HEADER SHEET FOR SEDIMENT SAMPLING TRIP

PROJECT LOCATION: WAHKIAKUM

SAMPLING DATE: Oct 1994

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

SAMPLING ANALYSIS (SAMPLE NUMBERS ANALYZED)

GRAIN SIZE: W-1 to 8, WC-9 to 14

OIL/GREASE:

AMMONIA (NH4):

SULFIDE:

TOTAL ORGANIC CARBON (TOC):

VOLATILE SOLIDS:

METALS:

PESTICIDES:

PAH'S:

ELUTRIATES:

BIOLOGICAL:

SEDIMENT QUALITY dBASE FILES:

entered
4/4/95

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION LABORATORY
CORPS OF ENGINEERS
1491 N.W. GRAHAM AVENUE
TROUTDALE, OREGON 97060-9503

CENPD-PE-GE-L (1110-1-8100c) November 10, 1994

MEMORANDUM FOR:Commander, Portland District ATTN: CENPP-PE-HR (Britton)

SUBJECT: W.O. #95-060, Report of Sediment Analysis

Project: WAHKIAKUM COUNTY FERRY CHANNEL
Location: Columbia River Estuary
Submitted by: National Marine Fisheries Service (McCabe)
Date Sampled: --- Date Received: 10/24/94
Method of Test or Specification: EMM1110-2-1906, ASTM
Reference: a) Pay Voucher no. 43JBNF500008..
b) Transmittal of Materials Samples outlining required tests.

1. Enclosed is report of mechanical analysis for 14 sediment samples submitted from the above project. Included are:

a) Enclosure 1, Summary of Volatile Solids and Soil Classification.

b) Enclosures 2 through 15, Report of Particle Size Analysis and Classification Tests, one for each sample submitted.

2. A copy of this report has been forwarded to National Marine Fisheries Service.

3. This completes all physical analysis requested to date for this project.

Enclosures

JAMES K. HINDS, PE
Deputy Director

Copy Furnished: CENPD-PE-GE

WAHKIAKUM COUNTY FERRY CHANNEL
Columbia River Estuary

Report of Volatile Solids and Soil Classification

Sample Id.	Volatile Solids, %	Soil Classification ASTM D-2487
W-1	0.3	SP
W-2	0.5	SP
W-3	0.4	SP
W-4	0.6	SP
W-5	0.7	SP
W-6	0.9	SM
W-7	0.5	SP
W-8	0.4	SP
WC-9	0.4	SP
WC-10	0.6	SP
WC-11	0.5	SP
WC-12	0.6	SP
WC-13	0.6	SP
WC-14	0.4	SP

North Pacific Division Laboratory number 5069, samples received 10/24/94.

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WAHKIAKUM COUNTY FERRY CHANNEL (95-060)

Boring: -- Sample: W-1 Depth: -- Lab No.: 106001

------ 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	644.90	0.0
No. 18	0.00	100.0
No. 35	1.20	98.9
No. 60	71.50	34.1
No. 120	106.20	2.1
No. 230	107.90	0.6
Pan	108.52	0.0

No hydrometer analysis.

$\bar{X} = .296$

D85: 0.42 D60: 0.32 D50: 0.29 D30: 0.24 D15: 0.18 D10: 0.16 mm

Cu: 2.01 Cc: 1.06

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

Gravel: 0.0% Sand: 99.0% Fines: 1.0%

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

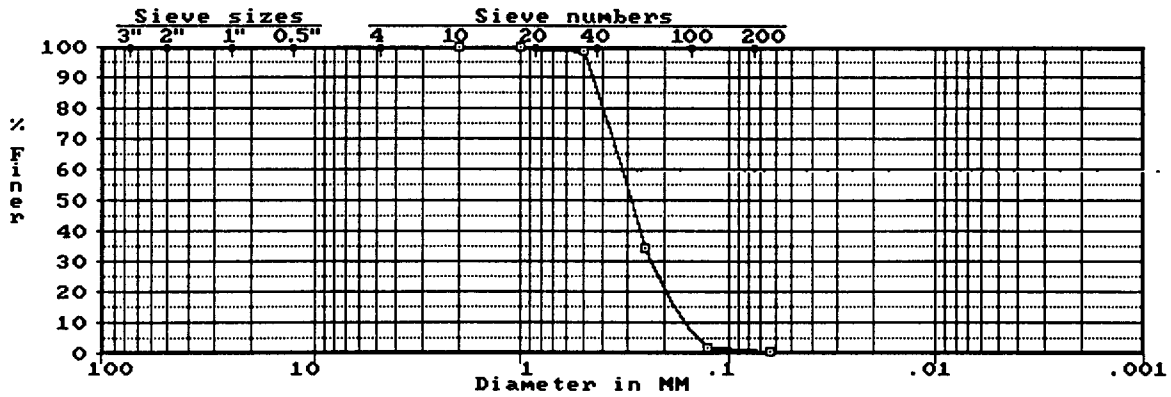
SP Poorly graded SAND

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

Frost Classification: **NFS**

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

- VOLATILE SOLIDS = 0.3%
- 12 OCT 94



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WAHKIAKUM COUNTY FERRY CHANNEL (95-060)

