



Appendix E

Geotechnical Evaluation of Samples

**alston associates inc.
consulting engineers**

EMAIL

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R.J. Burnside & Associates
Limited

Fax Number : (519) 941-8120

From : Jonathan Bond

Date : 3 November 2005

Ref. No. : 05-090

Page 1 of 9

Subject : Laboratory Results
Burnside File No. FEO 09754
Kugluktuk

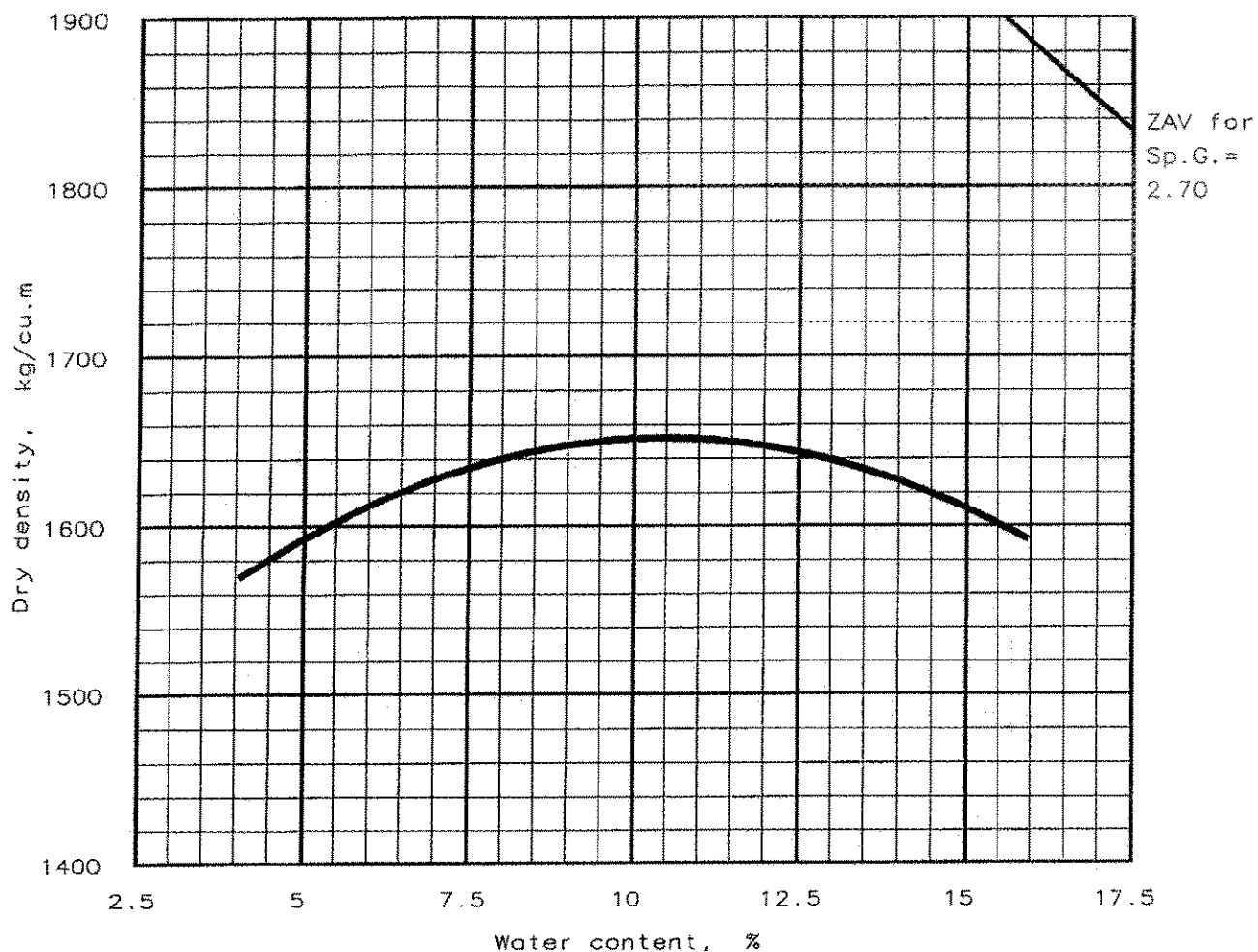
We enclose the Grain Size Distribution Test Reports and Standar Proctor Test Reports for the samples received in our office on 17 October 2005. Originals will follow by mail. Please note that hydrometers testing was not performed on the samples from test pits 4 and 7, as requested, as the tested material is too coarse. Hydrometers, therefore, are not necessary. Also, Atterberg limits were not performed on those same samples as the material is "not plastic".

If you have any questions please do not hesitate to contact our office.

Regards

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STANDARD PROCTOR TEST REPORT



Test specification: ASTM D 698-91 Method A, Standard
Oversize correction applied to each point

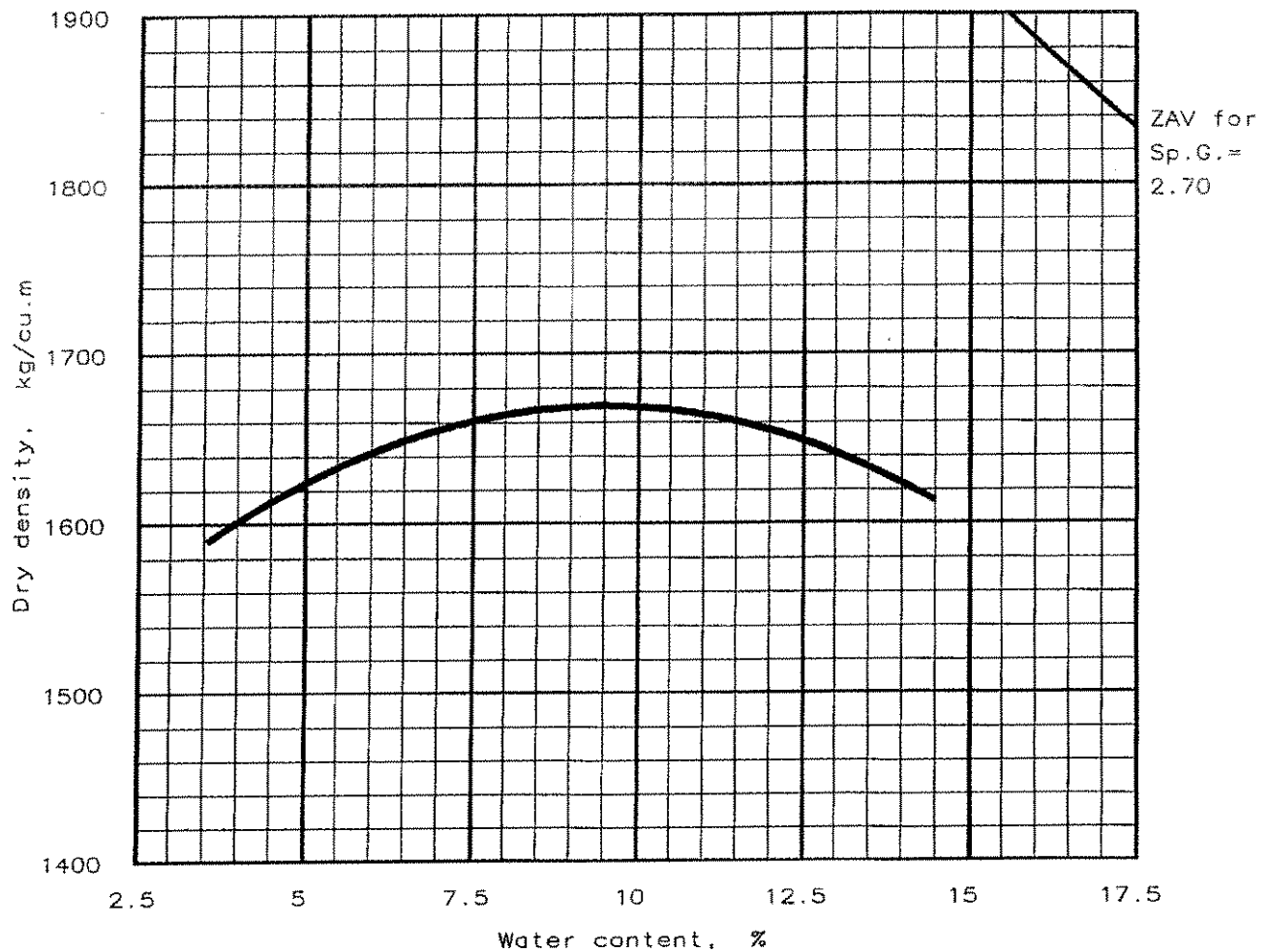
Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No. 4	% < No. 200
	USCS	AASHTO						
				2.70			0.00 %	

