

DRILL HOLE # BGC03-26**Date Drilled:** May 25, 2003**Contractor & Rig:** Mine's Diamond Drill**Drill Method:** BQ Chilled Brine Coring**Hammer Type:** N/A**Location:** East Twin Quarry**Elevation:** 416.6 m**Co-ord:** 8104113.8N, 583183.4E (UTM-NAD83)**Logged by:** G. Ferris**Project No.** 0255-008-03**Reviewed by:** J. Cassie**Notes:** No Installation

Depth (m)	SOIL DESCRIPTION	Core Run	Recovery	Moisture Content %		Installation / Backfill		Depth (m)
				Wp	Wl			
0	Ground Surface	416.6						0
0	TILL Cobbles, and gravel, clayey, trace sand, brown, frozen, friable, large clasts of various geological origins.	0.0	1					0
1								1
1	@ 1.57 m: Sand, silty, some gravel, sub rounded gravel.	414.6	2					2
2	SHALE Dark grey to black, fresh, angular rubble, varying from cobble to sand sizes, no visible ice.	2.0	3					2
3								3
3	@ 3.0 m: 10 - 15% visible ice to 3.35 m.		4					4
4			5					4
4			6					5
5			7					5
6		410.5	8	x				6
6	End of Borehole	6.1						6
7								7
8								8
9								9
10								10


BGC ENGINEERING INC.
 AN APPLIED EARTH SCIENCES COMPANY

Calgary, AB

Phone (403) 250-5185

CLIENT: Nanisivik Mine, a Division of CanZinco Ltd.

PROJECT: Geotechnical Investigation

Final Depth: 6.1 m

DRILL HOLE # BGC03-27**Date Drilled:** May 26, 2003**Contractor & Rig:** Mine's Diamond Drill**Drill Method:** BQ Chilled Brine Coring**Hammer Type:** N/A**Location:** West Twin Quarry**Elevation:** 431.0 m**Co-ord:** 8105295.1N, 580884.9E (UTM-NAD83)**Logged by:** G. Ferris**Project No.** 0255-008-03**Reviewed by:** J. Cassie**Notes:** No Installation

Depth (m)	SOIL DESCRIPTION	Core Run	Recovery	Moisture Content %		Installation / Backfill		Depth (m)
				Wp	Wl			
0	Ground Surface 431.0							0
0	TILL Cobbles, sandy, some gravel, some silt, frozen. @ .76 m: Tan red return water.							0
1	SHALE Dark grey, shale rubble ranging from cobble to sand sizes, fresh to slightly weathered. @ 2.1m: Fresh. @ 2.7 m: Medium strong.	1						1
2		2						2
3		3						3
4		4						4
5		5						5
6		6						6
7		7						7
8		8						8
9		9						9
10		10						10
11		11						11
12		12						12
6	End of Borehole 425.2 5.8							6



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Calgary, AB

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CLIENT: Nanisivik Mine, a Division of CanZinco Ltd.

PROJECT: Geotechnical Investigation

Final Depth: 5.8 m

DRILL HOLE # BGC03-28

Date Drilled: May 26, 2003

Contractor & Rig: Mine's Diamond Drill

Drill Method: BQ Chilled Brine Coring

Hammer Type: N/A

Location: West Twin Quarry

Elevation: 423.6 m

Co-ord: 8105321.9N, 580979.5E (UTM-NAD83)

Logged by: G. Ferris

Project No. 0255-008-03

Reviewed by: J. Cassie

Notes: No Installation

Depth (m)	SOIL DESCRIPTION	Core Run	Recovery	Moisture Content %				Installation / Backfill		Depth (m)
				Wp	X	WI				
				10	20	30	40			
0	Ground Surface 423.6									0
	TILL									
	Cobbles, some gravel, some boulders, some sand, light grey, various origin clasts.	1								
1	@ 0.9 m: Gravel, some silt, trace sand, reddish brown to 1.3 m.	2		x						1
	@ 1.3 m: Red, clay, silty.									
2	@ 2.0 m: Shale rubble with 40% visible ice.	3				x				2
	@ 2.5 m: 75 mm zone of ice.									
	@ 2.6 m: Silt, some clay, trace sand, bonded 15% ice.									
3	@ 3.1 m: Shale, rubble with 15% ice.	4								3
	@ 3.2 m: Silt, some gravel, some sand, 30% ice.									
	@ 3.4 m: Frost shattered dolostone.									
4	@ 4.0 m: Gravel, and boulders, some sand, 10% ice.	5				x				4
	@ 4.7 m: Sandy, some silt, oxidized.									
5	BEDROCK									5
	Frost shattered DOLOSTONE.									
	End of Borehole									
6										6
7										7
8										8
9										9
10										10


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Calgary, AB

Phone (403) 250-5185

CLIENT: Nanisivik Mine, a Division of CanZinco Ltd.

PROJECT: Geotechnical Investigation

Final Depth: 5.2 m

APPENDIX II LAB TESTING

2003 Aggregate Analysis Reports

2003 Moisture Density Relations of Soils

2003 Sieve Analysis Reports

2003 Constant Head Permeability Tests



7505 - 40 Street SE
Calgary, Alberta T2C 2H5
Telephone: (403) 236-8890

Aggregate Analysis Report

Sieve Size (mm)	% Passing
200	
150	100.0
100	94.2
80	91.0
50	88.3
40	84.8
25	80.7
20	74.3
12.5	63.1
10	53.3
5	29.1
2.5	18.3
1.25	11.5
0.63	7.5
0.315	5.2
0.16	3.8
0.08	2.9

Client BGC Engineering Inc.

Address

Attention Mr. Gerry Ferris

Project BGC # 0255-008-03
East Twin Lakes Quarry

Job # 33-099-10-1

Date Sampled Rec'd July 29/ 03

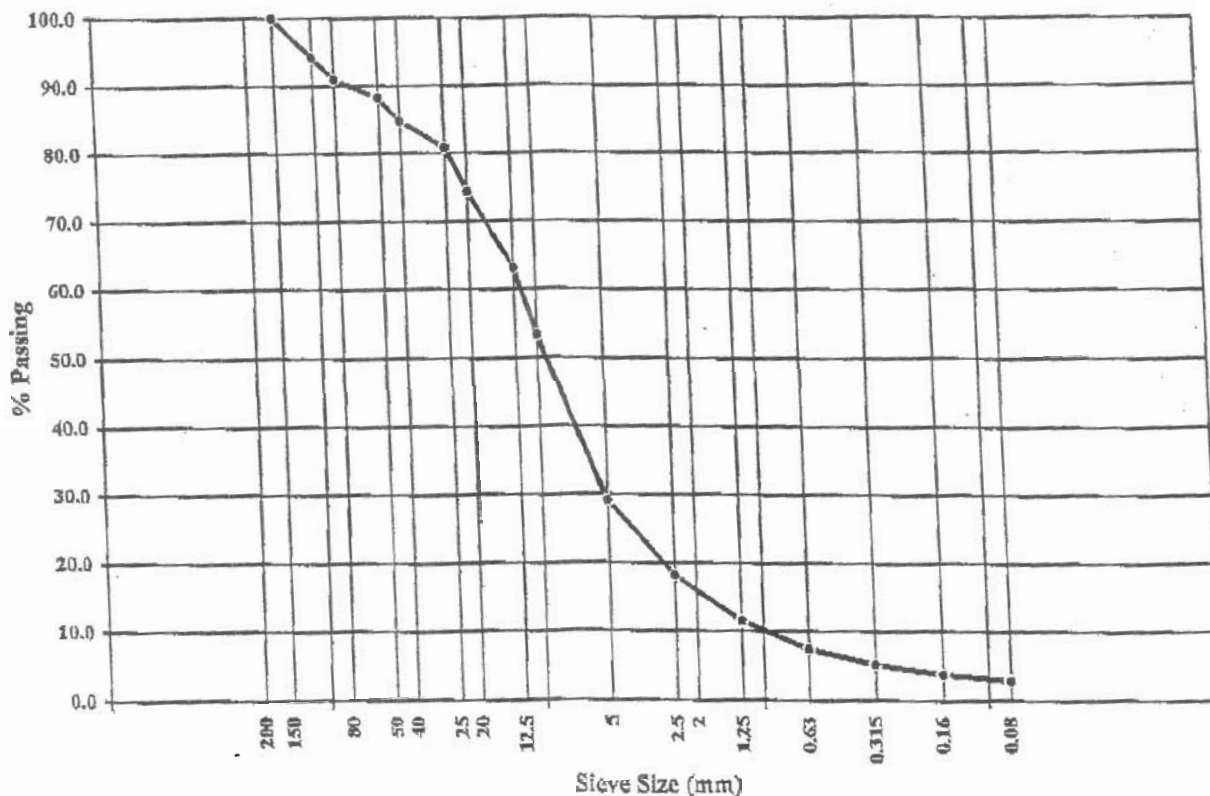
By BM

Date Tested July 30/ 03

By SG

Aggregate Type Bedrock Fragments

Comments Sieve Result Prior To Standard Proctor
Standard Proctor Value
(ASTM D698) = 2010kg/m³ @ 6.0% Opt. M.C.
Moisture Content Of Sample As Received = 2.0%