Boring: -- Sample: **W-2** Depth: -- Lab No.: 106002

------ 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	681.10	0.0
No. 18	0.00	100.0
No. 35	2.50	97.7
No. 60	72.10	~~33.6~~
No. 120	104.70	~~3.6~~
No. 230	106.80	~~1.7~~
Pan	108.60	0.0

No hydrometer analysis.

$\bar{X} = .300$

D85: 0.43 D60: 0.33 D50: 0.29 D30: 0.24 D15: 0.18 D10: 0.16 mm

Cu: 2.08 Cc: 1.09

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

Gravel: 0.0% Sand: 97.8% Fines: 2.2%

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

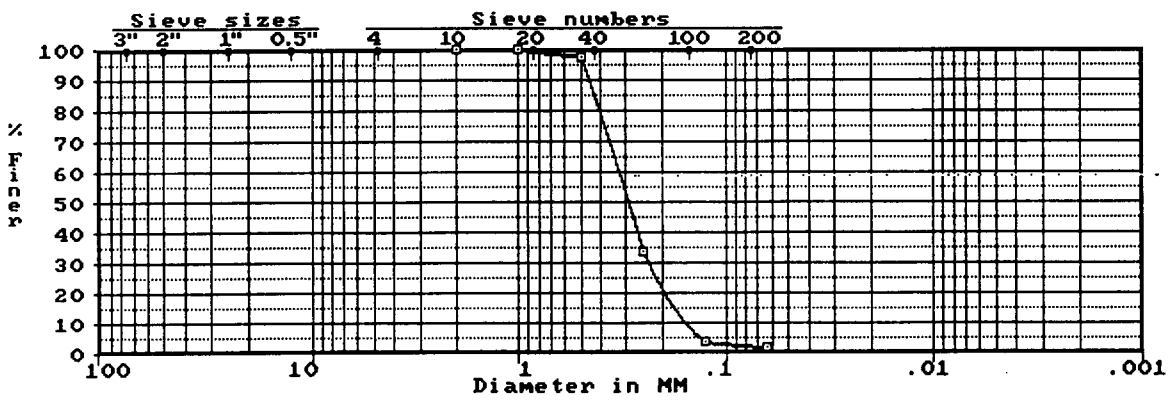
SP Poorly graded SAND

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

Frost Classification: **NFS**

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

- VOLATILE SOLIDS = 0.5%
- 12 OCT 94



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WAHKIAKUM COUNTY FERRY CHANNEL (95-060)

Boring: -- Sample: W-3 Depth: -- Lab No.: 106003

------ 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	552.60	0.0
No. 18	0.10	99.9
No. 35	1.40	98.8
No. 60	66.00	44.1
No. 120	112.30	4.8
No. 230	116.20	1.5
Pan	118.00	0.0

No hydrometer analysis.

$\bar{X} = .28$

D85: 0.41 D60: 0.30 D50: 0.27 D30: 0.20 D15: 0.16 D10: 0.14 mm

Cu: 2.11 Cc: 0.99

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

Gravel: 0.0% Sand: 97.7% Fines: 2.3%

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

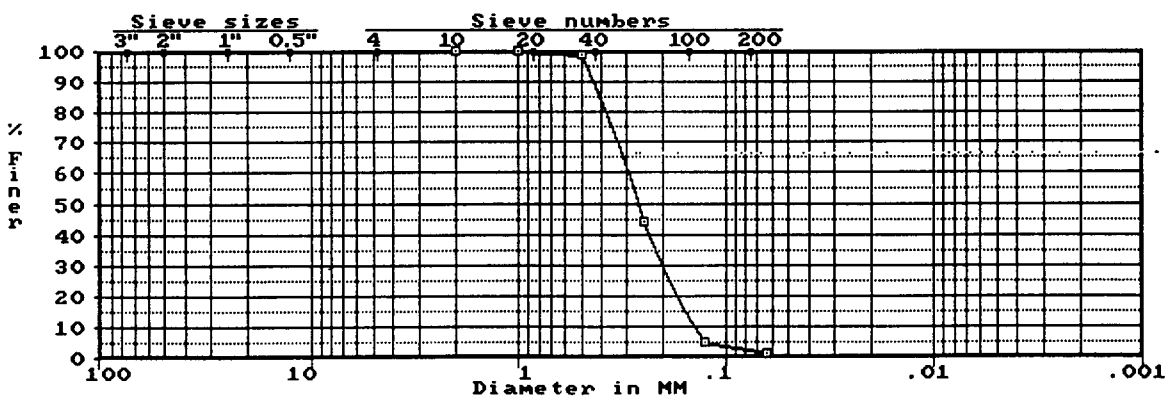
SP Poorly graded SAND

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

Frost Classification: **NFS**

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

- VOLATILE SOLIDS = 0.4%
- 12 OCT 94



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WAHKIAKUM COUNTY FERRY CHANNEL (95-060)

