HEADER SHEET FOR SEDIMENT SAMPLING TRIP

PROJECT LOCATION: Skamakawa Turn

SAMPLING DATE: April 1997

SAMPLING METHOD (PONAR/BOX CORE/GRAVITY CORE/VIBRA CORE):

SAMPLING ANALYSIS (SAMPLE NUMBERS ANALYZED) C-1 to 3 CW01 to 20 01-15

GRAIN SIZE: ✓

OIL/GREASE:

AMMONIA (NH4):

SULFIDE:

TOTAL ORGANIC CARBON (TOC):

VOLATILE SOLIDS:

METALS:

PESTICIDES:

PAH'S:

ELUTRIATES:

BIOLOGICAL:

SEDIMENT QUALITY dBASE FILES:

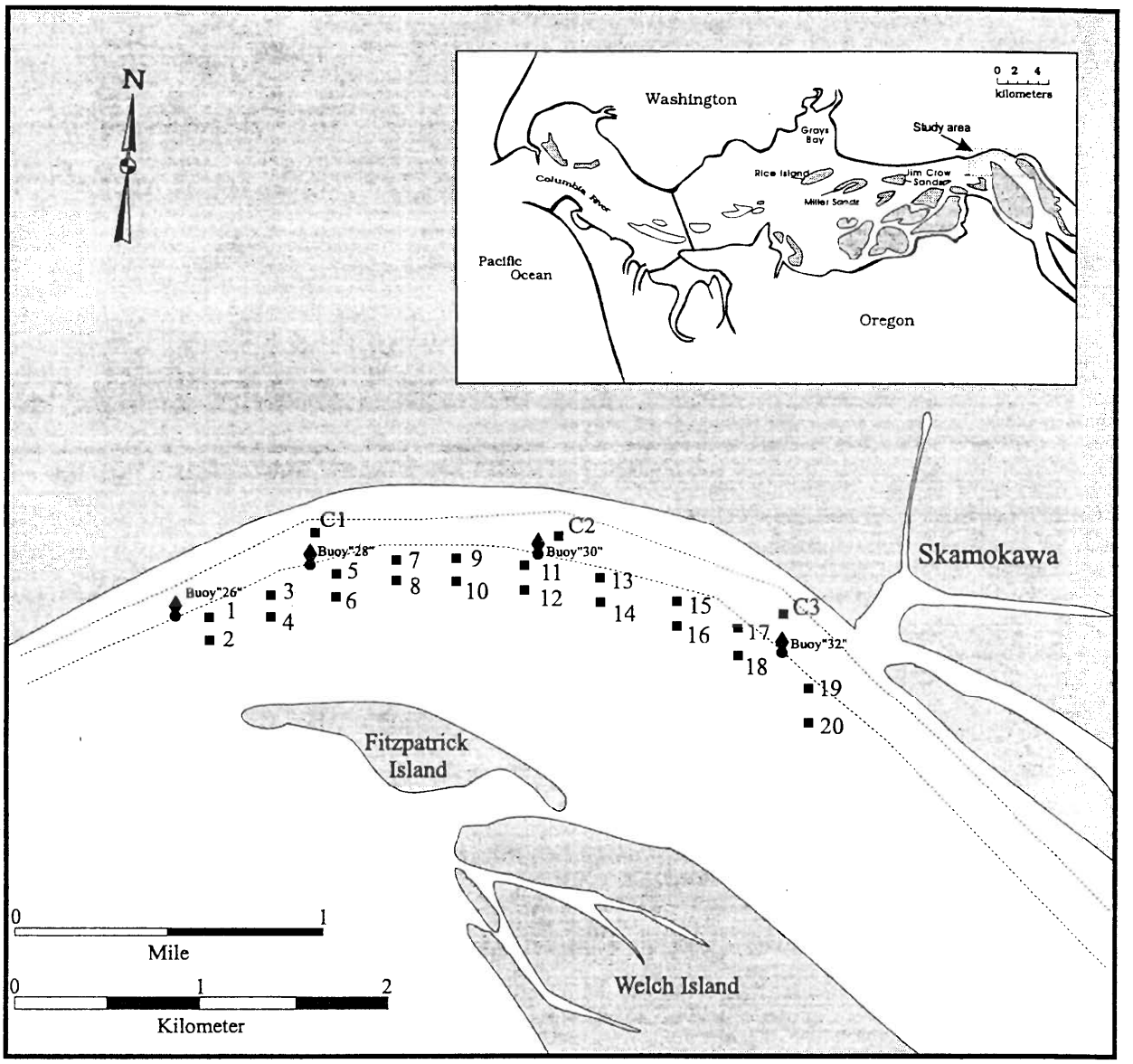

Figure 1. Locations of benthic invertebrate and sediment sampling stations in and adjacent to a proposed channel widening area (River Mile 31-34) in the Columbia River estuary. The North Transect stations (odd-numbered) were completely within the potential impact area, and the South Transect stations (even-numbered) were located along the southern boundary of the potential impact area or just south of the area. Stations C1-C3 were reference stations located in the navigational channel; the channel is indicated with dotted lines.

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION LABORATORY
CORPS OF ENGINEERS
1491 N.W. GRAHAM ROAD
TROUTDALE, OREGON 97060-9508

REPLY TO
ATTENTION OF:

Skamokawa Turn

No Si

August 8, 1997

National Marine Fisheries Service
Point Adams Biological Field Station
P.O. Box 155 (520 Heceta Place)
Hammond, OR 97121-0155
Attention: George McCabe, Jr.

Mr. McCabe,

In accordance with your letter dated April 14, 1997, enclosed are results for 23 sediment samples from the proposed channel widening area in the Columbia River Estuary collected by National Marine Fisheries personnel from April 4-7, 1997. Included are twenty-three "Report of Particle Size Analysis and Classification Tests" forms, one for each sample received.

This completes all physical analyses requested for this sample shipment.

Sincerely,

Timothy J. Seeman

TIMOTHY J. SEEMAN, Director
North Pacific Division Laboratory

Copy Furnished: CENWP-PE-E (Larson)

The Benthic info. can be found in "Benthic invertebrates and sediment characteristics in and adjacent to a proposed channel widening area (RM 31-34) Columbia River Estuary". McCabe & Hinton, Fish Ecology Division, NW Fisheries Science Center, National Marine Fisheries Service, March 1998

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COLUMBIA RIVER ESTUARY (97-047)

Boring: **CW** Sample: **C-1** Depth: --- Lab No.: 4701

------ Sieve Analysis ------

Sieve	Cumulative Grams Retained	Percent Passing
5 In.	0.00	100.0
2.5 In.	0.00	100.0
1.25 In.	0.00	100.0
5/8 In.	0.00	100.0
5/16 In.	0.00	100.0
No. 5	0.23	100.0
No. 10	1.12	99.9
Pan	873.00	0.0
No. 18	1.21	98.7
No. 35	27.40	73.6
No. 60	97.49	6.3
No. 120	103.85	0.2
No. 230	103.98	0.0
Pan	104.02	0.0

No hydrometer analysis.

D85: 0.62 D60: 0.44 D50: 0.40 D30: 0.32 D15: 0.28 D10: 0.26 mm

Cu: 1.68 Cc: 0.91

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

Gravel: 0.0% Sand: 99.9% Fines: 0.0%

---------- ASTM D 2487 Classification ----------

SP Poorly graded SAND

---------- TM 5-818-2 Frost Classification ----------

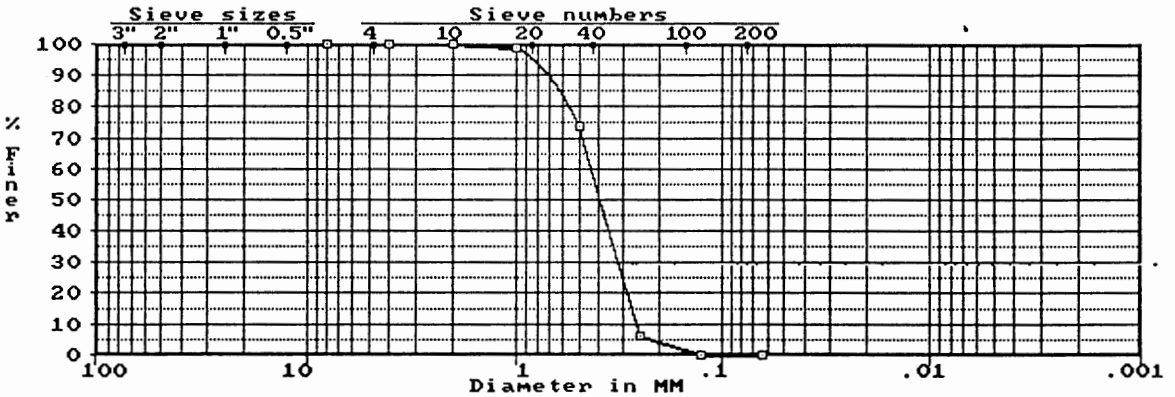
Percent finer than 0.02 mm: 0.0 Frost Classification: **NFS**

---------- Comments ----------

-Location:Channel widening near Skamokawa.

-Volatile Solids: 0.7%

-Date: 4 April 1997



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COLUMBIA RIVER ESTUARY (97-047)

Boring: **CW** Sample: **C-2** Depth: --- Lab No.: 4702

------ Sieve Analysis ------

Sieve	Cumulative Grams Retained	Percent Passing
5 In.	0.00	100.0
2.5 In.	0.00	100.0
1.25 In.	0.00	100.0
5/8 In.	0.00	100.0
5/16 In.	0.00	100.0
No. 5	0.35	100.0
No. 10	0.58	99.9
Pan	941.70	0.0
No. 18	0.27	99.7
No. 35	13.82	87.6
No. 60	100.49	10.5
No. 120	112.09	0.2
No. 230	112.30	0.0
Pan	112.33	0.0

No hydrometer analysis.

D85: 0.49 D60: 0.39 D50: 0.36 D30: 0.30 D15: 0.26 D10: 0.24 mm

Cu: 1.62 Cc: 0.94

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

Gravel: 0.0% Sand: 99.9% Fines: 0.0%

---------- ASTM D 2487 Classification ----------

SP Poorly graded SAND

---------- TM 5-818-2 Frost Classification ----------

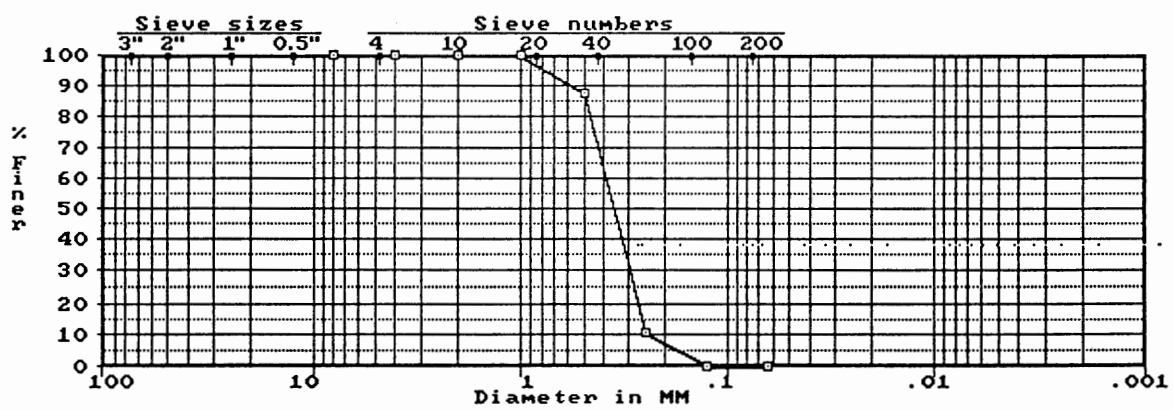
Percent finer than 0.02 mm: 0.0 Frost Classification: **NFS**

---------- Comments ----------

-Location:Channel widening near Skamokawa.

-Volatile Solids: 0.5%

-Date: 7 April 1997



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COLUMBIA RIVER ESTUARY (97-047)

Boring: **CW** Sample: **C-3** Depth: --- Lab No.: 4703

------ Sieve Analysis ------

Sieve	Cumulative Grams Retained	Percent Passing
5 In.	0.00	100.0
2.5 In.	0.00	100.0
1.25 In.	0.00	100.0
5/8 In.	0.00	100.0
5/16 In.	2.54	99.7
No. 5	3.37	99.6
No. 10	12.77	98.4
Pan	794.50	0.0
No. 18	9.89	87.8
No. 35	53.91	40.5
No. 60	89.20	2.5
No. 120	91.50	0.1
No. 230	91.53	0.0
Pan	91.56	0.0

No hydrometer analysis.

D85: 0.95 D60: 0.65 D50: 0.57 D30: 0.43 D15: 0.33 D10: 0.30 mm

Cu: 2.18 Cc: 0.95

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

Gravel: 0.4% Sand: 99.6% Fines: 0.0%

---------- ASTM D 2487 Classification ----------

SP Poorly graded SAND

---------- TM 5-818-2 Frost Classification ----------

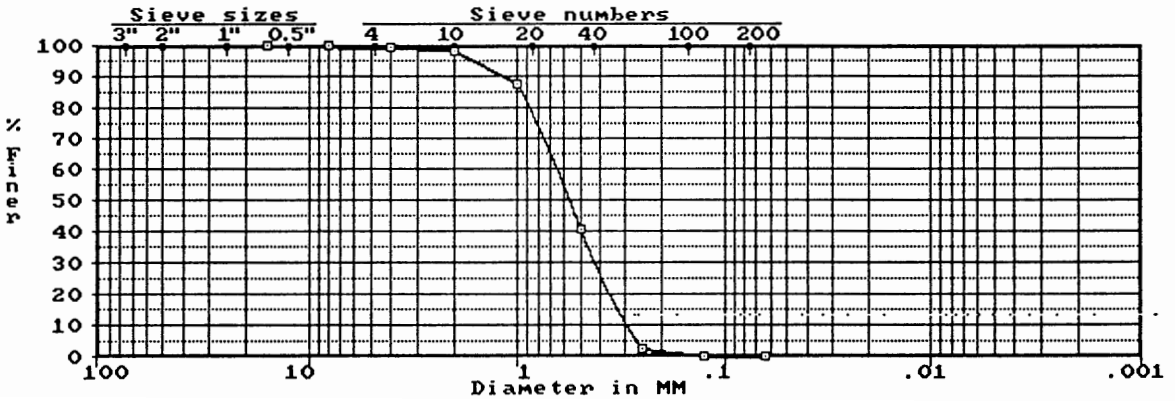
Percent finer than 0.02 mm: 0.0 Frost Classification: **NFS**

---------- Comments ----------

-Location:Channel widening near Skamokawa.