7505 - 40th Street S.E.
Calgary, Alberta T2C 2H5
Telephone: (403) 236-8880

Moisture Density Relations of Soils

☒ ASTM Designation: D 698

☐ ASTM Designation: D 1557

Location East Twin Lake Quarry
BGC #0255-008-03

Soil Description Bedrock Fragments

Elevation --

Date July 30/03 Job No. 33-099-10-1

Max Dry Density 2010 kg/m³

Optimum M.C. 6.0%

Natural M.C. 2.0%

Rammer Wt. 2495g

Rammer Drop 305mm

Dia. of Mold 152.4mm

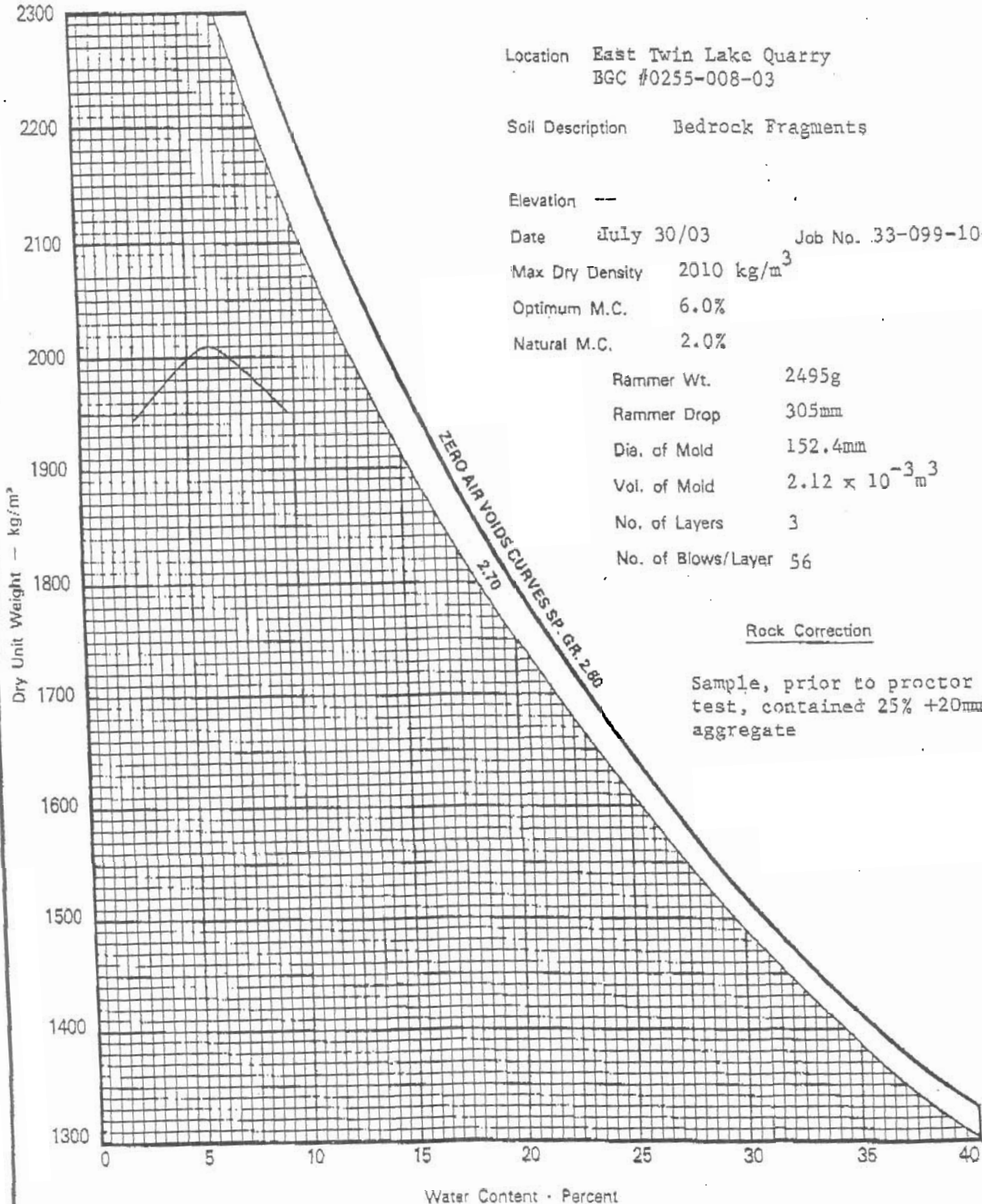
Vol. of Mold $2.12 \times 10^{-3} \text{ m}^3$

No. of Layers 3

No. of Blows/Layer 56

Rock Correction

Sample, prior to proctor
test, contained 25% +20mm
aggregate



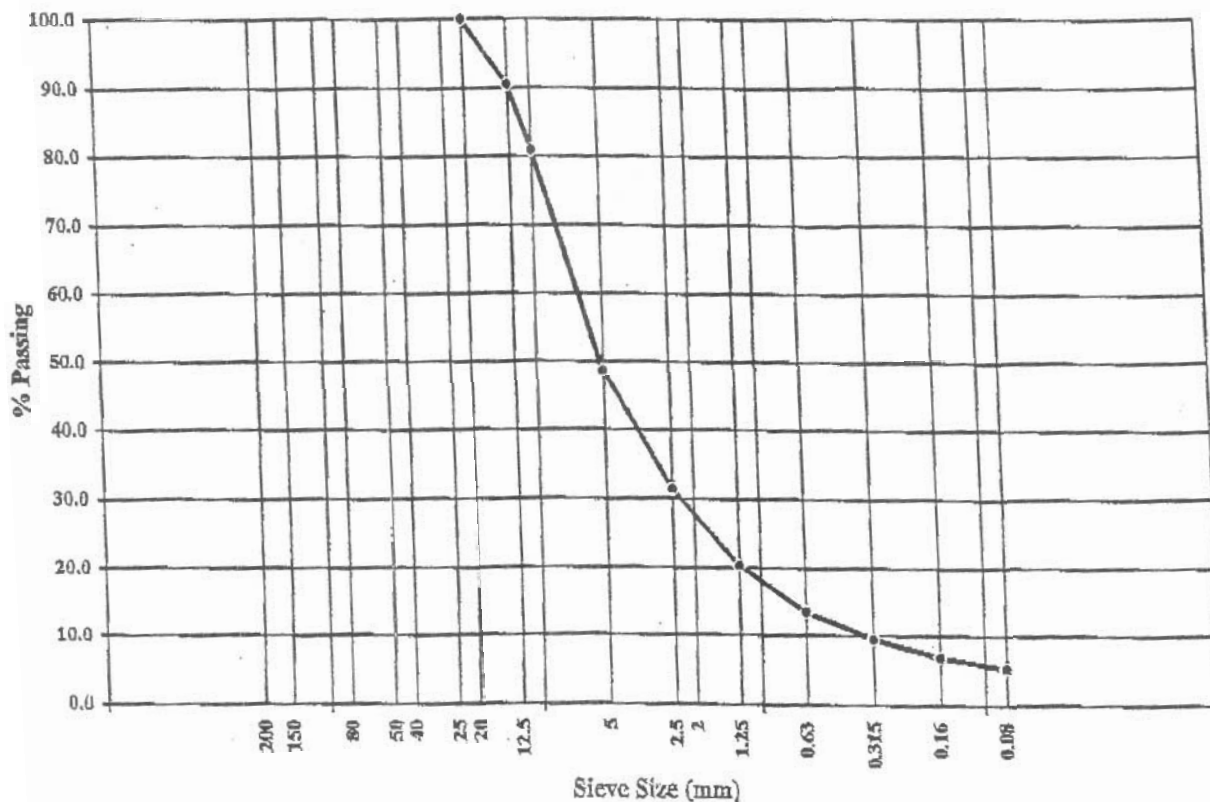


7505 - 40 Street SE
Calgary, Alberta T2C 2H5
Telephone: (403) 236-8880

Aggregate Analysis Report

Sieve Size (mm)	% Passing
200	
150	
100	
80	
50	
40	
25	
20	100.0
12.5	90.6
10	80.9
5	48.5
2.5	31.4
1.25	20.4
0.63	13.6
0.315	9.4
0.16	6.9
0.08	5.3

Client BGC Engineering Inc.
Address
Attention Mr. Gerry Farris
Project BGC # 0255-008-03 **Job #** 33-099-10-1
East Twin Lakes Quarry
Date Sampled Rec'd July 29/ 03 **By** BM
Date Tested July 30/ 03 **By** SG
Aggregate Type Bedrock Fragments
Comments Sieve Result After Standard Proctor Performed
Standard Proctor And This Sieve Performed
On Portion Of Sample Passing 20mm Sieve
(See ASTM D698)





7505 - 40 Street SE
Calgary, Alberta T2C 2H5
Telephone: (403) 236-8880

Aggregate Analysis Report

Sieve Size (mm)	% Passing
200	
150	
100	100.0
80	95.6
50	90.4
40	87.6
25	69.6
20	55.4
12.5	38.5
10	29.5
5	14.0
2.5	8.9
1.25	5.9
0.63	4.4
0.315	3.4
0.16	2.6
0.08	2.1

Client BGC Engineering Inc.