ROCK CORRECTED TEST RESULTS	UNCORRECTED	MATERIAL DESCRIPTION
Maximum dry density = 1652 kg/cu.m Optimum moisture = 10.5 %	1652 kg/cu.m 10.5 %	brown SAND

Project No.: 05-090 Project: Burnside Project # FEO 09754 Kugluktuk Location: Test Pit 4 Date: 3 November 2005	Remarks: Prepared for: Burnside Environmental
STANDARD PROCTOR TEST REPORT alston associates inc.	

Fig. No. 1

STANDARD PROCTOR TEST REPORT



Test specification: ASTM D 698-91 Method A, Standard
Oversize correction applied to each point

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
				2.70			0.00 %	

ROCK CORRECTED TEST RESULTS	UNCORRECTED	MATERIAL DESCRIPTION
Maximum dry density = 1670 kg/cu.m Optimum moisture = 9.5 %	1670 kg/cu.m 9.5 %	brown SAND

Project No.: 05-090
Project: Burnside Project # FE0 09754 Kugluktuk
Location: Test Pit 7

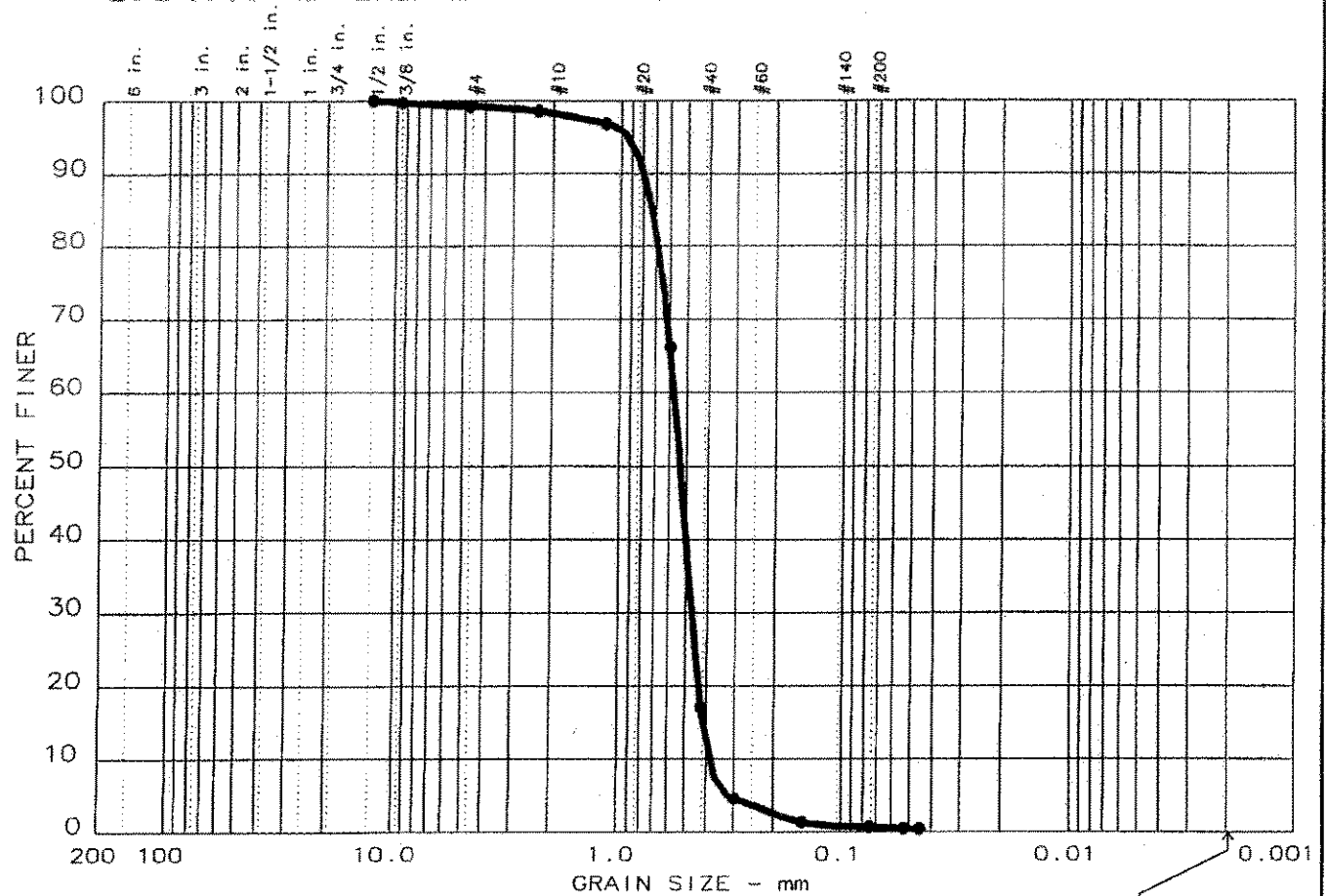
Date: 3 November 2005

STANDARD PROCTOR TEST REPORT
alston associates inc.