Boring: -- Sample: **W-4** Depth: -- Lab No.: 106004

------ 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	513.42	0.0
No. 18	0.10	99.9
No. 35	2.60	97.6
No. 60	70.40	35.7
No. 120	105.70	3.5
No. 230	108.10	1.3
Pan	109.57	0.0

No hydrometer analysis.

$\bar{x}$ = .296

D85: 0.43 D60: 0.32 D50: 0.29 D30: 0.23 D15: 0.17 D10: 0.15 mm

Cu: 2.09 Cc: 1.06

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 ----------

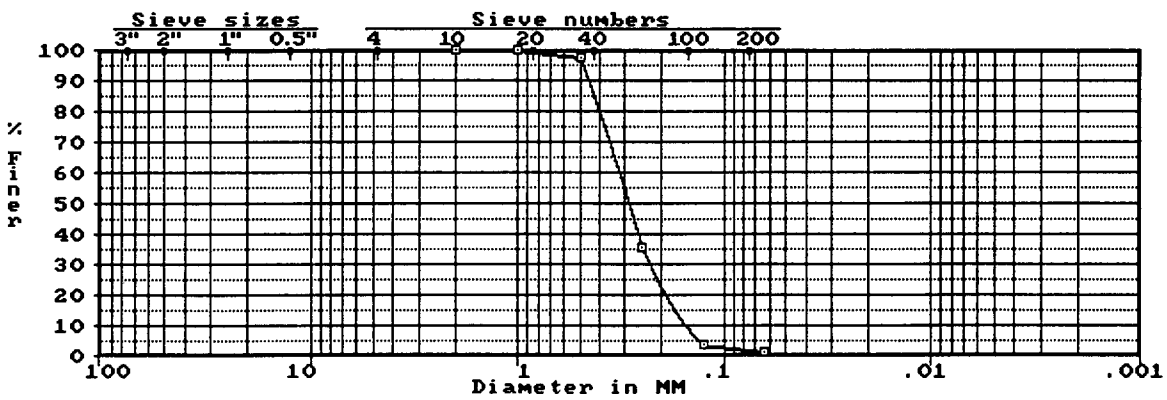
SP Poorly graded SAND

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

Frost Classification: **NFS**

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

- VOLATILE SOLIDS = 0.6%
- 12 OCT 94



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WAHKIAKUM COUNTY FERRY CHANNEL (95-060)

Boring: -- Sample: **W-5** Depth: -- Lab No.: 106005

------ 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	736.20	0.0
No. 18	0.50	99.5
No. 35	8.00	92.6
No. 60	75.60	30.4
No. 120	103.60	4.6
No. 230	106.50	1.9
Pan	108.59	0.0

No hydrometer analysis.

$\bar{X} = .316$

D85: 0.46 D60: 0.34 D50: 0.31 D30: 0.25 D15: 0.18 D10: 0.16 mm

Cu: 2.17 Cc: 1.14

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

Gravel: 0.0% Sand: 97.4% Fines: 2.6%

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

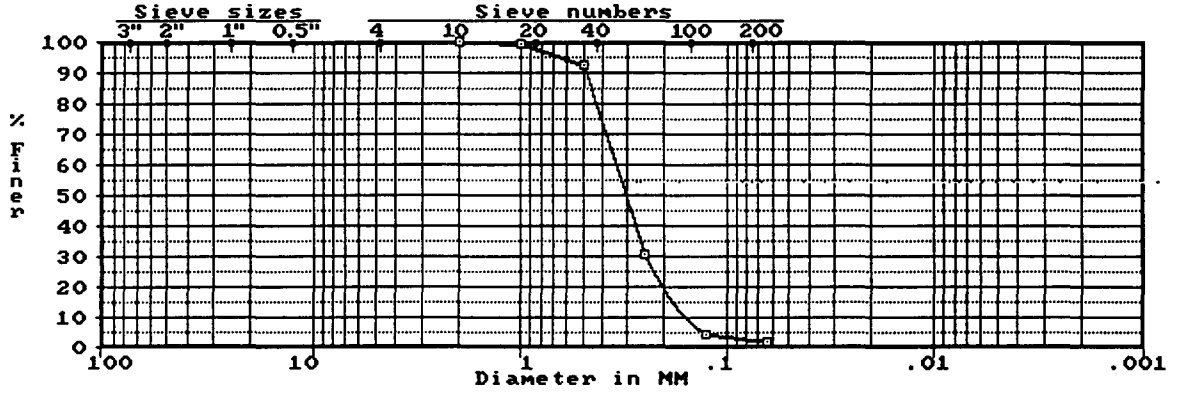
SP Poorly graded SAND

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

Frost Classification: **NFS**

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

- VOLATILE SOLIDS = 0.7%
- 12 OCT 94



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WAHKIAKUM COUNTY FERRY CHANNEL (95-060)

