21 March 1990

ELOCHOMAN SLOUGH SEDIMENT EVALUATION

1. In June 1988 the USACE proposed dredging 0.5 mile up the Elochoman Slough from the Columbia River in order to maintain the lower end of the 1.5 mile project. Sediment samples were taken and standard physical and chemical analysis was performed on them. Later, USACE decided to dredge further up the slough beyond the 0.5 mile distance. Washington Department of Ecology (DOE) requested that more samples be taken in this reach. In response to DOE's request CENPP-PL-CH collected more sediment samples.

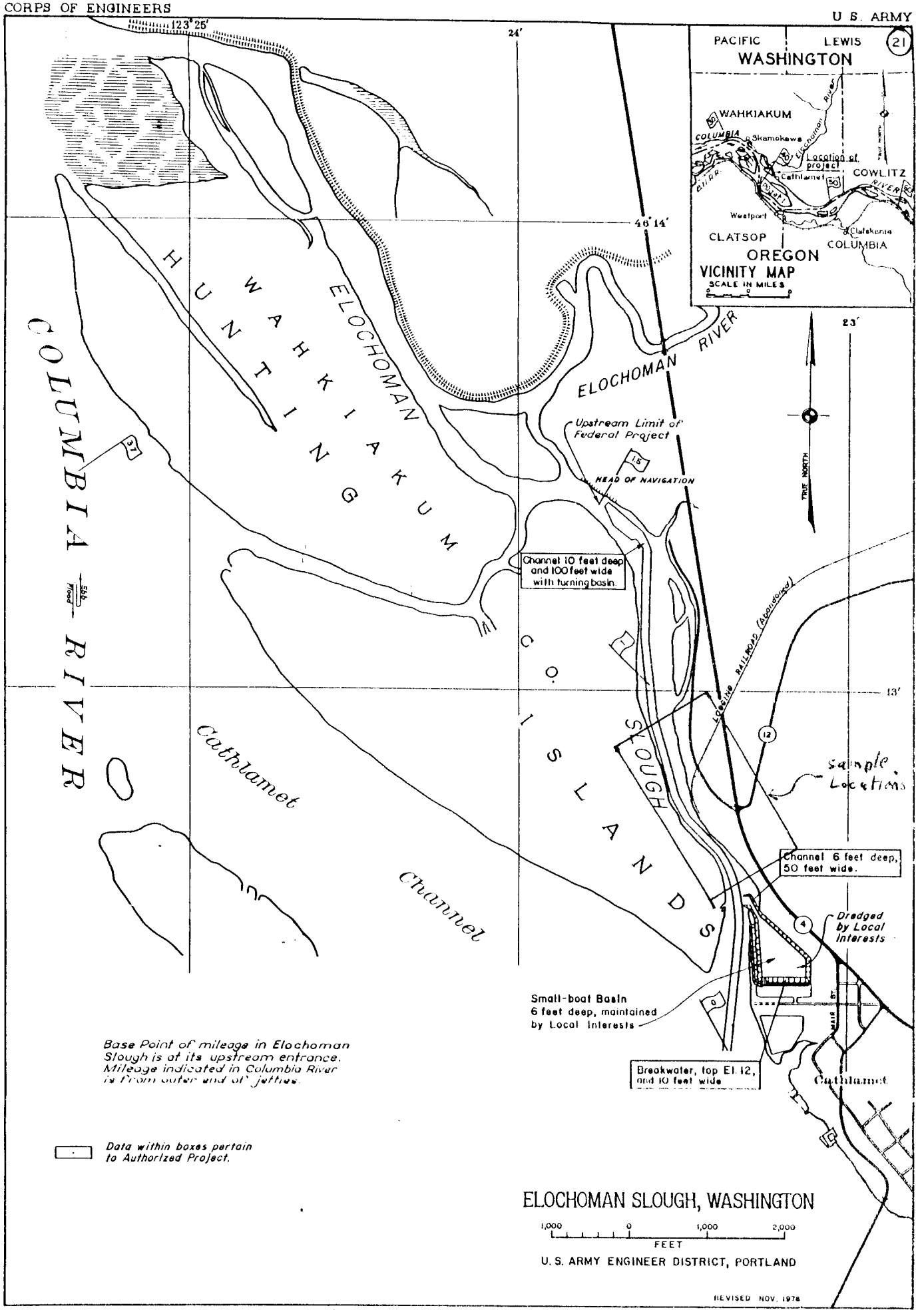
2. On 6 June 1989 six samples were taken by gravity core from Elochoman Slough (see map). Mark Siipola, Mark Hansen and Steve Perkins were in the sampling party. The cores ranged from 17 to 33 inches in length. The samples were analyzed for metals, ammonia, oil and grease, pesticides, PCBs and phenols by Battelle, Pacific Northwest Division, Sequim, Washington. Materials Lab NPD performed the physical analysis on the sediments. The physical and chemical data are stored in the Sediment Quality Data Book, in the Riverine dBase on computer, and in an Elochoman Slough file in the filing cabinet under "Sediment Evaluations".

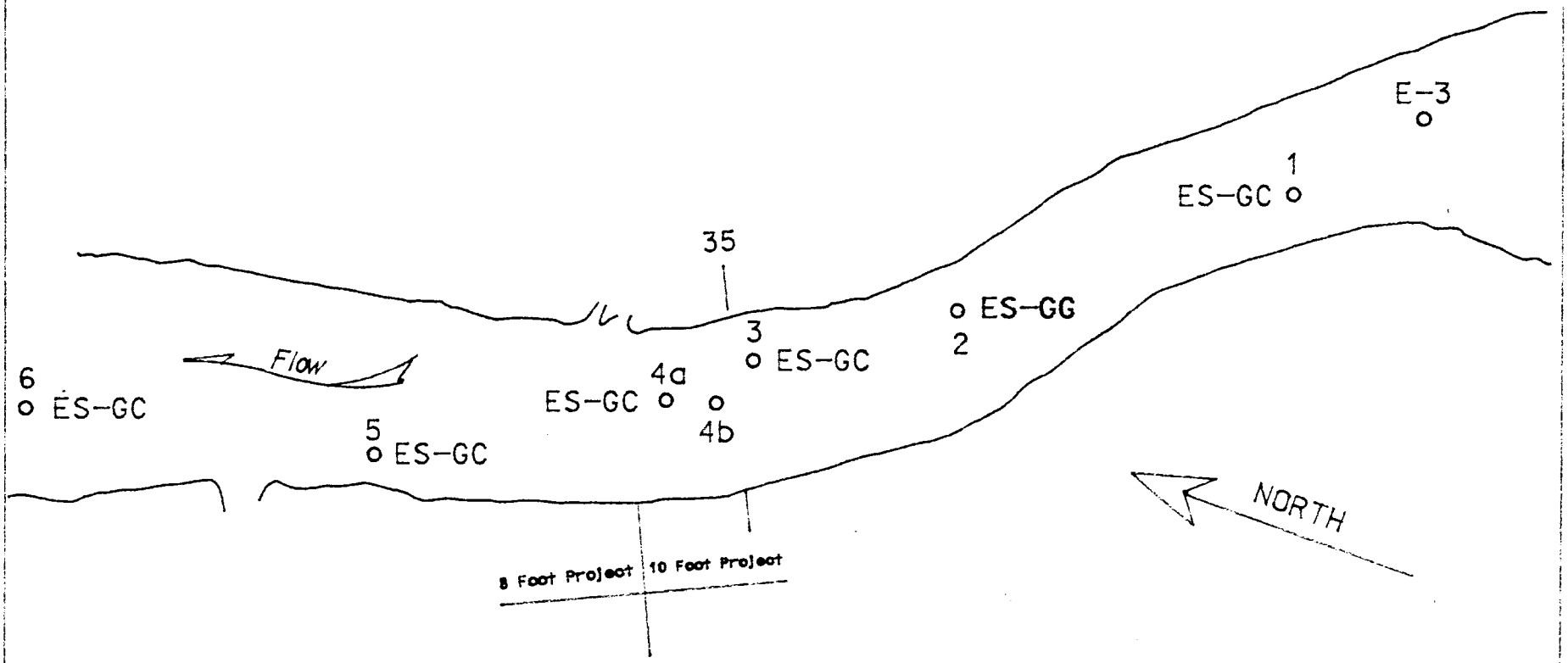
3. The physical analysis showed that the samples were mostly fine grained material with low volatile solids content. For chemical analysis the samples were composited as follows; ES-GC 1&2, ES-GC 3&4 and ES-GC 4&5. The chemical data indicated that the sediments passed CENPP screening levels for metals, pesticides, PCBs, Phenols, oil and grease. Ammonia levels were moderately elevated (104-121ppm).