-Volatile Solids: 0.6%

-Date: 7 April 1997



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COLUMBIA RIVER ESTUARY (97-047)

Boring: **CW** Sample: **01** Depth: --- Lab No.: 4704

------ Sieve Analysis ------

Sieve	Cumulative Grams Retained	Percent Passing
5 In.	0.00	100.0
2.5 In.	0.00	100.0
1.25 In.	0.00	100.0
5/8 In.	0.00	100.0
5/16 In.	0.00	100.0
No. 5	0.00	100.0
No. 10	0.00	100.0
Pan	809.10	0.0
No. 18	0.02	100.0
No. 35	0.10	99.9
No. 60	15.38	84.5
No. 120	92.13	7.0
No. 230	98.90	0.2
Pan	99.07	0.0

No hydrometer analysis.

D85: 0.26 D60: 0.20 D50: 0.18 D30: 0.15 D15: 0.13 D10: 0.13 mm

Cu: 1.57 Cc: 0.92

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

Gravel: 0.0% Sand: 98.1% Fines: 1.9%

---------- ASTM D 2487 Classification ----------

SP Poorly graded SAND

---------- TM 5-818-2 Frost Classification ----------

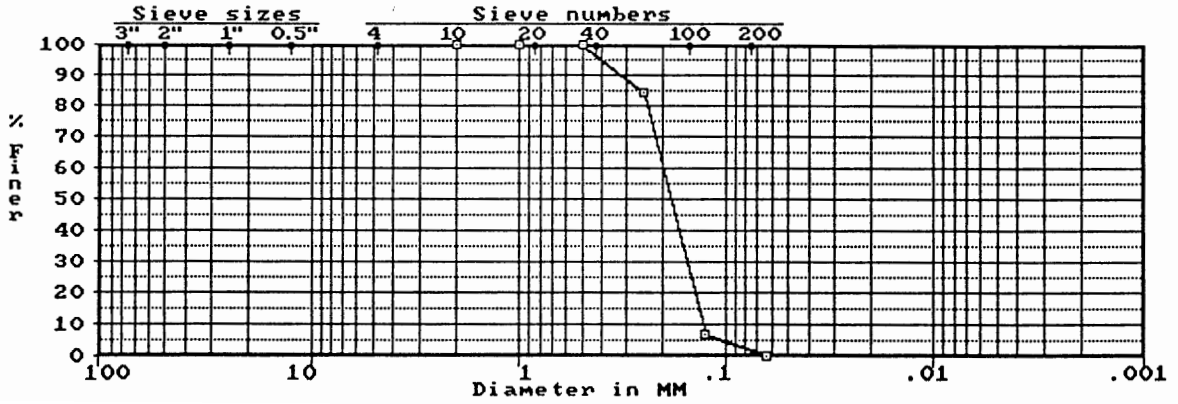
Frost Classification: **NFS**

---------- Comments ----------

-Location:Channel widening near Skamokawa.

-Volatile Solids: 0.5%

-Date: 4 April 1997



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COLUMBIA RIVER ESTUARY (97-047)

Boring: **CW** Sample: **02** Depth: --- Lab No.: 4705

------ Sieve Analysis ------

Sieve	Cumulative Grams Retained	Percent Passing
5 In.	0.00	100.0
2.5 In.	0.00	100.0
1.25 In.	0.00	100.0
5/8 In.	0.00	100.0
5/16 In.	0.00	100.0
No. 5	0.00	100.0
No. 10	0.06	100.0
Pan	807.20	0.0
No. 18	0.02	100.0
No. 35	0.82	99.1
No. 60	59.20	37.0
No. 120	93.54	0.5
No. 230	93.97	0.0
Pan	94.00	0.0

No hydrometer analysis.

D85: 0.42 D60: 0.32 D50: 0.28 D30: 0.23 D15: 0.18 D10: 0.16 mm

Cu: 1.97 Cc: 1.02

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

Gravel: 0.0% Sand: 99.9% Fines: 0.1%

---------- ASTM D 2487 Classification ----------

SP Poorly graded SAND

---------- TM 5-818-2 Frost Classification ----------

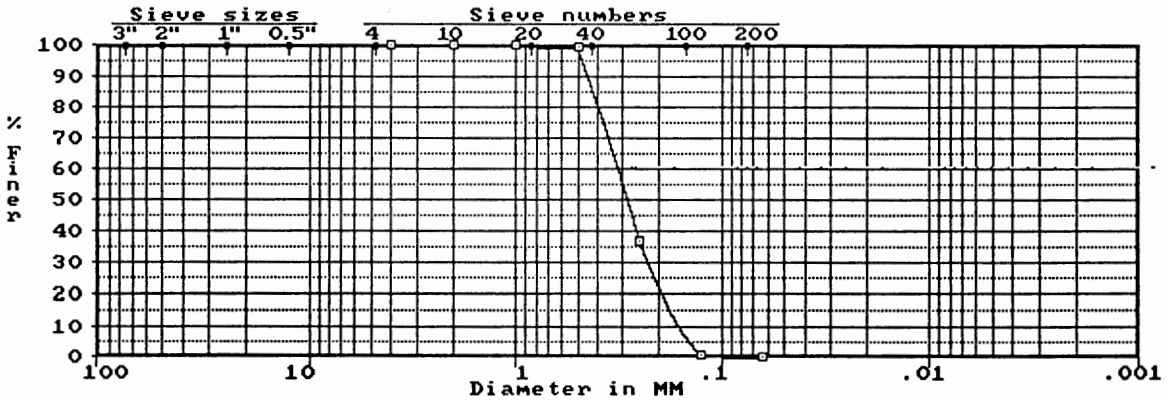
Percent finer than 0.02 mm: 0.0 Frost Classification: **NFS**

---------- Comments ----------

-Location:Channel widening near Skamokawa.

-Volatile Solids: 0.7%

-Date: 4 April 1997



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COLUMBIA RIVER ESTUARY (97-047)

Boring: CW Sample: 03 Depth: --- Lab No.: 4706

------ Sieve Analysis ------

Sieve	Cumulative Grams Retained	Percent Passing
5 In.	0.00	100.0
2.5 In.	0.00	100.0
1.25 In.	0.00	100.0
5/8 In.	0.00	100.0
5/16 In.	0.00	100.0
No. 5	0.00	100.0
No. 10	0.09	100.0
Pan	999.30	0.0
No. 18	0.10	99.9
No. 35	5.01	95.8
No. 60	97.30	18.9
No. 120	119.66	0.3
No. 230	120.00	0.0
Pan	120.04	0.0

No hydrometer analysis.

D85: 0.45 D60: 0.36 D50: 0.33 D30: 0.28 D15: 0.22 D10: 0.18 mm

Cu: 2.00 Cc: 1.18

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

Gravel: 0.0% Sand: 99.9% Fines: 0.0%

---------- ASTM D 2487 Classification ----------

SP Poorly graded SAND

---------- TM 5-818-2 Frost Classification ----------

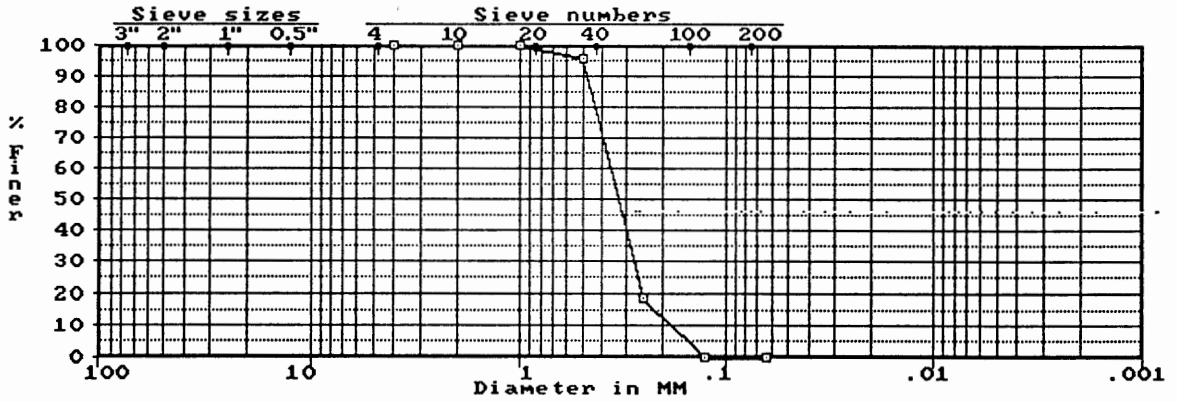
Percent finer than 0.02 mm: 0.0 Frost Classification: **NFS**

---------- Comments ----------

-Location:Channel widening near Skamokawa.

-Volatile Solids: 0.7%

-Date: 4 April 1997



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COLUMBIA RIVER ESTUARY (97-047)

Boring: CW Sample: 04 Depth: --- Lab No.: 4707

------ Sieve Analysis ------

Sieve	Cumulative Grams Retained	Percent Passing
5 In.	0.00	100.0
2.5 In.	0.00	100.0
1.25 In.	0.00	100.0
5/8 In.	0.00	100.0
5/16 In.	0.00	100.0
No. 5	0.00	100.0
No. 10	0.09	100.0
Pan	822.20	0.0
No. 18	0.05	99.9
No. 35	3.22	96.8
No. 60	79.76	21.1
No. 120	100.68	0.4
No. 230	101.06	0.1
Pan	101.12	0.0

No hydrometer analysis.

D85: 0.45 D60: 0.35 D50: 0.32 D30: 0.27 D15: 0.22 D10: 0.20 mm

Cu: 1.78 Cc: 1.04

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

Gravel: 0.0% Sand: 99.8% Fines: 0.2%

---------- ASTM D 2487 Classification ----------

SP Poorly graded SAND

---------- TM 5-818-2 Frost Classification ----------

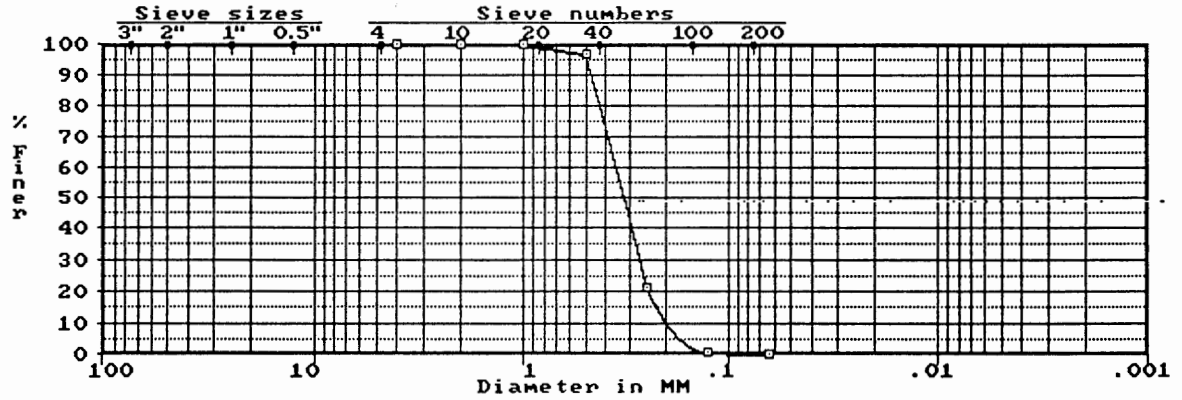
Frost Classification: **NFS**

---------- Comments ----------

-Location:Channel widening near Skamokawa.

-Volatile Solids: 0.6%

-Date: 4 April 1997



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COLUMBIA RIVER ESTUARY (97-047)

Boring: **CW** Sample: **05** Depth: --- Lab No.: 4708

------ Sieve Analysis ------

Sieve	Cumulative Grams Retained	Percent Passing
5 In.	0.00	100.0
2.5 In.	0.00	100.0
1.25 In.	0.00	100.0
5/8 In.	0.00	100.0
5/16 In.	0.00	100.0
No. 5	0.00	100.0
No. 10	0.14	100.0
Pan	849.50	0.0
No. 18	0.13	99.9
No. 35	5.70	94.4
No. 60	86.65	15.4
No. 120	102.24	0.2
No. 230	102.40	0.0
Pan	102.43	0.0

No hydrometer analysis.

D85: 0.46 D60: 0.37 D50: 0.34 D30: 0.28 D15: 0.25 D10: 0.20 mm

Cu: 1.88 Cc: 1.12

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

Gravel: 0.0% Sand: 99.9% Fines: 0.0%

---------- ASTM D 2487 Classification ----------

SP Poorly graded SAND

---------- TM 5-818-2 Frost Classification ----------

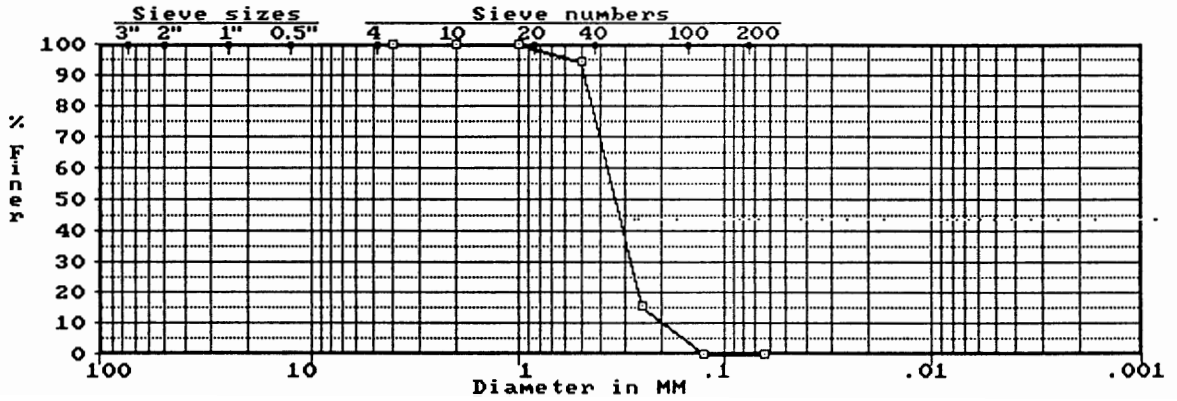
Percent finer than 0.02 mm: 0.0 Frost Classification: **NFS**

---------- Comments ----------

-Location:Channel widening near Skamokawa.

-Volatile Solids: 0.6%

-Date: 4 April 1997



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COLUMBIA RIVER ESTUARY (97-047)

Boring: **CW** Sample: **06** Depth: --- Lab No.: 4709

------ Sieve Analysis ------

Sieve	Cumulative Grams Retained	Percent Passing
5 In.	0.00	100.0
2.5 In.	0.00	100.0
1.25 In.	0.00	100.0
5/8 In.	0.00	100.0
5/16 In.	0.00	100.0
No. 5	0.39	100.0
No. 10	0.58	99.9
Pan	882.80	0.0
No. 18	0.30	99.7
No. 35	6.24	94.1
No. 60	88.94	17.3
No. 120	107.30	0.3
No. 230	107.55	0.0
Pan	107.59	0.0

No hydrometer analysis.

