Vangorda Plat. Env Geotech Invest 316 UU0486

SUBJECT: Site Investigation of the Vangorda Pit Area.

Date of investigation: August 18, 1987
Personnel : R. McLenehan, Jose Preciado.

Purpose: : To investigate soil overburden.

General Description

The site investigjpation consisted of the excavation of 6 test pits using a C235 back-hoe. Five of the six test pits were excavated to 4.5 metres. The sixth pit, test pit #5, was excavated to only 2.5 metres.

In general, a shallow layer of organic material covered a glacial till which extended the complete depth of the excavations. The till consisted of a gravelly sandy silt with some clay. Cobbles and boulders were also encountered, comprising approximately 3-5 % by weight of the material. Plasticity generally increased with depth; however, all plasticity encountered was low to moderately low.

Average Wet Unit Weight : 2.0 tonnes/m**3
Average Dry Unit Weight : 1.7 tonnes/m**3
Average Moisture Content : 10.9 percent

Average gradation:
- Gravels and larger : 64 %
- Coarse Sand : 15 %
- Medium Sand : 10 %
- Fine Sand : 7 % (Total sand : 32 %)
- Fines (Silts & Clays) : 4 %

Hydraulic Conductivity = (10**-5)m/s - (10**-6)m/s.

Test Pit #5 varied considerably with respect to the other test pits. Ponded water was present on the surface, while immediately below the surface and extending for 0.5 m, was a layer of sandy silt with some clay. Underlying this was a 1.0 layer of silty gravelly sand. The more dense glacial till then extended below this layer. It is important to note that the silty sandy gravelly sand was saturated and that the pit walls were not stable. This was the only pit in which the walls showed any major instability. In pit #5, wall slumping occured immediately following excavation.

Montreal Engineering Results: 1979 Grum Site Investigation

Average Wet Unit Weight : 2.3 tonnes/m**3
Average Dry Unit Weight : 2.1 tonnes/m**3
Average Moisture Content : 10.7 percent

Average gradation:
- Gravels and larger : 18-23 %
- Sands : 37-44 %
- Fines : 45-33 %

Atterberg Limits:
- Liquid Limit : 26-29 %
- Plastic Limit : 15 %
- Plasticity Index : 11-14 %

Hydraulic Conductivity (using formula (10**-2)(d10**2) = m/s
(d10 = diameter at 10 % gradation measured in mm)

Hydraulic Conductivity =(10**-5)m/s - (10**-8)m/s.

Description:
- Glacial till consisting of gravelly sandy silt containing some clay with occasional patings of sands and gravels. (High density till with low plasticity.)

Discussion of Results

In general, the results from the 1987 Vangorda site investigation correspond well to the glacial till characterizations made for the Grum site by Montreal Engineering in 1979. In both locations, the moisture contents averaged 10-11 %, and in both locations the material can be described as a gravelly, sandy silt with some clay, cobbles and boulders. A full range of angular to sub-rounded particles are also present at each location.

Differences are evident, however, but considering that the material is glacial till and the locations are separated by Vangorda Creek, some variation is expected. Major differences exist in unit weights and in percent fines present. The Vangorda investigation produced unit weights of 2.0 tonnes/m**3 while the Grum study produced unit weights of 2.3 tonnes/m**3. The percent fines at Vangorda ranged from 2 to 30 percent with an average fines compostion of 4-5 percent. Montreal Engineering found 33-45 percent fines at the Grum location. The lesser percentage of fines explains the lower densities determined for Vangorda; however, the fines percentage at Vangorda is suspect at being too low. (Based on the in-situ logging of the pits, and the evidence of low to moderately low plasticity found with depth.) All samples were split and EBA Consultants has been approached to do liquid limits, plastic limits, and grain size analysis on one to two samples selected from each test pit. This results will be available within 7-10 days. (Error source possibilities - improper splitting of samples/ sieves incorrectly sequenced.)