3. This report was prepared by Jim Britton. Point of contact regarding questions is Mark Siipola CENPP-PL-CH x6463.

CORPS OF ENGINEERS

U S. ARMY





A. COMPOSITE SAMPLE GROUP I 1&2
II 3&4
iii 5&6

B. Archive material from each location for futher testing if required.

Elochoman Slough

SEDIMENT SAMPLE LOCATIONS

DECEMBER 4, 1989

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION MATERIALS LABORATORY
CORPS OF ENGINEERS
1491 NW Graham Avenue
TROUTDALE, OREGON 97060 -9503

CENPD-EN-G-L (1110-1-8100c) 19

MEMORANDUM FOR: Commander, Portland District, ATTN: CENPP-PL-CH

SUBJECT: W.O.#89-SHM-716, Report of Sediment Test Results

Project: ELOCHOMAN SLOUGH
Intended Use: --
Source of Material: Elochoman Slough
Submitted by: CENPP-PL-CH (Siipola)
Date Sampled: -- Date Received: 8 Jun 89
Method of Test or Specification: ASTM, EM1110-2-1906
Reference: a) DA Form 2544, Order No. E86-89-0069, Change Order No. R-1,
b) NPD Form 300, Sample Transmittal, dated 8 Jun 89, covering the samples tested.
c) Our report, this subject, dated 9 Jun 89.

1. Enclosed are:

a. Enclosure 1, one summary sheet, "Results of Physical Analyses of Sediment," with results for the seven samples tested.

b. Enclosure 2, seven gradation analysis summary sheets.

2. Tests on samples from Wind River are underway; results will be reported as available.

Timothy J. Seeman
For JAMES PAXTON
Director

Encls

Copy Furnished: CENPD-EN-G

ELOCHOMAN SLOUGH

Results of Dredge Test Analysis

CENPP Sample Number	Resuspended Density, gms/L	Void Ratio	Volatile Solids, %	Specific Gravity	Roundness Grading
ES-GC-1	1661	1.423	1.4	2.60	angular to subangular
ES-GC-2	1624	1.447	2.9	2.53	angular to subangular
ES-GC-3	1546	1.615	5.9	2.43	subangular to subround
ES-GC-4	1534	1.909	5.8	2.55	subangular to subround
ES-GS-4B	1626	1.517	1.9	2.58	subangular to subround
ES-GC-5	1646	1.369	3.1	2.53	angular to subangular
ES-GC-6	1551	1.552	3.4	2.41	angular to subangular

Received : 8 Jun 89

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ELOCHOMAN SLOUGH (89-SHM-716)

Boring: --- Sample: **ES-GC-1** Depth: **0-25"** Lab No.: 71638

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	66.40	0.0
No. 18	0.10	99.8
No. 35	0.10	99.8
No. 60	0.30	99.5
No. 120	0.60	99.1
No. 230	16.70	74.8
Pan	66.40	0.0

Hydrometer Analysis

Sample Weight:66.4 gr. Start Time:0000

Time	Temp (C)	Hydrometer Reading	Diameter in mm	Percent Finer
1	20.0	36.0	0.0432	54.4
3	20.0	22.5	0.0275	34.3
10	20.0	13.0	0.0159	20.1
100	20.0	6.0	0.0068	9.7
200	20.0	3.8	0.0048	6.4

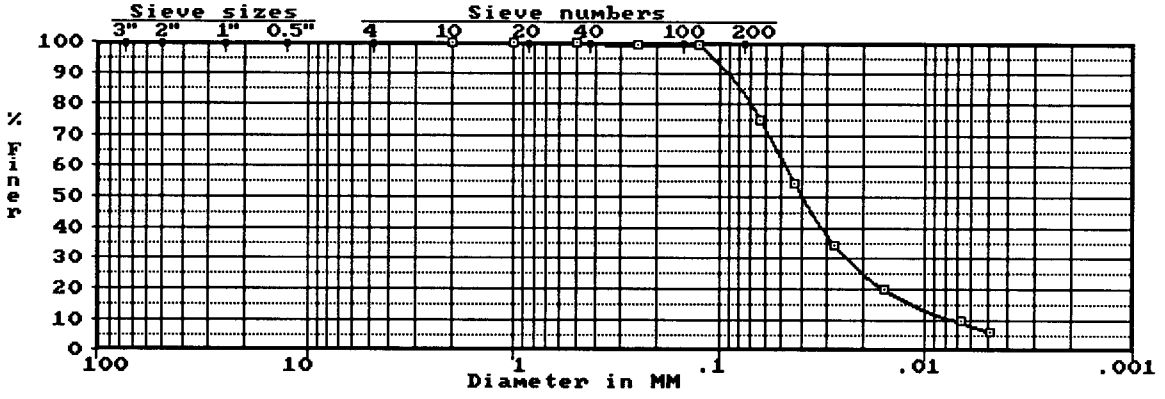
D85: .079 D60: .048 D50: .040 D30: .024 D15: .011 D10: .0071 mm

Cu: 6.78 Cc: 1.71

Gravel: 0.0% Sand: 17.1% Fines: 82.9%

Comments

Cannot classify soil without knowing type of fines.



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ELOCHOMAN SLOUGH (89-SHM-716)

Boring: --- Sample: **ES-GC-2** Depth: **0-25.5"** Lab No.: 71639

------ 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	71.80	0.0
No. 18	0.30	99.6
No. 35	2.10	97.1
No. 60	3.60	95.0
No. 120	3.70	94.8
No. 230	15.20	78.8
Pan	71.80	0.0

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

Sample Weight:71.8 gr. Start Time:0000

Time	Temp (C)	Hydrometer Reading	Diameter in mm	Percent Finer
1	20.0	43.0	0.0408	60.0
3	20.0	30.0	0.0261	42.1
10	20.0	19.0	0.0154	26.9
100	20.0	9.0	0.0067	13.1
200	20.0	5.8	0.0048	8.7

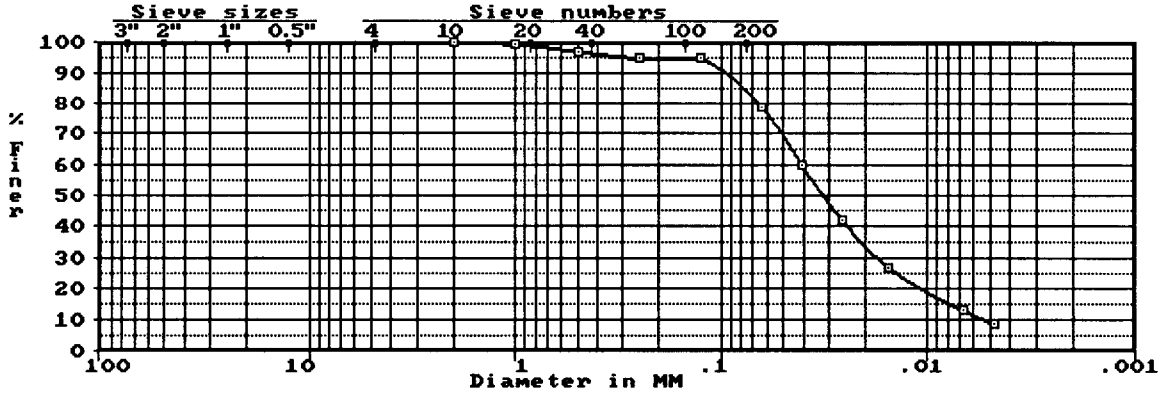
D85: .077 D60: .041 D50: .032 D30: .017 D15: .0078 D10: .0053 mm

Cu: 7.68 Cc: 1.41

Gravel: 0.0% Sand: 15.6% Fines: 84.4%

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

Cannot classify soil without knowing type of fines.