Boring: -- Sample: **W-6** Depth: -- Lab No.: 106006

------ 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	470.00	0.0
No. 18	0.10	99.9
No. 35	2.10	97.5
No. 60	31.70	61.6
No. 120	66.50	19.4
No. 230	73.80	10.6
Pan	82.52	0.0

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

Sample Weight: 82.52 gr. Start Time: 0000

Time	Temp (C)	Hydrometer Reading	Diameter in mm	Percent Finer
1	20.0	7.2	0.0521	9.2
3	20.0	5.2	0.0304	6.8
10	20.0	3.7	0.0168	5.0
100	20.0	2.2	0.0069	3.2
200	20.0	1.3	0.0049	2.2

$\bar{x}$ = .203

D85: 0.37 D60: 0.24 D50: 0.21 D30: 0.15 D15: .089 D10: .058 mm

Cu: 4.18 Cc: 1.62

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

Gravel: 0.0% Sand: 87.2% Fines: 12.8%

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

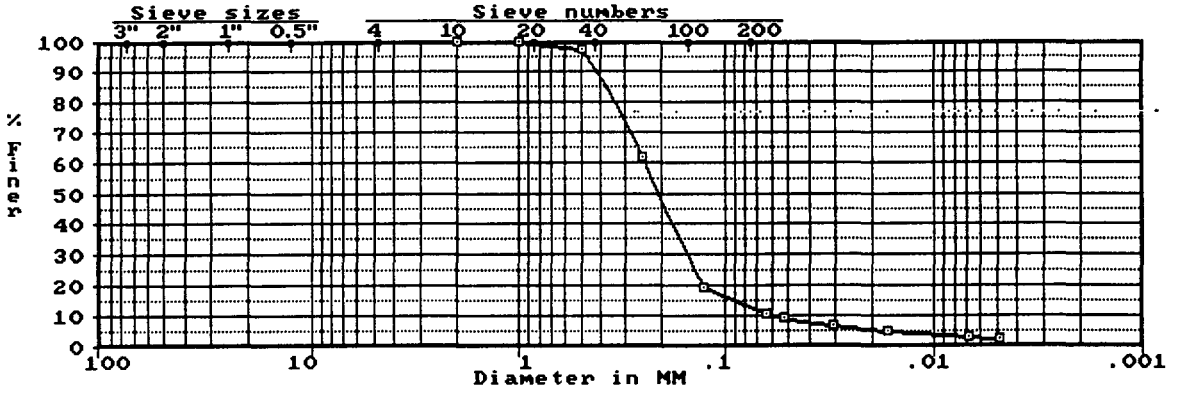
SM Silty SAND

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

Percent finer than 0.02 mm: 5.5 Frost Classification: **S2**

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

- VOLATILE SOLIDS = 0.9%
- 12 OCT 94



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WAHKIAKUM COUNTY FERRY CHANNEL (95-060)

Boring: -- Sample: **W-7** Depth: -- Lab No.: 106007

------ 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.	2.32	99.4
5/16 In.	9.65	97.5
No. 5	19.87	94.8
No. 10	31.97	91.6
Pan	382.00	0.0
No. 18	5.30	86.1
No. 35	22.10	68.5
No. 60	61.80	26.9
No. 120	83.80	3.8
No. 230	86.30	1.2
Pan	87.45	0.0

No hydrometer analysis.