Summary

1. Overburden consists of a gravelly, sandy silt with some clay. Cobbles and boulders are present.
2. The overburden is relatively dense (2.0 t/m**3), has a relatively low mositure content (11 %), has a low to moderately low plasticity, and has a moderately low hydraulic conductivity (10**-5 m/s -10**-6 m/s). The till has a large range of particle sizes and individual particles vary from angular to sub-angular.
3. It should be expected that some areas will have higher seepage as indicated by test pit #5 findings.

EBA Engineering Consultants Ltd.

Civil, Geotechnical and Materials Engineers

1987 09 23

Curragh Resources
117 Industrial Road
Whitehorse, Yukon
Y1A 2T8

EBA File No: 0201-4655.15

ATTENTION: Mr. R. McLennehan

Dear Sir:

Subject: Laboratory Test Results
Vangorda Pit Samples
Faro, Yukon

Enclosed are the results of the laboratory tests performed on the six samples delivered on 87-09-11. Also enclosed is an invoice for the tests performed. N672

If questions arise after reviewing the results, do not hesitate to contact our office at your convenience.

Yours truly,

EBA Engineering Consultants Ltd.

M.C. Plaunt, C.E.T.
Engineering Technologist

MCP/was

Encl.

3167-3rd Avenue, WHITEHORSE, Yukon, Canada Y1A 1G4

▪ Telephone (403) 668-3068 ▪ Facsimile Copier: (403) 668-4349 ▪

EBA Engineering Consultants Ltd.

SUMMARY OF LABORATORY TEST RESULTS

PROJECT: Tailings Pond Area, Faro, Yukon PROJECT No.: 0201-4655.15 DATE: 87-09-21

BOREHOLE	DEPTH	MOISTURE CONTENT (%)	ATTERBERG LIMITS			GRAIN SIZE DISTRIBUTION				DESCRIPTION
			LL (%)	PL (%)	PI (%)	Clay (%)	Silt (%)	Sand (%)	Gravel (%)	
1.3		12.4	27	16.5	10.5	13	34	40	13	SAND - silty, some clay, some gravel
2.3		9.2	22	18.5	3.5	7	28	52	13	SAND - silty, some gravel, trace of clay
3.2		10.7	25	17.5	7.5	14	28	46	12	SAND - silty, some clay, some gravel
4.2		11.7	25	17.5	7.5	13	30	42	8	SAND - silty, some clay, trace of gravel
5.3		14.5	23.5	18.0	6.0	9	26	46	19	SAND - silty, some gravel, trace of clay
6.4		11.2	26.0	17.5	8.5	17	34	40	9	SAND - silty, some clay, trace of gravel

EBA Engineering Consultants Ltd.

PARTICLE - SIZE ANALYSIS OF SOILS

Project: Tailings Pond Samples
Curragh Resources, Faro, Yukon

Project Number: 0201-4655.15

Date Tested: 1987-09-18

Borehole Number:

Depth:

Soil Description:

Cu:

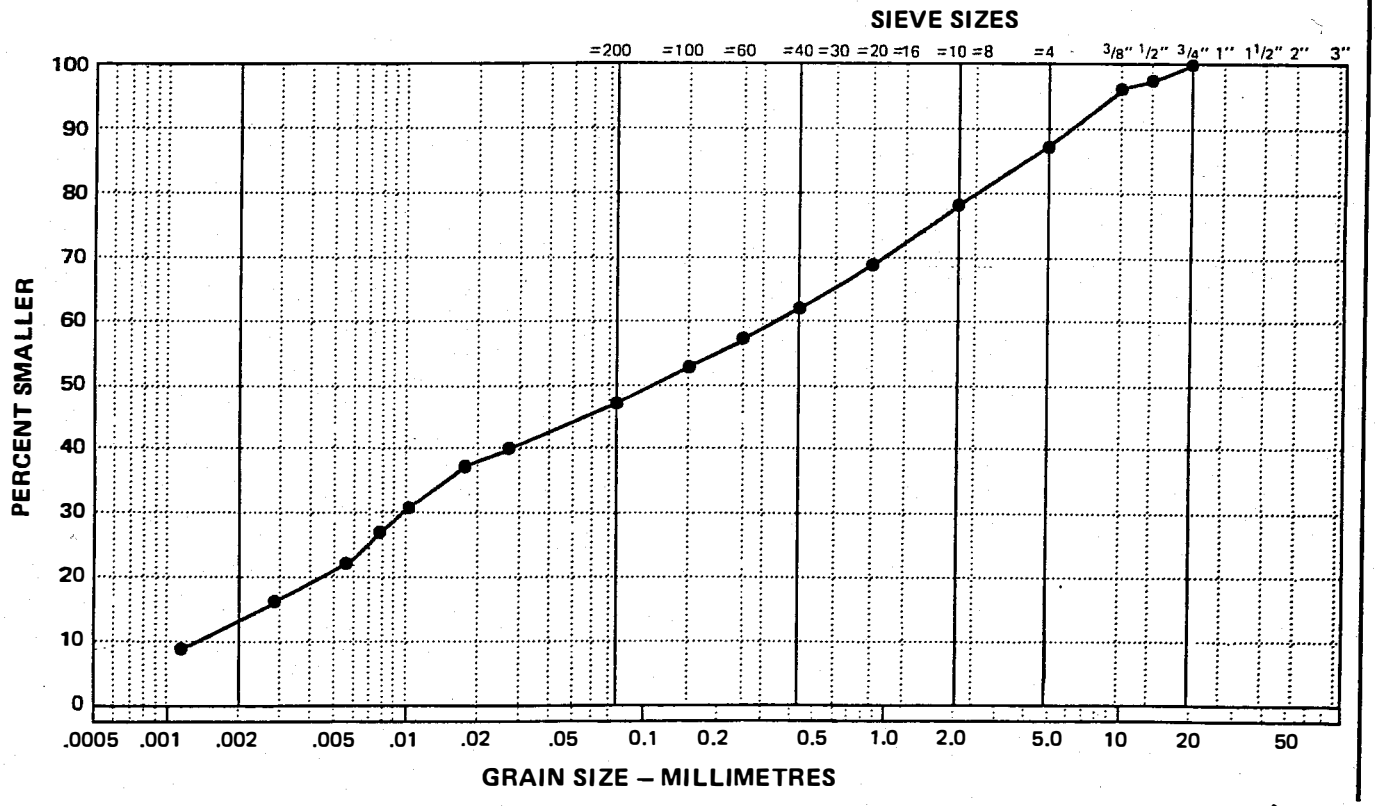
Cc:

Natural Moisture Content: 12.4 %

Remarks: SAMPLE 1.3

SIEVE	PERCENTAGE PASSING
3"	
1 1/2"	
1"	
3/4"	100
1/2"	97
3/8"	96
No. 4	87
No. 10	78
No. 20	69
No. 40	62
No. 60	57
No. 100	53
No. 200	47

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



Tested in accordance with ASTM D422 unless otherwise noted.

EBA Engineering Consultants Ltd.

PARTICLE - SIZE ANALYSIS OF SOILS

Project: Tailings Pond Samples
Curragh Resources, Faro, Yukon

Project Number: 0201-4655.15

Date Tested: 1987-09-18

Borehole Number:

Depth:

Soil Description:

Cu:

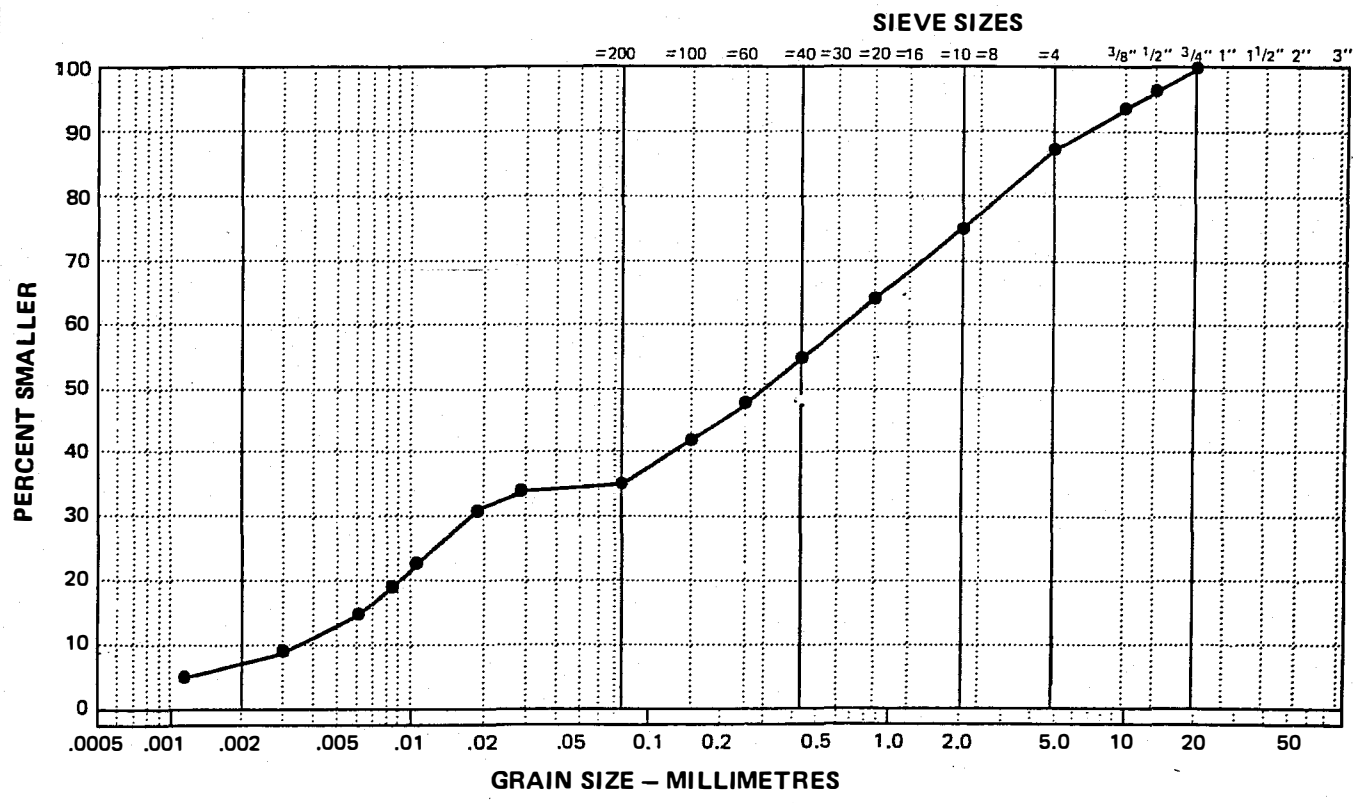
Cc:

Natural Moisture Content: 9.2 %

Remarks: SAMPLE 2.3

SIEVE	PERCENTAGE PASSING
3"	
1 1/2"	
1"	
3/4"	100
1/2"	96
3/8"	94
No. 4	87
No. 10	75
No. 20	64
No. 40	55
No. 60	48
No. 100	42
No. 200	35

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



Tested in accordance with ASTM D422 unless otherwise noted.

EBA Engineering Consultants Ltd.

PARTICLE - SIZE ANALYSIS OF SOILS

Project: Tailings Pond Samples
Curragh Resources, Faro, Yukon

Project Number: 0201-4655.15

Date Tested: 1987-09-18

Borehole Number:

Depth:

Soil Description:

Cu:

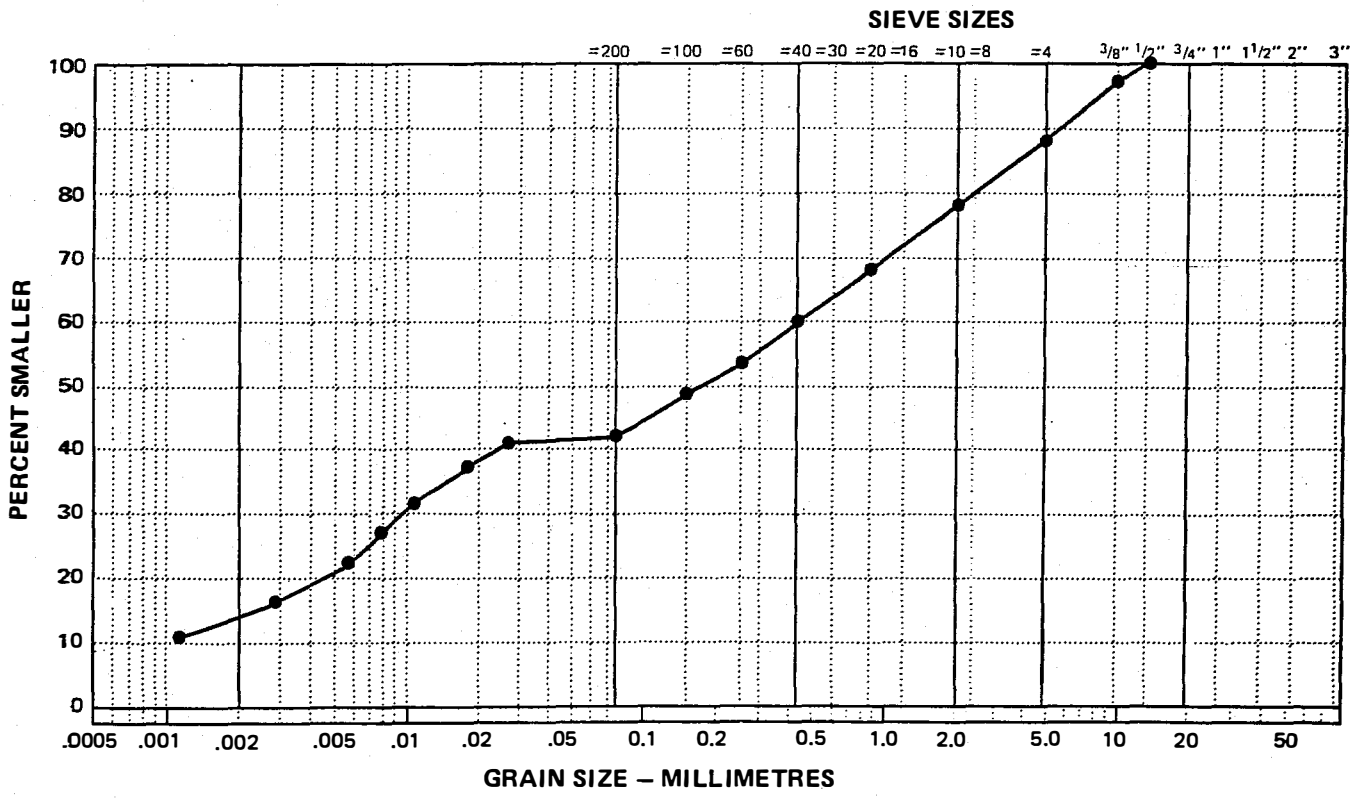
Cc:

Natural Moisture Content: 10.7 %

Remarks: SAMPLE 3.2

SIEVE	PERCENTAGE PASSING
3"	
1 1/2"	
1"	
3/4"	
1/2"	100
3/8"	97
No. 4	88
No. 10	78
No. 20	68
No. 40	60
No. 60	54
No. 100	49
No. 200	42

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



Tested in accordance with ASTM D422 unless otherwise noted.

EBA Engineering Consultants Ltd.

PARTICLE - SIZE ANALYSIS OF SOILS

Project: Tailings Pond Samples
Curragh Resources, Faro, Yukon

Project Number: 0201-4655.15

Date Tested: 1987-09-18

Borehole Number:

Depth:

Soil Description:

Cu:

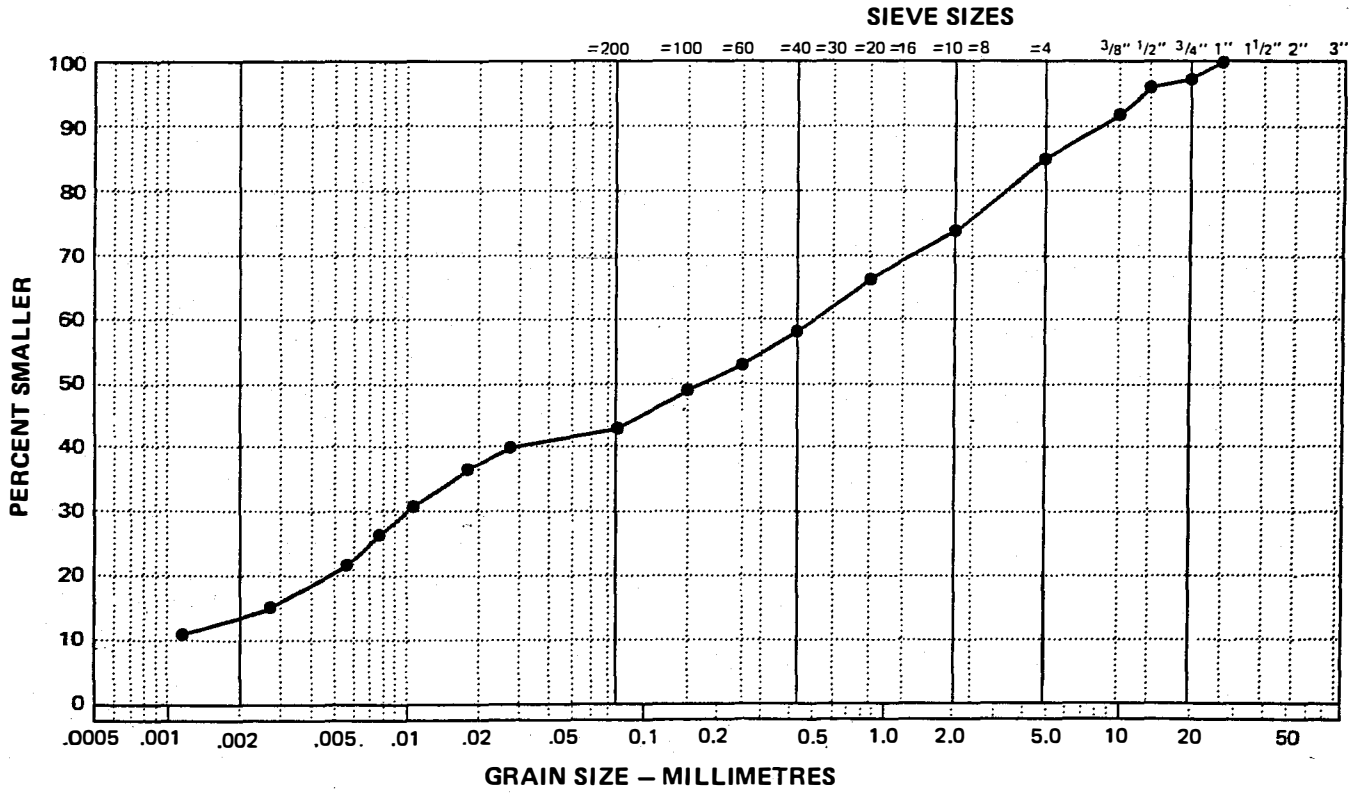
Cc:

Natural Moisture Content: 11.7 %

Remarks: SAMPLE 4.2

SIEVE	PERCENTAGE PASSING
3"	
1 1/2"	
1"	100
3/4"	97
1/2"	96
3/8"	92
No. 4	85
No. 10	74
No. 20	66
No. 40	58
No. 60	53
No. 100	49
No. 200	43

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



Tested in accordance with ASTM D422 unless otherwise noted.

EBA Engineering Consultants Ltd.