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ELOCHOMAN SLOUGH (89-SHM-716)

Boring: --- Sample: **ES-GC-3** Depth: **0-17"** Lab No.: 71640

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	81.80	0.0
No. 18	0.40	99.5
No. 35	3.40	95.8
No. 60	7.30	91.1
No. 120	9.50	88.4
No. 230	21.00	74.3
Pan	81.80	0.0

Hydrometer Analysis

Sample Weight:81.8 gr. Start Time:0000

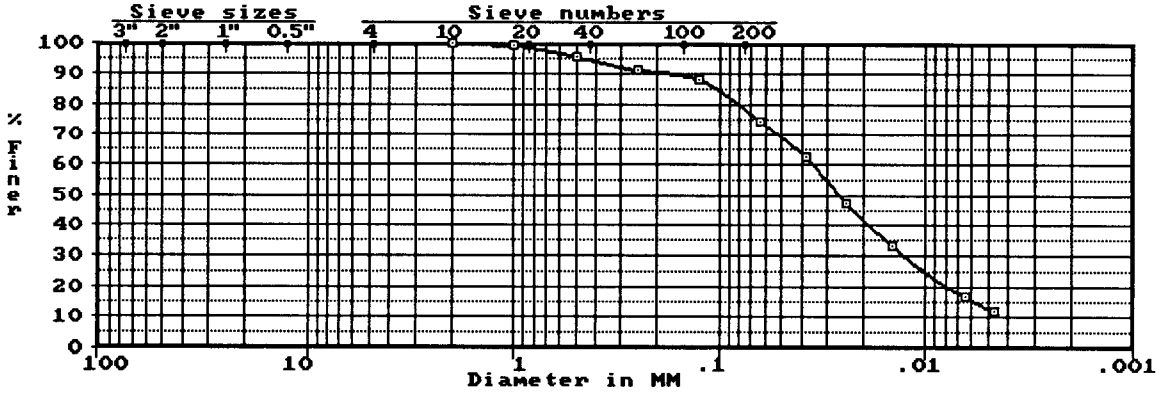
Time	Temp (C)	Hydrometer Reading	Diameter in mm	Percent Finer
1	20.0	51.0	0.0378	62.3
3	20.0	39.0	0.0244	47.8
10	20.0	27.0	0.0146	33.3
100	20.0	13.5	0.0065	16.9
200	20.0	9.3	0.0047	11.9

D85: 0.10 D60: .035 D50: .026 D30: .013 D15: .0058 mm

Gravel: 0.0% Sand: 21.5% Fines: 78.5%

Comments

Cannot classify soil without knowing type of fines.



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ELOCHOMAN SLOUGH (89-SHM-716)

Boring: --- Sample: **ES-GC-4** Depth: **0-19"** Lab No.: 71641

------ 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	78.90	0.0
No. 18	2.40	97.0
No. 35	11.40	85.6
No. 60	20.40	74.1
No. 120	33.80	57.2
No. 230	52.80	33.1
Pan	78.90	0.0

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

Sample Weight:78.9 gr. Start Time:0000

Time	Temp (C)	Hydrometer Reading	Diameter in mm	Percent Finer
1	20.0	22.5	0.0476	28.9
3	20.0	17.0	0.0284	22.0
10	20.0	13.0	0.0159	16.9
100	20.0	8.0	0.0067	10.7
200	20.0	5.3	0.0048	7.3

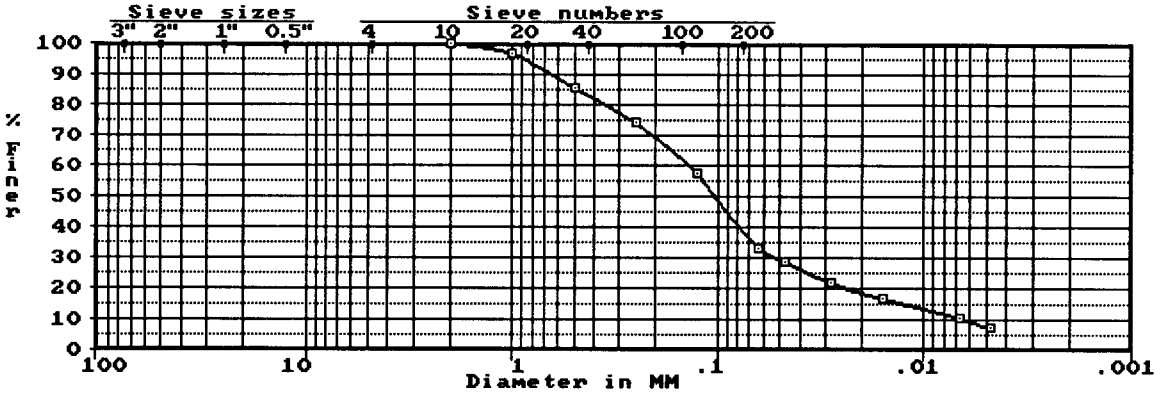
D85: 0.48 D60: 0.14 D50: 0.10 D30: .052 D15: .012 D10: .0062 mm

Cu: 22.2 Cc: 3.13

Gravel: 0.0% Sand: 61.4% Fines: 38.6%

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

Cannot classify soil without knowing type of fines.



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ELOCHOMAN SLOUGH (89-SHM-716)

Boring: --- Sample: **ES-GC-4B** Depth: **0-21"** Lab No.: 71642

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	95.00	0.0
No. 18	0.10	99.9
No. 35	0.80	99.2
No. 60	1.90	98.0
No. 120	3.00	96.8
No. 230	22.10	76.7
Pan	95.00	0.0

Hydrometer Analysis — Sample Weight: 95. gr. Start Time: 0000

Time	Temp (C)	Hydrometer Reading	Diameter in mm	Percent Finer
1	20.0	47.5	0.0391	50.0
3	20.0	30.0	0.0261	31.8
10	20.0	17.0	0.0156	18.2
100	20.0	8.0	0.0067	8.9
200	20.0	5.8	0.0048	6.6

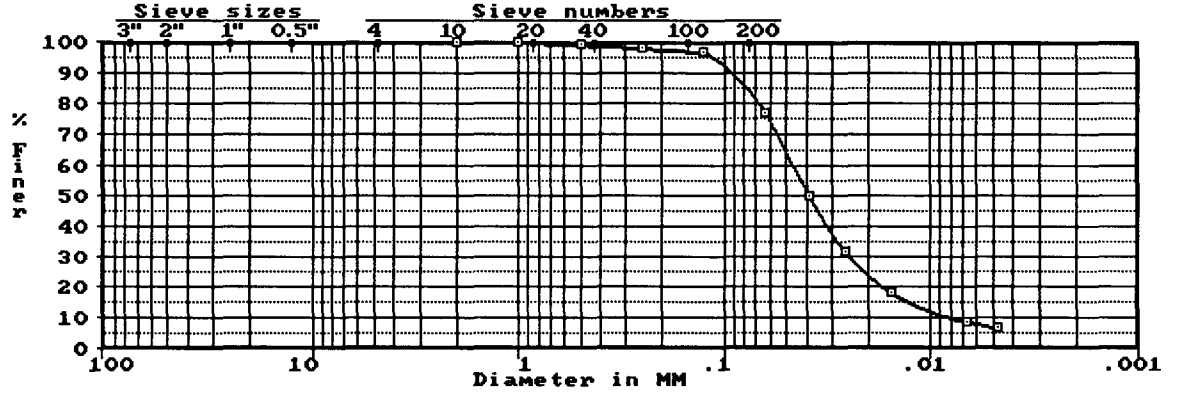
D85: .078 D60: .047 D50: .039 D30: .025 D15: .013 D10: .0080 mm

Cu: 5.80 Cc: 1.64

Gravel: 0.0% Sand: 16.3% Fines: 83.7%

Comments

Cannot classify soil without knowing type of fines.