$\bar{x} = .493$

D85: 0.92 D60: 0.43 D50: 0.37 D30: 0.26 D15: 0.19 D10: 0.16 mm

Cu: 2.68 Cc: 0.99

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

Gravel: 4.5% Sand: 93.7% Fines: 1.9%

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

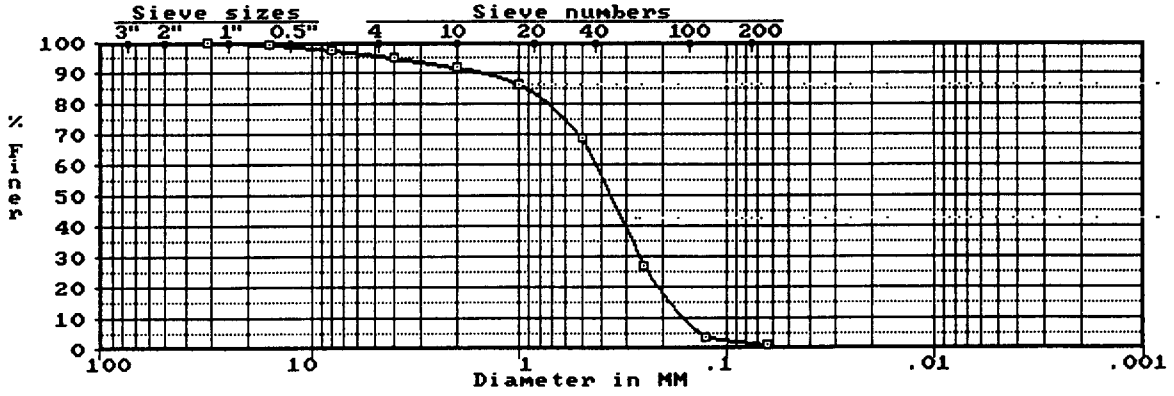
SP Poorly graded SAND

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

Frost Classification: **NFS**

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

- VOLATILE SOLIDS = 0.5%
- 12 OCT 94



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WAHKIAKUM COUNTY FERRY CHANNEL (95-060)

Boring: -- Sample: **W-8** Depth: -- Lab No.: 106008

------ 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.	24.53	94.7
5/16 In.	26.07	94.4
No. 5	30.03	93.5
No. 10	41.85	91.0
Pan	463.60	0.0
No. 18	4.60	87.0
No. 35	23.10	71.0
No. 60	86.60	16.2
No. 120	104.00	1.2
No. 230	104.80	0.5
Pan	105.34	0.0

No hydrometer analysis.

$\bar{x} = .48$

D85: 0.82 D60: 0.44 D50: 0.38 D30: 0.30 D15: 0.24 D10: 0.21 mm

Cu: 2.06 Cc: 0.97

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

Gravel: 6.2% Sand: 93.1% Fines: 0.7%

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

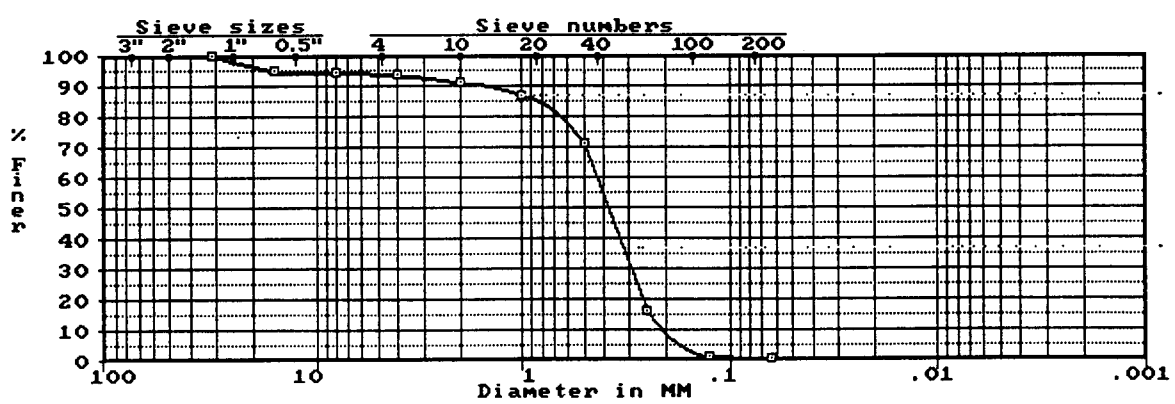
SP Poorly graded SAND

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

Frost Classification: **NFS**

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

- VOLATILE SOLIDS = 0.4%
- 12 OCT 94



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WAHKIAKUM COUNTY FERRY CHANNEL (95-060)

Boring: -- Sample: **WC-9** Depth: -- Lab No.: 106009

------ 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.	3.85	99.3
No. 5	21.26	96.3
No. 10	40.15	92.9
Pan	569.10	0.0
No. 18	2.90	91.0
No. 35	14.00	83.5
No. 60	88.50	~~33.2~~
No. 120	133.50	3.0
No. 230	136.90	0.7
Pan	137.97	0.0

No hydrometer analysis.

