9	
0.315	60.4	
0.16	54.5	
0.08	46.3	



Boulders	Cobbles	Gravel		Sand			Silt	Clay
		Coarse	Fine	Coarse	Medium	Fine		

Gravel %	27.2	Sand %	26.5	Silt/Clay %	46.3

Reviewed By: _____

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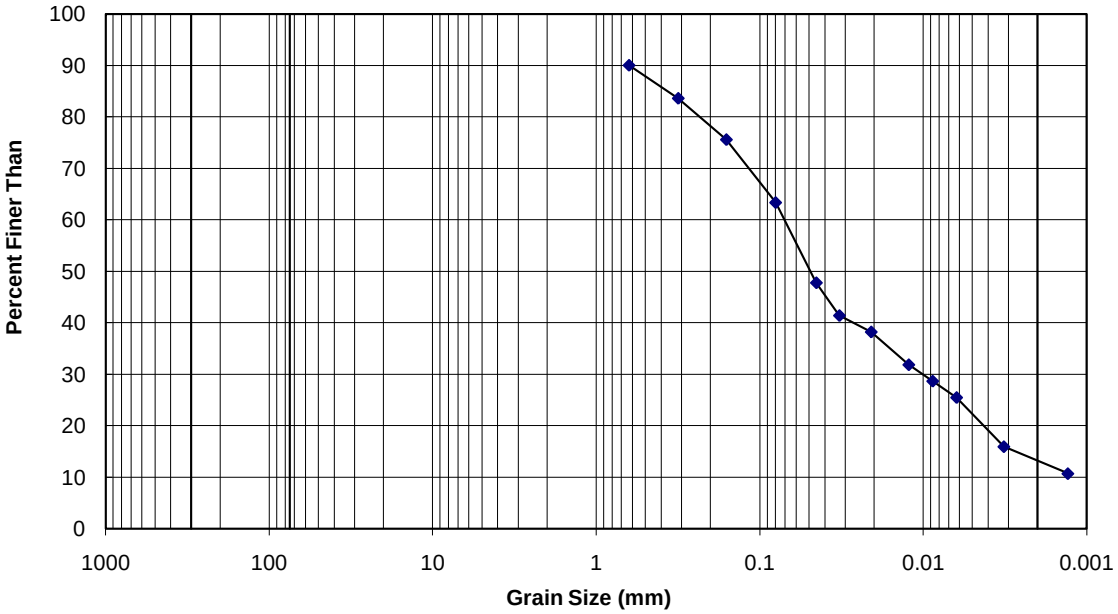
Grain Size Analysis

(Mechanical & Hydrometer)
ASTM D422

Project No: 10-204 Sample No. TI-3
Short Title: Pine Point Site Investigation
Location: Pine Point, NT
Location: 640964e, 6750058n
Borehole # n/a
Tested By: T. Bourque Date: December 7, 2010

Depth 0.5 to 0.15
Source: Surface Sample
Description of Sample: sandy, silt, some clay
Date Sampled: November 14, 2010

Graphical Analysis



BOULDERS	COBBLES	GRAVEL		SAND			SILT	CLAY
		Coarse	Fine	Coarse	Medium	Fine		

% Gravel % Sand 39.3 % Silt 48.0 % Clay 12.6

Grain Size Analysis Results:

Opening (mm)	Percent Passing (%)
2.00	100.0
1.25	96.2
0.63	90.0
0.315	83.6
0.160	75.6
0.080	63.3
0.045	47.8
0.033	41.4
0.021	38.2
0.012	31.9
0.009	28.7
0.006	25.5
0.003	16.0
0.001	10.7

Comments

Natural water content 9.2

Reviewed by:

MASKWA
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Sieve Analysis of Fine and Course Aggregates
ASTM C136 / CSA A23.2-2a

Project #:	10-024	Source	Surface Sample	Lot No.	n/a
Title	Pine Point Site Investigation	Quantity (m3)	n/a	Sample.	WR-1
Client	Knight Pieshold Consulting	Load Count	n/a		

Sample Location: Pine Point, NT

Sample Description: Cobbles and Boulders

Fractured Face %: n/a

In situ Water Content %:

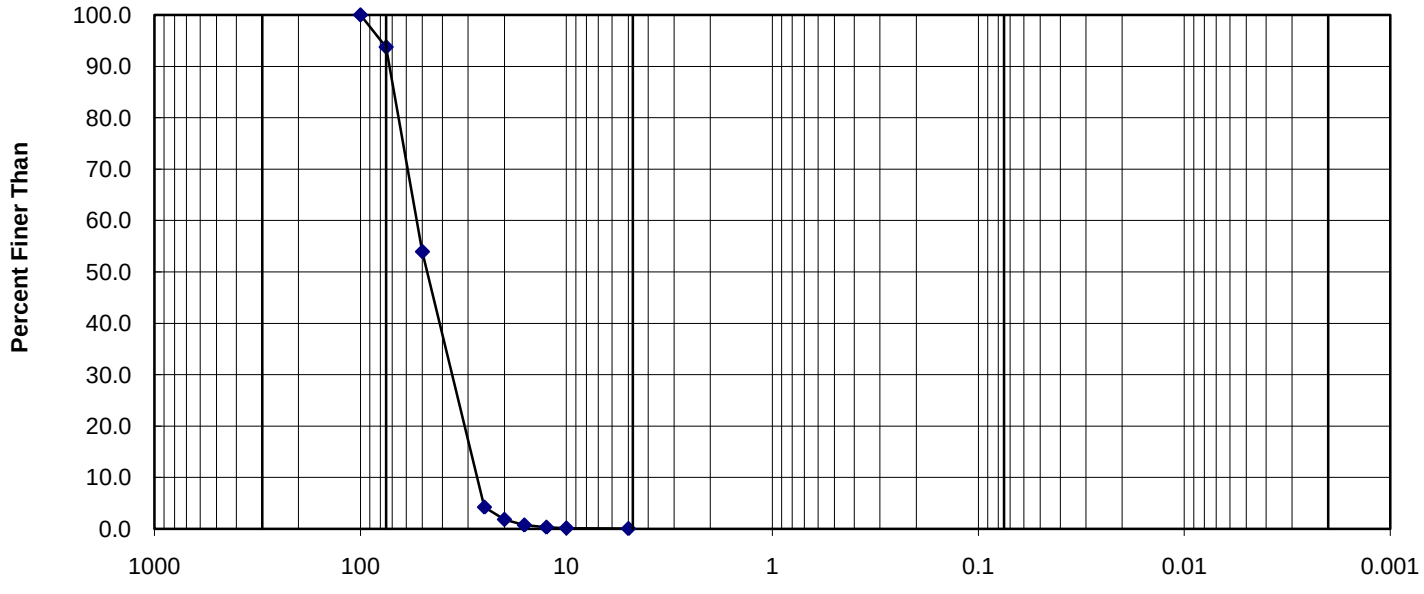
Date Tested: December 3, 2010

Tested By: T. Smith

Remarks:

Sample retrieved by the client from a test pit.

Sieve Size (mm)	Percent Passing	Specification Custom
100	100.0	
75	93.8	
50	53.9	
25	4.2	
20	1.8	
16	0.7	
12.5	0.3	
10	0.1	
5	0.0	



Boulders	Cobbles	Gravel		Sand			Silt	Clay
		Coarse	Fine	Coarse	Medium	Fine		

Gravel %	95.8	Sand %	4.2	Silt/Clay %	0.0

Reviewed By: _____

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ASTM C136 / CSA A23.2-2a

Project #:	10-024	Source	Surface Sample	Lot No.	n/a
Title	Pine Point Site Investigation	Quantity (m3)	n/a	Sample.	WR-2
Client	Knight Pieshold Consulting	Load Count	n/a		

Sample Location: Pine Point, NT

Sample Description: Cobbles and Boulders

Fractured Face %: n/a

In situ Water Content %:

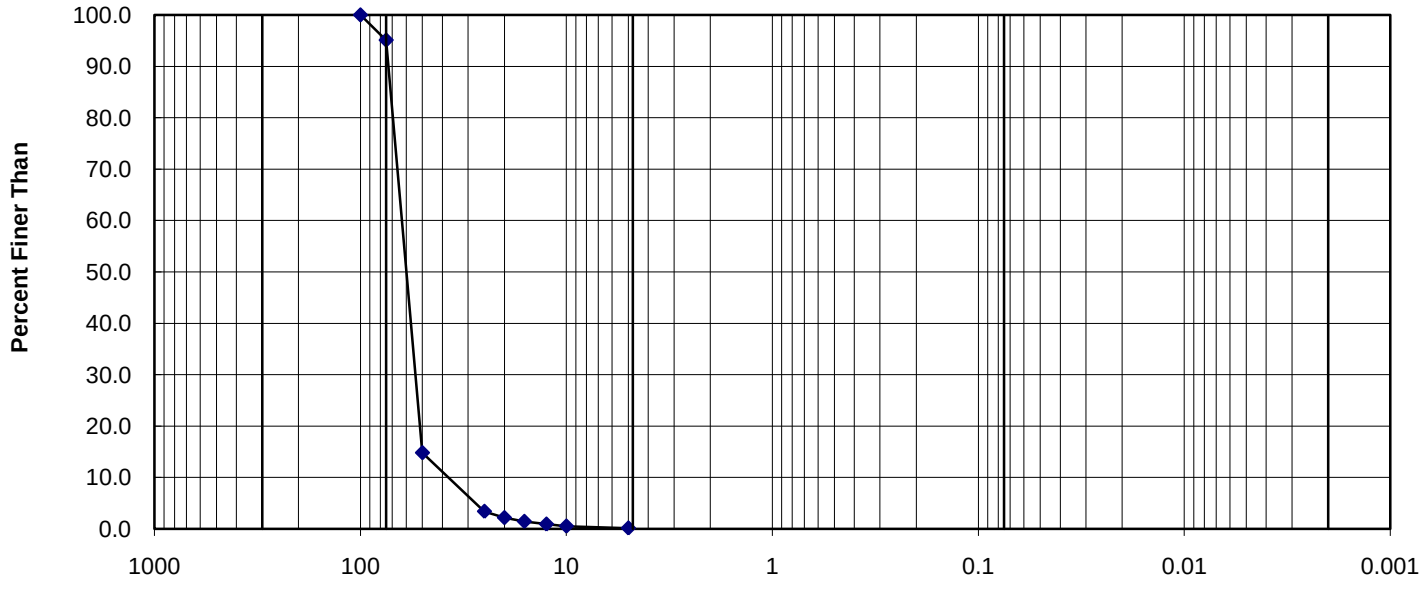
Date Tested: December 3, 2010

Tested By: A. Heron

Remarks:

Sample retrieved by the client from a test pit.

Sieve Size (mm)	Percent Passing	Specification Custom
100	100.0	
75	95.1	
50	14.8	
25	3.4	
20	2.2	
16	1.4	
12.5	0.9	
10	0.5	
5	0.1	



Boulders	Cobbles	Gravel		Sand			Silt	Clay
		Coarse	Fine	Coarse	Medium	Fine		

Gravel %	96.6	Sand %	3.2	Silt/Clay %	0.1

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Sieve Analysis of Fine and Course Aggregates
ASTM C136 / CSA A23.2-2a

Project #:	10-024	Source	Surface Sample	Lot No.	n/a
Title	Pine Point Site Investigation	Quantity (m3)	n/a	Sample.	WR-3
Client	Knight Pieshold Consulting	Load Count	n/a		

Sample Location: Pine Point, NT

Sample Description: Cobbles and Boulders

Fractured Face %: n/a

In situ Water Content %:

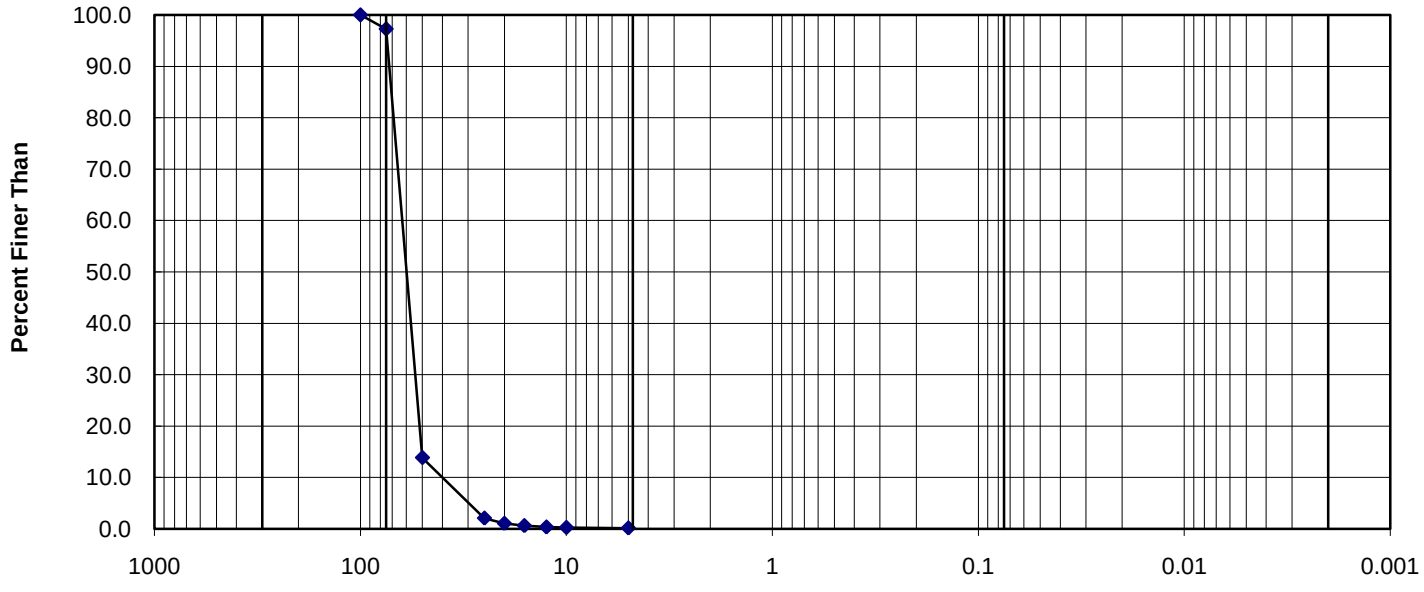
Date Tested: December 3, 2010

Tested By: A. Heron

Remarks:

Sample retrieved by the client from a test pit.

Sieve Size (mm)	Percent Passing	Specification Custom
100	100.0	
75	97.3	
50	13.8	
25	2.1	
20	1.0	
16	0.6	
12.5	0.3	
10	0.2	
5	0.1	



Boulders	Cobbles	Gravel		Sand			Silt	Clay
		Coarse	Fine	Coarse	Medium	Fine		

Gravel %	97.9	Sand %	1.9	Silt/Clay %	0.1

Reviewed By: _____

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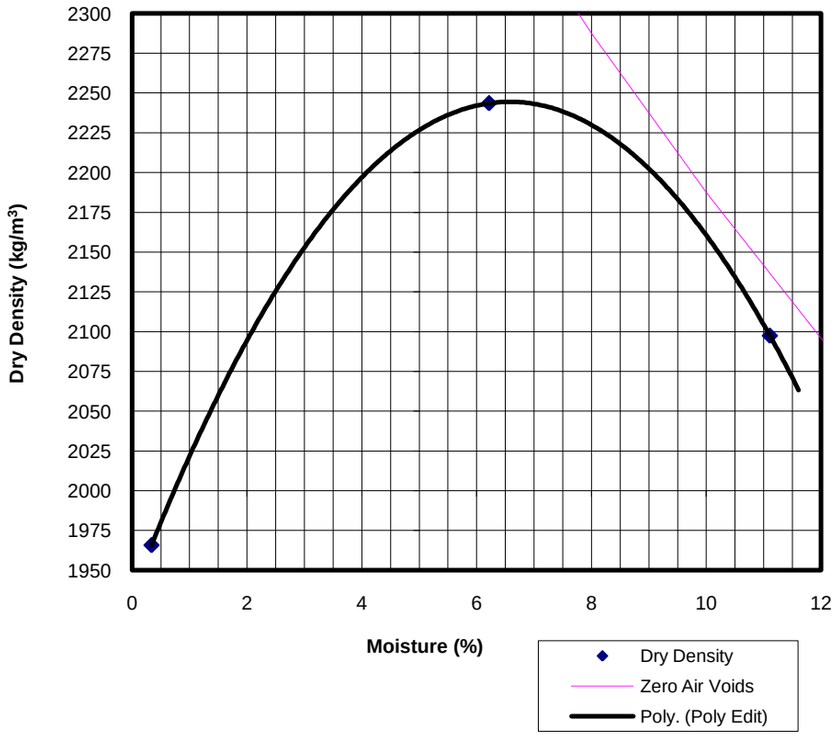
Job No. 10-204