Address

Attention Mr. Gerry Ferris

Project BGC # 0255-008-03
Mount Fuji Quarry

Job # 33-099-10-1

Date Sampled Rec'd July 29/ 03

By BM

Date Tested July 30/ 03

By SG

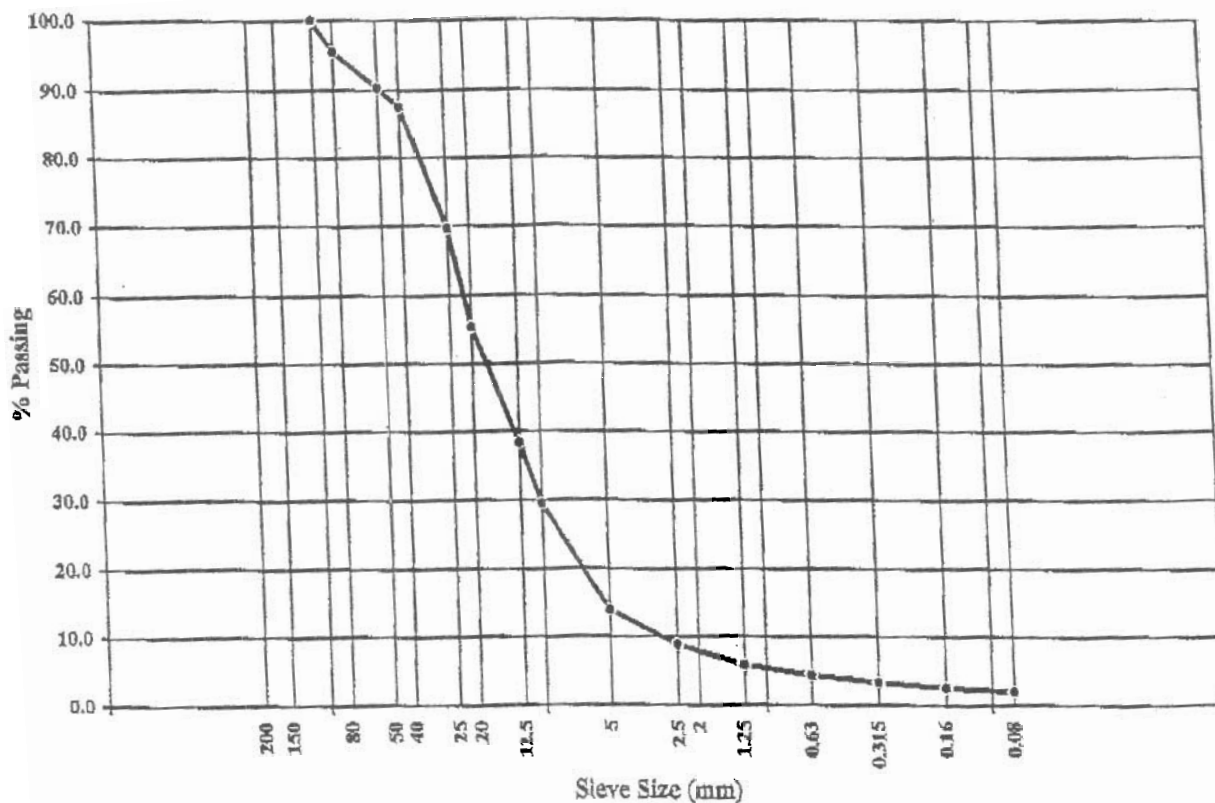
Aggregate Type Bedrock Fragments

Comments

Sieve Result Prior To Standard Proctor
Standard Proctor Value

(ASTM D698) = 1870kg/m³ @ 7.0% Opt. M.C.

Moisture Content Of Sample As Received = 3.8%





7505 - 40th Street S.E.
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Telephone: (403) 238-8880

Moisture Density Relations of Soils

☒ ASTM Designation: D 698

☐ ASTM Designation: D 1557

Location Mt. Fuji Quarry
BGC #0255-008-03

Soil Description Bedrock Fragments

Elevation --

Date July 30/03 Job No. 33-099-10-1

Max Dry Density 1870 kg/m³

Optimum M.C. 7.0%

Natural M.C. 3.8%

Rammer Wt. 2495g

Rammer Drop 305mm

Dia. of Mold 152.4mm

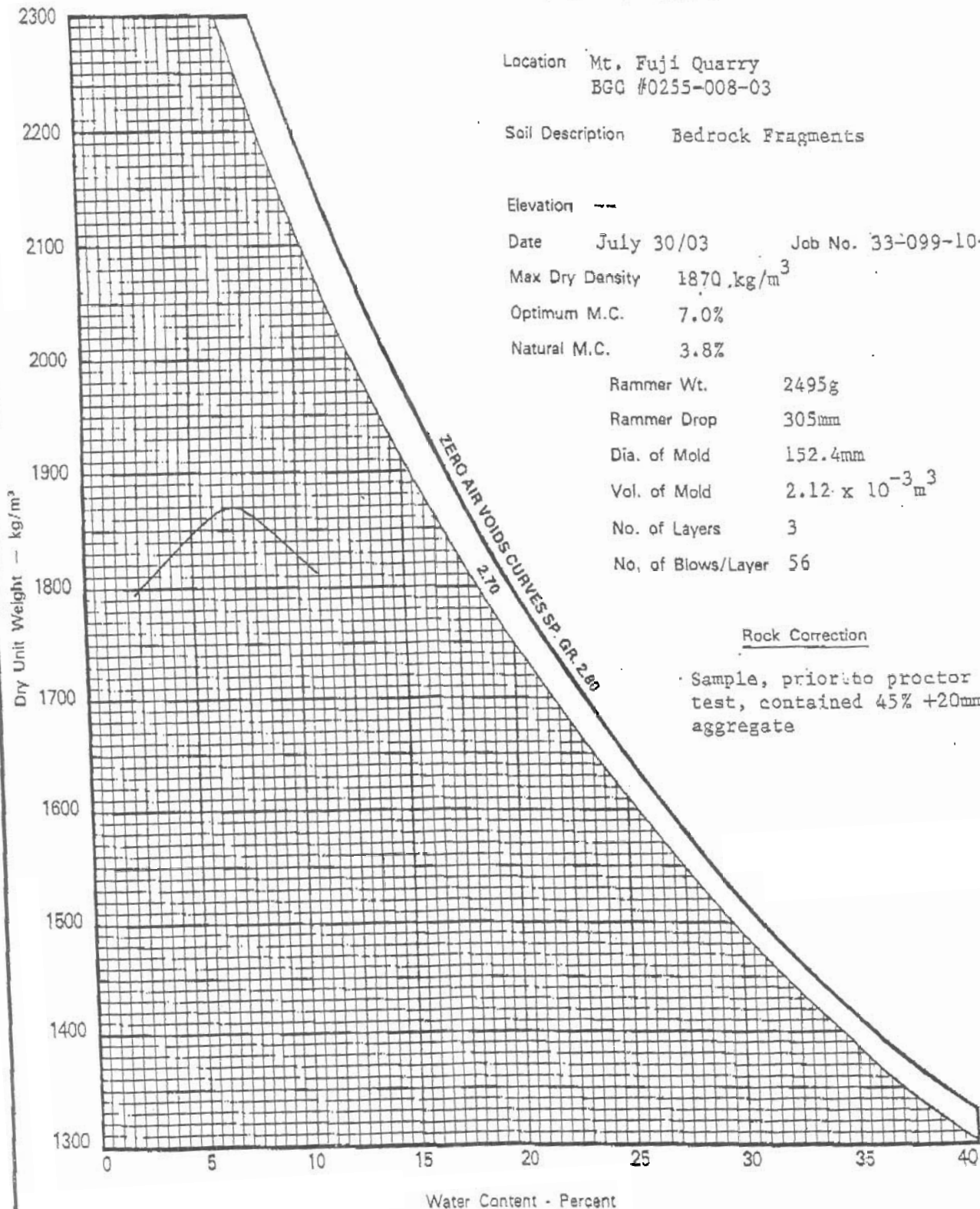
Vol. of Mold $2.12 \times 10^{-3} \text{ m}^3$

No. of Layers 3

No. of Blows/Layer 56

Rock Correction

Sample, prior to proctor
test, contained 45% +20mm
aggregate





7505 - 40 Street SE
Calgary, Alberta T2C 2H5
Telephone: (403) 236-8880

Aggregate Analysis Report

Sieve Size (mm)	% Passing
200	
150	
100	
80	
50	
40	
25	
20	100.0
12.5	90.7
10	80.2
5	37.4
2.5	16.7
1.25	8.8
0.63	5.7
0.315	4.1
0.16	3.1
0.08	2.3

Client BGC Engineering Inc.