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ELOCHOMAN SLOUGH (89-SHM-716)

Boring: --- Sample: **ES-GC-5** Depth: **0-26"** Lab No.: 71643

------ 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	77.60	0.0
No. 18	0.20	99.7
No. 35	0.70	99.1
No. 60	1.90	97.6
No. 120	3.70	95.2
No. 230	15.10	80.5
Pan	77.60	0.0

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

Sample Weight:77.6 gr. Start Time:0000

Time	Temp (C)	Hydrometer Reading	Diameter in mm	Percent Finer
1	20.0	47.0	0.0393	60.6
3	20.0	32.0	0.0257	41.5
10	20.0	19.0	0.0154	24.9
100	20.0	10.0	0.0066	13.4
200	20.0	6.8	0.0048	9.3

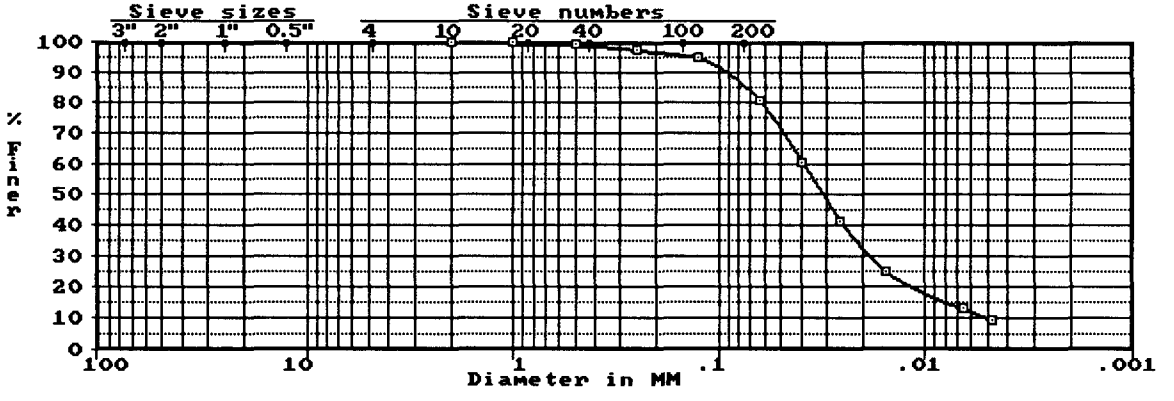
D85: .073 D60: .039 D50: .031 D30: .018 D15: .0079 D10: .0050 mm

Cu: 7.69 Cc: 1.75

Gravel: 0.0% Sand: 14.4% Fines: 85.6%

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

Cannot classify soil without knowing type of fines.



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ELOCHOMAN SLOUGH (89-SHM-716)

Boring: --- Sample: **ES-GC-6** Depth: **0-33"** Lab No.: 71644

------ 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	75.10	0.0
No. 18	0.20	99.7
No. 35	0.50	99.3
No. 60	0.90	98.8
No. 120	1.50	98.0
No. 230	10.60	85.9
Pan	75.10	0.0

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

Sample Weight: 75.1 gr. Start Time: 0000

Time	Temp (C)	Hydrometer Reading	Diameter in mm	Percent Finer
1	20.0	48.6	0.0387	64.7
3	20.0	32.6	0.0256	43.6
10	20.0	20.6	0.0152	27.8
100	20.0	8.7	0.0067	12.1
200	20.0	6.4	0.0048	9.1

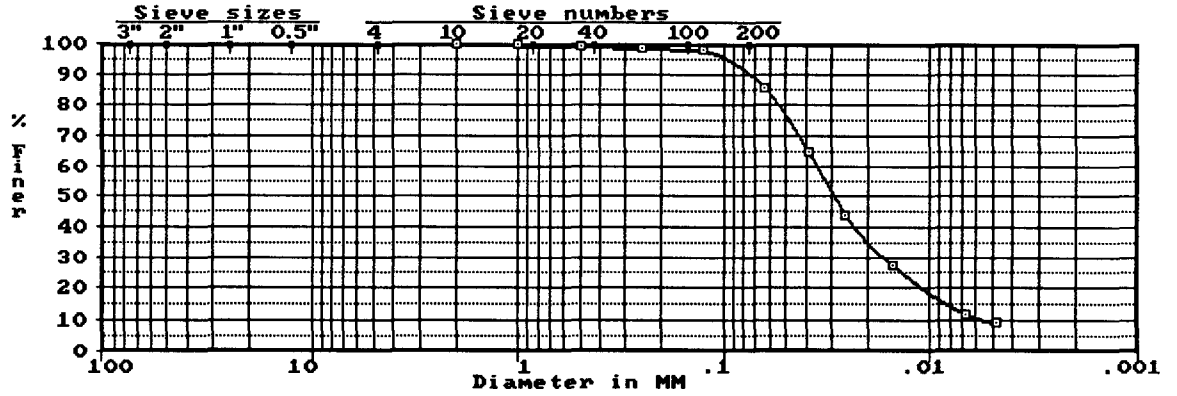
D85: .061 D60: .035 D50: .029 D30: .017 D15: .0082 D10: .0054 mm

Cu: 6.54 Cc: 1.45

Gravel: 0.0% Sand: 9.5% Fines: 90.5%

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

Cannot classify soil without knowing type of fines.



ELOCHOMAN SLOUGH

Results of Dredge Test Analysis

CENPP Sample Number	Resuspended Density, gms/L	Void Ratio	Volatile Solids, %	Specific Gravity	Roundness Grading
ES-GC-1	1661	1.423	1.4	2.60	angular to subangular
ES-GC-2	1624	1.447	2.9	2.53	angular to subangular
ES-GC-3	1546	1.615	5.9	2.43	subangular to subround
ES-GC-4	1534	1.909	5.8	2.55	subangular to subround
ES-GS-4B	1626	1.517	1.9	2.58	subangular to subround
;C-5	1646	1.369	3.1	2.53	angular to subangular
ES-GC-6	1551	1.552	3.4	2.41	angular to subangular

Received : 8 Jun 89

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ELOCHOMAN SLOUGH (89-SHM-716)

Boring: --- Sample: ES-GC-1 Depth: 0-25" Lab No.: 71638

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	66.40	0.0
No. 18	0.10	99.8
No. 35	0.10	99.8
No. 60	0.30	99.5
No. 120	0.60	99.1
No. 230	16.70	74.8
Pan	66.40	0.0

Hydrometer Analysis

Sample Weight:66.4 gr. Start Time:0000

Time	Temp (C)	Hydrometer Reading	Diameter in mm	Percent Finer
1	20.0	36.0	0.0432	54.4
3	20.0	22.5	0.0275	34.3
10	20.0	13.0	0.0159	20.1
100	20.0	6.0	0.0068	9.7
200	20.0	3.8	0.0048	6.4

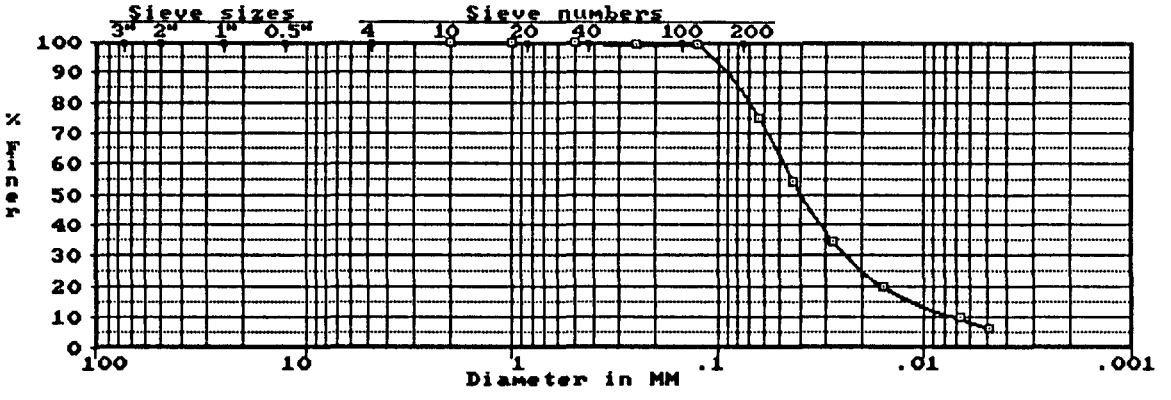
D85: .079 D60: .048 D50: .040 D30: .024 D15: .011 D10: .0071 mm

Cu: 6.78 Cc: 1.71

Gravel: 0.0% Sand: 17.1% Fines: 82.9%

Comments

Cannot classify soil without knowing type of fines.