$\bar{x} = .353$

D85: 0.57 D60: 0.35 D50: 0.31 D30: 0.24 D15: 0.18 D10: 0.16 mm

Cu: 2.28 Cc: 1.01

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

Gravel: 2.8% Sand: 95.9% Fines: 1.3%

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

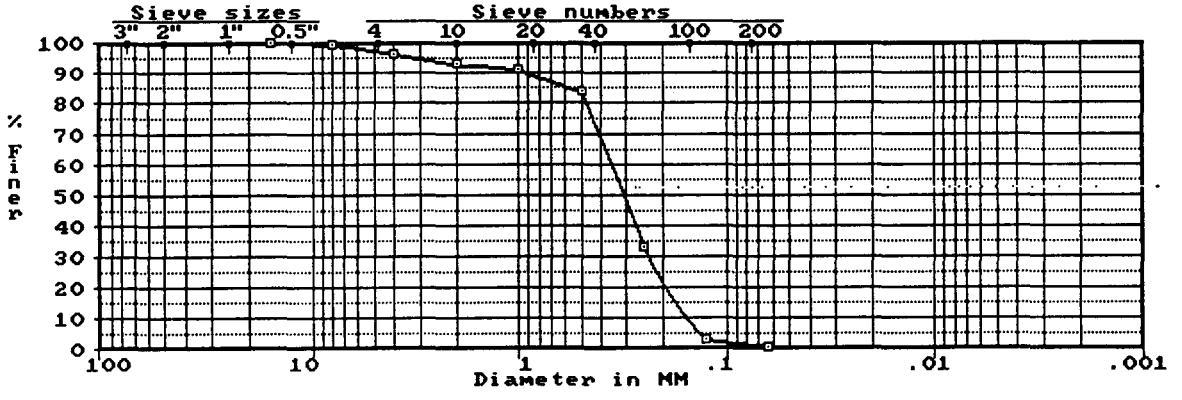
SP Poorly graded SAND

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

Frost Classification: **NFS**

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

- VOLATILE SOLIDS = 0.4%
- 12 OCT 94



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WAHKIAKUM COUNTY FERRY CHANNEL (95-060)

Boring: -- Sample: **WC-10** Depth: -- Lab No.: 106010

------ 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.	9.67	98.4
No. 5	22.97	96.1
No. 10	31.02	94.7
Pan	586.30	0.0
No. 18	0.89	94.1
No. 35	11.90	86.8
No. 60	84.00	39.0
No. 120	136.50	4.2
No. 230	141.20	1.0
Pan	142.78	0.0

No hydrometer analysis.

$\bar{x}$=.313

D85: 0.49 D60: 0.33 D50: 0.29 D30: 0.22 D15: 0.16 D10: 0.15 mm

Cu: 2.27 Cc: 0.97

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

Gravel: 3.3% Sand: 94.8% Fines: 1.8%

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

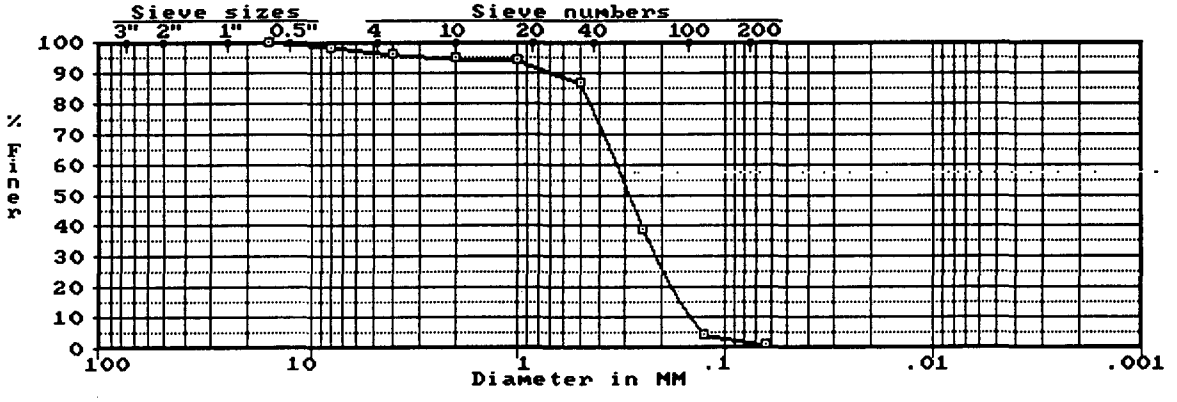
SP Poorly graded SAND

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

Frost Classification: ***NFS***

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

- VOLATILE SOLIDS = 0.6%
- 12 OCT 94



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WAHKIAKUM COUNTY FERRY CHANNEL (95-060)

Boring: -- Sample: **WC-11** Depth: -- Lab No.: 106011

----- 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	2.13	99.6
Pan	539.70	0.0
No. 18	4.50	95.4
No. 35	50.80	52.1
No. 60	95.90	9.9
No. 120	104.80	1.6
No. 230	105.70	0.8
Pan	106.53	0.0

No hydrometer analysis.