D85: 0.46 D60: 0.37 D50: 0.33 D30: 0.28 D15: 0.23 D10: 0.19 mm

Cu: 1.97 Cc: 1.15

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

Gravel: 0.0% Sand: 99.9% Fines: 0.0%

---------- ASTM D 2487 Classification ----------

SP Poorly graded SAND

---------- TM 5-818-2 Frost Classification ----------

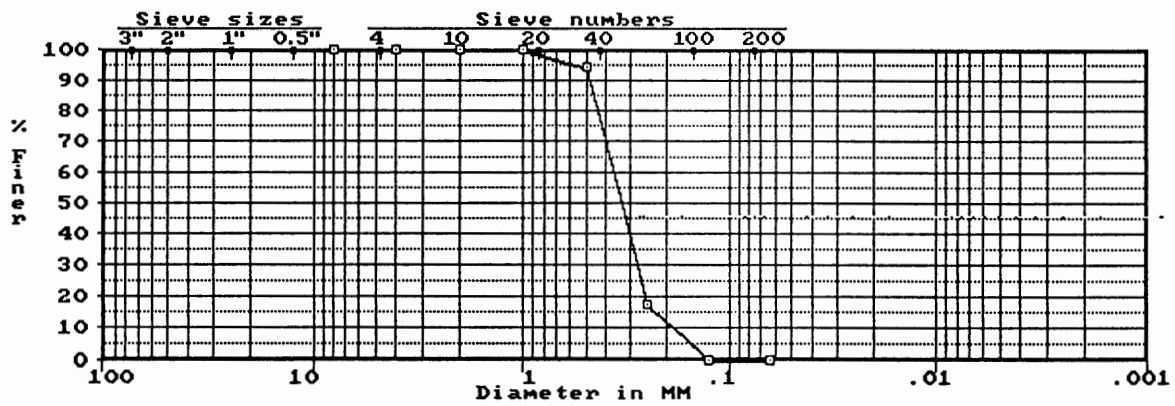
Percent finer than 0.02 mm: 0.0 Frost Classification: **NFS**

---------- Comments ----------

-Location:Channel widening near Skamokawa.

-Volatile Solids: 0.6%

-Date: 4 April 1997



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COLUMBIA RIVER ESTUARY (97-047)

Boring: **CW** Sample: 07 Depth: --- Lab No.: 4710

------ Sieve Analysis ------

Sieve	Cumulative Grams Retained	Percent Passing
5 In.	0.00	100.0
2.5 In.	0.00	100.0
1.25 In.	0.00	100.0
5/8 In.	0.00	100.0
5/16 In.	0.00	100.0
No. 5	0.09	100.0
No. 10	0.99	99.9
Pan	968.90	0.0
No. 18	1.07	99.0
No. 35	15.21	87.0
No. 60	102.06	13.5
No. 120	117.76	0.2
No. 230	118.00	0.0
Pan	118.02	0.0

No hydrometer analysis.

D85: 0.49 D60: 0.39 D50: 0.35 D30: 0.29 D15: 0.25 D10: 0.21 mm

Cu: 1.86 Cc: 1.06

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

Gravel: 0.0% Sand: 99.9% Fines: 0.0%

---------- ASTM D 2487 Classification ----------

SP Poorly graded SAND

---------- TM 5-818-2 Frost Classification ----------

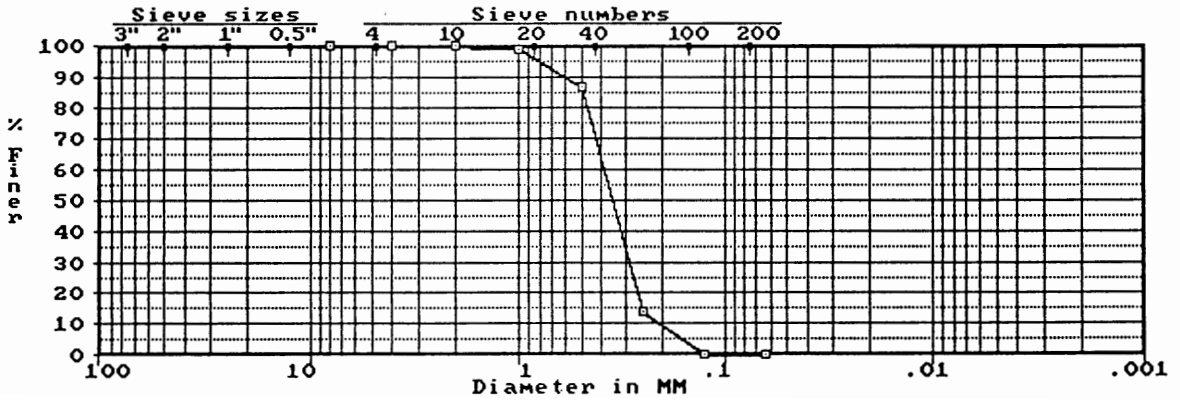
Percent finer than 0.02 mm: 0.0 Frost Classification: **NFS**

---------- Comments ----------

-Location:Channel widening near Skamokawa.

-Volatile Solids: 0.7%

-Date: 4 April 1997



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COLUMBIA RIVER ESTUARY (97-047)

Boring: CW Sample: 08 Depth: --- Lab No.: 4711

------ Sieve Analysis ------

Sieve	Cumulative Grams Retained	Percent Passing
5 In.	0.00	100.0
2.5 In.	0.00	100.0
1.25 In.	0.00	100.0
5/8 In.	0.00	100.0
5/16 In.	0.00	100.0
No. 5	0.00	100.0
No. 10	0.12	100.0
Pan	846.30	0.0
No. 18	0.19	99.8
No. 35	10.45	89.7
No. 60	88.61	12.9
No. 120	101.48	0.3
No. 230	101.63	0.1
Pan	101.78	0.0

No hydrometer analysis.

D85: 0.48 D60: 0.38 D50: 0.35 D30: 0.29 D15: 0.25 D10: 0.21 mm

Cu: 1.79 Cc: 1.04

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

Gravel: 0.0% Sand: 99.8% Fines: 0.2%

---------- ASTM D 2487 Classification ----------

SP Poorly graded SAND

---------- TM 5-818-2 Frost Classification ----------

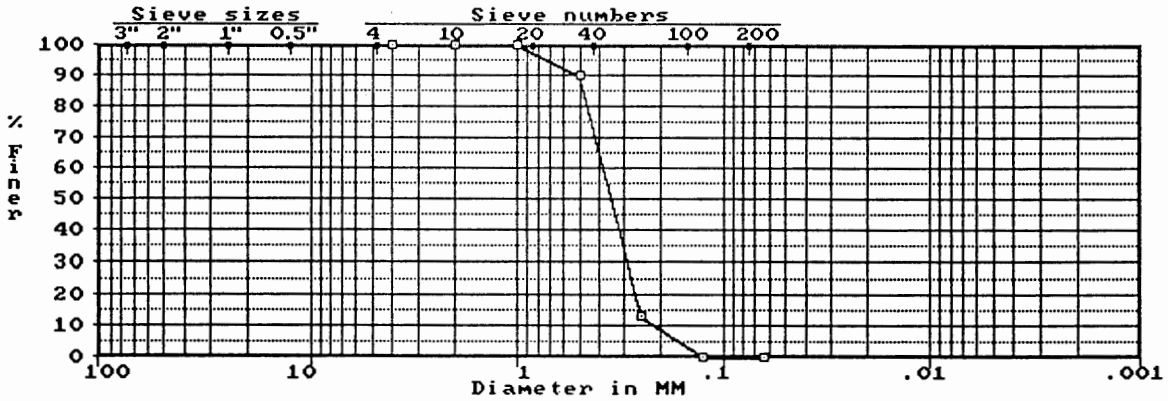
Frost Classification: **NFS**

---------- Comments ----------

-Location:Channel widening near Skamokawa.

-Volatile Solids: 0.8%

-Date: 4 April 1997



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COLUMBIA RIVER ESTUARY (97-047)

Boring: CW Sample: 09 Depth: --- Lab No.: 4712

------ Sieve Analysis ------

Sieve	Cumulative Grams Retained	Percent Passing
5 In.	0.00	100.0
2.5 In.	0.00	100.0
1.25 In.	0.00	100.0
5/8 In.	0.00	100.0
5/16 In.	0.00	100.0
No. 5	0.00	100.0
No. 10	0.57	99.9
Pan	965.70	0.0
No. 18	0.40	99.6
No. 35	10.79	90.9
No. 60	102.63	13.7
No. 120	118.34	0.4
No. 230	118.77	0.1
Pan	118.87	0.0

No hydrometer analysis.

D85: 0.47 D60: 0.38 D50: 0.35 D30: 0.29 D15: 0.25 D10: 0.21 mm

Cu: 1.83 Cc: 1.07

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

Gravel: 0.0% Sand: 99.8% Fines: 0.2%

---------- ASTM D 2487 Classification ----------

SP Poorly graded SAND

---------- TM 5-818-2 Frost Classification ----------

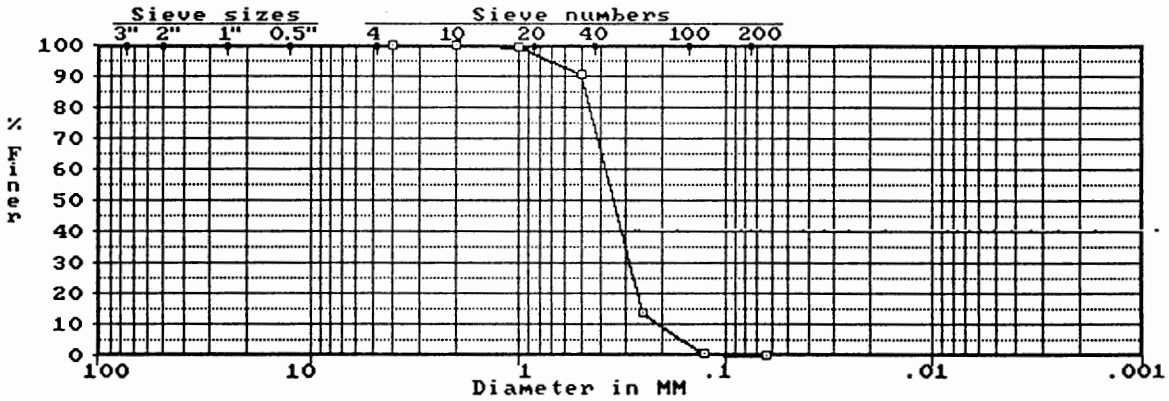
Frost Classification: **NFS**

---------- Comments ----------

-Location:Channel widening near Skamokawa.

-Volatile Solids: 0.6%

-Date: 4 April 1997



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COLUMBIA RIVER ESTUARY (97-047)

Boring: CW Sample: 10 Depth: --- Lab No.: 4713

------ Sieve Analysis ------

Sieve	Cumulative Grams Retained	Percent Passing
5 In.	0.00	100.0
2.5 In.	0.00	100.0
1.25 In.	0.00	100.0
5/8 In.	0.00	100.0
5/16 In.	0.00	100.0
No. 5	1.57	99.8
No. 10	3.78	99.6
Pan	916.30	0.0
No. 18	1.57	98.2
No. 35	23.89	77.8
No. 60	99.82	8.4
No. 120	108.88	0.1
No. 230	109.00	0.0
Pan	109.02	0.0

No hydrometer analysis.

D85: 0.58 D60: 0.42 D50: 0.38 D30: 0.31 D15: 0.27 D10: 0.25 mm

Cu: 1.66 Cc: 0.91

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

Gravel: 0.1% Sand: 99.8% Fines: 0.0%

---------- ASTM D 2487 Classification ----------

SP Poorly graded SAND

---------- TM 5-818-2 Frost Classification ----------

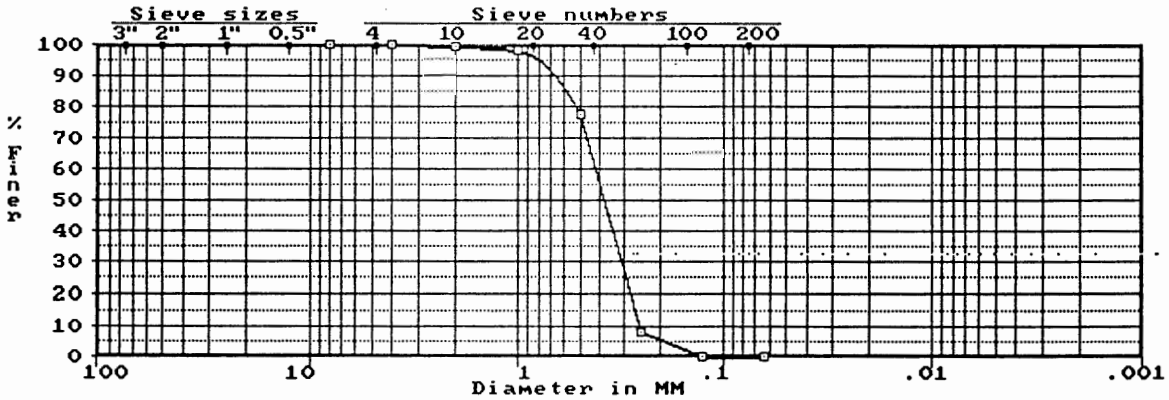
Percent finer than 0.02 mm: 0.0 Frost Classification: **NFS**

---------- Comments ----------

-Location:Channel widening near Skamokawa.

-Volatile Solids: 0.6%

-Date: 4 April 1997



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COLUMBIA RIVER ESTUARY (97-047)

Boring: **CW** Sample: **11** Depth: --- Lab No.: 4714

------ Sieve Analysis ------

Sieve	Cumulative Grams Retained	Percent Passing
5 In.	0.00	100.0
2.5 In.	0.00	100.0
1.25 In.	0.00	100.0
5/8 In.	0.00	100.0
5/16 In.	0.00	100.0
No. 5	0.62	99.9
No. 10	1.55	99.8
Pan	939.10	0.0
No. 18	1.39	98.6
No. 35	22.08	80.4
No. 60	102.81	9.5
No. 120	113.22	0.3
No. 230	113.39	0.2
Pan	113.61	0.0

No hydrometer analysis.

D85: 0.55 D60: 0.41 D50: 0.37 D30: 0.31 D15: 0.26 D10: 0.25 mm

Cu: 1.64 Cc: 0.91

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

Gravel: 0.0% Sand: 99.7% Fines: 0.2%

---------- ASTM D 2487 Classification ----------

SP Poorly graded SAND

---------- TM 5-818-2 Frost Classification ----------

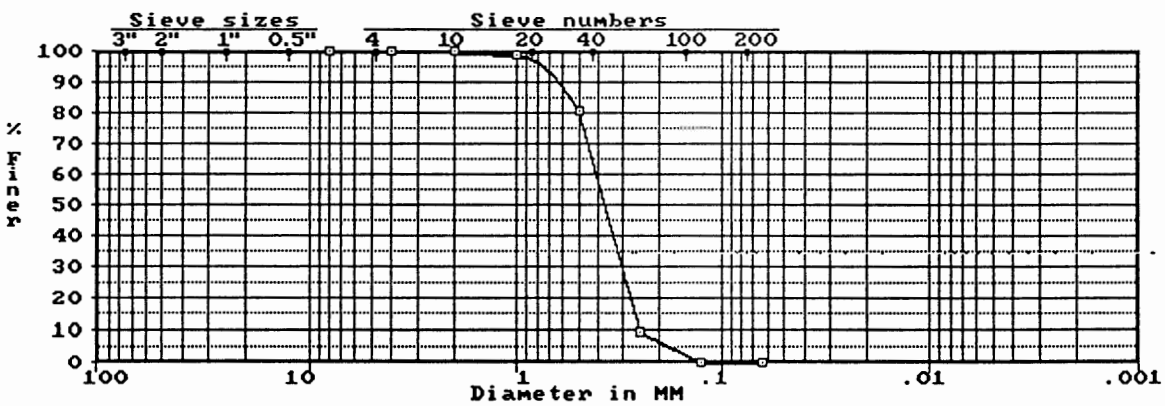
Frost Classification: **NFS**

---------- Comments ----------

-Location:Channel widening near Skamokawa.