Test Peformed By Troy Bourque

Date of Test 6-Dec-10

MOISTURE DENSITY RELATIONSHIP

Trial No.	1	2	3	4	5
Mold No.	Split Ring	Split Ring	Split Ring		
Wt of sample wet + mold (g)	11166.5	12038.7	11926.9		
Wt. Of mold (g)	6977.1	6977.1	6977.1		
Wt. Of sample wet (g)	4189.4	5061.6	4949.8		
Volume of Mold (cm^3)	2124.0	2124.0	2124.0		
Wet Density (kg/m^3)	1972.4	2383.1	2330.4		
Dry Density (kg/m^3)	1965.8	2243.6	2097.4		
MOISTURE CONTENT					
Tare No.	T1	T2	T3		
Wt of sample wet + tare (g)	2130.7	2388.6	2838.8		
Wt of sample dry + tare (g)	2124.9	2272.7	2596.0		
Wt. Water	5.8	115.9	242.8		
Tare mass (g)	406.6	408.5	410.3		
Wt. Dry soil (g)	1718.3	1864.2	2185.7		
Moisture content (%)	0.3	6.2	11.1		



Maximum Dry Density

Max. Dry Density **2245** kg/m^3

Optimum Moisture **6.5** %

Standard Method **ASTM D698** **C**

Rock Correction (if required)

% Oversize 6.9 %

Max. Dry Density **2266** kg/m^3 @ **6.1%**

Sample Description: Combonation of samples TI-1, TI-2, and TI-3. Samples consisted of mostly silt and clay with some gravel and sand present

REMARKS: Proctor conducted on a mix of three separate samples, oversize content calculated by taking the average of the three samples oversize percentage.

MASKWA ENGINEERING

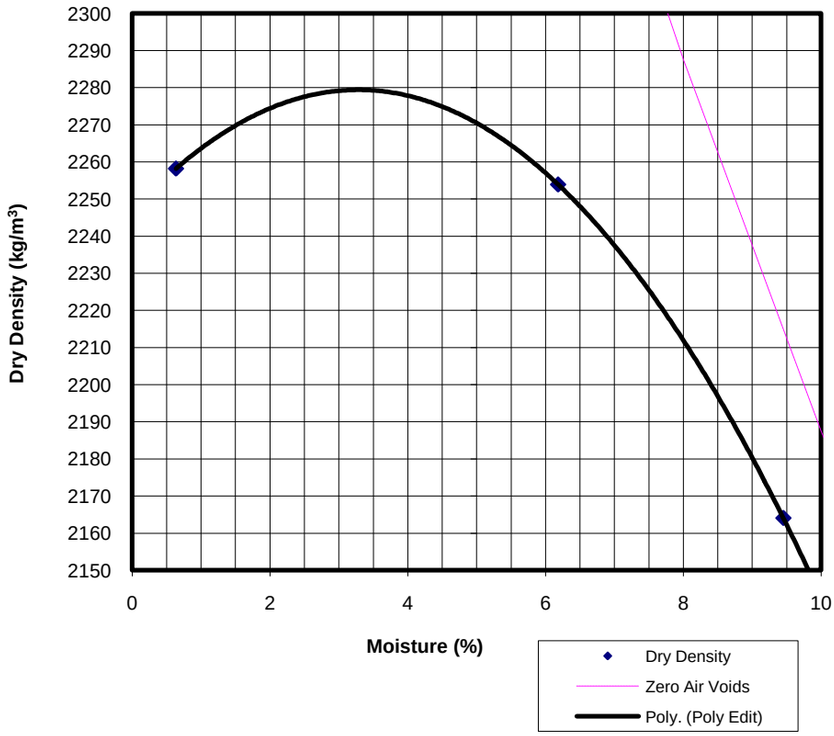
Job No. 10-204

Test Peformed By Troy Bourque

Date of Test 6-Dec-10

MOISTURE DENSITY RELATIONSHIP

Trial No.	1	2	3	4	5
Mold No.	Split Ring	Split Ring	Split Ring		
Wt of sample wet + mold (g)	11804.1	12060.4	12008.0		
Wt. Of mold (g)	6977.1	6977.1	6977.1		
Wt. Of sample wet (g)	4827.0	5083.3	5030.9		
Volume of Mold (cm^3)	2124.0	2124.0	2124.0		
Wet Density (kg/m^3)	2272.6	2393.3	2368.6		
Dry Density (kg/m^3)	2258.2	2253.9	2164.1		
MOISTURE CONTENT					
Tare No.	T1	T2	T3		
Wt of sample wet + tare (g)	864.0	745.8	2734.6		
Wt of sample dry + tare (g)	861.1	726.0	2533.5		
Wt. Water	2.9	19.8	201.1		
Tare mass (g)	405.7	405.7	405.7		
Wt. Dry soil (g)	455.4	320.3	2127.8		
Moisture content (%)	0.6	6.2	9.5		



Maximum Dry Density

Max. Dry Density **2280** kg/m^3

Optimum Moisture **3.4** %

Standard Method **ASTM D1557 C**

Rock Correction (if required)

% Oversize 14.6 %

Max. Dry Density **2322** kg/m^3 @ **3.0%**

Sample Description: Combonation of samples GR-1 and GR-2. Samples consisted of mostly gravel and sand with some silt/clay present.