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ELOCHOMAN SLOUGH (89-SHM-716)

Boring: --- Sample: ES-GC-2 Depth: 0-25.5" Lab No.: 71639

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	71.80	0.0
No. 18	0.30	99.6
No. 35	2.10	97.1
No. 60	3.60	95.0
No. 120	3.70	94.8
No. 230	15.20	78.8
Pan	71.80	0.0

Hydrometer Analysis

Sample Weight: 71.8 gr. Start Time: 0000

Time	Temp (C)	Hydrometer Reading	Diameter in mm	Percent Finer
1	20.0	43.0	0.0408	60.0
3	20.0	30.0	0.0261	42.1
10	20.0	19.0	0.0154	26.9
100	20.0	9.0	0.0067	13.1
200	20.0	5.8	0.0048	8.7

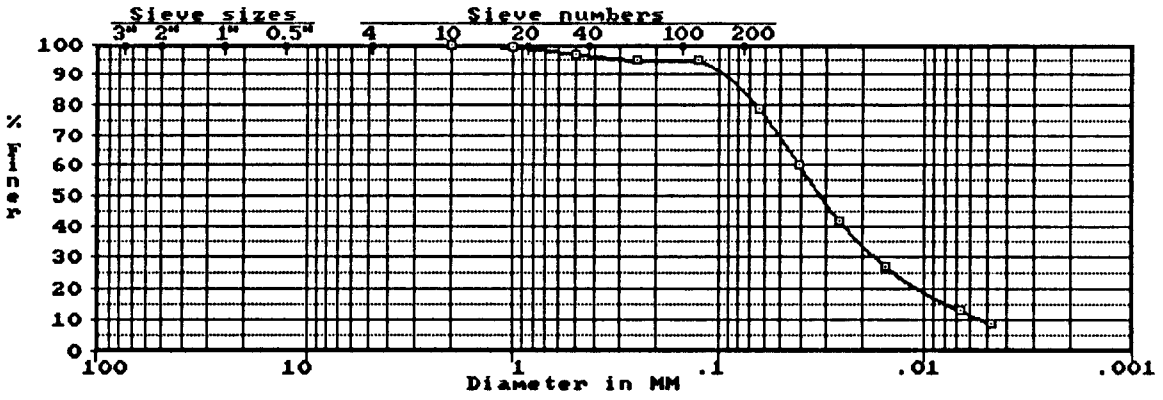
D85: .077 D60: .041 D50: .032 D30: .017 D15: .0078 D10: .0053 mm

Cu: 7.68 Cc: 1.41

Gravel: 0.0% Sand: 15.6% Fines: 84.4%

Comments

Cannot classify soil without knowing type of fines.



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ELOCHOMAN SLOUGH (89-SHM-716)

Boring: --- Sample: ES-GC-3 Depth: 0-17" Lab No.: 71640

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	81.80	0.0
No. 18	0.40	99.5
No. 35	3.40	95.8
No. 60	7.30	91.1
No. 120	9.50	88.4
No. 230	21.00	74.3
Pan	81.80	0.0

Hydrometer Analysis

Sample Weight:81.8 gr. Start Time:0000

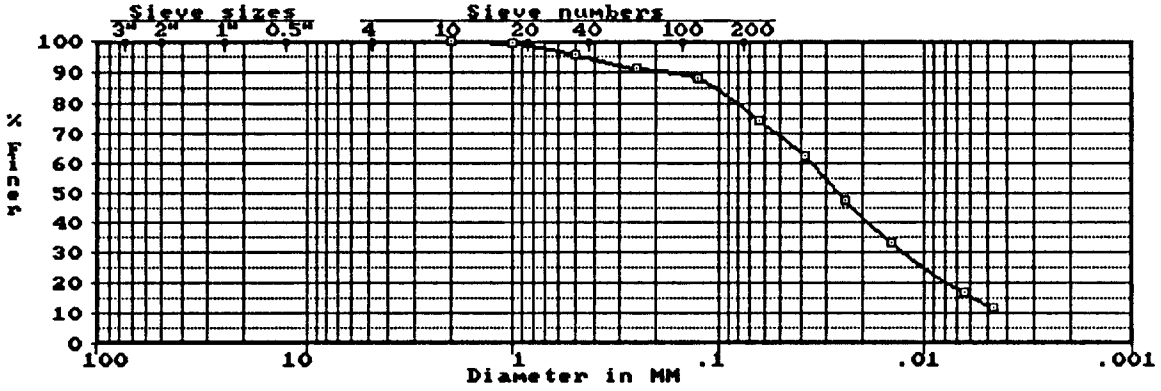
Time	Temp (C)	Hydrometer Reading	Diameter in mm	Percent Finer
1	20.0	51.0	0.0378	62.3
3	20.0	39.0	0.0244	47.8
10	20.0	27.0	0.0146	33.3
100	20.0	13.5	0.0065	16.9
200	20.0	9.3	0.0047	11.9

D85: 0.10 D60: .035 D50: .026 D30: .013 D15: .0058 mm

Gravel: 0.0% Sand: 21.5% Fines: 78.5%

Comments

Cannot classify soil without knowing type of fines.



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ELOCHOMAN SLOUGH (89-SHM-716)

Boring: --- Sample: ES-GC-4 Depth: 0-19" Lab No.: 71641

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	78.90	0.0
No. 18	2.40	97.0
No. 35	11.40	85.6
No. 60	20.40	74.1
No. 120	33.80	57.2
No. 230	52.80	33.1
Pan	78.90	0.0

Hydrometer Analysis

Sample Weight:78.9 gr. Start Time:0000

Time	Temp (C)	Hydrometer Reading	Diameter in mm	Percent Finer
1	20.0	22.5	0.0476	28.9
3	20.0	17.0	0.0284	22.0
10	20.0	13.0	0.0159	16.9
100	20.0	8.0	0.0067	10.7
200	20.0	5.3	0.0048	7.3

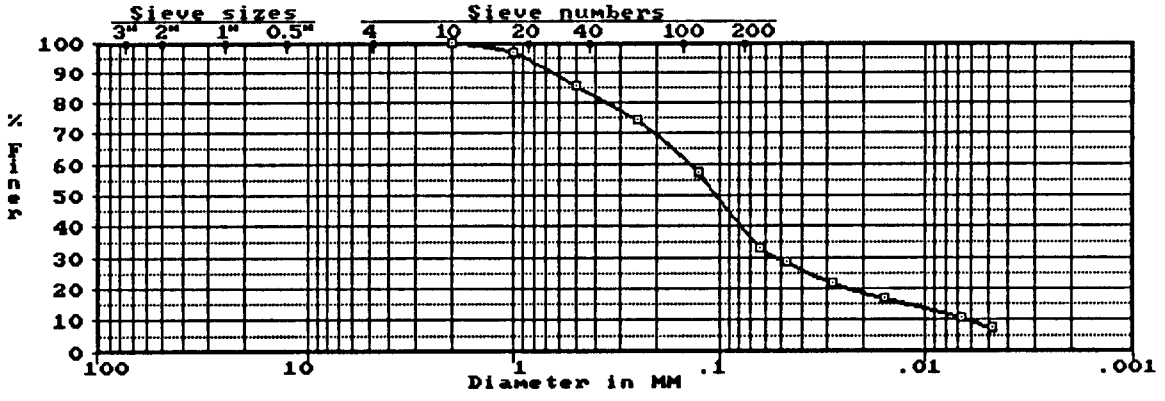
D85: 0.48 D60: 0.14 D50: 0.10 D30: .052 D15: .012 D10: .0062 mm

Cu: 22.2 Cc: 3.13

Gravel: 0.0% Sand: 61.4% Fines: 38.6%

Comments

Cannot classify soil without knowing type of fines.