-Volatile Solids: 0.6%

-Date: 4 April 1997



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COLUMBIA RIVER ESTUARY (97-047)

Boring: **CW** Sample: **12** Depth: --- Lab No.: 4715

------ Sieve Analysis ------

Sieve	Cumulative Grams Retained	Percent Passing
5 In.	0.00	100.0
2.5 In.	0.00	100.0
1.25 In.	0.00	100.0
5/8 In.	0.00	100.0
5/16 In.	0.00	100.0
No. 5	1.77	99.8
No. 10	4.28	99.4
Pan	748.20	0.0
No. 18	2.11	98.3
No. 35	27.61	84.7
No. 60	163.17	12.5
No. 120	186.05	0.4
No. 230	186.35	0.2
Pan	186.73	0.0

No hydrometer analysis.

D85: 0.51 D60: 0.39 D50: 0.36 D30: 0.30 D15: 0.26 D10: 0.22 mm

Cu: 1.82 Cc: 1.02

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

Gravel: 0.1% Sand: 99.6% Fines: 0.3%

---------- ASTM D 2487 Classification ----------

SP Poorly graded SAND

---------- TM 5-818-2 Frost Classification ----------

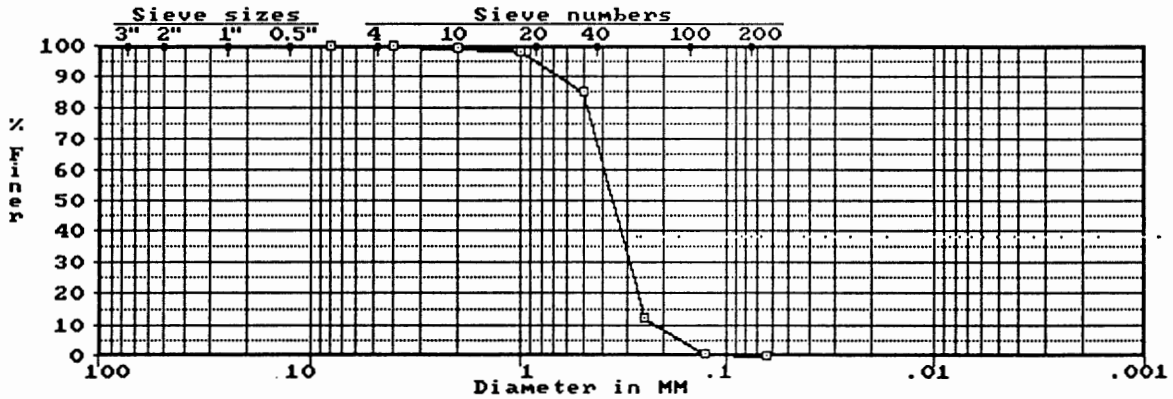
Frost Classification: NFS

---------- Comments ----------

-Location:Channel widening near Skamokawa.

-Volatile Solids: 0.7%

-Date: 4 April 1997



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COLUMBIA RIVER ESTUARY (97-047)

Boring: **CW** Sample: 13 Depth: --- Lab No.: 4716

------ Sieve Analysis ------

Sieve	Cumulative Grams Retained	Percent Passing
5 In.	0.00	100.0
2.5 In.	0.00	100.0
1.25 In.	0.00	100.0
5/8 In.	0.00	100.0
5/16 In.	0.00	100.0
No. 5	0.87	99.9
No. 10	3.95	99.6
Pan	959.30	0.0
No. 18	5.07	97.5
No. 35	50.18	78.5
No. 60	213.68	9.7
No. 120	235.83	0.3
No. 230	236.22	0.2
Pan	236.63	0.0

No hydrometer analysis.

D85: 0.57 D60: 0.42 D50: 0.38 D30: 0.31 D15: 0.26 D10: 0.25 mm

Cu: 1.66 Cc: 0.91

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

Gravel: 0.0% Sand: 99.7% Fines: 0.2%

---------- ASTM D 2487 Classification ----------

SP Poorly graded SAND

---------- TM 5-818-2 Frost Classification ----------

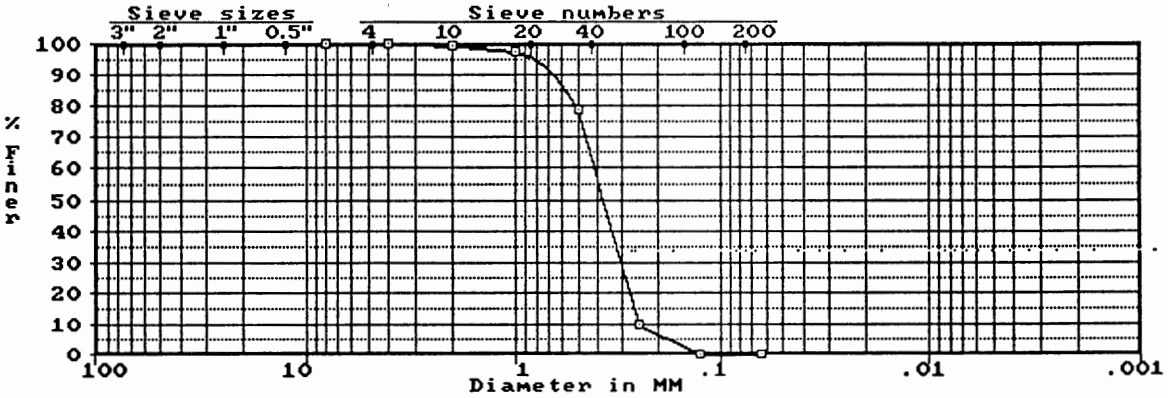
Frost Classification: **NFS**

---------- Comments ----------

-Location:Channel widening near Skamokawa.

-Volatile Solids: 0.5%

-Date: 4 April 1997



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COLUMBIA RIVER ESTUARY (97-047)

Boring: **CW** Sample: **14** Depth: --- Lab No.: 4717

------ Sieve Analysis ------

Sieve	Cumulative Grams Retained	Percent Passing
5 In.	0.00	100.0
2.5 In.	0.00	100.0
1.25 In.	0.00	100.0
5/8 In.	0.00	100.0
5/16 In.	0.00	100.0
No. 5	1.09	99.8
No. 10	2.09	99.7
Pan	647.75	0.0
No. 18	0.44	99.1
No. 35	9.18	87.3
No. 60	64.61	12.6
No. 120	73.78	0.3
No. 230	73.95	0.1
Pan	74.00	0.0

No hydrometer analysis.

D85: 0.49 D60: 0.39 D50: 0.35 D30: 0.29 D15: 0.26 D10: 0.22 mm

Cu: 1.80 Cc: 1.03

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

Gravel: 0.1% Sand: 99.7% Fines: 0.2%

---------- ASTM D 2487 Classification ----------

SP Poorly graded SAND

---------- TM 5-818-2 Frost Classification ----------

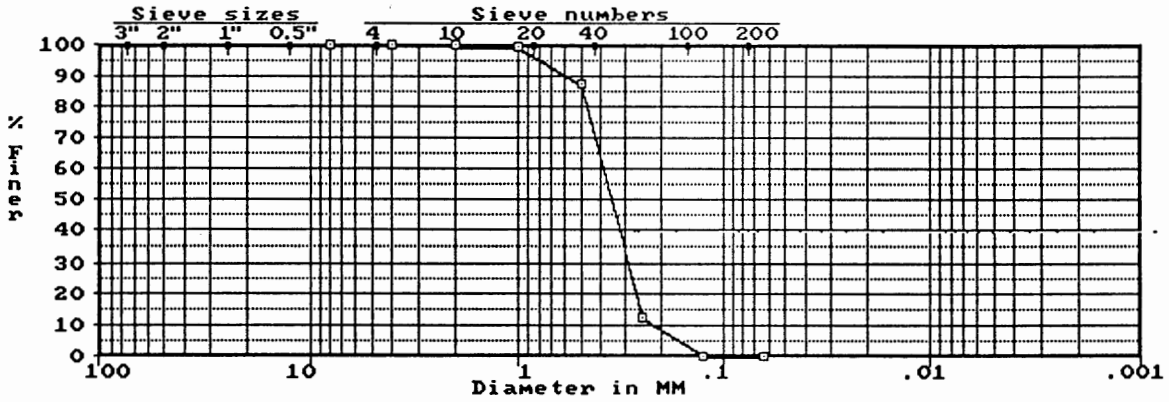
Frost Classification: **NFS**

---------- Comments ----------

-Location:Channel widening near Skamokawa.

-Volatile Solids: 0.5%

-Date: 4 April 1997



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COLUMBIA RIVER ESTUARY (97-047)

Boring: **CW** Sample: **15** Depth: --- Lab No.: 4718

------ Sieve Analysis ------

Sieve	Cumulative Grams Retained	Percent Passing
5 In.	0.00	100.0
2.5 In.	0.00	100.0
1.25 In.	0.00	100.0
5/8 In.	0.00	100.0
5/16 In.	0.00	100.0
No. 5	0.43	100.0
No. 10	1.62	99.8
Pan	943.67	0.0
No. 18	1.00	98.9
No. 35	15.80	85.7
No. 60	100.66	9.6
No. 120	111.21	0.1
No. 230	111.31	0.0
Pan	111.33	0.0

No hydrometer analysis.

D85: 0.50 D60: 0.40 D50: 0.36 D30: 0.30 D15: 0.26 D10: 0.25 mm

Cu: 1.58 Cc: 0.91

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

Gravel: 0.0% Sand: 100.0% Fines: 0.0%

---------- ASTM D 2487 Classification ----------

SP Poorly graded SAND

---------- TM 5-818-2 Frost Classification ----------

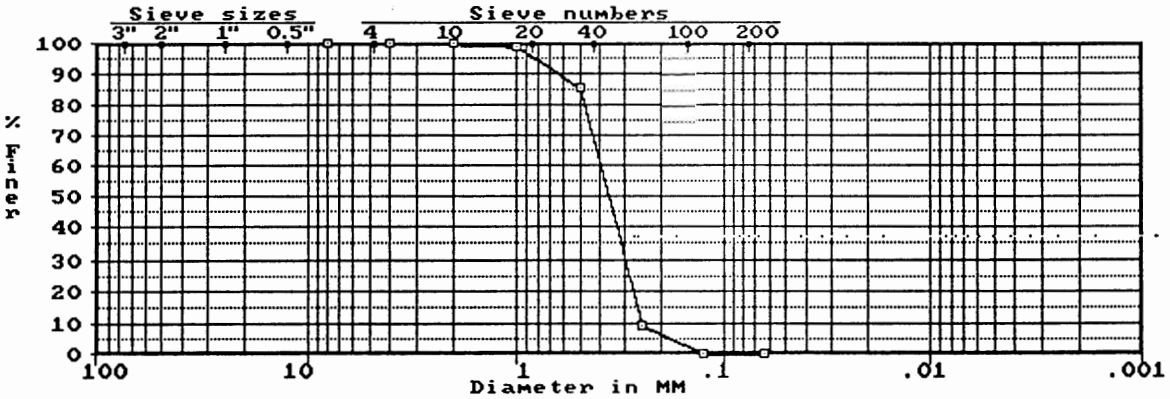
Percent finer than 0.02 mm: 0.0 Frost Classification: **NFS**

---------- Comments ----------

-Location:Channel widening near Skamokawa.

-Volatile Solids: 0.5%

-Date: 4 April 1997



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COLUMBIA RIVER ESTUARY (97-047)

Boring: **CW** Sample: 16 Depth: --- Lab No.: 4719

------ Sieve Analysis ------

Sieve	Cumulative Grams Retained	Percent Passing
5 In.	0.00	100.0
2.5 In.	0.00	100.0
1.25 In.	0.00	100.0
5/8 In.	0.00	100.0
5/16 In.	0.48	99.9
No. 5	1.46	99.8
No. 10	4.20	99.5
Pan	897.07	0.0
No. 18	2.03	97.7
No. 35	23.64	78.0
No. 60	96.91	11.3
No. 120	109.09	0.2
No. 230	109.31	0.0
Pan	109.33	0.0

No hydrometer analysis.

D85: 0.58 D60: 0.42 D50: 0.38 D30: 0.31 D15: 0.26 D10: 0.23 mm

Cu: 1.81 Cc: 0.97

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

Gravel: 0.2% Sand: 99.8% Fines: 0.0%

---------- ASTM D 2487 Classification ----------

SP Poorly graded SAND

---------- TM 5-818-2 Frost Classification ----------

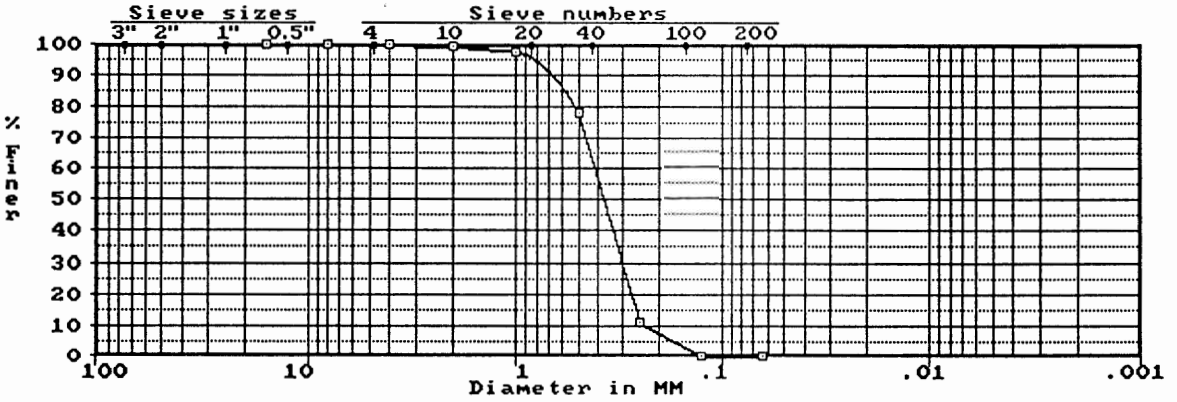
Percent finer than 0.02 mm: 0.0 Frost Classification: **NFS**

---------- Comments ----------

-Location:Channel widening near Skamokawa.