REMARKS: Proctor conducted on a mix of two separate samples, oversize content calculated by taking the average of the two samples oversize percentage.

Appendix C.17

Thor Lake Project - Estimate of Groundwater Inflows to Underground Mine. Report NB11-00076

Knight Piésold
CONSULTING

MEMORANDUM

To:	Mr. David Swisher	Date:	February 22, 2011
Copy To:	Bill Mercer, Cara Stapley, Kevin Hawton, Matt Parfitt	File No.:	NB101-390/2-A.01
From:	Jordin Barclay	Cont. No.:	NB11-00076
Re:	Thor Lake Project - Estimate of Groundwater Inflows to Underground Mine		

1.0 Introduction

Knight Piésold Ltd. (KPL) conducted a hydrogeological site investigation program at Avalon's Thor Lake Project site as part of the geomechanical site investigations to determine hydraulic characteristics of the Nechalacho Deposit rock mass. The results of the hydrogeological program were used to estimate groundwater inflows associated with the proposed underground mine. This memo presents the results of the modelling completed to estimate the mine water inflow into the proposed underground mine.

2.0 Conceptual Model

For the purpose of estimating groundwater inflows to the proposed underground mine, a simple conceptual model was developed. The boundaries of the model were primarily based on the estimated Project site watershed areas, as presented in KPL Memorandum "Feasibility Study Water/Solids Balance Analysis Results", issued on January 6, 2011 (Cont. No. NB10-00596, Rev 0). There are several lakes within the watershed area of the deposit, and the lakes in the immediate vicinity of the Nechalacho Deposit are expected to represent the primary groundwater flow boundaries.

Hydraulic conductivity values estimated from the 2010 packer testing results are relatively low. The hydraulic conductivity ranges from approximately $3x10^{-9}$ m/s to $2x10^{-7}$ m/s, which is consistent with expected values for intrusive and metamorphic crystalline rock (Freeze and Cherry, 1979). Results of the geomechanical program (as presented in KPL Memorandum Cont. No. NB10-00570) suggested that the Rock Mass Rating in the area of the deposit indicates GOOD to VERY GOOD rock with the design values typically being in the upper end of the GOOD range. Based on the data from the 2010 geomechanical investigations, flat-lying (horizontal) joints form the dominant joint set. Vertical to sub-vertical joint sets are also present although not as prominent.

The Deposit area is surrounded by a Sodalite Cumulate zone, a cap rock of the Nechalacho mineralized intrusion that was subsequently eroded away. The sodalite cumulate material is described as hydrothermally altered and is a mixture of illitic clays and sericite. There are no persistent records of drill fluid loss within this zone and it is expected to have very low hydraulic conductivity.

Temperature data has been collected from thermistors installed by Stantec (for their Environmental Baseline Report, dated December 23, 2009), and by KPL during winter 2010 to assess the presence of permafrost. Temperature data suggests that permafrost is discontinuous in the area and absent beneath the lakes and in some areas close to the lakes. No permafrost was encountered in the KPL drillholes equipped with thermistors.

3.0 Groundwater Inflow Model

Groundwater inflow was modelled using Visual MODFLOW software. The model was run in steady state and boundary conditions included: constant head cells for nearby lakes, recharge boundaries for precipitation at surface and drain cells for the proposed underground workings.

One hydrogeologic unit was used to simulate bedrock in the area of the deposit. It was assumed that the sodalite cumulate zone has similar hydraulic conductivity as the un-altered bedrock. The horizontal hydraulic conductivity is likely greater than the vertical hydraulic conductivity due to the orientation of the dominant joint sets. It was assumed that the horizontal hydraulic conductivity is two times higher than the vertical hydraulic conductivity.

A range of hydraulic conductivity values were used to account for low and high hydraulic conductivities for bedrock. The estimated hydraulic conductivities assigned for the sensitivity analysis are included in Table 1. The range of selected hydraulic conductivity values is within a more narrow range than the results of packer testing. The highest hydraulic conductivity recorded ($2x10^{-7}$ m/s) was tested along a relatively shallow interval and is not representative of the bedrock at the depth of the deposit. The range of values selected for the sensitivity analysis provides a relatively conservative range of possible hydraulic conductivity values within the area of the deposit.