Address

Attention Mr. Gerry Ferris

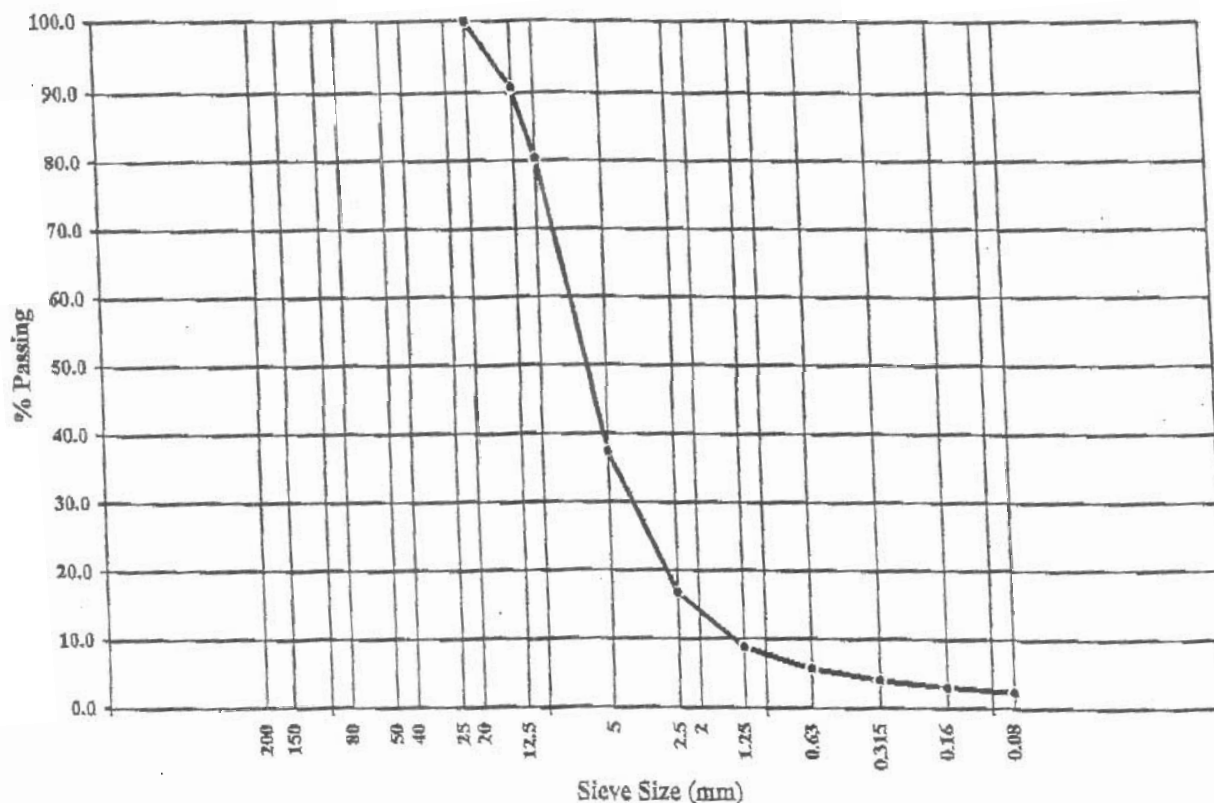
Project BGC # 0255-008-03 Job # 33-099-10-1
Mount Fuji Quarry

Date Sampled Rec'd July 29/ 03 By BM

Date Tested July 30/ 03 By SG

Aggregate Type Bedrock Fragments

Comments Sieve Result After Standard Proctor Performed
Standard Proctor And This Sieve Performed
On Portion Of Sample Passing 20mm Sieve
(See ASTM D698)



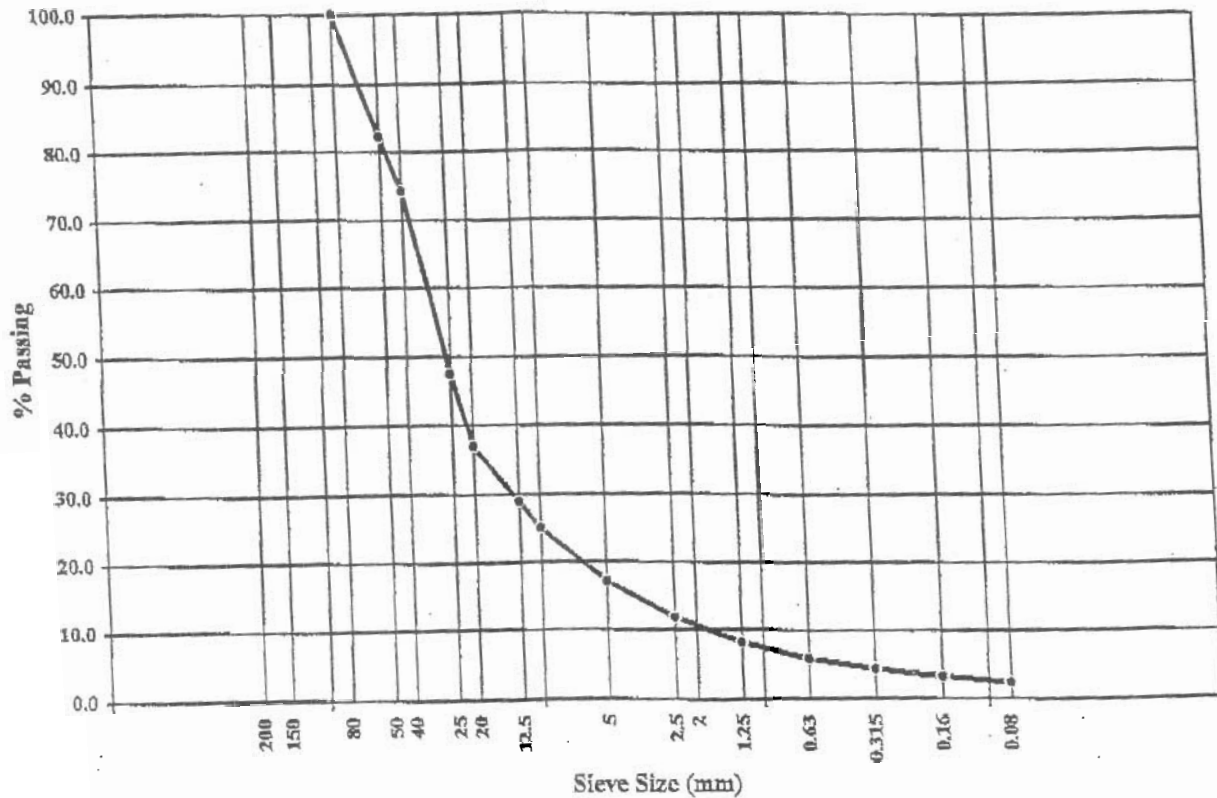


7505 - 40 Street SE
Calgary, Alberta T2C 2H5
Telephone: (403) 236-8880

Sieve Analysis Report

Sieve Size (mm)	% Passing
200	
150	
100	
80	100.0
50	82.2
40	74.2
25	47.5
20	37.0
12.5	28.9
10	25.1
5	17.2
2.5	11.7
1.25	8.2
0.63	5.9
0.315	4.3
0.16	3.2
0.08	2.3

Client BGC Engineering Inc.
Address 1605, 840-7th Ave S.W. Calgary, Alta. T2P 3G2
Attention Mr. Geoff Claypool
Project Nanisivik Job # 33-099-10-1
 BGC # 0255-008-03
Date Sampled Rec'd August 28/ 03
Date Tested August 29/ 03
 By BM
 By CBL
Aggregate Type Shale Fragments
Comments Test Cell #1 @ 0.6m.
 Sample "A" Combined Samples 1&2
 Moisture Content = 3.8%





7505 - 40 Street SE
Calgary, Alberta T2C 2H5
Telephone: (403) 236-8880

Sieve Analysis Report

Sieve Size (mm)	% Passing
200	
150	
100	
80	100.0
50	87.5
40	83.7
25	66.5
20	55.7
12.5	44.9
10	39.7
5	25.9
2.5	17.4
1.25	12.5
0.63	9.5
0.315	7.5
0.16	5.9
0.08	4.5

Client BGC Engineering Inc.