-Volatile Solids: 0.3%

-Date: 7 April 1997



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COLUMBIA RIVER ESTUARY (97-047)

Boring: **CW** Sample: **17** Depth: --- Lab No.: 4720

------ Sieve Analysis ------

Sieve	Cumulative Grams Retained	Percent Passing
5 In.	0.00	100.0
2.5 In.	0.00	100.0
1.25 In.	0.00	100.0
5/8 In.	0.00	100.0
5/16 In.	0.56	99.9
No. 5	8.79	99.1
No. 10	29.38	96.9
Pan	951.61	0.0
No. 18	6.79	91.0
No. 35	36.21	65.4
No. 60	102.03	8.0
No. 120	111.08	0.2
No. 230	111.21	0.0
Pan	111.26	0.0

No hydrometer analysis.

D85: 0.79 D60: 0.47 D50: 0.42 D30: 0.33 D15: 0.27 D10: 0.26 mm

Cu: 1.83 Cc: 0.90

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

Gravel: 0.6% Sand: 99.3% Fines: 0.0%

---------- ASTM D 2487 Classification ----------

SP Poorly graded SAND

---------- TM 5-818-2 Frost Classification ----------

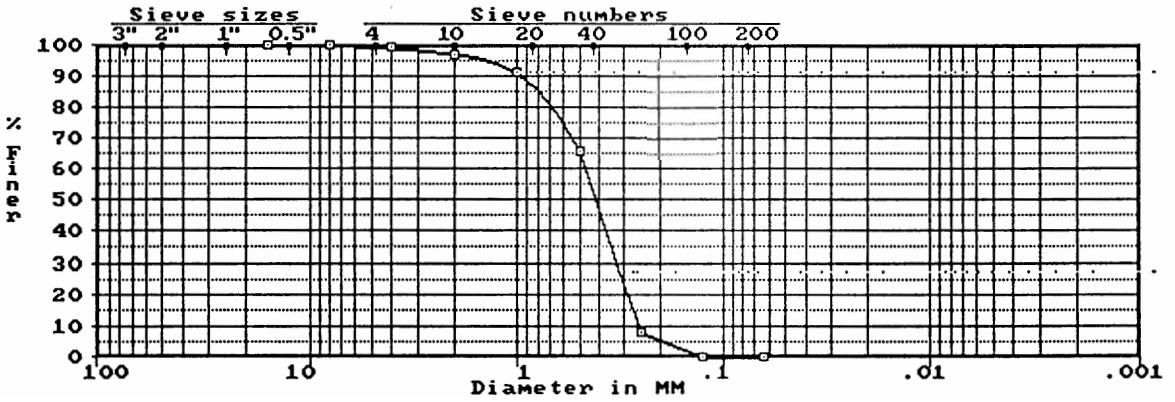
Percent finer than 0.02 mm: 0.0 Frost Classification: **NFS**

---------- Comments ----------

-Location:Channel widening near Skamokawa.

-Volatile Solids: 0.5%

-Date: 7 April 1997



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COLUMBIA RIVER ESTUARY (97-047)

Boring: **CW** Sample: 18 Depth: --- Lab No.: 4721

------ Sieve Analysis ------

Sieve	Cumulative Grams Retained	Percent Passing
5 In.	0.00	100.0
2.5 In.	0.00	100.0
1.25 In.	0.00	100.0
5/8 In.	0.00	100.0
5/16 In.	2.21	99.8
No. 5	6.52	99.3
No. 10	15.16	98.4
Pan	936.29	0.0
No. 18	4.55	94.3
No. 35	29.68	71.8
No. 60	100.33	8.5
No. 120	106.60	2.9
No. 230	109.74	0.0
Pan	109.79	0.0

No hydrometer analysis.

D85: 0.67 D60: 0.44 D50: 0.40 D30: 0.32 D15: 0.27 D10: 0.25 mm

Cu: 1.74 Cc: 0.91

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

Gravel: 0.5% Sand: 99.0% Fines: 0.5%

---------- ASTM D 2487 Classification ----------

SP Poorly graded SAND

---------- TM 5-818-2 Frost Classification ----------

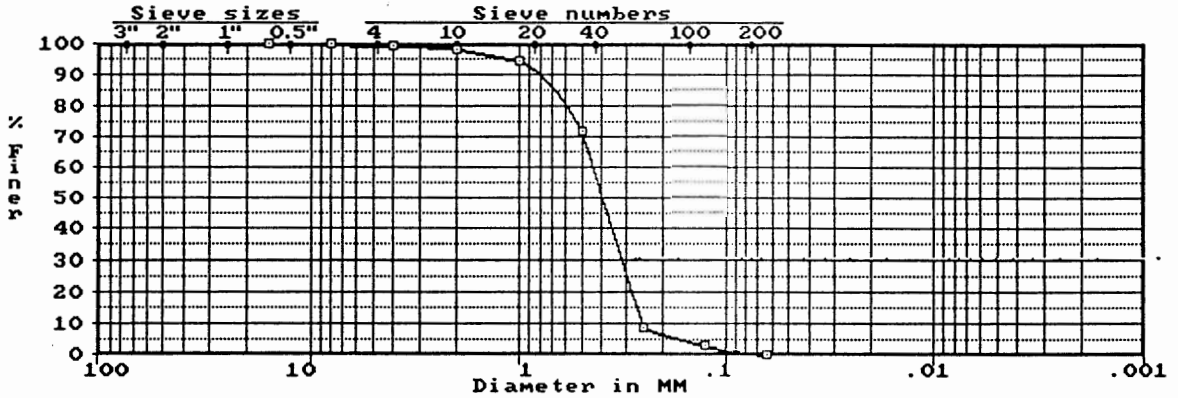
Percent finer than 0.02 mm: 0.0 Frost Classification: **NFS**

---------- Comments ----------

-Location:Channel widening near Skamokawa.

-Volatile Solids: 0.5%

-Date: 7 April 1997



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COLUMBIA RIVER ESTUARY (97-047)

Boring: **CW** Sample: 19 Depth: --- Lab No.: 4722

------ Sieve Analysis ------

Sieve	Cumulative Grams Retained	Percent Passing
5 In.	0.00	100.0
2.5 In.	0.00	100.0
1.25 In.	0.00	100.0
5/8 In.	0.00	100.0
5/16 In.	0.64	99.9
No. 5	5.61	99.2
No. 10	19.23	97.3
Pan	716.73	0.0
No. 18	9.82	89.5
No. 35	56.32	52.6
No. 60	117.43	4.1
No. 120	122.44	0.1
No. 230	122.58	0.0
Pan	122.60	0.0

No hydrometer analysis.

D85: 0.90 D60: 0.56 D50: 0.48 D30: 0.37 D15: 0.30 D10: 0.28 mm

Cu: 2.03 Cc: 0.90

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

Gravel: 0.5% Sand: 99.4% Fines: 0.0%

---------- ASTM D 2487 Classification ----------

SP Poorly graded SAND

---------- TM 5-818-2 Frost Classification ----------

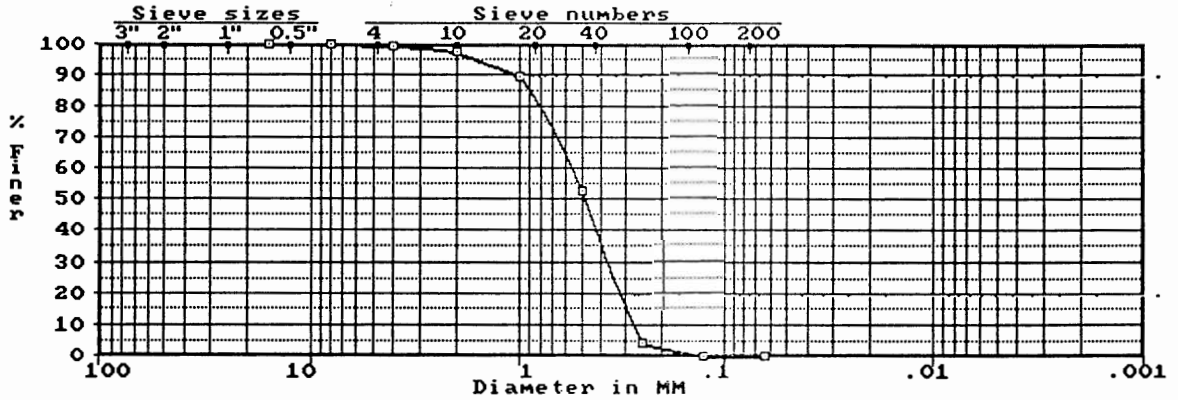
Percent finer than 0.02 mm: 0.0 Frost Classification: **NFS**

---------- Comments ----------

-Location:Channel widening near Skamokawa.

-Volatile Solids: 0.5%

-Date: 7 April 1997



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COLUMBIA RIVER ESTUARY (97-047)

Boring: **CW** Sample: **20** Depth: --- Lab No.: 4723

------ Sieve Analysis ------

Sieve	Cumulative Grams Retained	Percent Passing
5 In.	0.00	100.0
2.5 In.	0.00	100.0
1.25 In.	0.00	100.0
5/8 In.	0.00	100.0
5/16 In.	1.25	99.8
No. 5	3.96	99.5
No. 10	8.18	99.0
Pan	822.27	0.0
No. 18	1.48	97.5
No. 35	14.80	83.9
No. 60	85.80	11.5
No. 120	96.90	0.2
No. 230	97.06	0.0
Pan	97.08	0.0

No hydrometer analysis.

D85: 0.53 D60: 0.40 D50: 0.36 D30: 0.30 D15: 0.26 D10: 0.23 mm

Cu: 1.75 Cc: 0.98

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

Gravel: 0.4% Sand: 99.5% Fines: 0.0%

---------- ASTM D 2487 Classification ----------

SP Poorly graded SAND

---------- TM 5-818-2 Frost Classification ----------

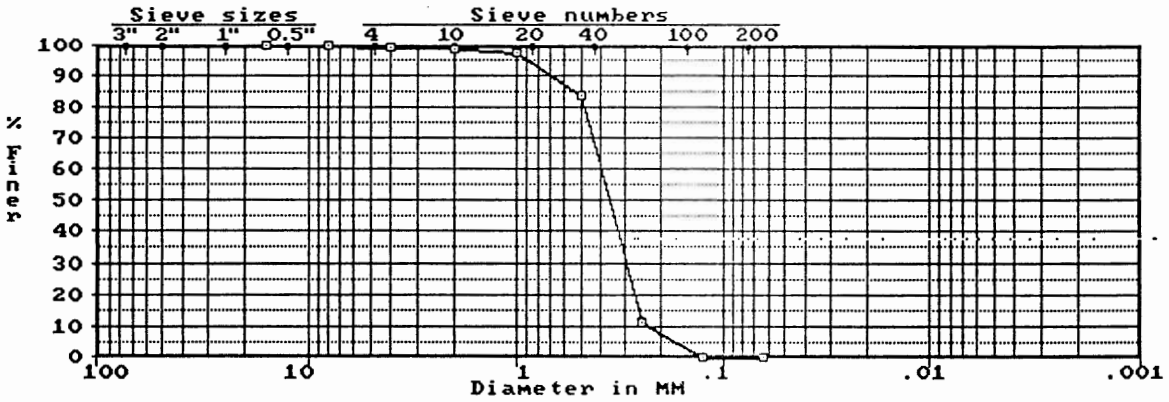
Percent finer than 0.02 mm: 0.0 Frost Classification: **NFS**

---------- Comments ----------

-Location:Channel widening near Skamokawa.

-Volatile Solids: 0.5%

-Date: 7 April 1997



DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION LABORATORY
CORPS OF ENGINEERS
1491 N.W. GRAHAM ROAD
TROUTDALE, OREGON 97060-9508

15, 6 no Si

REPLY TO
ATTENTION OF:

August 8, 1997

Skamakawa Turn? 60% are >30% Si

National Marine Fisheries Service
Point Adams Biological Field Station
P.O. Box 155 (520 Heceta Place)
Hammond, OR 97121-0155
Attention: George McCabe, Jr.

Mr. McCabe,

In accordance with your letter dated April 24, 1997, enclosed are results for 15 sediment samples from the proposed channel widening area in the Columbia River Estuary collected by National Marine Fisheries personnel from April 2-21, 1997. Included are fifteen "Report of Particle Size Analysis and Classification Tests" forms, one for each sample received.

This completes all physical analyses requested for this sample shipment.

Sincerely,

Timothy J. Seeman

TIMOTHY J. SEEMAN, Director
North Pacific Division Laboratory

Copy Furnished: CENWP-PE-E (Larson)

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COLUMBIA RIVER ESTUARY (97-047)

Boring: Sample: **01** Depth: --- Lab No.: 4724

------ Sieve Analysis ------

Sieve	Cumulative Grams Retained	Percent Passing
5 In.	0.00	100.0
2.5 In.	0.00	100.0
1.25 In.	0.00	100.0
5/8 In.	0.00	100.0
5/16 In.	0.00	100.0
No. 5	0.00	100.0
No. 10	0.00	100.0
Pan	103.27	0.0
No. 18	0.00	100.0
No. 35	0.12	99.8
No. 60	2.88	95.4
No. 120	13.77	78.1
No. 230	18.12	71.1
Pan	62.76	0.0

---------- Hydrometer Analysis ----------

Sample Weight:62.76 gr. Start Time:0000

Time	Temp (C)	Hydrometer Reading	Diameter in mm	Percent Finer
1	20.0	37.3	0.0428	59.6
3	20.0	27.3	0.0266	43.9
10	20.0	18.3	0.0155	29.7
100	20.0	9.8	0.0066	16.2
200	20.0	7.3	0.0048	12.3

D85: 0.16 D60: .043 D50: .032 D30: .016 D15: .0060 mm

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

Gravel: 0.0% Sand: 26.8% Fines: 73.2%

---------- ASTM D 2487 Classification ----------

ML SILT with sand

---------- TM 5-818-2 Frost Classification ----------

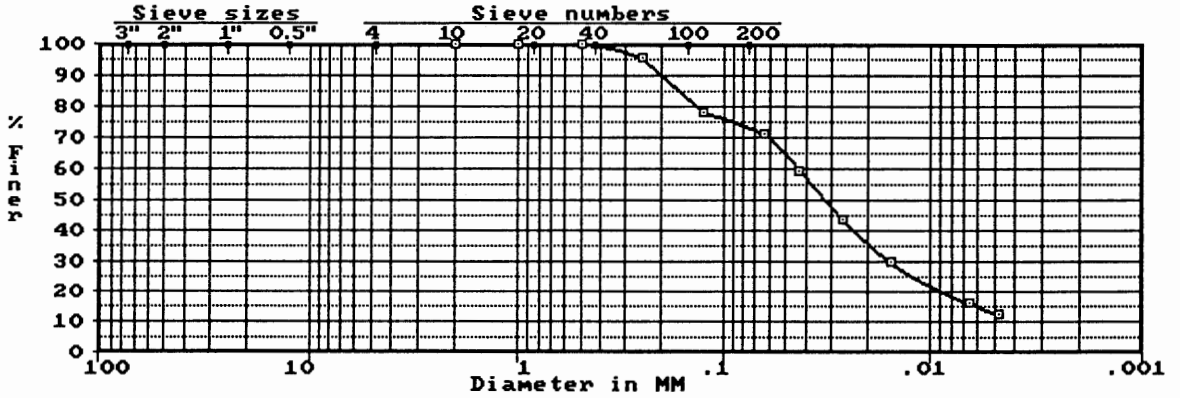
Percent finer than 0.02 mm: 35.9 Frost Classification: **F4**

---------- Comments ----------

-Location:In or adjacent to Trestle Bay.