A simplified version of the Pre-Feasibility Study mine layout was entered into the model as drain cells representing the ramp and the base of the deposit area. Arbitrarily high hydraulic conductivity was assigned to cells in the area of the deposit to represent the mine workings. Groundwater inflows were estimated at steady state conditions prior to initiation of paste backfilling. It was assumed that the open area of the mine was greatest just prior to the start of paste backfilling (at the end of Year 4).

4.0 Estimated Groundwater Inflow

The estimated range of groundwater inflows is between 3 L/s and 10 L/s. It is estimated that approximately 60% of the groundwater will inflow along the ramp and approximately 40% will inflow into the underground workings through the surrounding rock.

The predicted groundwater drawdown in bedrock at ground surface for the 10 L/s case is illustrated on Figure 1.

During mine development, groundwater inflows may be higher than the range that has been estimated herein. Higher inflows may occur if mine development intersects any relatively high permeability features. It is expected that high inflows would decrease quickly as the groundwater stored in high permeability features was drained. There is also a possibility that a high permeability feature may provide a conduit for groundwater flow from a surface water body to the mine, resulting in persistent higher than predicted groundwater inflows. To date, there have been no geologic units or structures that have been intersected during site investigations that are interpreted to potentially produce relatively high long term inflows. KPL understands that Avalon intends to drill additional drillholes along the alignment of the proposed ramp. KPL recommends that the results of additional drilling be evaluated to update the hydrogeological characterization.

The chance of relatively high long term groundwater inflows can be reduced during advancement of the ramp. Investigation is recommended in advance of the face during ramp development to avoid potentially high groundwater inflows. If high inflows are observed during investigation, the area can be grouted prior to advancing the ramp.

5.0 Estimated Underground Flooding

During post-closure the underground workings will be allowed to flood. It was estimated that 95% of the void space of the underground mine will be filled with paste backfill. The remaining void space will be flooded with groundwater. The MODFLOW simulation of the groundwater inflows was also used to model underground mine flooding by modifying the elevation of the drain boundaries. Results suggest that the inflow rate does not change significantly during underground mine flooding.

The volume of the void space including the ramp and non-backfilled stopes for the end of mine was estimated to be 500,000 m^3. Based on the estimated void volume and the simulated mine inflows, the underground mine will be flooded 5.3 years to 1.6 years after mine closure. It was anticipated that for each scenario it will take an additional 0.5 years to re-establish water levels to pre-mine conditions.

Signed: _____ Approved: _____

FOR Jordin Barclay, P.Geo
Project Hydrogeologist

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

References

Freeze, R.A. and J.A. Cherry. 1979. Groundwater. Prentice-Hall, Englewood Cliffs, NJ.

Attachments:

Table 1 Rev 0 Model Parameters and Sensitivity Analysis
Figure 1 Rev 0 Predicted Groundwater Drawdown Due to Mine Dewatering