PARTICLE - SIZE ANALYSIS OF SOILS

Project: Tailings Pond Samples
Curragh Resources, Faro, Yukon

Project Number: 0201-4655.15

Date Tested: 1987-09-18

Borehole Number:

Depth:

Soil Description:

Cu:

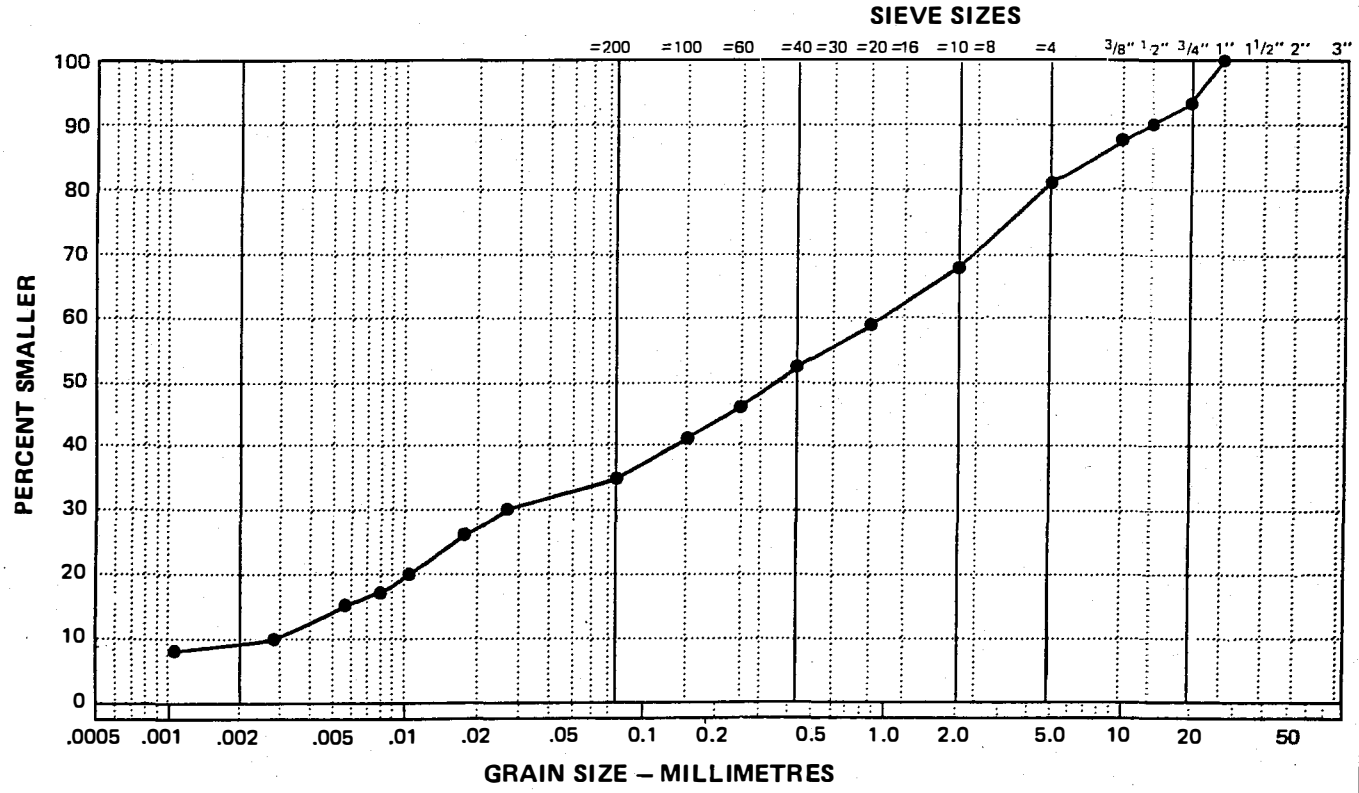
Cc:

Natural Moisture Content: 14.5 %

Remarks: SAMPLE 5.3

SIEVE	PERCENTAGE PASSING
3"	
$1^1/_2$"	
1"	100
$^3/_4$"	94
$^1/_2$"	90
$^3/_8$"	88
No. 4	81
No. 10	68
No. 20	59
No. 40	53
No. 60	46
No. 100	41
No. 200	35

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



Tested in accordance with ASTM D422 unless otherwise noted.

EBA Engineering Consultants Ltd.