-Volatile Solids: 4.8%

-Date: 2 April 1997



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COLUMBIA RIVER ESTUARY (97-047)

Boring: Sample: **02** Depth: --- Lab No.: 4725

----- Sieve Analysis ------

Sieve	Cumulative Grams Retained	Percent Passing
5 In.	0.00	100.0
2.5 In.	0.00	100.0
1.25 In.	0.00	100.0
5/8 In.	0.00	100.0
5/16 In.	0.00	100.0
No. 5	0.00	100.0
No. 10	0.00	100.0
Pan	117.83	0.0
No. 18	0.00	100.0
No. 35	0.19	99.7
No. 60	0.77	98.7
No. 120	3.38	94.3
No. 230	10.15	82.9
Pan	59.37	0.0

---------- Hydrometer Analysis ----------

Sample Weight:59.37 gr. Start Time:0000

Time	Temp (C)	Hydrometer Reading	Diameter in mm	Percent Finer
1	20.0	39.3	0.0421	66.4
3	20.0	25.3	0.0270	43.0
10	20.0	16.3	0.0156	28.0
100	20.0	9.3	0.0066	16.3
200	20.0	7.2	0.0048	12.8

D85: .068 D60: .037 D50: .031 D30: .017 D15: .0059 mm

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

Gravel: 0.0% Sand: 12.9% Fines: 87.1%

---------- ASTM D 2487 Classification ----------

ML SILT

---------- TM 5-818-2 Frost Classification ----------

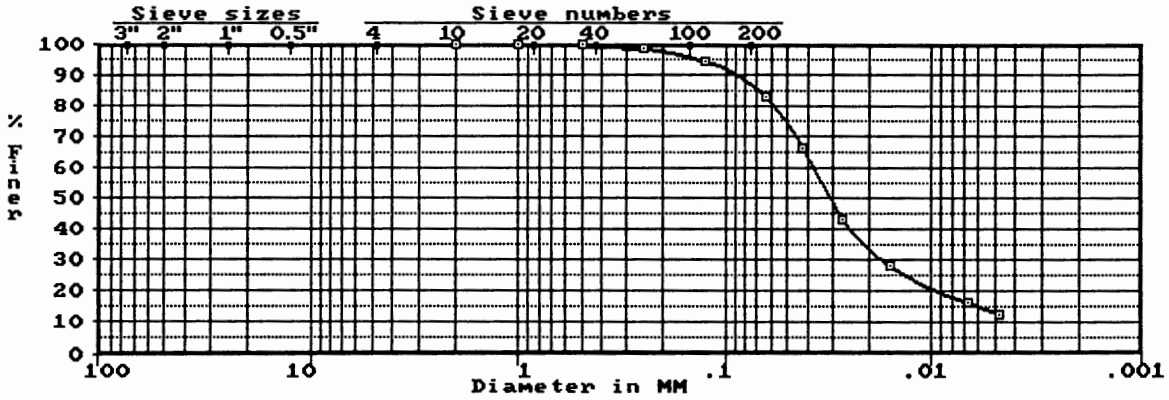
Percent finer than 0.02 mm: 33.5 Frost Classification: **F4**

---------- Comments ----------

-Location:In or adjacent to Trestle Bay.

-Volatile Solids: 6.0%

-Date:21 April 1997



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COLUMBIA RIVER ESTUARY (97-047)

Boring: Sample: **03** Depth: --- Lab No.: 4726

------ Sieve Analysis ------

Sieve	Cumulative Grams Retained	Percent Passing
5 In.	0.00	100.0
2.5 In.	0.00	100.0
1.25 In.	0.00	100.0
5/8 In.	0.00	100.0
5/16 In.	0.00	100.0
No. 5	0.00	100.0
No. 10	0.00	100.0
Pan	127.02	0.0
No. 18	0.00	100.0
No. 35	0.18	99.7
No. 60	0.63	98.9
No. 120	1.75	96.9
No. 230	7.98	86.0
Pan	57.02	0.0

---------- Hydrometer Analysis ----------

Sample Weight:57.02 gr. Start Time:0000

Time	Temp (C)	Hydrometer Reading	Diameter in mm	Percent Finer
1	20.0	40.3	0.0417	70.8
3	20.0	29.3	0.0262	51.7
10	20.0	19.3	0.0154	34.4
100	20.0	10.3	0.0066	18.8
200	20.0	8.2	0.0047	15.1

D85: .061 D60: .032 D50: .025 D30: .013 mm

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

Gravel: 0.0% Sand: 10.0% Fines: 90.0%

---------- ASTM D 2487 Classification ----------

ML SILT

---------- TM 5-818-2 Frost Classification ----------

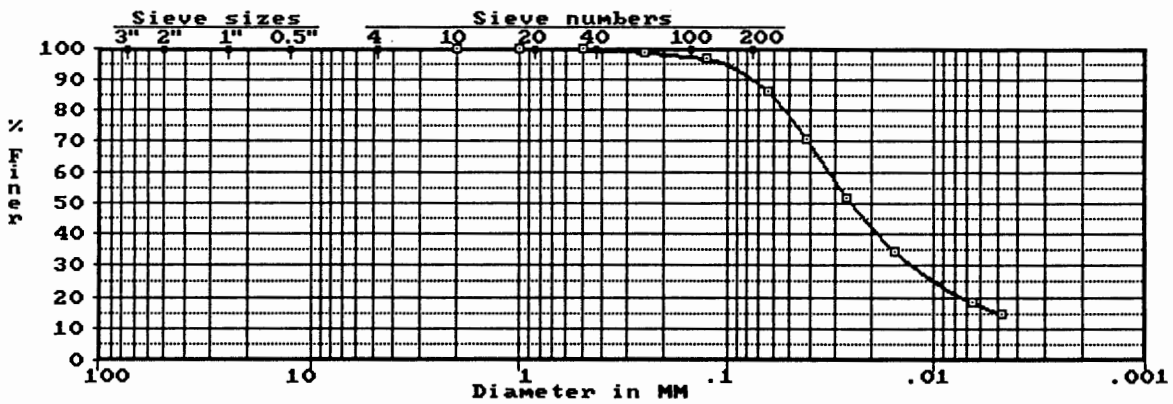
Percent finer than 0.02 mm: 42.3 Frost Classification: **F4**

---------- Comments ----------

-Location:In or adjacent to Trestle Bay.

-Volatile Solids: 4.8%

-Date: 2 April 1997



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COLUMBIA RIVER ESTUARY (97-047)

Boring: Sample: **04** Depth: --- Lab No.: 4727

Sieve Analysis

Sieve	Cumulative Grams Retained	Percent Passing
5 In.	0.00	100.0
2.5 In.	0.00	100.0
1.25 In.	0.00	100.0
5/8 In.	0.00	100.0
5/16 In.	0.00	100.0
No. 5	0.00	100.0
No. 10	0.00	100.0
Pan	102.76	0.0
No. 18	0.01	100.0
No. 35	0.17	99.7
No. 60	0.62	99.0
No. 120	1.91	97.0
No. 230	7.78	87.6
Pan	62.98	0.0

Hydrometer Analysis

Sample Weight:62.98 gr. Start Time:0000

Time	Temp (C)	Hydrometer Reading	Diameter in mm	Percent Finer
1	20.0	44.3	0.0403	70.4
3	20.0	32.8	0.0256	52.3
10	20.0	23.3	0.0150	37.4
100	20.0	14.3	0.0065	23.3
200	20.0	11.8	0.0046	19.3

D85: .058 D60: .031 D50: .024 D30: .010 mm

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

Gravel: 0.0% Sand: 8.7% Fines: 91.3%

ASTM D 2487 Classification

ML SILT

TM 5-818-2 Frost Classification

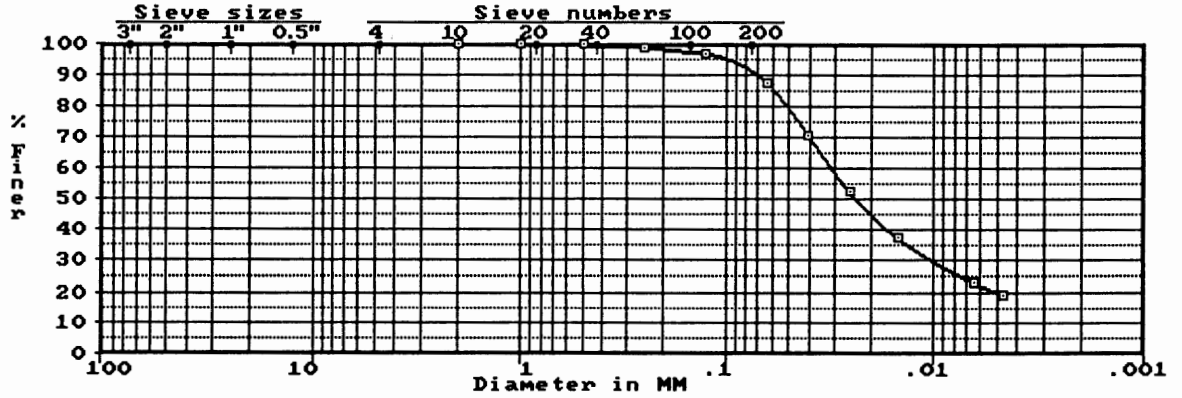
Percent finer than 0.02 mm: 44.7 Frost Classification: **F4**

Comments

-Location:In or adjacent to Trestle Bay.

-Volatile Solids: 5.1%

-Date:21 April 1997



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COLUMBIA RIVER ESTUARY (97-047)

Boring: Sample: **05** Depth: --- Lab No.: 4728

------ Sieve Analysis ------

Sieve	Cumulative Grams Retained	Percent Passing
5 In.	0.00	100.0
2.5 In.	0.00	100.0
1.25 In.	0.00	100.0
5/8 In.	0.00	100.0
5/16 In.	0.00	100.0
No. 5	0.00	100.0
No. 10	0.00	100.0
Pan	279.80	0.0
No. 18	0.01	100.0
No. 35	0.35	99.8
No. 60	45.92	67.8
No. 120	122.94	13.7
No. 230	128.74	9.6
Pan	142.43	0.0

---------- Hydrometer Analysis ----------

Sample Weight:142.43 gr. Start Time:0000

Time	Temp (C)	Hydrometer Reading	Diameter in mm	Percent Finer
1	20.0	12.3	0.0506	8.9
3	20.0	10.3	0.0296	7.5
10	20.0	8.3	0.0164	6.1
100	20.0	5.3	0.0068	4.0
200	20.0	3.7	0.0048	2.9

D85: 0.34 D60: 0.23 D50: 0.20 D30: 0.16 D15: 0.13 D10: .067 mm

Cu: 3.39 Cc: 1.60

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

Gravel: 0.0% Sand: 89.4% Fines: 10.6%

---------- ASTM D 2487 Classification ----------

SP-SM Poorly graded SAND with silt

---------- TM 5-818-2 Frost Classification ----------

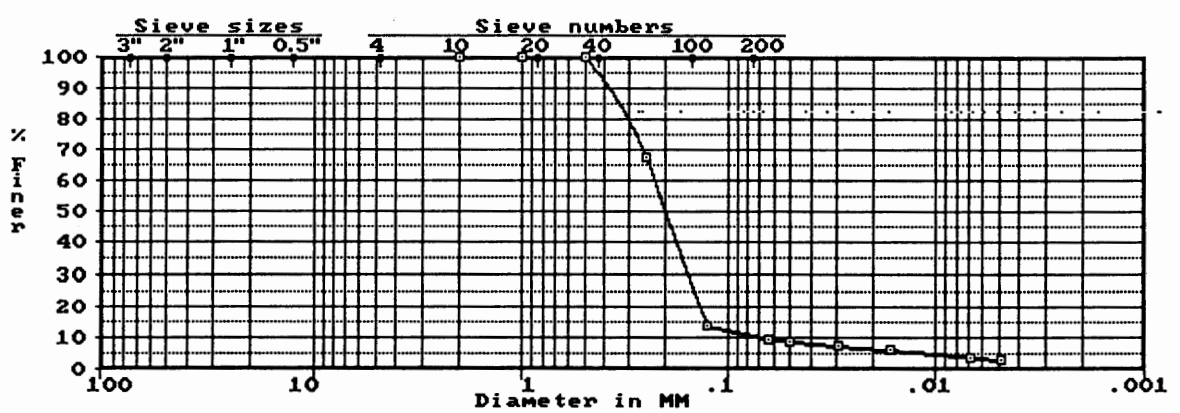
Percent finer than 0.02 mm: 6.6 Frost Classification: **F2**

---------- Comments ----------

-Location:In or adjacent to Trestle Bay.

-Volatile Solids: 0.7%

-Date:21 April 1997



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COLUMBIA RIVER ESTUARY (97-047)

Boring: Sample: **06** Depth: --- Lab No.: 4729

------ Sieve Analysis ------

Sieve	Cumulative Grams Retained	Percent Passing
5 In.	0.00	100.0
2.5 In.	0.00	100.0
1.25 In.	0.00	100.0
5/8 In.	0.00	100.0
5/16 In.	0.00	100.0
No. 5	0.00	100.0
No. 10	0.00	100.0
Pan	223.89	0.0
No. 18	0.00	100.0
No. 35	0.12	99.9
No. 60	15.23	87.4
No. 120	85.51	29.5
No. 230	95.41	21.4
Pan	121.33	0.0

---------- Hydrometer Analysis ----------

Sample Weight:121.33 gr. Start Time:0000

Time	Temp (C)	Hydrometer Reading	Diameter in mm	Percent Finer
1	20.0	22.3	0.0476	18.6
3	20.0	17.3	0.0284	14.5
10	20.0	14.3	0.0158	12.1
100	20.0	7.3	0.0067	6.4
200	20.0	6.3	0.0048	5.5

D85: 0.24 D60: 0.18 D50: 0.16 D30: 0.13 D15: .031 D10: .012 mm

Cu: 15.3 Cc: 7.43

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

Gravel: 0.0% Sand: 76.5% Fines: 23.5%

---------- ASTM D 2487 Classification ----------

SM Silty SAND

---------- TM 5-818-2 Frost Classification ----------

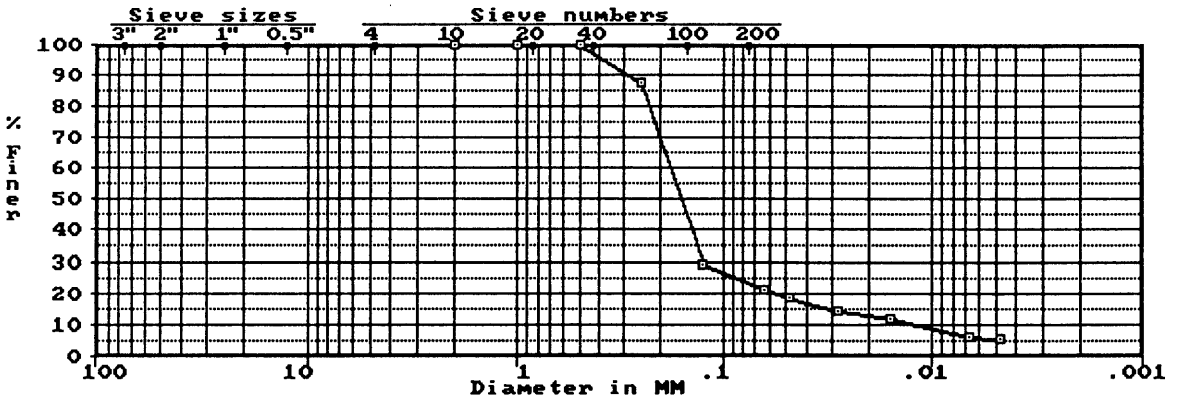
Percent finer than 0.02 mm: 13.0 Frost Classification: **F2**

---------- Comments ----------

-Location:In or adjacent to Trestle Bay.