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ELOCHOMAN SLOUGH (89-SHM-716)

Boring: --- Sample: ES-GC-4B Depth: 0-21" Lab No.: 71642

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	95.00	0.0
No. 18	0.10	99.9
No. 35	0.80	99.2
No. 60	1.90	98.0
No. 120	3.00	96.8
No. 230	22.10	76.7
Pan	95.00	0.0

Sample Weight:95. gr. Start Time:0000

Time	Temp (C)	Hydrometer Reading	Diameter in mm	Percent Finer
1	20.0	47.5	0.0391	50.0
3	20.0	30.0	0.0261	31.8
10	20.0	17.0	0.0156	18.2
100	20.0	8.0	0.0067	8.9
200	20.0	5.8	0.0048	6.6

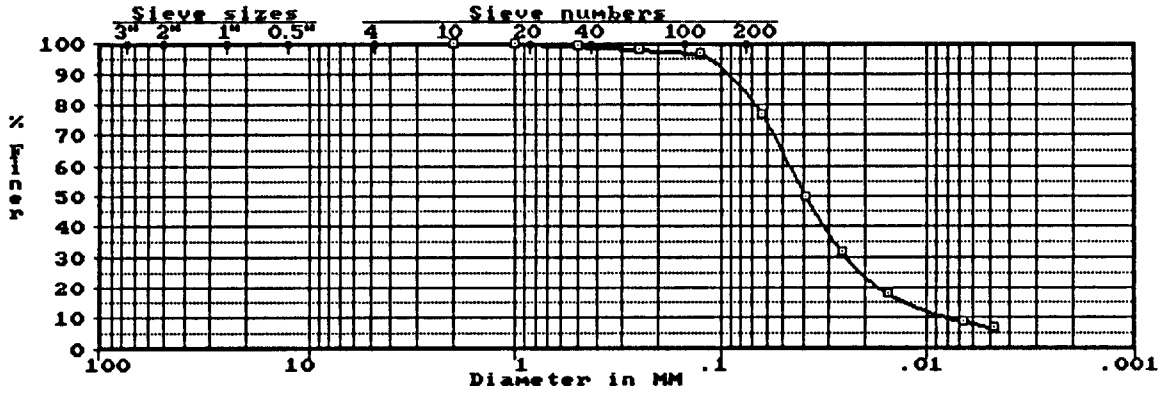
D85: .078 D60: .047 D50: .039 D30: .025 D15: .013 D10: .0080 mm

Cu: 5.80 Cc: 1.64

Gravel: 0.0% Sand: 16.3% Fines: 83.7%

Comments

Cannot classify soil without knowing type of fines.



* * * Corps of Engineers - North Pacific Division Materials Laboratory * * *

ELOCHOMAN SLOUGH (89-SHM-716)

Boring: --- Sample: **ES-GC-5** Depth: **0-26"** Lab No.: 71643

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	77.60	0.0
No. 18	0.20	99.7
No. 35	0.70	99.1
No. 60	1.90	97.6
No. 120	3.70	95.2
No. 230	15.10	80.5
Pan	77.60	0.0

Sample Weight:77.6 gr. Start Time:0000

Time	Temp (C)	Hydrometer Reading	Diameter in mm	Percent Finer
1	20.0	47.0	0.0393	60.6
3	20.0	32.0	0.0257	41.5
10	20.0	19.0	0.0154	24.9
100	20.0	10.0	0.0066	13.4
200	20.0	6.8	0.0048	9.3

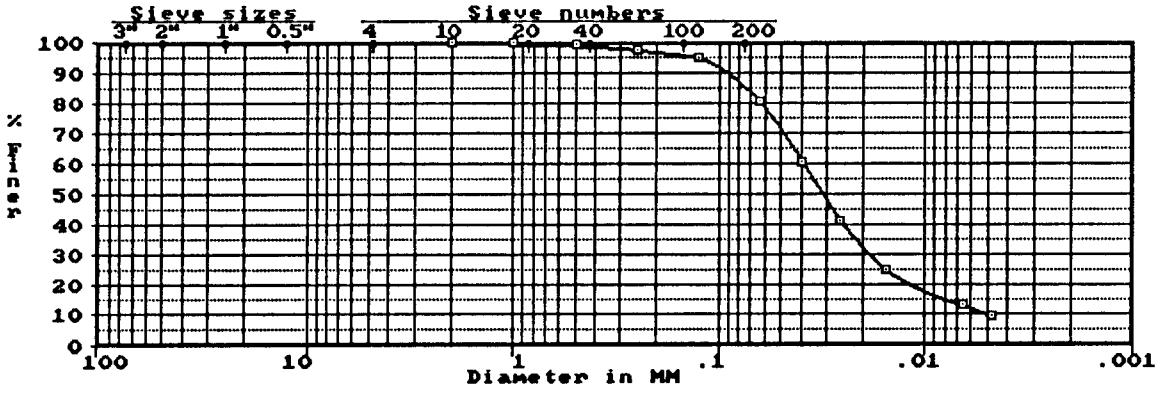
D85: .073 D60: .039 D50: .031 D30: .018 D15: .0079 D10: .0050 mm

Cu: 7.69 Cc: 1.75

Gravel: 0.0% Sand: 14.4% Fines: 85.6%

Comments

Cannot classify soil without knowing type of fines.



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ELOCHOMAN SLOUGH (89-SHM-716)

Boring: --- Sample: **ES-GC-6** Depth: **0-33"** Lab No.: 71644

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	75.10	0.0
No. 18	0.20	99.7
No. 35	0.50	99.3
No. 60	0.90	98.8
No. 120	1.50	98.0
No. 230	10.60	85.9
Pan	75.10	0.0

Hydrometer Analysis

Sample Weight:75.1 gr. Start Time:0000

Time	Temp (C)	Hydrometer Reading	Diameter in mm	Percent Finer
1	20.0	48.6	0.0387	64.7
3	20.0	32.6	0.0256	43.6
10	20.0	20.6	0.0152	27.8
100	20.0	8.7	0.0067	12.1
200	20.0	6.4	0.0048	9.1

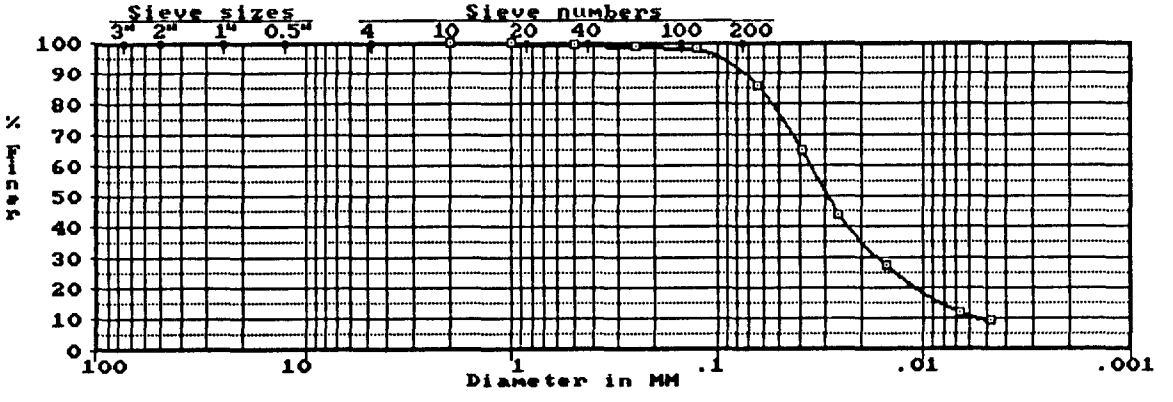
D85: .061 D60: .035 D50: .029 D30: .017 D15: .0082 D10: .0054 mm

Cu: 6.54 Cc: 1.45

Gravel: 0.0% Sand: 9.5% Fines: 90.5%

Comments

Cannot classify soil without knowing type of fines.