/jab

Knight Piésold CONSULTING

TABLE 1

AVALON RARE METALS INC.
THOR LAKE PROJECT

ESTIMATE OF GROUNDWATER INFLOWS TO UNDERGROUND MINE
MODEL PARAMETERS AND SENSITIVITY ANALYSIS

Print Feb/22/11 10:55:06

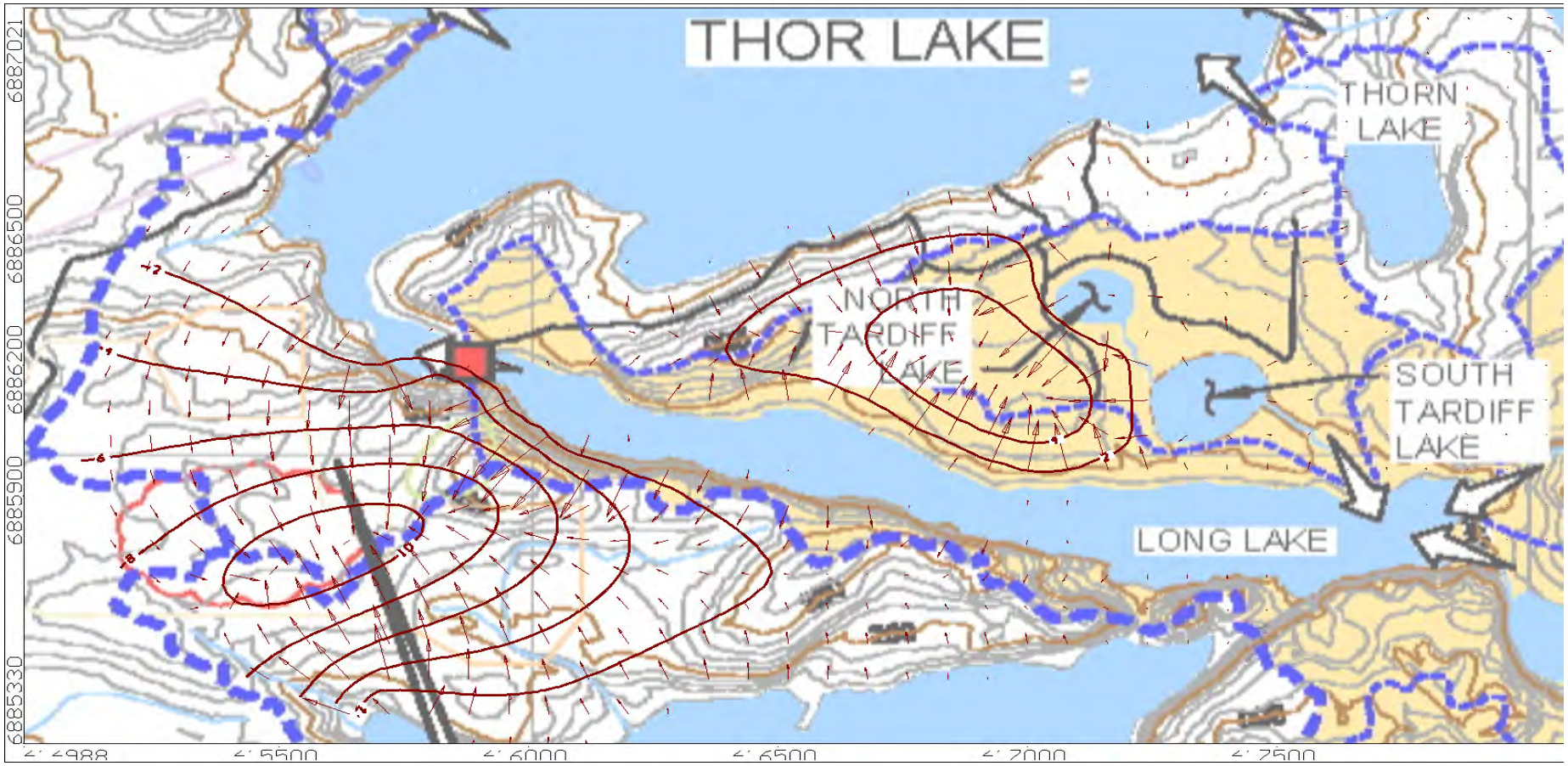
Geologic Unit	Low Hydraulic Conductivity (m/s)	High Hydraulic Conductivity (m/s)
Bedrock (Horizontal)	8.E-09	2.E-08
Bedrock (Vertical)	4.E-09	1.E-08

I:\1\01\00390\02\A\Correspondence\NB11-00076 - Mine Inflow Modelling Summary\[Table 1.xlsx]Table 1 - PARAMETERS

NOTES:

1. HYDRAULIC CONDUCTIVITY ESTIMATES BASED ON THE RANGE OF PACKER TEST RESULTS AND TYPICAL RANGES FOR GEOLOGIC UNITS (FREEZE AND CHERRY, 1979).

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	22FEB11	ISSUED WITH MEMO NB11-00076	JAB	CLS	MRP



NOTES:

1. DRAWDOWN IS CHANGE IN WATER LEVELS (m) FROM STATIC CONDITIONS AS A RESULT OF MINE DEWATERING.
2. ARROWS REPRESENT ESTIMATED GROUNDWATER FLOW DIRECTIONS.

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	22FEB'11	ISSUED WITH MEMO	JB	CLS	MRP

AVALON RARE METALS INC.

THOR LAKE PROJECT

ESTIMATE OF GROUNDWATER INFLOWS TO UNDERGROUND MINE
PREDICTED GROUNDWATER DRAWDOWN DUE TO MINE DEWATERING

Knight Piésold CONSULTING

P/A NO. NB101-390/2

REF. NO. NB11-00076

FIGURE 1

REV 0