Remarks:
Prepared for:
Burnside Environmental

Fig. No. 2

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
1	0.0	0.8	98.5	0.7	

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
		0.73	0.57	0.54	0.471	0.4150	0.3868	1.00	1.5

MATERIAL DESCRIPTION	USCS	AASHTO
SAND		

Project No.: 05-090
 Project: Burnside Project # FE0 09754 Kugluktuk
 Location: GOV-1

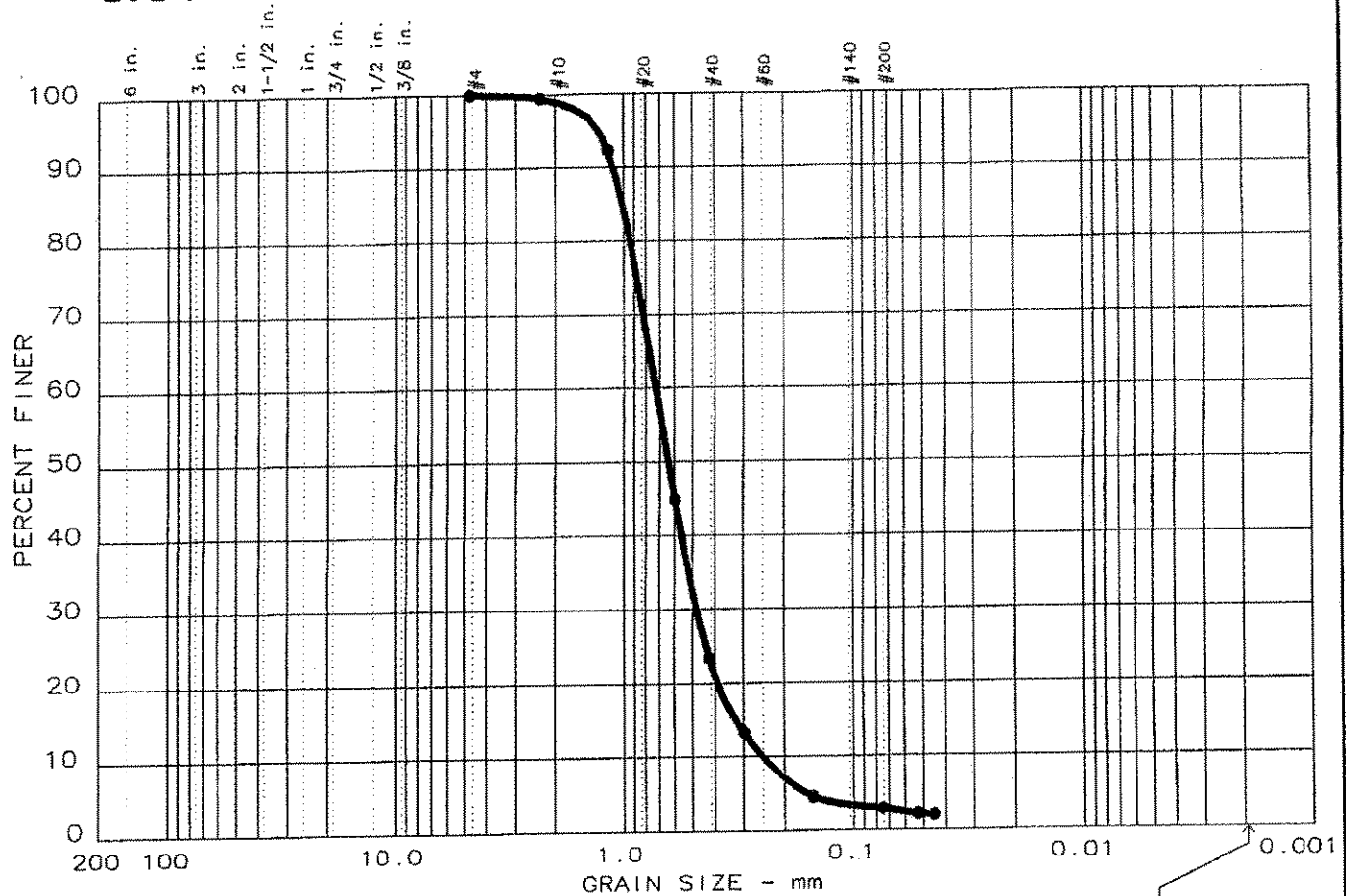
Date: 3 November 2005

GRAIN SIZE DISTRIBUTION TEST REPORT
alston associates inc.

Remarks:
 Prepared for:
 Burnside Environmental

Figure No. 3

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
2	0.0	0.0	97.2	2.8	

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
		1.02	0.72	0.64	0.483	0.3262	0.2475	1.30	2.9

MATERIAL DESCRIPTION	USCS	AASHTO
SAND, trace silt		

Project No.: 05-090
 Project: Burnside Project # FE0 09754 Kugluktuk
 Location: MSW-1

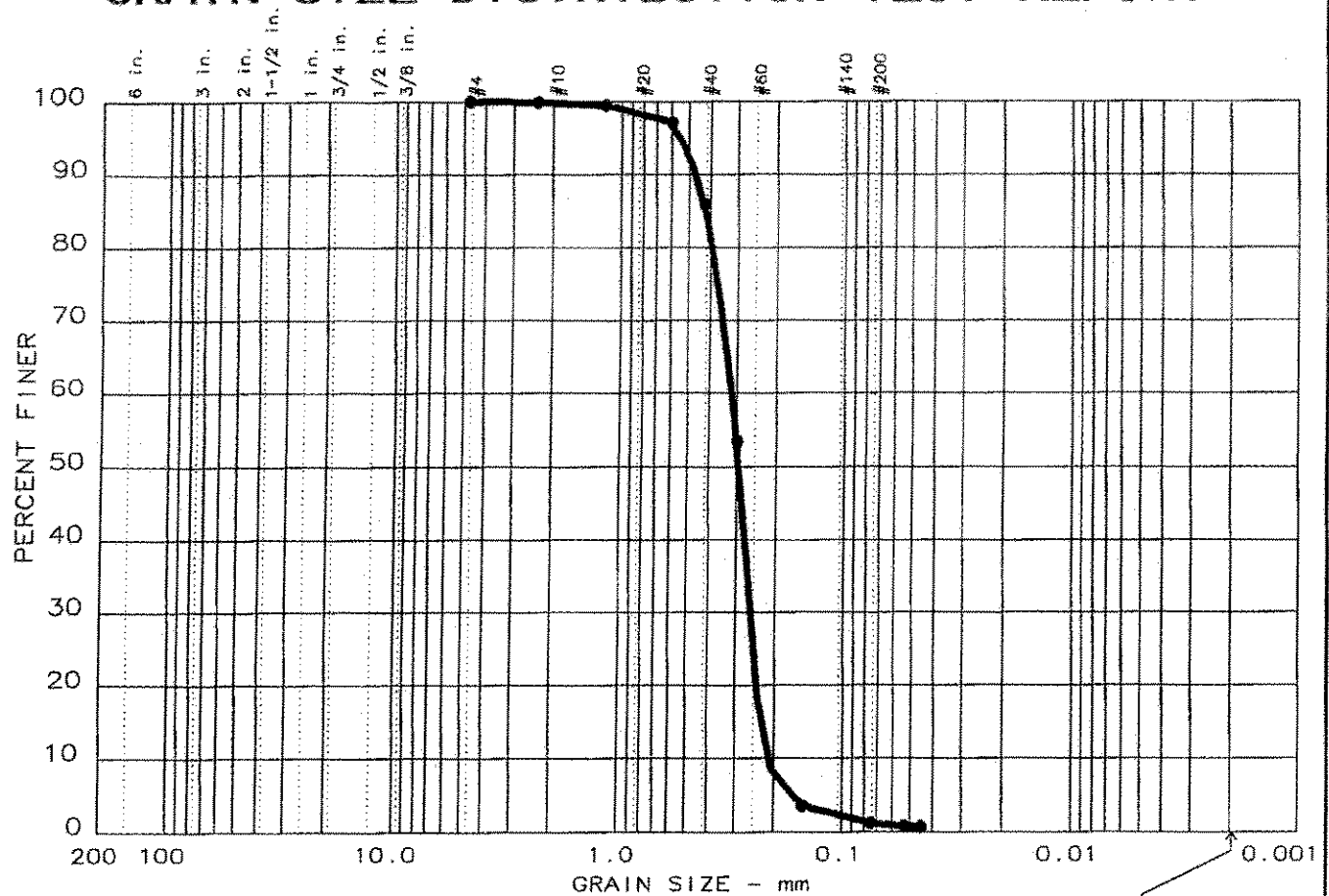
Date: 3 November 2005

GRAIN SIZE DISTRIBUTION TEST REPORT
alston associates inc.