Address 1605, 840-7th Ave. S.W. Calgary Alta. T2P 3G2

Attention Mr. Geoff Claypool

Project Nanisivik
BGC # 0255-008-03

Job # 33-099-10-1

Date Sampled Rec'd August 28/ 03

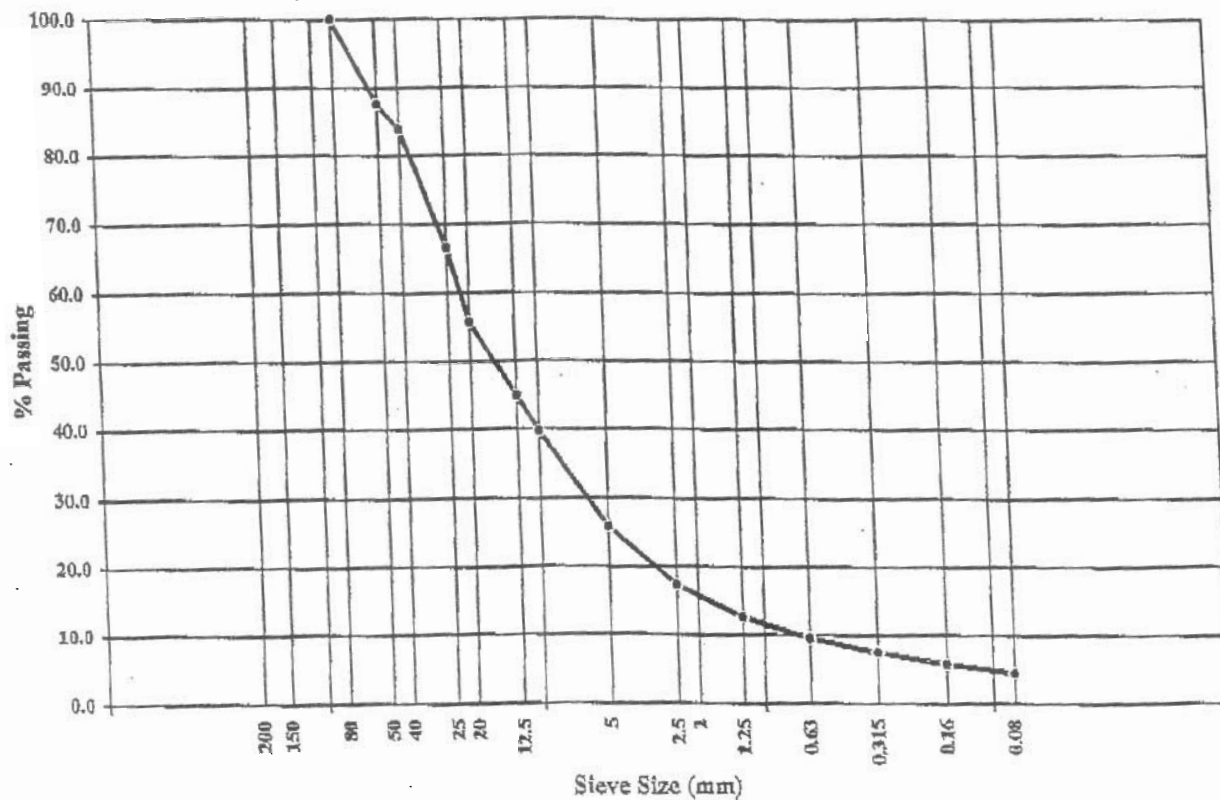
By BM

Date Tested August 29/ 03

By CBL

Aggregate Type Shale Fragments

Comments Test Cell #1 @ 1.3m.
Sample "B" Combined Samples 3&4
Moisture Content = 5.1%





7505 - 40 Street SE
Calgary, Alberta T2C 2H5
Telephone: (403) 236-8880

Sieve Analysis Report

Sieve Size (mm)	% Passing
200	
150	
100	
80	100.0
50	95.1
40	82.8
25	71.2
20	63.0
12.5	54.1
10	49.6
5	39.2
2.5	30.6
1.25	23.8
0.63	19.0
0.315	15.6
0.16	12.8
0.08	10.6

Client BGC Engineering Inc.
Address 1605 840-7th Ave. S.W.

Attention Mr. Garry Ferris

Project Nanisivik Mine
BGC # 0255-008-05

Job # 33-099-10-1

Date Sampled Rec'd Sept. 8/ 03

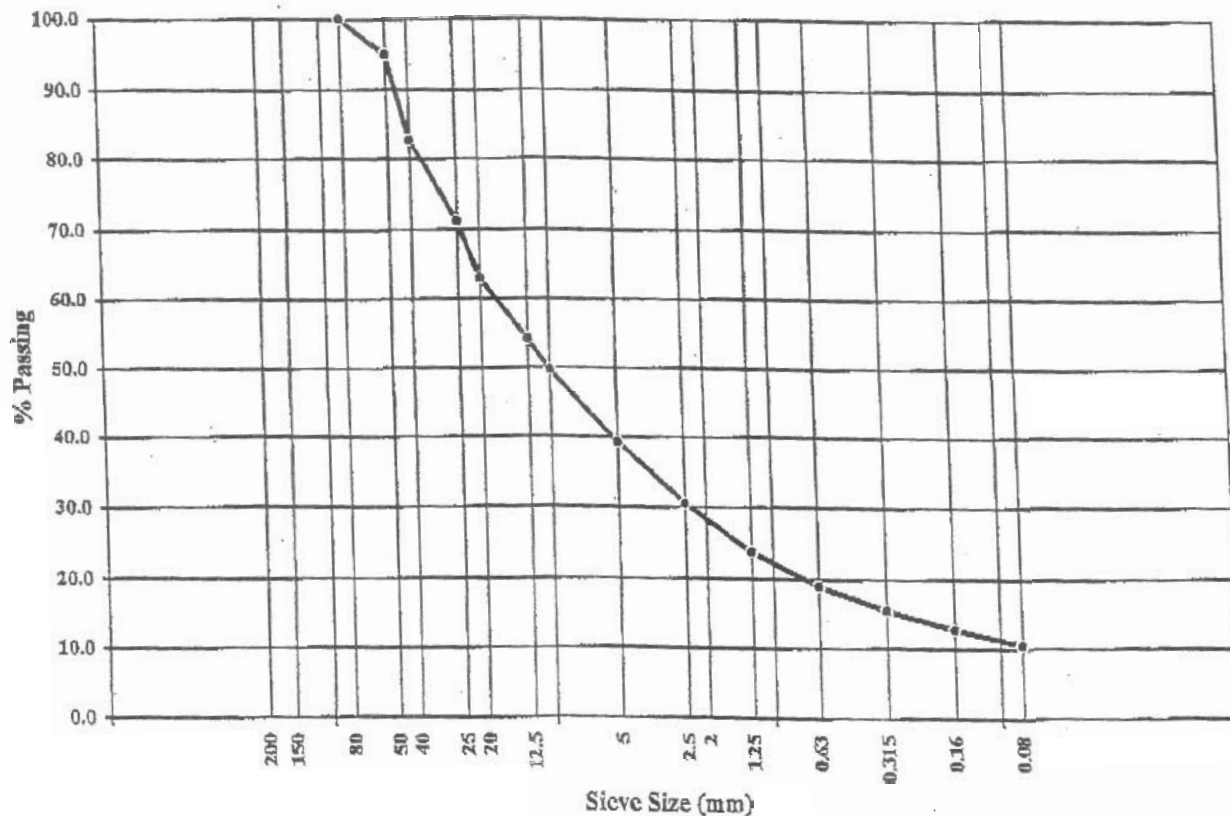
By BM

Date Tested Sept. 9/ 03

By TH,CBL

Aggregate Type Shale Fragments

Comments Test Cover Surface Cell @ 37"
Moisture Content = 4.6%





7505 - 40 Street SE
Calgary, Alberta T2C 2H5
Telephone: (403) 236-8880

Sieve Analysis Report

Sieve Size (mm)	% Passing
200	
150	100.0
100	88.5
80	88.5
50	79.4
40	77.4
25	63.7
20	57.2
12.5	50.2
10	46.9
5	36.0
2.5	27.9
1.25	21.2
0.63	16.6
0.315	13.4
0.16	11.0
0.08	9.0

Client BGC Engineering Inc.
Address 1605 840-7th Ave. S.W.