Battelle
Pacific Northwest Division
Marine Sciences Laboratory
439 West Sequim Bay Road
Sequim, Washington 98382
(206) 683-4151

July 14, 1989

Mr. Mark Siipola
U.S. Army Corps of Engineers
P.O. Box 2946, Attn: PL-AP
Portland, Oregon 97208

Dear Mark:

Recently Pacific Northwest Laboratory (Battelle-Northwest) conducted chemical analyses of sediments from the Portland District dredging project (Elochman Slough) collected by your organization. Battelle received, in good condition, on June 8, 1989, three sediment samples from the COE. These samples were analyzed for metals (Ag, As, Cd, Cr, Cu, Pb, Hg, Ni, and Zn), ammonia, oil and grease, pesticides, PCBs and phenols. The methods included:

Metal - By U.S. EPA (1986) Method 3050, which includes acid digestion followed by atomic absorption.

Oil and Grease - By Standard Methods 502 (1975), which includes solvent extraction and quantification by infrared spectrophotometry.

Ammonia - By Standard Methods 417 (1975), which includes distillation and titration.

Pesticides and PCBs - By U.S. EPA (1986) Method 8080, which includes solvent extraction and quantification by GC-ECD.

Phenols - By U.S. EPA (1986) Method 8040 which includes solvent extraction and quantification by GC-FID.

For quality control (QC) surrogates were added to the sediments analyzed for organic compounds. The surrogate recoveries ranged from 41% to 103%.

The chemical results in the enclosed tables indicate metal ammonia and oil and grease concentrations are low and typical for uncontaminated sandy river sediment. The concentrations of pesticides, PCBs and phenols are below the method detection limits. DDD and DDE were observed in sample ES-GC 3&4 Comp, but below the detection of 2 μg/Kg.

If I can be of additional assistance to your organization, please call me at 206/683-4151.

Sincerely,

Eric

Eric Crecelius
Senior Research Scientist

:dj

Enclosures

Concentrations of Metals, Ammonia and Oil and Grease
in Elchoman Slough Sediments
(June 1989)

	mg/kg dry weight		
Parameter	ES-GC 1&2 Comp	ES-GC 3&4 Comp	ES-GC 4&5 Comp
Ag	0.04	0.08	0.05
As	2.80	2.77	2.37
Cd	0.20	0.46	0.27
Cr	9.16	12.8	9.93
Cu	24.7	28.8	24.7
Pb	4.1	8.2	3.9
Hg	0.04	0.33	0.04
Ni	9.8	13.5	10.3
Zn	54.0	90.4	56.5
Oil and Grease	66	152	89
Ammonia	121	124	104

ORGANICS ANALYSIS DATA SHEET - PESTICIDE/PCB

Lab Sample ID: 0626MB
Matrix: Sediment
VTSR: 06/20/89

Date Extracted: 06/26/89
Date Analyzed: 06/30/89
Conc/Dil Factor: 1:10
Dry Weight: 25.00 g (equiv. wt.)

Sample No.: Method Blank
QC Report No.: 3173- Battelle
Project: #60694AKS

GPC Cleanup: No
Alumina Cleanup: Yes
Sulfur Cleanup: No

Data Release Authorized:

DATA PREPARED: MAC:C C.G. (07/06/89)

CAS Number		µg/kg
319-84-6	Alpha-BHC	1.0 U
319-85-7	Beta-BHC	1.0 U
319-86-8	Delta-BHC	2.0 U
58-89-9	Gamma-BHC (Lindane)	1.0 U
76-44-8	Heptachlor	1.0 U
309-00-2	Aldrin	1.0 U
1024-57-3	Heptachlor Epoxide	1.0 U
959-98-8	Endosulfan I	1.0 U
60-57-1	Dieldrin	2.0 U
72-55-9	4,4'-DDE	2.0 U
72-20-8	Endrin	2.0 U
33212-65-9	Endosulfan II	2.0 U
72-54-8	4,4'-DDD	3.0 U
1031-07-8	Endosulfan Sulfate	4.5 U
50-29-3	4,4'-DDT	3.0 U
72-43-5	Methoxychlor	4.0 U
53494-70-5	Endrin Ketone	3.0 U
5103-74-2	Gamma-Chlordane	1.5 U
5103-71-9	Alpha-Chlordane	1.5 U
8001-35-2	Toxaphene	150 U
-	Aroclor-1242/1016	20 U
12672-29-6	Aroclor-1248	20 U
11097-69-1	Aroclor-1254	20 U
11096-82-5	Aroclor-1260	20 U

* Pesticide Surrogate Recovery	
Dibutylchlorendate	**98%**

Data Qualifiers

U — Indicates compound was analyzed for but not detected at the given detection limit.

J — Indicates an estimated value when the result is less than the specified detection limit.

ORGANICS ANALYSIS DATA SHEET - PESTICIDE/PCB

Lab Sample ID: 3173 A
Matrix: Sediment
VTSR: 06/20/89

Date Extracted: 06/26/89
Date Analyzed: 06/30/89
Conc/Dil Factor: 1:10
Dry Weight: 27.00 g

Data Release Authorized:

Sample No.: ES-GC-1&2 Composite
QC Report No.: 3173- Battelle
Project: #60694AKS
GPC Cleanup: No
Alumina Cleanup: Yes
Sulfur Cleanup: No
DATA PREPARED: MAC:C C.G. (07/06/89)

CAS Number		µg/kg
319-84-6	Alpha-BHC	1.0 U
319-85-7	Beta-BHC	1.0 U
319-86-8	Delta-BHC	2.0 U
58-89-9	Gamma-BHC (Lindane)	1.0 U
76-44-8	Heptachlor	1.0 U
309-00-2	Aldrin	1.0 U
1024-57-3	Heptachlor Epoxide	1.0 U
959-98-8	Endosulfan I	1.0 U
60-57-1	Dieldrin	2.0 U
72-55-9	4,4'-DDE	2.0 U
72-20-8	Endrin	2.0 U
33212-65-9	Endosulfan II	2.0 U
72-54-8	4,4'-DDD	3.0 U
1031-07-8	Endosulfan Sulfate	4.5 U
50-29-3	4,4'-DDT	3.0 U
72-43-5	Methoxychlor	4.0 U
53494-70-5	Endrin Ketone	3.0 U
5103-74-2	Gamma-Chlordane	1.5 U
5103-71-9	Alpha-Chlordane	1.5 U
8001-35-2	Toxaphene	150 U
-	Aroclor-1242/1016	20 U
12672-29-6	Aroclor-1248	20 U
11097-69-1	Aroclor-1254	20 U
11096-82-5	Aroclor-1260	20 U

* Pesticide Surrogate Recovery	
Dibutylchlorendate	86%

Data Qualifiers

U — Indicates compound was analyzed for but not detected at the given detection limit.

J — Indicates an estimated value when the result is less than the specified detection limit.

ORGANICS ANALYSIS DATA SHEET - PESTICIDE/PCB

Lab Sample ID: 3173 B
Matrix: Sediment
VTSR: 06/20/89

Date Extracted: 06/26/89
Date Analyzed: 06/30/89
Conc/Dil Factor: 1:10
Dry Weight: 23.05 g

Data Release Authorized:

Sample No.: ES-GC-3&4
Composite
QC Report No.: 3173- Battelle
Project: #60694AKS
GPC Cleanup: No
Alumina Cleanup: Yes
Sulfur Cleanup: No
DATA PREPARED: MAC:C C.G. (07/06/89)

CAS Number		µg/kg
319-84-6	Alpha-BHC	1.0 U
319-85-7	Beta-BHC	1.0 U
319-86-8	Delta-BHC	2.0 U
58-89-9	Gamma-BHC (Lindane)	1.0 U
76-44-8	Heptachlor	1.0 U
309-00-2	Aldrin	1.0 U
1024-57-3	Heptachlor Epoxide	1.0 U
959-98-8	Endosulfan I	1.0 U
60-57-1	Dieldrin	2.0 U
72-55-9	**4,4'-DDE**	**0.4 J**
72-20-8	Endrin	2.0 U
33212-65-9	Endosulfan II	2.0 U
72-54-8	**4,4'-DDD**	**0.7 J**
1031-07-8	Endosulfan Sulfate	4.5 U
50-29-3	4,4'-DDT	3.0 U
72-43-5	Methoxychlor	4.0 U
53494-70-5	Endrin Ketone	3.0 U
5103-74-2	Gamma-Chlordane	1.5 U
5103-71-9	Alpha-Chlordane	1.5 U
8001-35-2	Toxaphene	150 U
-	Aroclor-1242/1016	20 U
12672-29-6	Aroclor-1248	20 U
11097-69-1	Aroclor-1254	20 U
11096-82-5	Aroclor-1260	20 U

* Pesticide Surrogate Recovery	
Dibutylchlorendate	99%

Data Qualifiers

U — Indicates compound was analyzed for but not detected at the given detection limit.