Remarks:
 Prepared for:
 Burnside Environmental

Figure No. 4

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
• 3	0.0	0.0	98.8	1.2	

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
•		0.42	0.32	0.29	0.257	0.2331	0.2226	0.94	1.4

MATERIAL DESCRIPTION	USCS	AASHTO
• SAND, trace silt		

Project No.: 05-090
 Project: Burnside Project # FE0 09754 Kugluktuk
 • Location: MSW-2

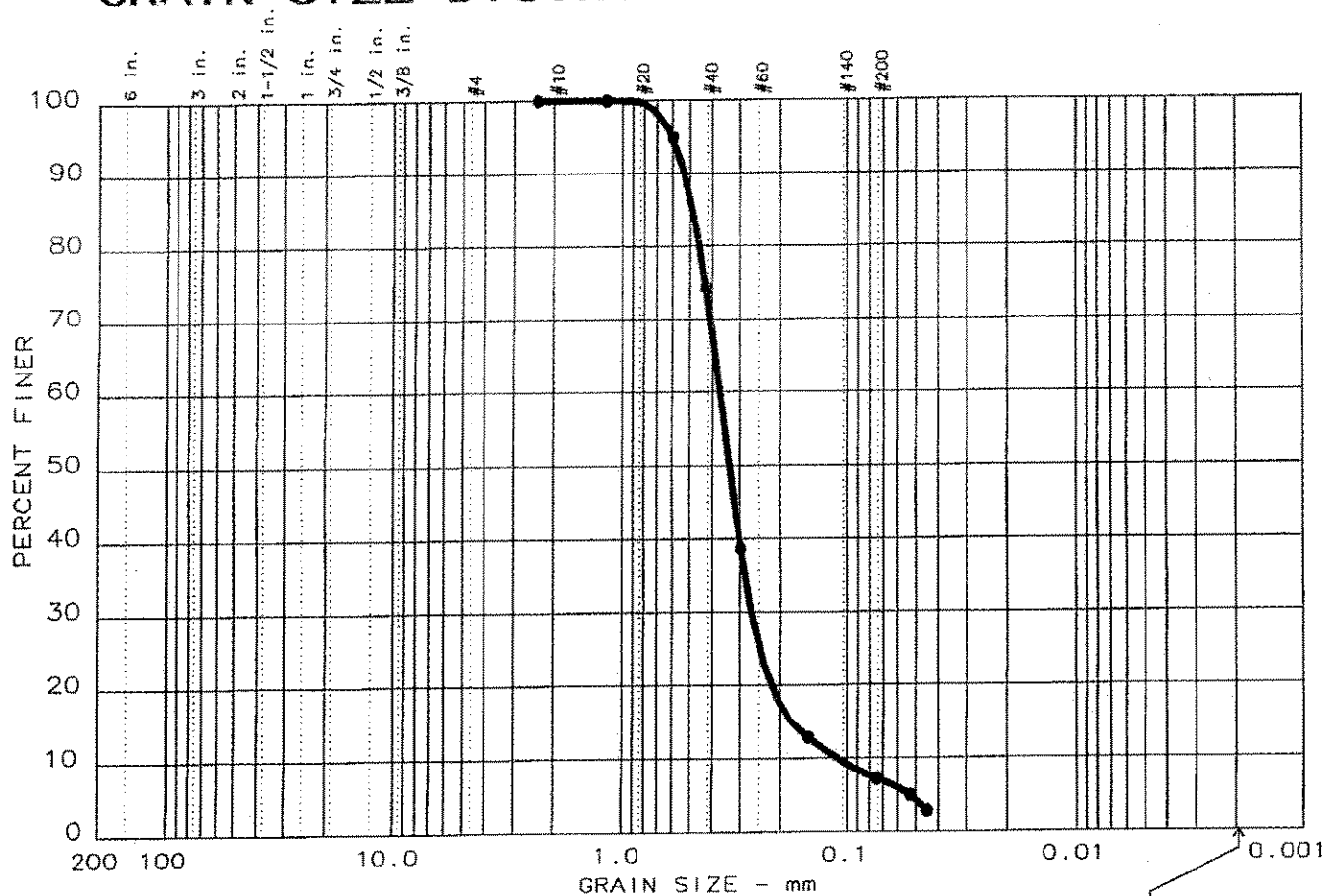
Date: 3 November 2005

GRAIN SIZE DISTRIBUTION TEST REPORT
alston associates inc.

Remarks:
 Prepared for:
 Burnside Environmental

Figure No. 5

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
● 4	0.0	0.0	92.8	7.2	

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
●		0.49	0.37	0.34	0.268	0.1770	0.1104	1.76	3.3

MATERIAL DESCRIPTION	USCS	AASHTO
● SAND, trace silt		

Project No.: 05-090
 Project: Burnside Project # FE0 09754 Kugluktuk
 ● Location: Test Pit 3