Attention Mr. Gerry Ferris

Project Nanisivik Mine
BGC # 0255-008-05

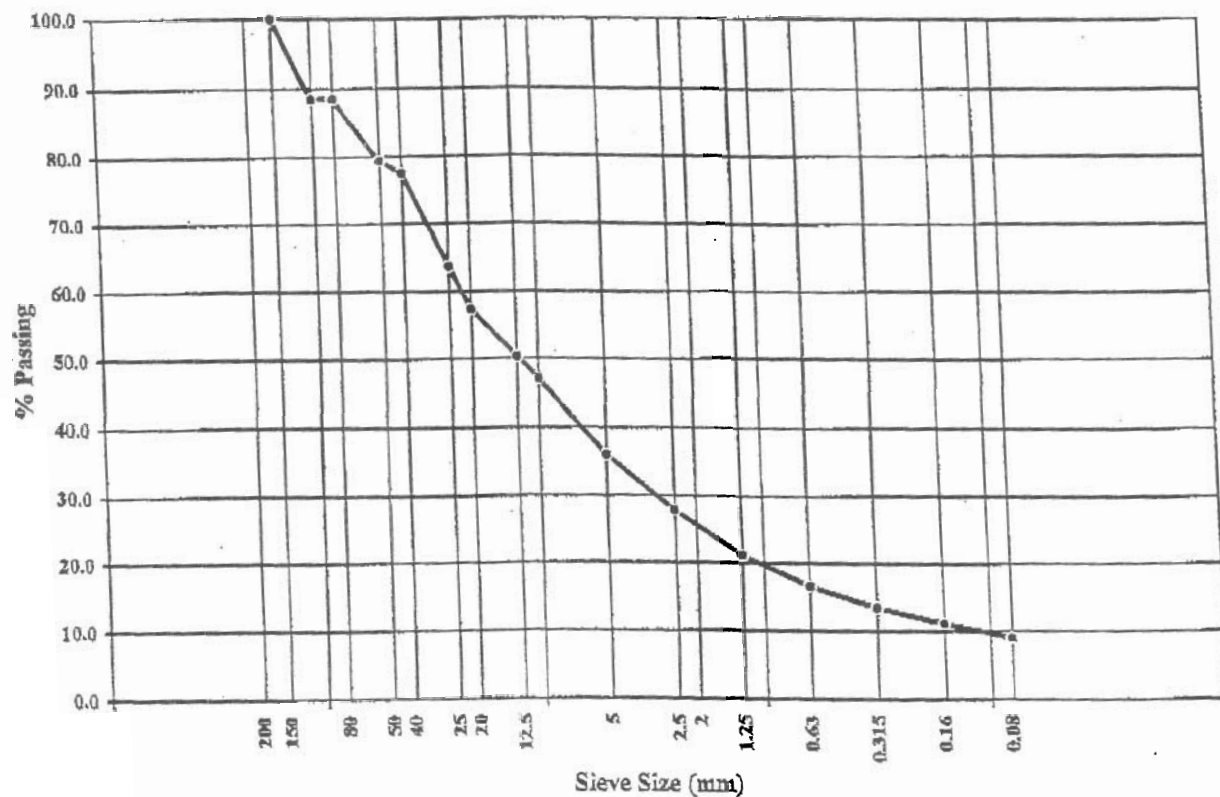
Job # 33-099-10-1

Date Sampled Rec'd Sept. 8/ 03
Date Tested Sept. 9/ 03

By BM
By TH,CBL

Aggregate Type Shale Fragments

Comments Test Cover Surface Cell @ 57"
Moisture Content = 5.7%



Constant Head Permeability Test (ASTM D2434-68) Shale Sample from Test Cell Test Cover # 1

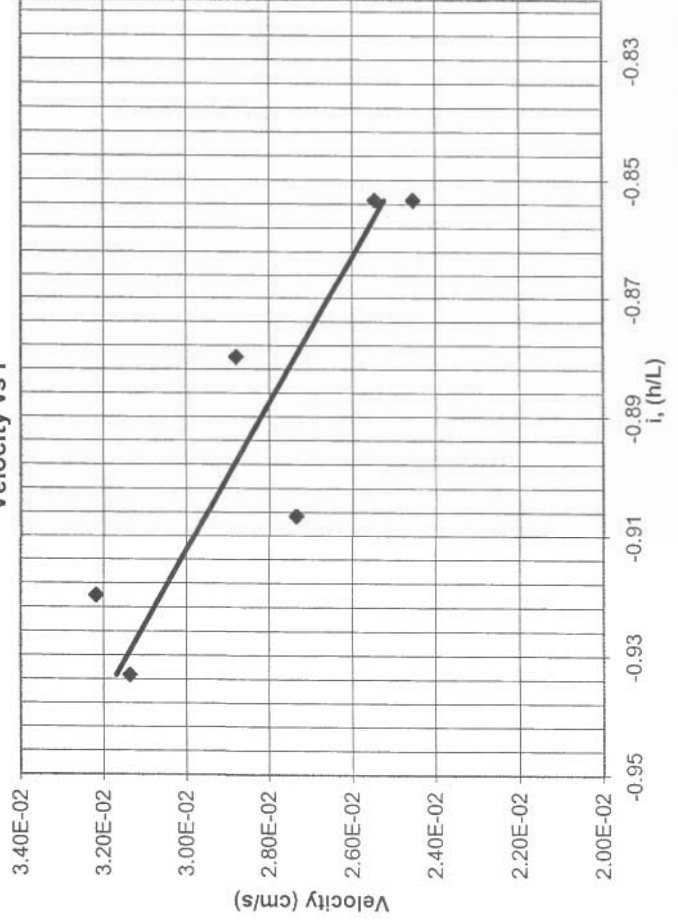
JOB NUMBER: 03-1321-900	SAMPLE HEIGHT:	11.600 cm
BOREHOLE: Nanisivik	SAMPLE DIAMETER:	10.160 cm
SAMPLE ID: -	SAMPLE AREA:	81.073 cm^2
LAB ID: -	SAMPLE VOLUME:	940.449 cm^3
WET MASS: 1750.8 g	WET DENSITY:	1862 kg/m^3
W/C: 0.63 %	DRY DENSITY:	1850 kg/m^3

Where:

K=Permeability at 20° C
Q= Total Flow in cm³ during time t
L = length between manometers
μT = Viscosity of water at Temp
h = total head loss (cm)

Trial No.	Q (cm ³)	L (cm)	Temp °C	μT (millipoises)	t (s)	Manometer top	Manometer Bottom	h (cm)	μ20°C	i (h/l)	V (cm/s)	K (cm/s) (V/i)
1	795	7.5	18	10.6	420	9.30	15.70	-6.40	10.09	-0.85	2.45E-02	-2.87E-02
2	825	7.5	18	10.6	420	9.00	15.40	-6.40	10.09	-0.85	2.55E-02	-2.98E-02
3	800	7.5	18	10.6	360	11.00	17.60	-6.60	10.09	-0.88	2.88E-02	-3.27E-02
4	760	7.5	18	10.6	360	10.80	17.60	-6.80	10.09	-0.91	2.74E-02	-3.02E-02
5	1375	7.5	18.7	10.34	540	14.60	21.50	-6.90	10.09	-0.92	3.22E-02	-3.50E-02
6	1340	7.5	18.7	10.34	540	14.60	21.60	-7.00	10.09	-0.93	3.14E-02	-3.36E-02

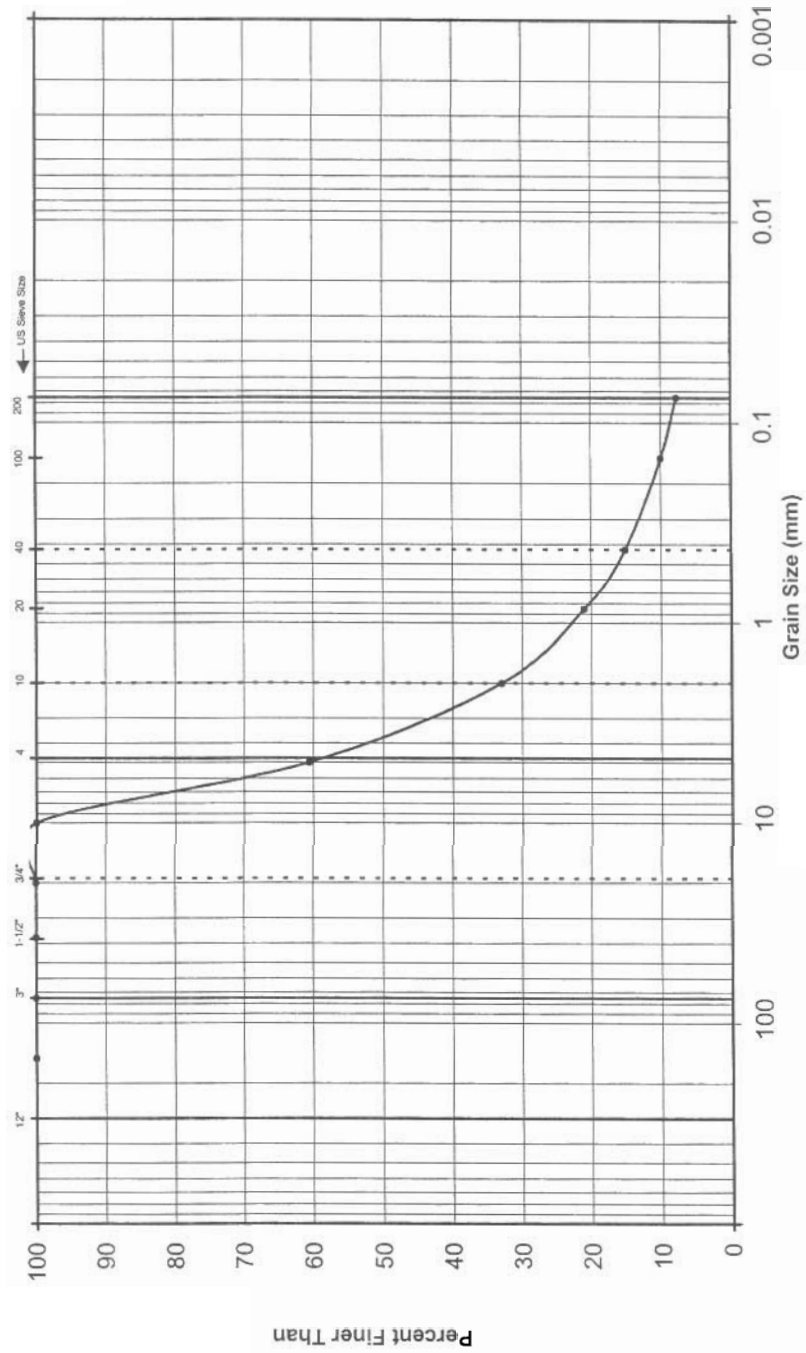
Velocity vs i



Average Permeability = -3.17E-02 cm/s

Average Permeability = -3.17E-04 m/s

Project No.: 03-1321-900 Lab No.: 541302
 Project Title: BGC/Lab Testing/Calgary
 Borehole: - Sample No.: Nanisivik
 Depth: -
 Date Tested: 22-Dec-03 By: LT/BT