$\bar{x} = .53$

D85: 0.82 D60: 0.56 D50: 0.49 D30: 0.36 D15: 0.28 D10: 0.25 mm

Cu: 2.22 Cc: 0.93

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

Gravel: 0.0% Sand: 99.0% Fines: 1.0%

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

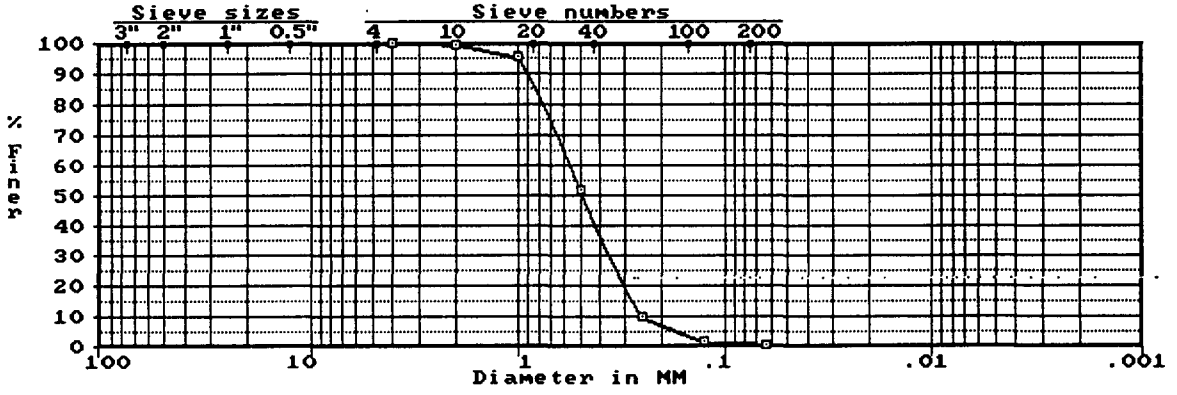
SP Poorly graded SAND

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

Frost Classification: ***NFS***

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

- VOLATILE SOLIDS = 0.5%
- 12 OCT 94



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WAHKIAKUM COUNTY FERRY CHANNEL (95-060)

Boring: -- Sample: **WC-12** Depth: -- Lab No.: 106012

------ 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	0.83	99.8
No. 10	2.54	99.5
Pan	528.50	0.0
No. 18	2.10	97.3
No. 35	25.30	73.1
No. 60	73.70	22.5
No. 120	93.80	1.5
No. 230	95.00	0.2
Pan	95.22	0.0

No hydrometer analysis.

$\bar{X} = .41$

D85: 0.65 D60: 0.42 D50: 0.37 D30: 0.28 D15: 0.21 D10: 0.18 mm

Cu: 2.29 Cc: 1.00

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

Gravel: 0.1% Sand: 99.3% Fines: 0.5%

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

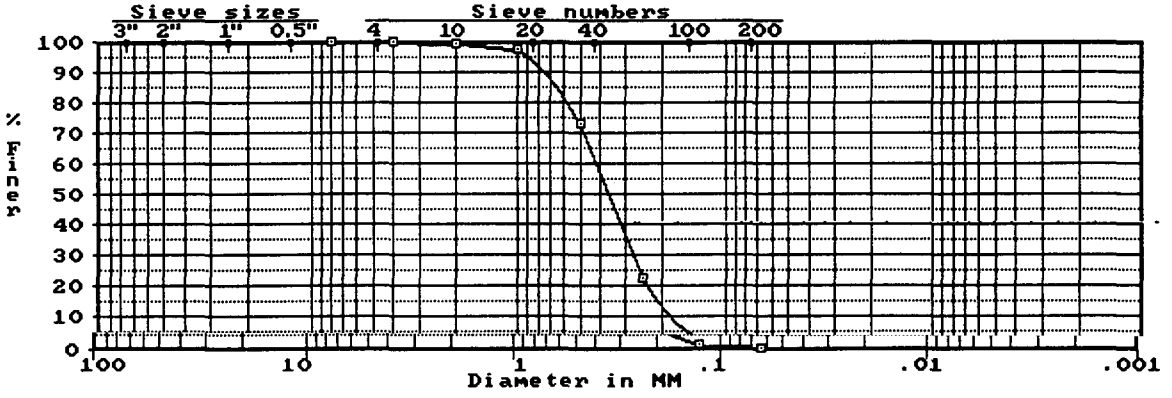
SP Poorly graded SAND

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

Frost Classification: **NFS**

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

- VOLATILE SOLIDS = 0.6%
- 12 OCT 94



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WAHKIAKUM COUNTY FERRY CHANNEL (95-060)

Boring: -- Sample: **WC-13** Depth: -- Lab No.: 106013

------ 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.	7.28	98.9
5/16 In.	26.54	95.9
No. 5	51.02	92.1
No. 10	57.63	91.1
Pan	646.50	0.0
No. 18	1.30	90.0
No. 35	11.30	81.3
No. 60	62.00	37.5
No. 120	103.30	1.8
No. 230	104.90	0.4
Pan	105.35	0.0

No hydrometer analysis.