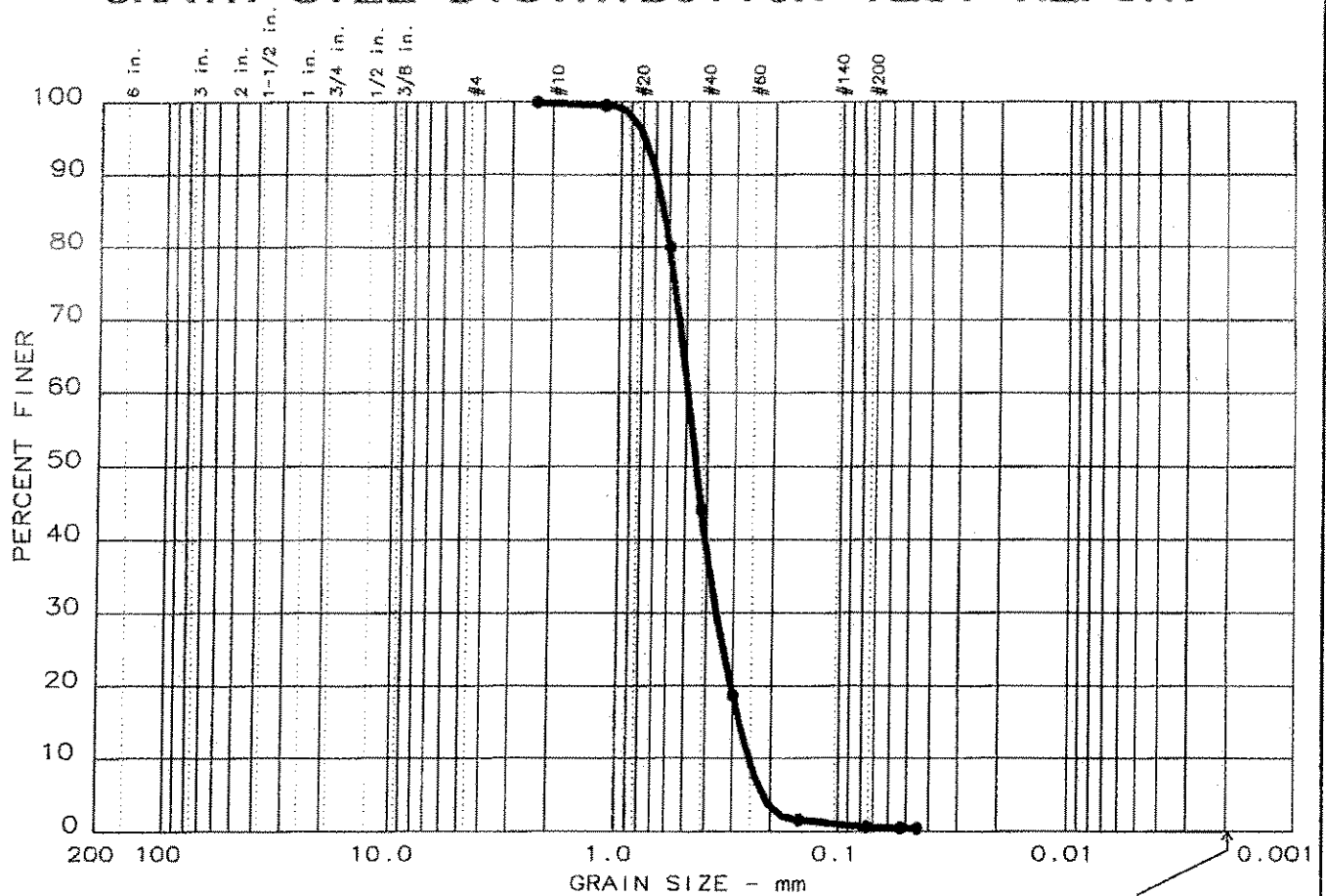
Date: 3 November 2005

GRAIN SIZE DISTRIBUTION TEST REPORT
alston associates inc.

Remarks:
 Prepared for:
 Burnside Environmental

Figure No. 6

GRAIN SIZE DISTRIBUTION TEST REPORT



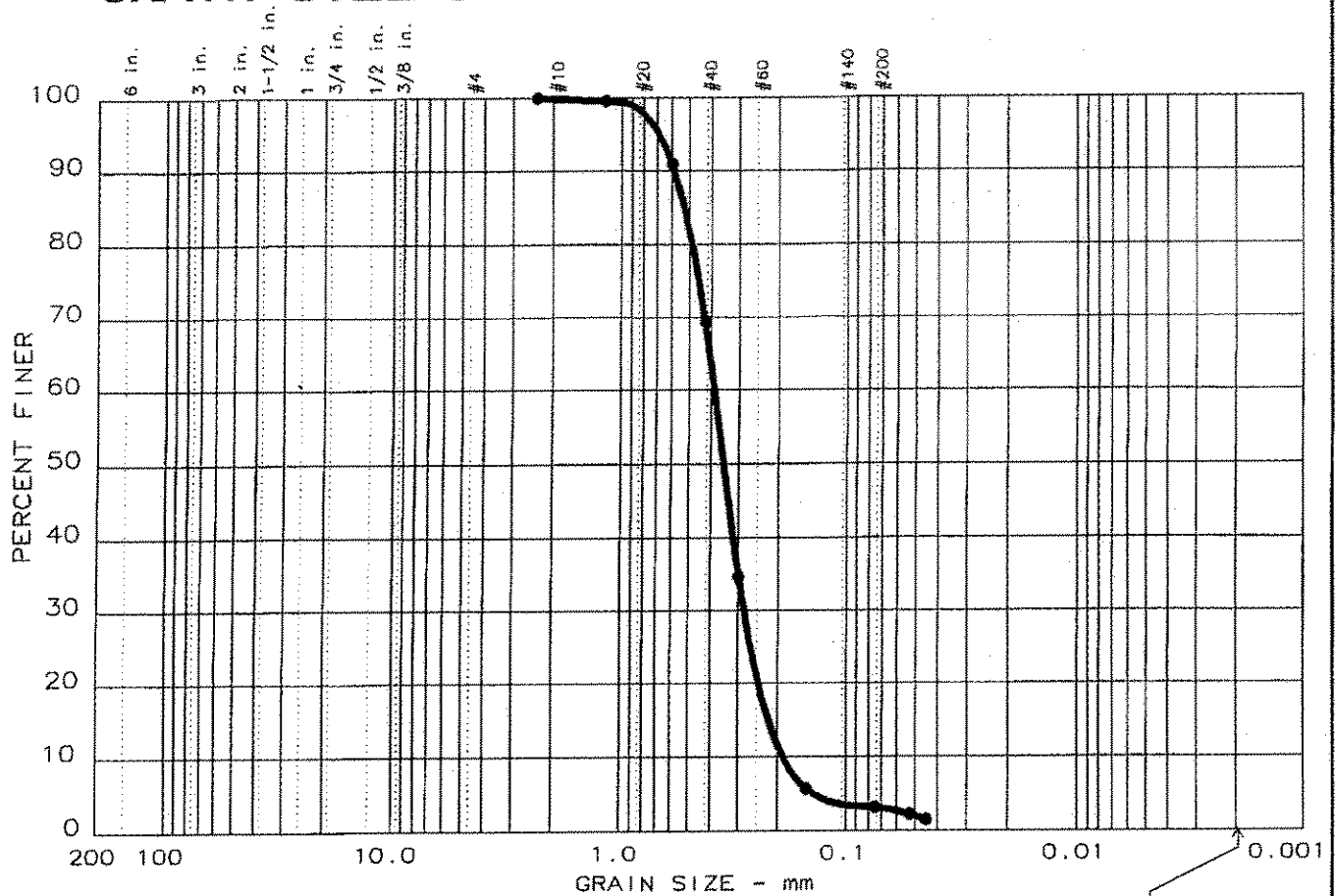
Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
• 5	0.0	0.0	99.4	0.6	

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
•		0.64	0.49	0.45	0.359	0.2799	0.2523	1.03	2.0

MATERIAL DESCRIPTION	USCS	AASHTO
• SAND		

Project No.: 05-090 Project: Burnside Project # FE0 09754 Kugluktuk • Location: Test Pit 4 Date: 3 November 2005	Remarks: Prepared for: Burnside Environmental Figure No. 7
GRAIN SIZE DISTRIBUTION TEST REPORT alston associates inc.	