Diameter of Sieve (mm)	Percent Passing (%)
150.000	100.0
75.000	100.0
37.500	100.0
20.000	100.0
10.000	100.0
5.000	60.6
2.000	32.9
0.850	21.0
0.425	15.1
0.150	10.0
0.075	7.7

Comments/Limits:

Shale Sample from
Test Cell Test Cover # 1

Boulder Size	Cobble Size	Gravel	Sand	Silt and Clay

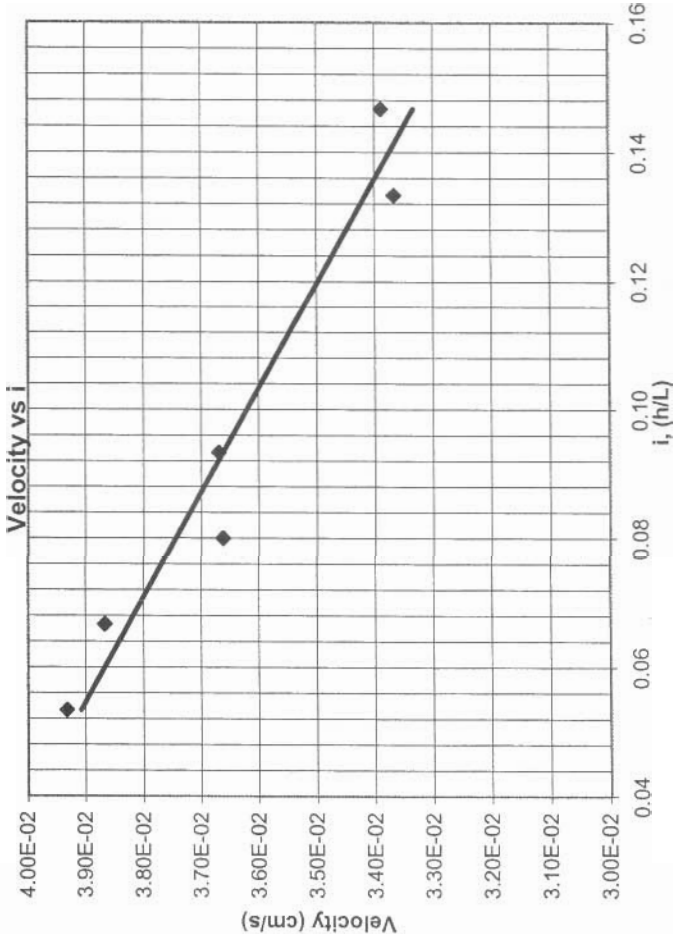
Constant Head Permeability Test (ASTM D2434-68)
Shale Sample from Shale Hill

JOB NUMBER: 03-1321-900	SAMPLE HEIGHT:	11.600 cm
BOREHOLE: Shale Hill	SAMPLE DIAMETER:	10.160 cm
SAMPLE ID: -	SAMPLE AREA:	81.073 cm ²
LAB ID: -	SAMPLE VOLUME:	940.449 cm ³
WET MASS: 1329.29 g	WET DENSITY:	1413 kg/m ³
W/C: 2.11 %	DRY DENSITY:	1384 kg/m ³

Where:

K=Permeability at 20° C
Q= Total Flow in cm³ during time t
L = length between manometers
 μT = Viscosity of water at Temp
h = total head loss (cm)

Trial No.	Q (cm ³)	L (cm)	Temp °C	μT (millipoises)	t (s)	Manometer		h (cm)	$\mu 20^{\circ}C$	i (h/l)	V (cm/s)	K (cm/s) (V/i)
						top	Bottom					
1	953	7.5	18.5	10.47	360	12.60	11.50	1.10	10.09	0.15	3.39E-02	2.31E-01
2	947	7.5	18.5	10.47	360	12.50	11.50	1.00	10.09	0.13	3.37E-02	2.53E-01
3	865	7.5	18.8	10.39	300	14.50	13.90	0.60	10.09	0.08	3.66E-02	4.58E-01
4	1040	7.5	18.8	10.39	360	14.30	13.60	0.70	10.09	0.09	3.67E-02	3.93E-01
5	1120	7.5	19	10.34	360	16.80	16.40	0.40	10.09	0.05	3.93E-02	7.37E-01
6	1285	7.5	19	10.34	420	16.50	16.00	0.50	10.09	0.07	3.87E-02	5.80E-01

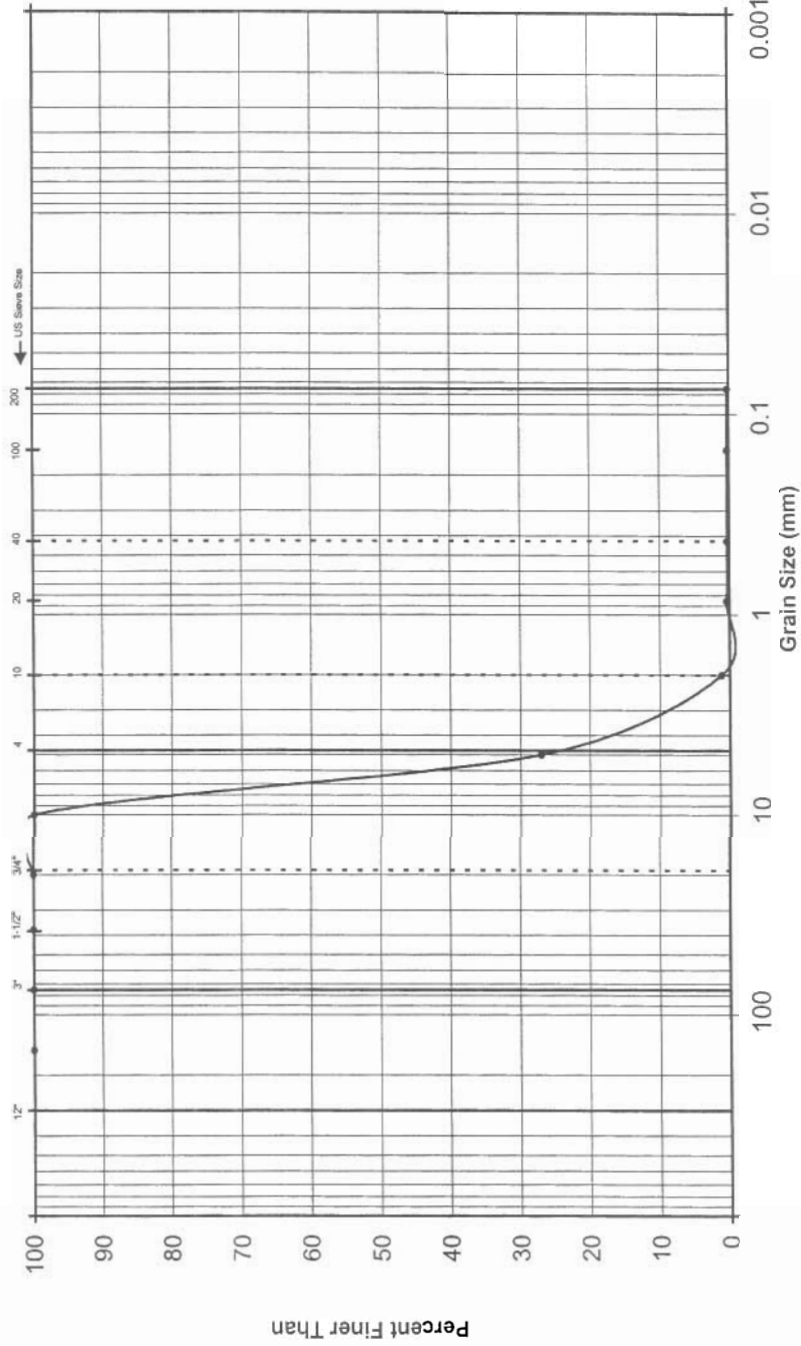


Average Permeability = 4.42E-01 cm/s

Average Permeability = 4.42E-03 m/s

Project No.: 03-1321-900 Lab No.: 541303
 Project Title: BGC/Lab Testing/Calgary
 Borehole: - Sample No.: Shale Hill
 Depth: -
 Date Tested: 22-Dec-03 By: LT/BT