-Volatile Solids: 1.4%

-Date:21 April 1997



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COLUMBIA RIVER ESTUARY (97-047)

Boring: Sample: **07** Depth: --- Lab No.: 4730

------ Sieve Analysis ------

Sieve	Cumulative Grams Retained	Percent Passing
5 In.	0.00	100.0
2.5 In.	0.00	100.0
1.25 In.	0.00	100.0
5/8 In.	0.00	100.0
5/16 In.	0.00	100.0
No. 5	0.00	100.0
No. 10	0.00	100.0
Pan	114.82	0.0
No. 18	0.03	99.9
No. 35	0.12	99.8
No. 60	0.41	99.3
No. 120	1.24	97.9
No. 230	4.13	92.9
Pan	58.21	0.0

---------- Hydrometer Analysis ----------

Sample Weight:58.21 gr. Start Time:0000

Time	Temp (C)	Hydrometer Reading	Diameter in mm	Percent Finer
1	20.0	48.3	0.0388	83.0
3	20.0	35.3	0.0251	60.9
10	20.0	25.3	0.0148	43.9
100	20.0	12.8	0.0065	22.6
200	20.0	8.3	0.0047	15.0

D85: .042 D60: .025 D50: .018 D30: .0088 D15: .0047 mm

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

Gravel: 0.0% Sand: 5.2% Fines: 94.8%

---------- ASTM D 2487 Classification ----------

ML SILT

---------- TM 5-818-2 Frost Classification ----------

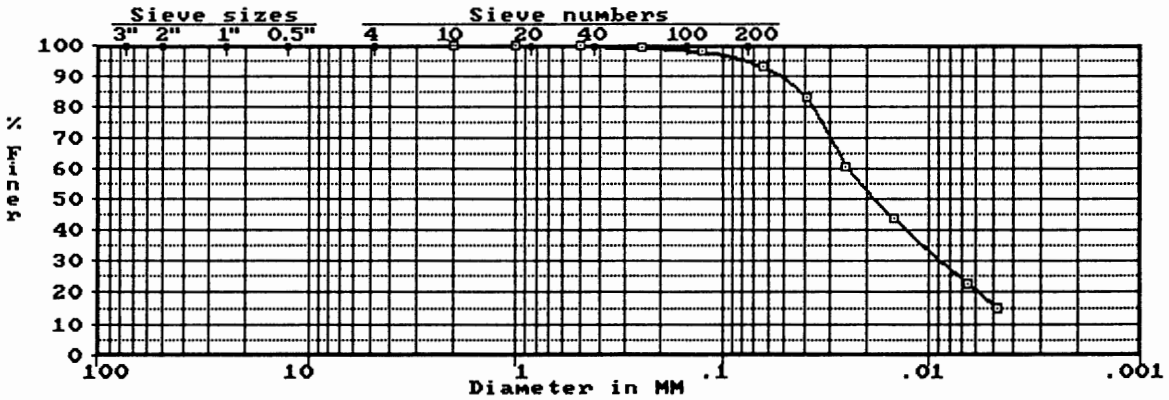
Percent finer than 0.02 mm: 52.8 Frost Classification: **F4**

---------- Comments ----------

-Location:In or adjacent to Trestle Bay.

-Volatile Solids: 5.0%

-Date:21 April 1997



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COLUMBIA RIVER ESTUARY (97-047)

Boring: Sample: **08** Depth: --- Lab No.: 4731

------ Sieve Analysis ------

Sieve	Cumulative Grams Retained	Percent Passing
5 In.	0.00	100.0
2.5 In.	0.00	100.0
1.25 In.	0.00	100.0
5/8 In.	0.00	100.0
5/16 In.	0.00	100.0
No. 5	0.00	100.0
No. 10	0.00	100.0
Pan	180.13	0.0
No. 18	0.03	100.0
No. 35	0.05	99.9
No. 60	5.08	92.6
No. 120	30.43	55.5
No. 230	32.75	52.1
Pan	68.31	0.0

---------- Hydrometer Analysis ----------

Sample Weight:68.31 gr. Start Time:0000

Time	Temp (C)	Hydrometer Reading	Diameter in mm	Percent Finer
1	20.0	30.8	0.0449	45.4
3	20.0	23.3	0.0273	34.5
10	20.0	17.8	0.0155	26.5
100	20.0	8.8	0.0067	13.5
200	20.0	6.3	0.0048	9.9

D85: 0.22 D60: 0.14 D50: .056 D30: .020 D15: .0074 D10: .0048 mm

Cu: 28.2 Cc: 0.62

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

Gravel: 0.0% Sand: 47.0% Fines: 53.0%

---------- ASTM D 2487 Classification ----------

ML Sandy SILT

---------- TM 5-818-2 Frost Classification ----------

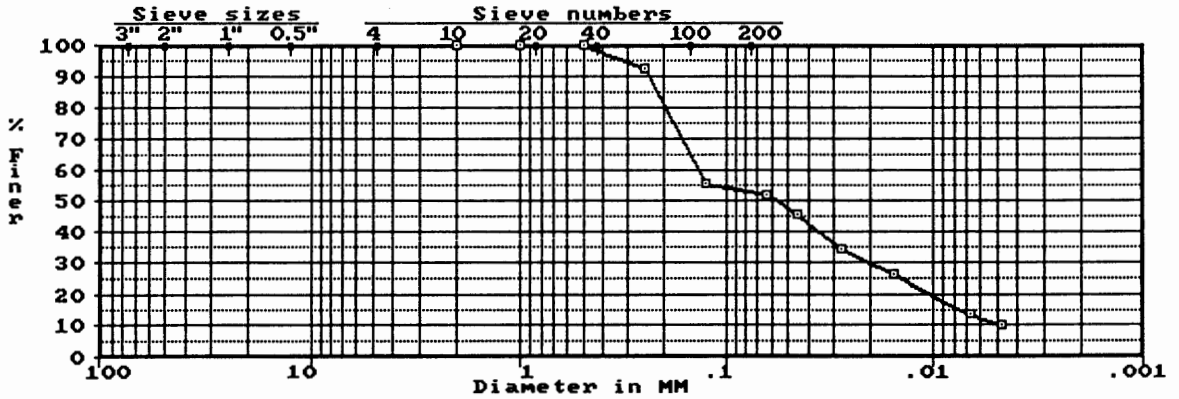
Percent finer than 0.02 mm: 29.8 Frost Classification: **F4**

---------- Comments ----------

-Location:In or adjacent to Trestle Bay.

-Volatile Solids: 3.0%

-Date:21 April 1997



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COLUMBIA RIVER ESTUARY (97-047)

Boring: Sample: **09** Depth: --- Lab No.: 4732

------ Sieve Analysis ------

Sieve	Cumulative Grams Retained	Percent Passing
5 In.	0.00	100.0
2.5 In.	0.00	100.0
1.25 In.	0.00	100.0
5/8 In.	0.00	100.0
5/16 In.	0.00	100.0
No. 5	0.00	100.0
No. 10	0.00	100.0
Pan	103.27	0.0
No. 18	0.03	99.9
No. 35	0.08	99.8
No. 60	0.28	99.4
No. 120	0.92	98.1
No. 230	5.13	89.7
Pan	49.61	0.0

---------- Hydrometer Analysis ----------

Sample Weight:49.61 gr. Start Time:0000

Time	Temp (C)	Hydrometer Reading	Diameter in mm	Percent Finer
1	20.0	37.3	0.0428	75.4
3	20.0	28.3	0.0264	57.5
10	20.0	19.3	0.0154	39.5
100	20.0	9.8	0.0066	20.6
200	20.0	7.3	0.0048	15.6

D85: .055 D60: .028 D50: .021 D30: .011 mm

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

Gravel: 0.0% Sand: 6.8% Fines: 93.2%

---------- ASTM D 2487 Classification ----------

ML SILT

---------- TM 5-818-2 Frost Classification ----------

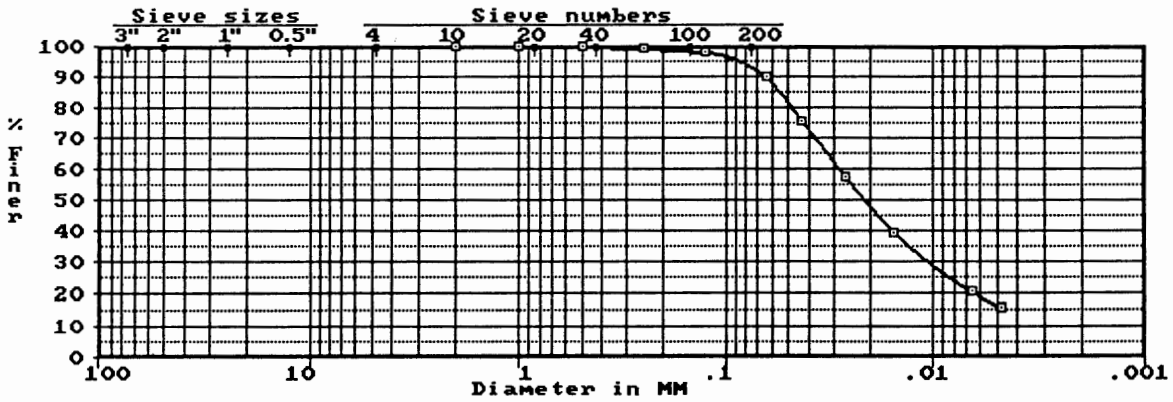
Percent finer than 0.02 mm: 47.8 Frost Classification: **F4**

---------- Comments ----------

-Location:In or adjacent to Trestle Bay.

-Volatile Solids: 4.9%

-Date:21 April 1997



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COLUMBIA RIVER ESTUARY (97-047)

Boring: Sample: 10 Depth: --- Lab No.: 4733

Sieve Analysis

Sieve	Cumulative Grams Retained	Percent Passing
5 In.	0.00	100.0
2.5 In.	0.00	100.0
1.25 In.	0.00	100.0
5/8 In.	0.00	100.0
5/16 In.	0.00	100.0
No. 5	0.00	100.0
No. 10	0.00	100.0
Pan	153.44	0.0
No. 18	0.03	100.0
No. 35	0.06	99.9
No. 60	1.06	98.3
No. 120	20.56	66.6
No. 230	22.63	63.2
Pan	61.56	0.0

Hydrometer Analysis

Sample Weight:61.56 gr. Start Time:0000

Time	Temp (C)	Hydrometer Reading	Diameter in mm	Percent Finer
1	20.0	32.8	0.0443	53.6
3	20.0	25.3	0.0270	41.5
10	20.0	17.3	0.0155	28.6
100	20.0	8.3	0.0067	14.2
200	20.0	6.3	0.0048	10.9

D85: 0.19 D60: .055 D50: .038 D30: .017 D15: .0071 mm

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

Gravel: 0.0% Sand: 36.3% Fines: 63.7%

ASTM D 2487 Classification

ML Sandy SILT

TM 5-818-2 Frost Classification

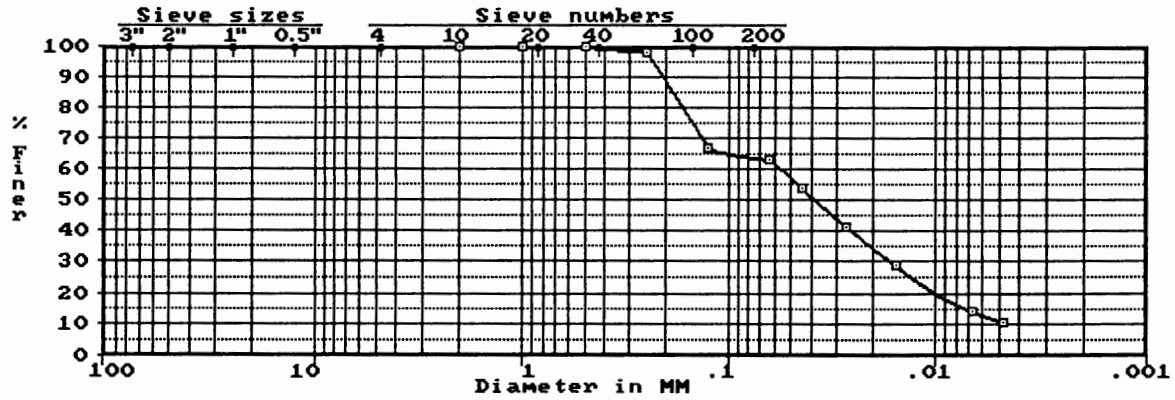
Percent finer than 0.02 mm: 34.3 Frost Classification: **F4**

Comments

-Location:In or adjacent to Trestle Bay.