GRAIN SIZE DISTRIBUTION TEST REPORT



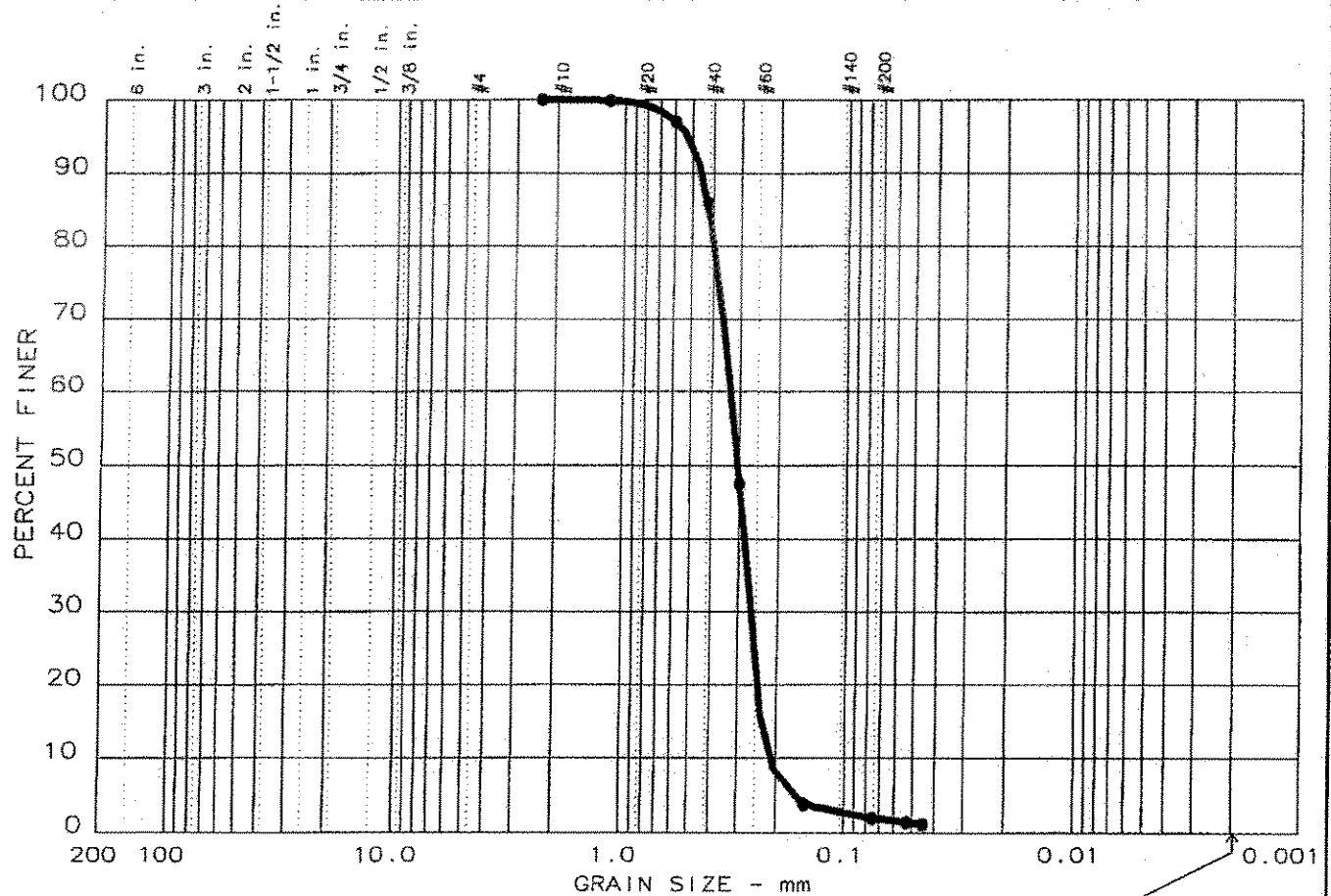
Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
6	0.0	0.0	96.9	3.1	

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
		0.53	0.39	0.35	0.284	0.2203	0.1897	1.10	2.0

MATERIAL DESCRIPTION	USCS	AASHTO
SAND, trace silt		

Project No.: 05-090 Project: Burnside Project # FE0 09754 Kugluktuk Location: Test Pit 5 Date: 3 November 2005 GRAIN SIZE DISTRIBUTION TEST REPORT alston associates inc.	Remarks: Prepared for: Burnside Environmental Figure No. 8
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GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
7	0.0	0.0	98.1	1.9	

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
		0.42	0.33	0.31	0.262	0.2342	0.2236	0.93	1.5

MATERIAL DESCRIPTION	USCS	AASHTO
SAND, trace silt		

Project No.: 05-090
 Project: Burnside Project # FEO 09754 Kugluktuk
 Location: Test Pit 7

Date: 3 November 2005

GRAIN SIZE DISTRIBUTION TEST REPORT
alston associates inc.

Remarks:
 Prepared for:
 Burnside Environmental

Figure No. 9

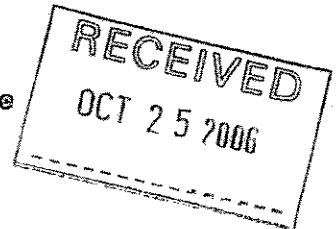


SIEVE ANALYSIS REPORT

MB Trans and Gov

TO
Nuna Burnside
Box 175, 25 Third Avenue
Rankin Inlet, NU
X0C 0G0

CLIENT Nuna Burnside
C.C.



ATTN: John Kuchak

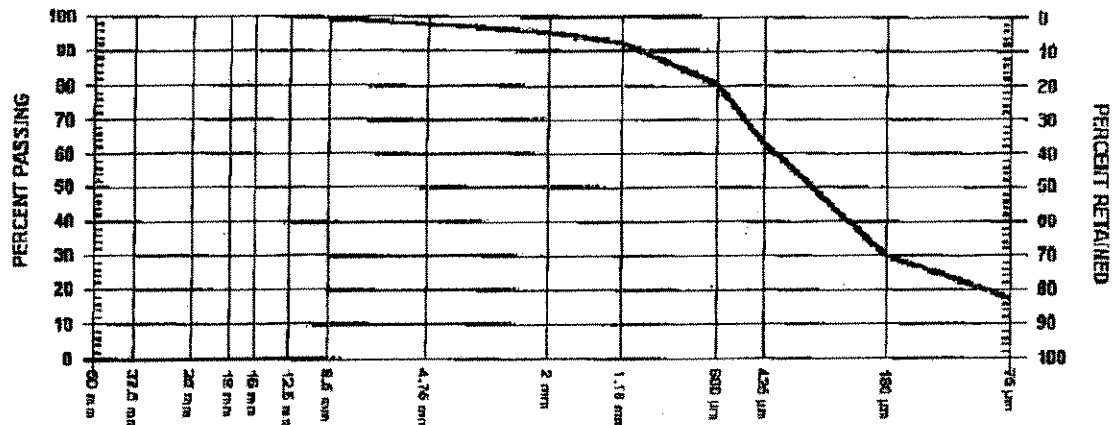
PROJECT *FE09754*
Kugluktuk Sewage Lagoon
Kugluktuk, NU

SIEVE TEST NO. 1

PROJECT NO. NUN-601

SAMPLED BY Client
SUPPLIER
SOURCE Existing Material
SPECIFICATION
MATERIAL TYPE Borrow Pit Sand

DATE SAMPLED ~~2006.Oct.19~~ 2006 Oct. 11
DATE RECEIVED 2006.Oct.19
DATE TESTED 2006.Oct.24
TESTED BY Larry Presado
TEST METHOD WASHED



GRAVEL SIZES	PERCENT PASSING	GRADATION LIMITS
50 mm		
37.5 mm		
25 mm		
19 mm		
16 mm		
12.5 mm	100.0	
9.5 mm	99.6	

SAND SIZES AND FINES	PERCENT PASSING	GRADATION LIMITS
4.75 mm	98.1	
2 mm	95.5	
1.18 mm	92.4	
600 µm	80.4	
425 µm	63.1	
180 µm	29.9	
75 µm	17.4	

COMMENTS

Sample obtained and delivered by client. Material tested identified as sample no. 623R1, South of Heart Lake.