Diameter of Sieve (mm)	Percent Passing (%)
150.000	100.0
75.000	100.0
37.500	100.0
20.000	100.0
10.000	100.0
5.000	27.0
2.000	1.2
0.850	0.4
0.425	0.3
0.150	0.2
0.075	0.2



Boulder Size	Cobble Size	Gravel	Sand	Silt and Clay
	Coarse	Coarse	Coarse	
		Fine	Medium	
			Fine	

Comments/Limits:

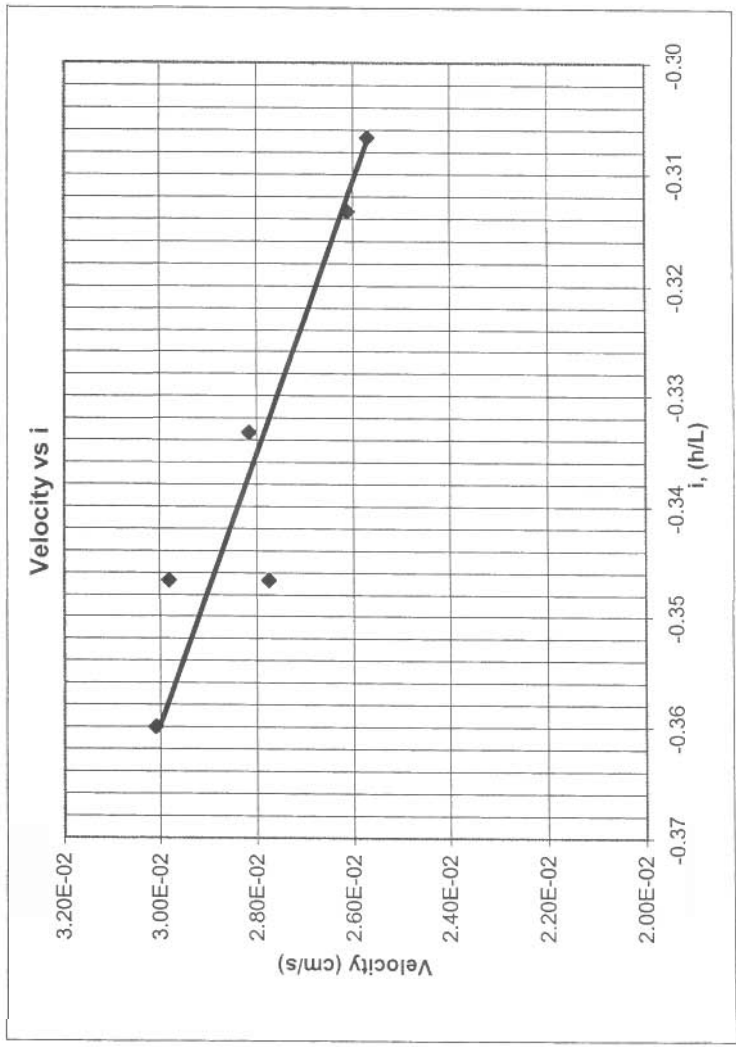
Shale Sample from
Shale Hill Quarry

Constant Head Permeability Test (ASTM D2434-68)
Shale Sample from West Twin Lake Quarry

JOB NUMBER: 03-1321-900	SAMPLE HEIGHT:	11.600 cm
BOREHOLE: West Twin Lake Quarry	SAMPLE DIAMETER:	10.160 cm
SAMPLE ID: -	SAMPLE AREA:	81.073 cm^2
LAB ID: -	SAMPLE VOLUME:	940.449 cm^3
WET MASS: 1872.5 g	WET DENSITY:	1991 kg/m^3
W/C: 7.63 %	DRY DENSITY:	1850 kg/m^3

Where:
K=Permeability at 20° C
Q= Total Flow in cm³ during time t
L = length between manometers
 μT = Viscosity of water at Temp
h = total head loss (cm)

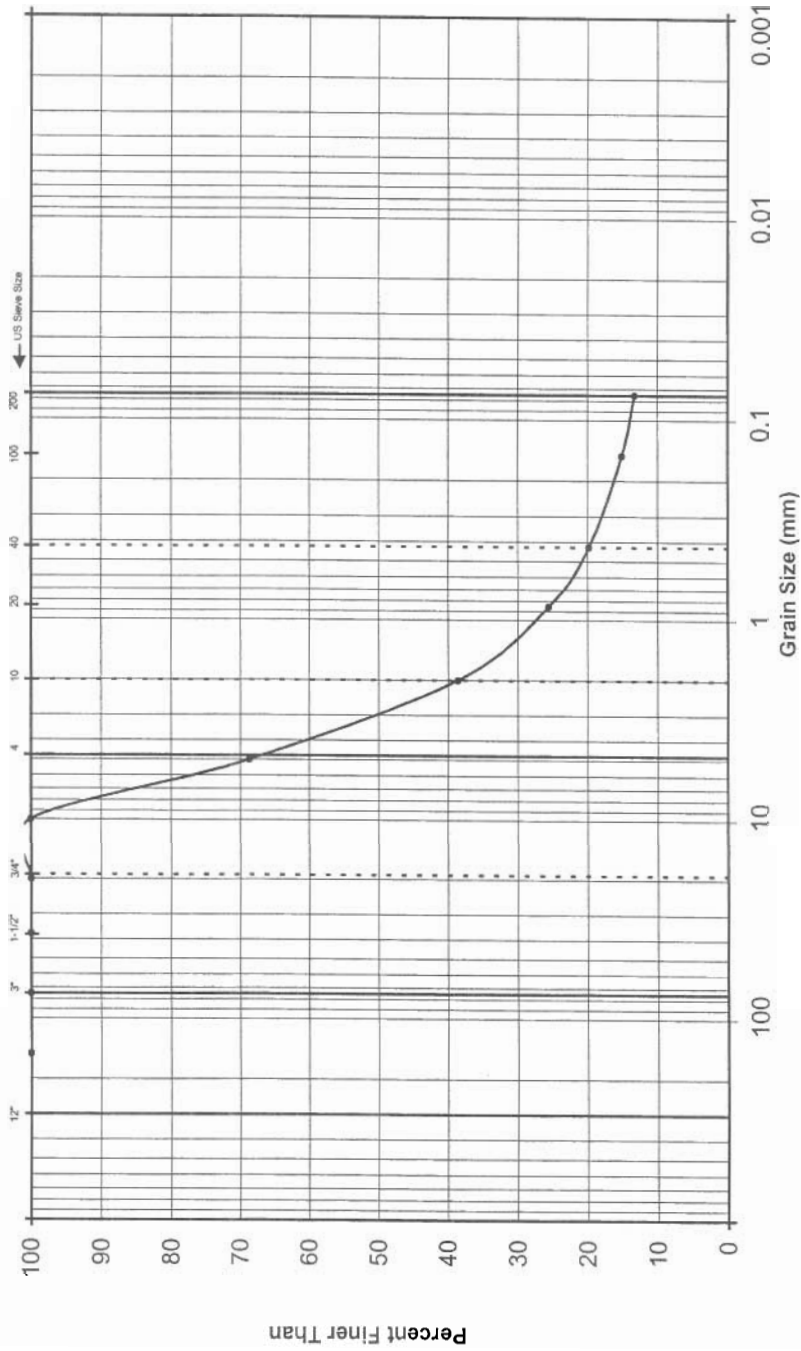
Trial No.	Q (cm ³)	L (cm)	Temp °C	μT (millipoises)	t (s)	Manometer top	Manometer Bottom	h (cm)	$\mu 20^{\circ}C$	i (h/l)	V (cm/s)	K (cm/s) (V/i)
1	635	7.5	20	10.09	300	5.80	8.15	-2.35	10.09	-0.31	2.61E-02	-8.33E-02
2	625	7.5	20	10.09	300	5.50	7.80	-2.30	10.09	-0.31	2.57E-02	-8.38E-02
3	685	7.5	20	10.09	300	7.00	9.50	-2.50	10.09	-0.33	2.82E-02	-8.45E-02
4	675	7.5	20	10.09	300	6.60	9.20	-2.60	10.09	-0.35	2.78E-02	-8.01E-02
5	732	7.5	20	10.09	300	8.60	11.30	-2.70	10.09	-0.36	3.01E-02	-8.36E-02
6	725	7.5	20	10.09	300	8.60	11.20	-2.60	10.09	-0.35	2.98E-02	-8.60E-02



Average Permeability = -8.35E-02 cm/s

Average Permeability = -8.35E-04 m/s

Project No.: 03-1321-900 Lab No.: 541301
 Project Title: BGC/Lab Testing/Calgary
 Borehole: - Sample No.: Twin Lake Quarry
 Depth: -
 Date Tested: 22-Dec-03 By: LT/BT



Diameter of Sieve (mm)	Percent Passing (%)
150.000	100.0
75.000	100.0
37.500	100.0
20.000	100.0
10.000	100.0
5.000	68.7
2.000	38.6
0.850	25.6
0.425	19.8
0.150	15.1
0.075	13.3

Comments/Limits:

Shale Sampe from
West Twin Lake Quarry

Boulder Size	Cobble Size	Coarse Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt and Clay
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