PARTICLE - SIZE ANALYSIS OF SOILS

Project: Tailings Pond Samples
Curragh Resources, Faro, Yukon

Project Number: 0201-4655.15

Date Tested: 1987-09-18

Borehole Number:

Depth:

Soil Description:

Cu:

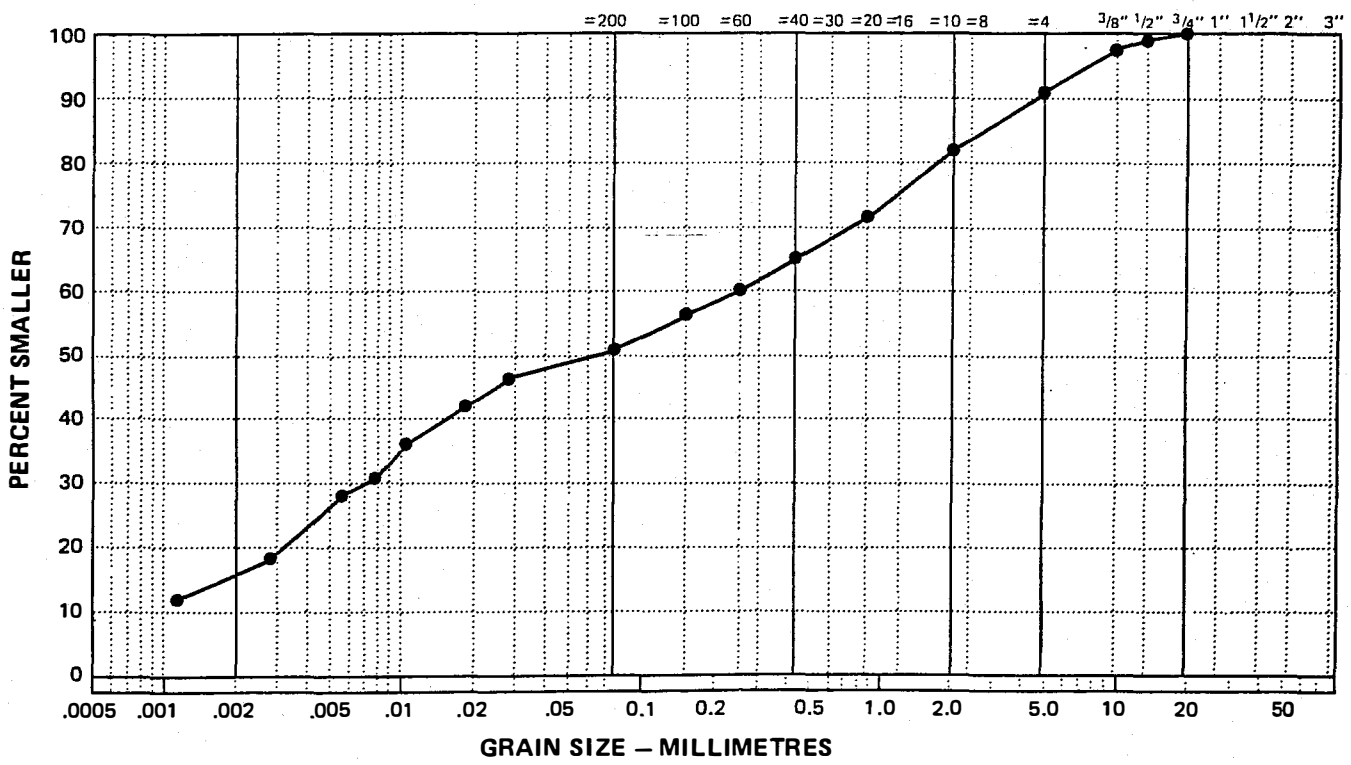
Cc:

Natural Moisture Content: 11.2 %

Remarks: SAMPLE 6.4

SIEVE	PERCENTAGE PASSING
3"	
1 1/2"	
1"	
3/4"	100
1/2"	99
3/8"	97
No. 4	91
No. 10	82
No. 20	72
No. 40	65
No. 60	60
No. 100	56
No. 200	51

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



Tested in accordance with ASTM D422 unless otherwise noted.