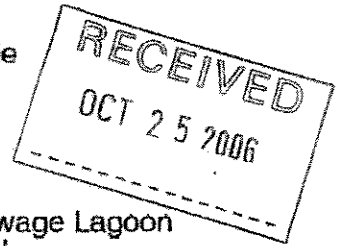
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LABORATORIES
LIMITED**
Established in 1923

SIEVE ANALYSIS REPORT MB Trans and Gov

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Nuna Burnside
Box 175, 25 Third Avenue
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X0C 0G0

CLIENT Nuna Burnside
C.C.



ATTN: John Kuchak

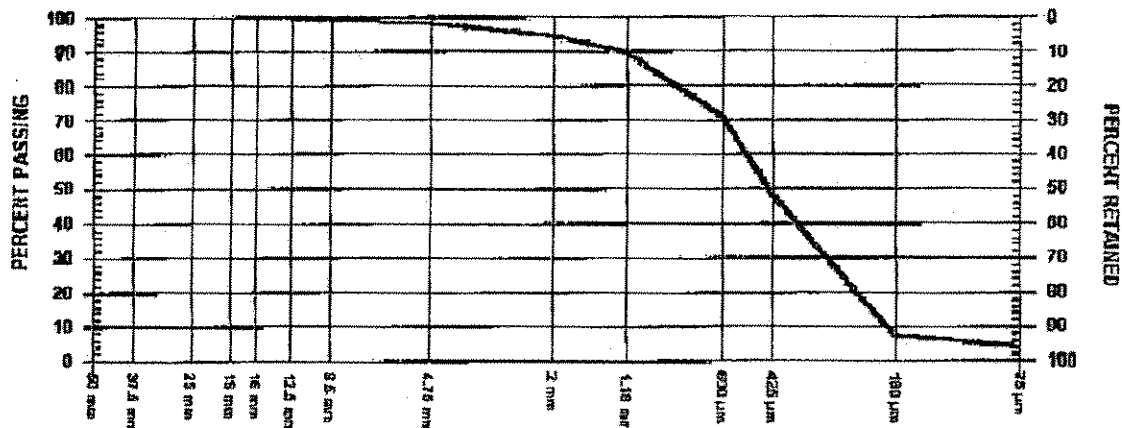
PROJECT Kugluktuk Sewage Lagoon
Kugluktuk, NU

SIEVE TEST NO. 2

PROJECT NO. NUN-601

SAMPLED BY Client
SUPPLIER
SOURCE Existing Material
SPECIFICATION
MATERIAL TYPE Borrow Pit Sand

DATE SAMPLED 2006.Oct.19 2006 at 11
DATE RECEIVED 2006.Oct.19
DATE TESTED 2006.Oct.24
TESTED BY Larry Presado
TEST METHOD WASHED



GRAVEL SIZES	PERCENT PASSING	GRADATION LIMITS
50 mm		
37.5 mm		
25 mm		
19 mm		
16 mm		
12.5 mm	100.0	
9.5 mm	99.6	

SAND SIZES AND FINES	PERCENT PASSING	GRADATION LIMITS
4.75 mm	98.4	
2 mm	94.7	
1.18 mm	89.8	
600 µm	71.0	
425 µm	48.3	
180 µm	7.6	
75 µm	4.3	

COMMENTS

Sample obtained and delivered by client. Material tested identified as sample no. 624R1, South of Heart Lake.



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OCT 25 2006

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Rankin Inlet, NU
X0C 0G0

CLIENT Nuna Burnside
C.C.

PROJECT Kugluktuk Sewage Lagoon
Kugluktuk, NU

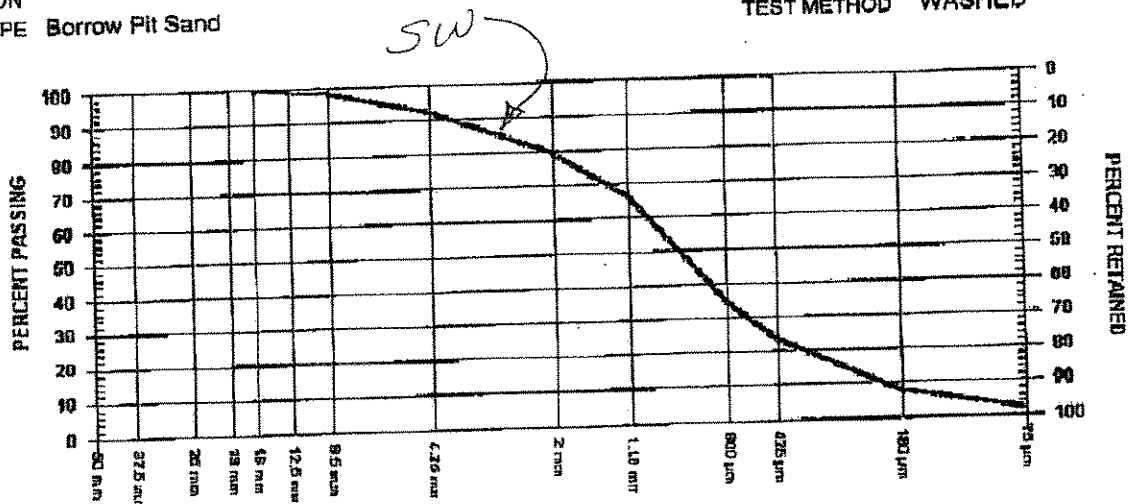
ATTN: John Kuchak

SIEVE TEST NO. 3

PROJECT NO. NUN-601

SAMPLED BY Client
SUPPLIER
SOURCE Existing Material
SPECIFICATION
MATERIAL TYPE Borrow Pit Sand

DATE SAMPLED ~~2006.Oct.19~~ 2006.Oct.11
DATE RECEIVED 2006.Oct.19
DATE TESTED 2006.Oct.24
TESTED BY Larry Presado
TEST METHOD WASHED



GRAVEL SIZES	PERCENT PASSING	GRADATION LIMITS
50 mm		
37.5 mm		
25 mm		
19 mm		
16 mm	100.0	
12.5 mm	99.4	
9.5 mm	98.3	

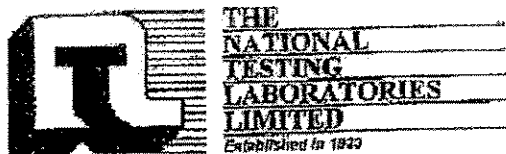
SAND SIZES AND FINES	PERCENT PASSING	GRADATION LIMITS
4.75 mm	92.0	
2 mm	79.5	
1.18 mm	66.2	
600 µm	34.7	
425 µm	23.3	
180 µm	7.8	
75 µm	2.2	

COMMENTS

Sample obtained and delivered by client. Material tested identified as sample no. 625R1, end of runway, west of road, within existing pit.

$$C_u = \frac{D_{60}}{D_{10}} = \frac{1.0}{0.2} = 5.0 \therefore \text{SW - well graded sand.}$$

$$C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}} = \frac{0.3025}{1.2} = 1.5 - \text{" "$$



SIEVE ANALYSIS REPORT

MB Trans and Gov



TO

Nuna Burnside
Box 175, 25 Third Avenue
Rankin Inlet, NU
X0C 0G0

CLIENT Nuna Burnside
C.C.