-Volatile Solids: 3.1%

-Date:21 April 1997



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COLUMBIA RIVER ESTUARY (97-047)

Boring: Sample: **11c** Depth: --- Lab No.: 4734

------ Sieve Analysis ------

Sieve	Cumulative Grams Retained	Percent Passing
5 In.	0.00	100.0
2.5 In.	0.00	100.0
1.25 In.	0.00	100.0
5/8 In.	0.00	100.0
5/16 In.	0.00	100.0
No. 5	0.00	100.0
No. 10	0.00	100.0
Pan	272.04	0.0
No. 18	0.02	100.0
No. 35	0.36	99.7
No. 60	41.48	69.4
No. 120	120.91	10.7
No. 230	127.93	5.5
Pan	135.38	0.0

---------- Hydrometer Analysis ----------

Sample Weight:135.38 gr. Start Time:0000

Time	Temp (C)	Hydrometer Reading	Diameter in mm	Percent Finer
1	20.0	6.3	0.0524	5.0
3	20.0	6.3	0.0302	5.0
10	20.0	4.8	0.0167	3.9
100	20.0	1.8	0.0069	1.7
200	20.0	1.7	0.0049	1.6

D85: 0.33 D60: 0.23 D50: 0.20 D30: 0.16 D15: 0.13 D10: 0.11 mm

Cu: 1.98 Cc: 0.99

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

Gravel: 0.0% Sand: 93.2% Fines: 6.8%

---------- ASTM D 2487 Classification ----------

SP-SM Poorly graded SAND with silt

---------- TM 5-818-2 Frost Classification ----------

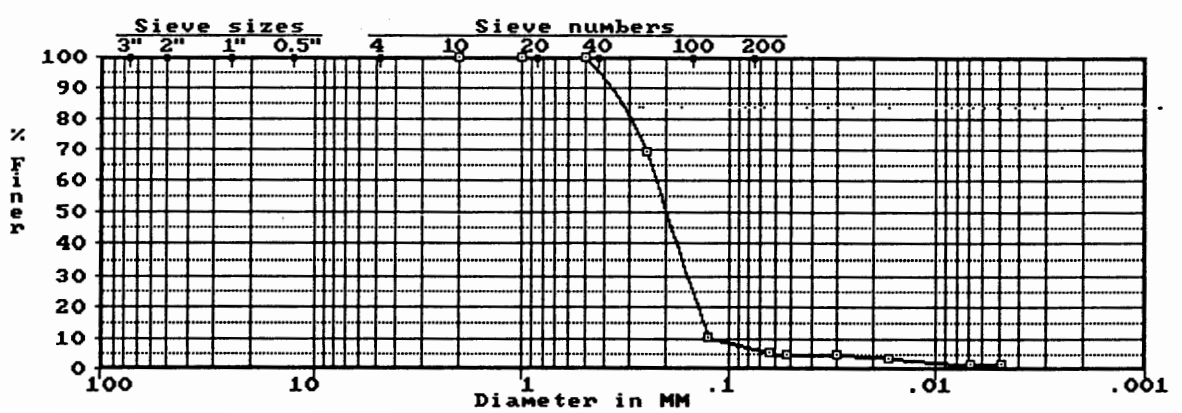
Percent finer than 0.02 mm: 4.3 Frost Classification: **S2**

---------- Comments ----------

-Location:In or adjacent to Trestle Bay.

-Volatile Solids: 0.8%

-Date:21 April 1997



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COLUMBIA RIVER ESTUARY (97-047)

Boring: Sample: **12c** Depth: --- Lab No.: 4735

Sieve Analysis

Sieve	Cumulative Grams Retained	Percent Passing
5 In.	0.00	100.0
2.5 In.	0.00	100.0
1.25 In.	0.00	100.0
5/8 In.	0.00	100.0
5/16 In.	0.00	100.0
No. 5	0.00	100.0
No. 10	0.00	100.0
Pan	251.57	0.0
No. 18	0.02	100.0
No. 35	0.16	99.9
No. 60	36.41	70.8
No. 120	118.57	4.8
No. 230	121.65	2.3
Pan	124.55	0.0

Hydrometer Analysis

Sample Weight:124.55 gr. Start Time:0000

Time	Temp (C)	Hydrometer Reading	Diameter in mm	Percent Finer
1	20.0	2.3	0.0535	2.2
3	20.0	1.3	0.0310	1.4
10	20.0	1.3	0.0170	1.4
100	20.0	0.0	0.0070	0.4
200	20.0	0.0	0.0049	0.4

D85: 0.32 D60: 0.23 D50: 0.20 D30: 0.17 D15: 0.14 D10: 0.13 mm

Cu: 1.70 Cc: 0.92

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

Gravel: 0.0% Sand: 97.1% Fines: 2.9%

ASTM D 2487 Classification

SP Poorly graded SAND

TM 5-818-2 Frost Classification

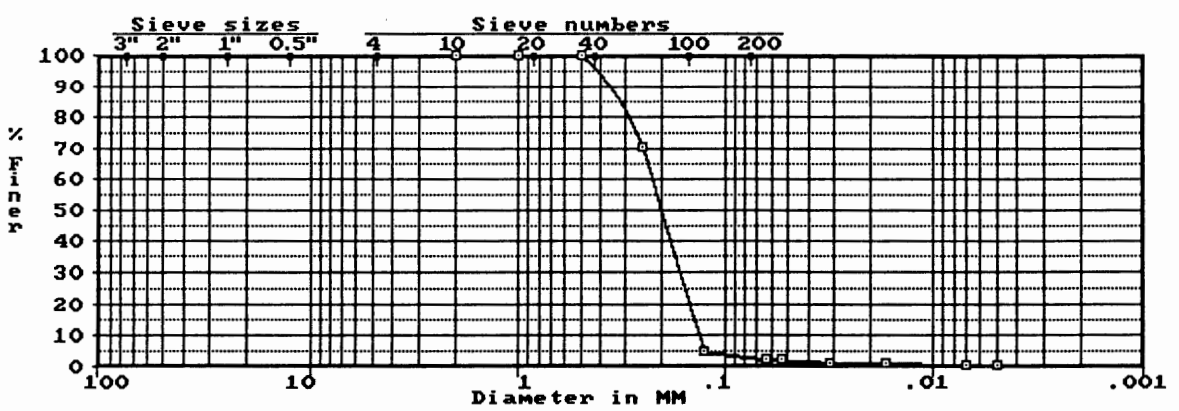
Percent finer than 0.02 mm: 1.4 Frost Classification: **NFS**

Comments

-Location:In or adjacent to Trestle Bay.

-Volatile Solids: 0.6%

-Date:21 April 1997



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COLUMBIA RIVER ESTUARY (97-047)

Boring: Sample: **13c** Depth: --- Lab No.: 4736

------ Sieve Analysis ------

Sieve	Cumulative Grams Retained	Percent Passing
5 In.	0.00	100.0
2.5 In.	0.00	100.0
1.25 In.	0.00	100.0
5/8 In.	0.00	100.0
5/16 In.	0.00	100.0
No. 5	0.00	100.0
No. 10	0.00	100.0
Pan	241.97	0.0
No. 18	0.02	100.0
No. 35	0.93	99.2
No. 60	67.91	43.9
No. 120	116.23	4.0
No. 230	118.17	2.4
Pan	121.12	0.0

---------- Hydrometer Analysis ----------

Sample Weight:121.12 gr. Start Time:0000

Time	Temp (C)	Hydrometer Reading	Diameter in mm	Percent Finer
1	20.0	2.4	0.0534	2.4
3	20.0	1.8	0.0309	1.9
10	20.0	1.3	0.0170	1.5
100	20.0	0.0	0.0070	0.4
200	20.0	0.0	0.0049	0.4

D85: 0.41 D60: 0.30 D50: 0.27 D30: 0.21 D15: 0.16 D10: 0.14 mm

Cu: 2.07 Cc: 0.98

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

Gravel: 0.0% Sand: 97.2% Fines: 2.8%

---------- ASTM D 2487 Classification ----------

SP Poorly graded SAND

---------- TM 5-818-2 Frost Classification ----------

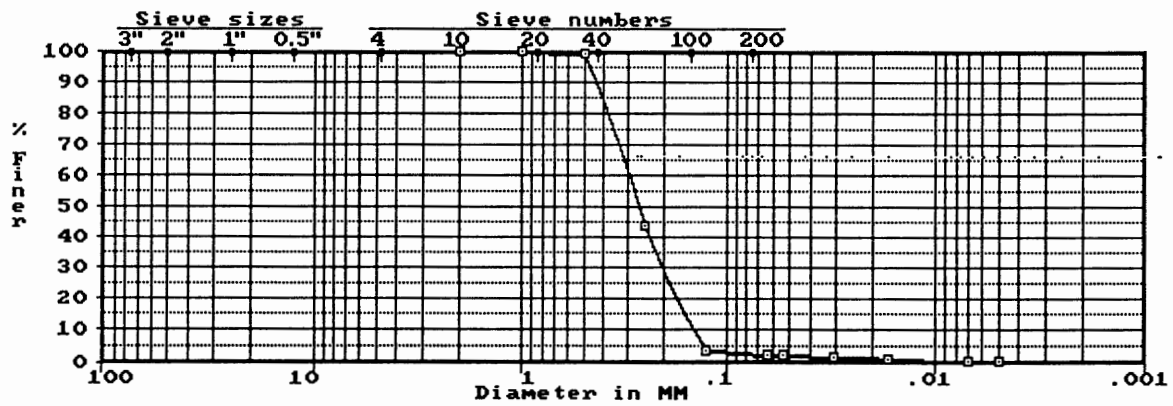
Percent finer than 0.02 mm: 1.6 Frost Classification: **NFS**

---------- Comments ----------

-Location:In or adjacent to Trestle Bay.

-Volatile Solids: 0.6%

-Date:21 April 1997



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COLUMBIA RIVER ESTUARY (97-047)

Boring: Sample: **14** Depth: --- Lab No.: 4737

Sieve Analysis

Sieve	Cumulative Grams Retained	Percent Passing
5 In.	0.00	100.0
2.5 In.	0.00	100.0
1.25 In.	0.00	100.0
5/8 In.	0.00	100.0
5/16 In.	0.00	100.0
No. 5	0.00	100.0
No. 10	0.00	100.0
Pan	120.99	0.0
No. 18	0.00	100.0
No. 35	0.00	100.0
No. 60	0.12	99.8
No. 120	0.45	99.2
No. 230	1.24	97.7
Pan	54.02	0.0

Hydrometer Analysis

Sample Weight:54.02 gr. Start Time:0000

Time	Temp (C)	Hydrometer Reading	Diameter in mm	Percent Finer
1	20.0	48.3	0.0388	89.4
3	20.0	42.3	0.0237	78.4
10	20.0	32.3	0.0141	60.1
100	20.0	14.3	0.0065	27.1
200	20.0	10.3	0.0047	19.8

D85: .031 D60: .014 D50: .011 D30: .0070 mm

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

Gravel: 0.0% Sand: 1.9% Fines: 98.1%

ASTM D 2487 Classification

ML SILT

TM 5-818-2 Frost Classification

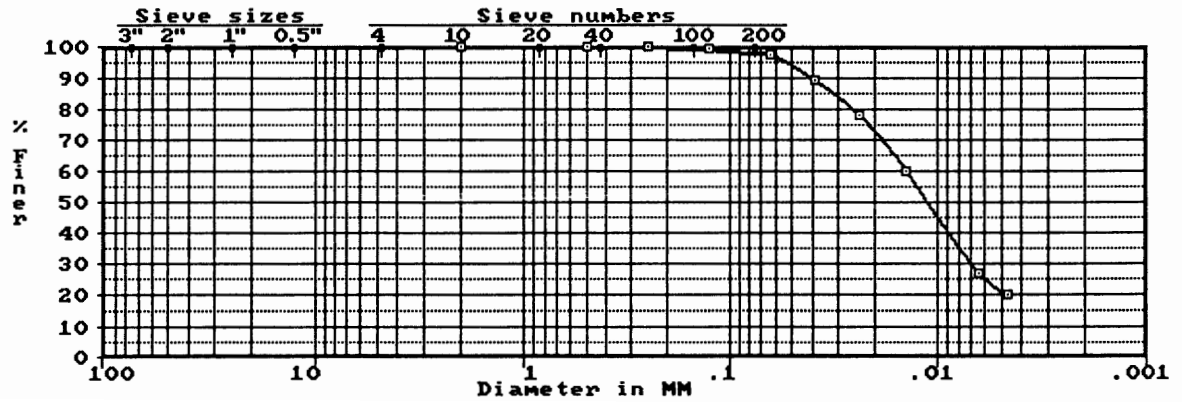
Percent finer than 0.02 mm: 73.0 Frost Classification: **F4**

Comments

-Location:In or adjacent to Trestle Bay.

-Volatile Solids: 5.3%

-Date:12 April 1997



* * * CORPS OF ENGINEERS - NORTH PACIFIC DIVISION LABORATORY * * *

COLUMBIA RIVER ESTUARY (97-047)

Boring: Sample: **15** Depth: --- Lab No.: 4738

Sieve Analysis

Sieve	Cumulative Grams Retained	Percent Passing
5 In.	0.00	100.0
2.5 In.	0.00	100.0
1.25 In.	0.00	100.0
5/8 In.	0.00	100.0
5/16 In.	0.00	100.0
No. 5	0.00	100.0
No. 10	0.00	100.0
Pan	252.51	0.0
No. 18	0.00	100.0
No. 35	0.05	100.0
No. 60	6.04	94.7
No. 120	90.68	20.9
No. 230	97.49	14.9
Pan	114.61	0.0

Hydrometer Analysis

Sample Weight: 114.61 gr. Start Time: 0000

Time	Temp (C)	Hydrometer Reading	Diameter in mm	Percent Finer
1	20.0	16.3	0.0495	14.5
3	20.0	13.3	0.0291	11.9
10	20.0	10.8	0.0162	9.8
100	20.0	5.3	0.0068	5.0
200	20.0	3.8	0.0048	3.7

D85: 0.23 D60: 0.18 D50: 0.16 D30: 0.14 D15: .064 D10: .017 mm

Cu: 10.6 Cc: 6.02

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

Gravel: 0.0% Sand: 83.6% Fines: 16.4%

ASTM D 2487 Classification

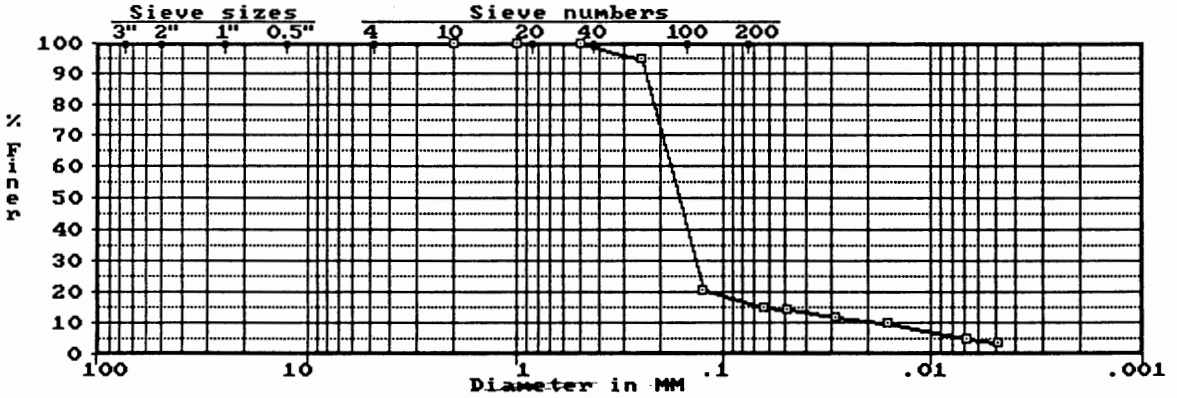
SM Silty SAND

TM 5-818-2 Frost Classification

Percent finer than 0.02 mm: 10.6 Frost Classification: **F2**

Comments

-Location: In or adjacent to Trestle Bay.

-Volatile Solids: 0.9%

-Date: 21 April 1997