Xc .38

D85: 0.67 D60: 0.35 D50: 0.30 D30: 0.22 D15: 0.17 D10: 0.15 mm

Cu: 2.27 Cc: 0.93

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

Gravel: 7.1% Sand: 92.2% Fines: 0.8%

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

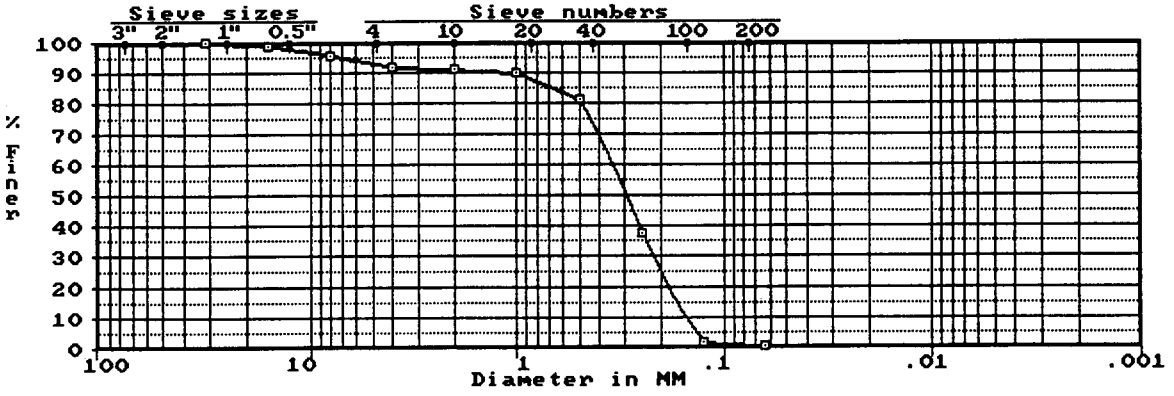
SP Poorly graded SAND

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

Frost Classification: **NFS**

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

- VOLATILE SOLIDS = 0.6%
- 12 OCT 94



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

WAHKIAKUM COUNTY FERRY CHANNEL (95-060)

Boring: -- Sample: **WC-14** Depth: -- Lab No.: 106014

------ 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	702.40	0.0
No. 18	0.10	99.9
No. 35	11.30	89.7
No. 60	98.30	10.3
No. 120	109.20	0.3
No. 230	109.30	0.2
Pan	109.54	0.0

No hydrometer analysis.

$\bar{x} = .363$

D85: 0.48 D60: 0.39 D50: 0.35 D30: 0.30 D15: 0.26 D10: 0.24 mm

Cu: 1.58 Cc: 0.93

Liquid Limit: NP Plasticity Index: NP

Fines Type Used for Classification: ML, SILT

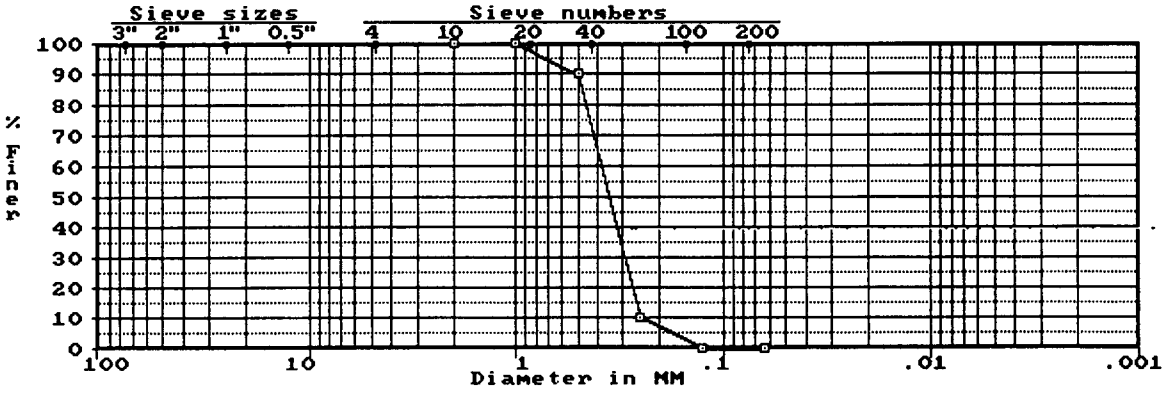
Gravel: 0.0% Sand: 99.8% Fines: 0.2%

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

SP Poorly graded SAND

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

Frost Classification: **NFS**

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

- VOLATILE SOLIDS = 0.4%
- 12 OCT 94