ATTN: John Kuchak

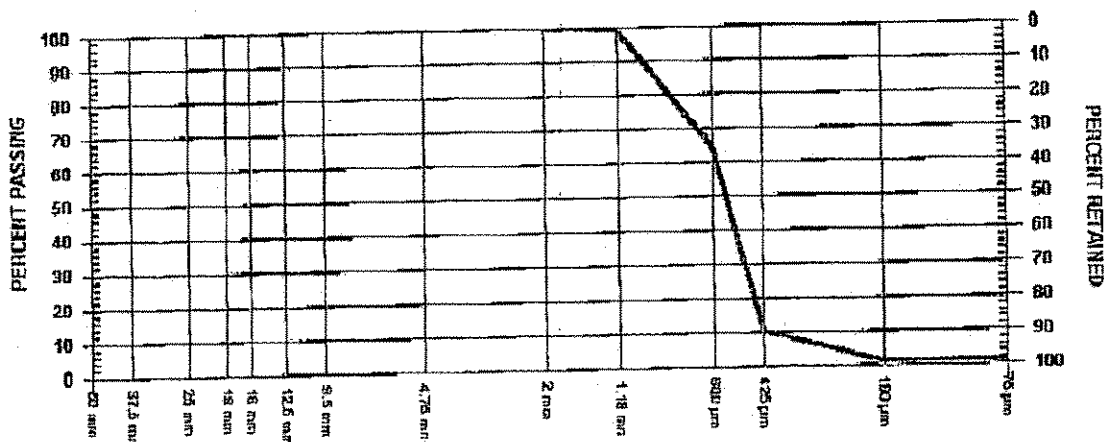
PROJECT *FE09754*
Kugluktuk Sewage Lagoon
Kugluktuk, NU

SIEVE TEST NO. 4

PROJECT NO. NUN-001

SAMPLED BY Client
SUPPLIER
SOURCE Existing Material
SPECIFICATION
MATERIAL TYPE Borrow Pit Sand

DATE SAMPLED ~~2006.Oct.19~~ *2006.Oct.11*
DATE RECEIVED 2006.Oct.19
DATE TESTED 2006.Oct.24
TESTED BY Larry Presado
TEST METHOD WASHED



GRAVEL SIZES	PERCENT PASSING	GRADATION LIMITS
50 mm		
37.5 mm		
25 mm		
19 mm		
16 mm		
12.5 mm		
9.5 mm		

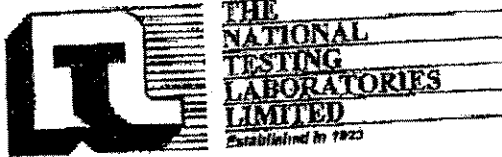
SAND SIZES AND FINES	PERCENT PASSING	GRADATION LIMITS
4.75 mm		
2 mm	100.0	
1.18 mm	99.3	
600 µm	64.2	
425 µm	10.3	
180 µm	1.4	
75 µm	1.1	

COMMENTS

Sample obtained and delivered by client. Material tested identified as sample no. 626H1, end of runway, west of road, west of existing pit.

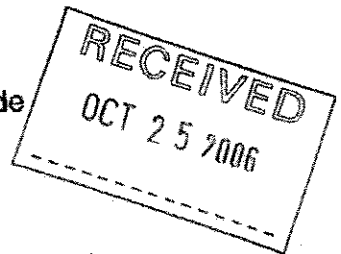
$$C_u = 0.6 / 0.075 = 1.4 < 4 \rightarrow \text{SP - poorly graded sand}$$

$$C_c = (0.5)^2 / 0.6 \times 0.075 = 0.98 < 1.3 \rightarrow \text{poorly graded sand}$$



SIEVE ANALYSIS REPORT

MB Trans and Gov



TO
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Box 175, 25 Third Avenue
Rankin Inlet, NU
X0C 0G0

CLIENT Nuna Burnside
C.C.

PROJECT *FE09754*
Kugluktuk Sewage Lagoon
Kugluktuk, NU

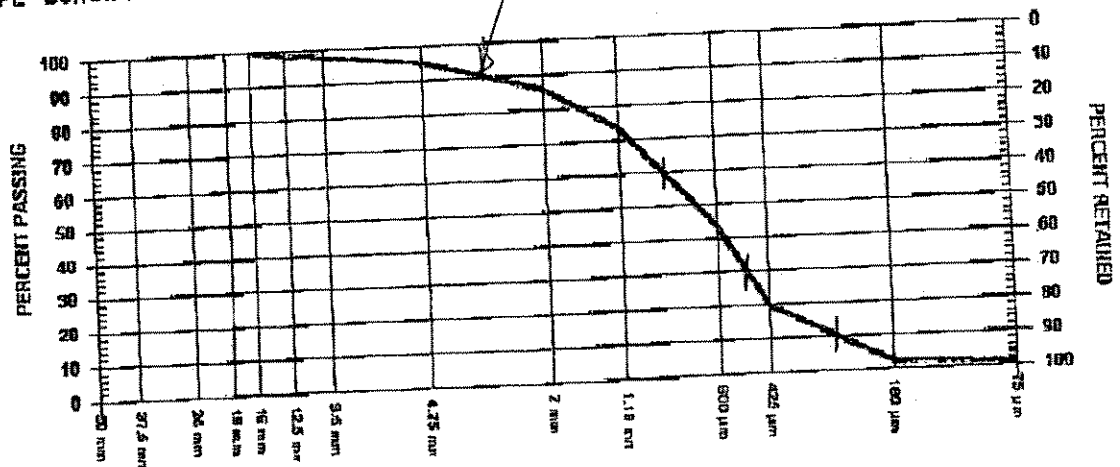
ATTN: John Kuchak

PROJECT NO. NUN-601

SIEVE TEST NO. 5

SAMPLED BY Client
SUPPLIER
SOURCE Existing Material
SPECIFICATION
MATERIAL TYPE Borrow Pit Sand

DATE SAMPLED ~~2006.Oct.19~~ *2006.Oct.11*
DATE RECEIVED 2006.Oct.19
DATE TESTED 2006.Oct.24
TESTED BY Larry Presado
TEST METHOD WASHED



GRAVEL SIZES	PERCENT PASSING	GRADATION LIMITS
50 mm		
37.5 mm		
25 mm		
19 mm		
16 mm	100.0	
12.5 mm	99.0	
9.5 mm	98.1	

SAND SIZES AND FINES	PERCENT PASSING	GRADATION LIMITS
4.75 mm	95.1	
2 mm	85.8	
1.18 mm	73.8	
600 µm	43.7	
425 µm	20.1	
180 µm	2.3	
75 µm	0.9	

$$C_u = \frac{D_{60}}{D_{10}} = \frac{1.75}{0.285} = 2.7 < 4$$

$$C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}} = \frac{(0.573)^2}{0.285 \times 1.75} = 1.2 \rightarrow 1-3$$

COMMENTS

Sample obtained and delivered by client. Material tested identified as sample no. 627R1, existing pit, southeast side of runway.

Page 1 of 1 2006.Oct.24

REVIEWED BY Hermie Manalo