J — Indicates an estimated value when the result is less than the specified detection limit.

ORGANICS ANALYSIS DATA SHEET - PESTICIDE/PCB

Lab Sample ID: 3173 C
Matrix: Sediment
VTSR: 06/20/89

Date Extracted: 06/26/89
Date Analyzed: 06/30/89
Conc/Dil Factor: 1:10
Dry Weight: 23.13 g

Sample No.: ES-GC-5&6 Composite
QC Report No.: 3173- Battelle
Project: #60694AKS
GPC Cleanup: No
Alumina Cleanup: Yes
Sulfur Cleanup: No

Data Release Authorized:

DATA PREPARED: MAC:C C.G. (07/06/89)

CAS Number		µg/kg
319-84-6	Alpha-BHC	1.0 U
319-85-7	Beta-BHC	1.0 U
319-86-8	Delta-BHC	2.0 U
58-89-9	Gamma-BHC (Lindane)	1.0 U
76-44-8	Heptachlor	1.0 U
309-00-2	Aldrin	1.0 U
1024-57-3	Heptachlor Epoxide	1.0 U
959-98-8	Endosulfan I	1.0 U
60-57-1	Dieldrin	2.0 U
72-55-9	4,4'-DDE	2.0 U
72-20-8	Endrin	2.0 U
33212-65-9	Endosulfan II	2.0 U
72-54-8	4,4'-DDD	3.0 U
1031-07-8	Endosulfan Sulfate	4.5 U
50-29-3	4,4'-DDT	3.0 U
72-43-5	Methoxychlor	4.0 U
53494-70-5	Endrin Ketone	3.0 U
5103-74-2	Gamma-Chlordane	1.5 U
5103-71-9	Alpha-Chlordane	1.5 U
8001-35-2	Toxaphene	150 U
-	Aroclor-1242/1016	20 U
12672-29-6	Aroclor-1248	20 U
11097-69-1	Aroclor-1254	20 U
11096-82-5	Aroclor-1260	20 U

* Pesticide Surrogate Recovery	
Dibutylchlorendate	103%

Data Qualifiers

U — Indicates compound was analyzed for but not detected at the given detection limit.

J — Indicates an estimated value when the result is less than the specified detection limit.

ORGANICS ANALYSIS DATA SHEET
PHENOLS SCREEN by GC/FID

Lab Sample ID: 0626MB
Matrix: Sediment

Sample No: Method Blank
QC Report No: 3173-Battelle NW
Project: #60694AKS
VTSR: 06/20/89

Data Release Authorized: _____
DATA PREPARED: MAC:C C.G. (07/06/89)

Date Extracted: 06/26/89
Date Analyzed: 07/04/89
Conc/Dil Factor: 1:2
Dry Weight: 20.00 g.

CAS Number		µg/kg
108-95-2	Phenol	150 U
95-57-8	2-Chlorophenol	225 U
95-48-7	2-Methylphenol	120 U
106-44-5	4-Methylphenol	150 U
88-75-5	2-Nitrophenol	225 U
51-28-5	2,4-Dinitrophenol	120 U
120-83-2	2,4-Dichlorophenol	240 U
59-50-7	4-Chloro-3-methylphenol	240 U
88-06-2	2,4,6-Trichlorophenol	420 U
95-95-0	2,4,5-Trichlorophenol	450 U

Guaiacol Surrogate %	**41%**

DATA QUALIFIERS

U Indicates compound was analyzed for but not detected at the given detection limit.

J Indicates a hit below the calculated detection but considered reaal by the analyst.

ORGANICS ANALYSIS DATA SHEET
PHENOLS SCREEN by GC/FID

Lab Sample ID: 3173 A
Matrix: Sediment

Sample No: ES-GC-1&2
QC Report No: 3173-Battelle NW
Project: #60694AKS
VTSR: 06/20/89

Data Release Authorized: _____
DATA PREPARED: MAC:C C.G. (07/06/89)

Date Extracted: 06/26/89
Date Analyzed: 07/04/89
Conc/Dil Factor: 1:2
Dry Weight: 27.00 g.

CAS Number		µg/kg
108-95-2	Phenol	150 U
95-57-8	2-Chlorophenol	225 U
95-48-7	2-Methylphenol	120 U
106-44-5	4-Methylphenol	150 U
88-75-5	2-Nitrophenol	225 U
51-28-5	2,4-Dinitrophenol	120 U
120-83-2	2,4-Dichlorophenol	240 U
59-50-7	4-Chloro-3-methylphenol	240 U
88-06-2	2,4,6-Trichlorophenol	420 U
95-95-0	2,4,5-Trichlorophenol	450 U

Guaiacol Surrogate %	**52%**

DATA QUALIFIERS

U Indicates compound was analyzed for but not detected at the given detection limit.

J Indicates a hit below the calculated detection but considered reaal by the analyst.

ORGANICS ANALYSIS DATA SHEET
PHENOLS SCREEN by GC/FID

Lab Sample ID: 3173 B
Matrix: Sediment

Sample No: ES-GC-3&4
QC Report No: 3173-Battelle NW
Project: #60694AKS
VTSR: 06/20/89

Data Release Authorized: _____
DATA PREPARED: MAC:C C.G. (07/06/89)

Date Extracted: 06/26/89
Date Analyzed: 07/04/89
Conc/Dil Factor: 1:2
Dry Weight: 23.05 g.

CAS Number		µg/kg
108-95-2	Phenol	150 U
95-57-8	2-Chlorophenol	225 U
95-48-7	2-Methylphenol	120 U
106-44-5	4-Methylphenol	150 U
88-75-5	2-Nitrophenol	225 U
51-28-5	2,4-Dinitrophenol	120 U
120-83-2	2,4-Dichlorophenol	240 U
59-50-7	4-Chloro-3-methylphenol	240 U
88-06-2	2,4,6-Trichlorophenol	420 U
95-95-0	2,4,5-Trichlorophenol	450 U

Guaiacol Surrogate %	**44%**

DATA QUALIFIERS

U Indicates compound was analyzed for but not detected at the given detection limit.

J Indicates a hit below the calculated detection but considered reaal by the analyst.

ORGANICS ANALYSIS DATA SHEET
PHENOLS SCREEN by GC/FID

Lab Sample ID: 3173C
Matrix: Sediment

Sample No: ES-GC-5&6
QC Report No: 3173-Battelle NW
Project: #60694AKS
VTSR: 06/20/89

Data Release Authorized:
DATA PREPARED: MAC:C C.G. (07/06/89)

Date Extracted: 06/26/89
Date Analyzed: 07/04/89
Conc/Dil Factor: 1:2
Dry Weight: 23.13 g.

CAS Number		µg/kg
108-95-2	Phenol	150 U
95-57-8	2-Chlorophenol	225 U
95-48-7	2-Methylphenol	120 U
106-44-5	4-Methylphenol	150 U
88-75-5	2-Nitrophenol	225 U
51-28-5	2,4-Dinitrophenol	120 U
120-83-2	2,4-Dichlorophenol	240 U
59-50-7	4-Chloro-3-methylphenol	240 U
88-06-2	2,4,6-Trichlorophenol	420 U
95-95-0	2,4,5-Trichlorophenol	450 U

Guaiacol Surrogate %	52%

DATA QUALIFIERS

U Indicates compound was analyzed for but not detected at the given detection limit.

J Indicates a hit below the calculated detection but considered reaal by the analyst.