November 28, 1990

Planning Division

Subject: ST. Helens, Oregon Cross Channel Sediment Quality Evaluation Report

U. S. Fish and Wildlife Service
ATTN: Elizabeth Materna
Portland Field Office
2600 SE 98 Avenue
Portland, Oregon 97266

Dear Ms. Materna:

The sediment quality evaluation entitled "St. Helens, Oregon Cross Channel Sediment Quality Evaluation, 1989" is forwarded per your verbal request on November 27, 1990. Please contact Mark D. Siipola (503-326-6463) of my staff if you have any questions or need any clarifications regarding the subject evaluation.

Sincerely,

Eugene D. Pospisil, P.E.
Chief, Coastal and Flood Plain
Management Branch

Enclosure

MARK D. SIIPOLA
(EX. 6463)

ST. HELENS, OREGON CROSS CHANNEL SEDIMENT QUALITY EVALUATION, 1989

Project

The St. Helens Cross Channel is located downstream of Sauvie Island and connects the Columbia River at approximately RM 86.5 and the St. Helens Channel at mile 2. The authorized Columbia River Project in this area provides for a channel 40 feet deep and 600 feet wide. The existing St Helens Channel project calls for a channel 30 feet deep, 300 feet wide and 2 miles long from RM 84.4 on the Columbia River to the entrance of Multnomah Channel with a 700 feet wide and 2400 feet long turning basin across from the town of St. Helens. This cross channel project calls for the excavation of the cross channel to a depth of 18 feet, current depths are as shallow as 10 feet below Columbia River Datum. The cross channel was dredged in 1960, 1963 and 1967 when 169,740, 225,420 and 207,454 cubic yards were removed. No dredging has been preformed in the area since 1967.

The sewage outfall for the town of St. Helens is located on the Columbia River side of the downstream end of Sauvie Island. The outfall carries a combined municipal waste and industrial waste water load. The majority of the effluent (98%) is generated by the Boise Cascade St. Helens pulp and paper mill (kraft pulp mill). Other industrial contributors include PSI Manufacturing and Bergsoe Metal Corporation both of which discharge various metals including arsenic, copper, cadmium, lead, nickel and tin.

On March 19, 1984 the loaded tanker SS Mobiloil while proceeding up bound in the Columbia River lost steerage and grounded at river mile 88.2 about a mile up river of St. Helens, Oregon. As a result between 197,412 and 228,370 gallons (4700 and 5437 barrels) of oil cargo were lost to the river and drifted downstream, a significant amount being carried to the Pacific Ocean.

Chemical and physical analyses of the potential dredge material was conducted to provide a technical evaluation of the material as required by Sections 401 and 404 of the Clean Water Act, USEPA guidelines (40 CFR 230) and USACE, Portland District current dredge material evaluation procedures. The evaluation prior to dredging is deemed necessary to determine if significant physical, chemical or biological impacts will result from dredging or disposal operations.

Previous Studies

No previous studies have been conducted in this area.

Present Study

Sediment samples for physical and bulk chemical analyses were collected on April 13, 1989 and May 4, 1989 at the locations shown on attachment 1. A gravity corer

(April 13, 1989) and vibra-core (May 4, 1989) with transparent acid-rinsed cellulose butyrate acetate core liners were use to collect the samples. The recovered material was extruded from the core liners and a channel subsample was taken. Materials for physical analyses were placed in ziplock bags. Samples for chemical analysis, except for SH-VC-5 & 6, were placed in 8oz. I-Chem Specialty Cleaned Containers with teflon lined lids. Samples were transported to NPDMT Laboratory for further processing on the same day as sampled.

The bulk of the material collected on April 13, 1989 appeared to be a clean coarse sand with less than 20% fines (test results show less than 2% fines) and would contained less than 1% volatile solids (see attachment 2). However during sampling oil droplets were noted in sample SH-GC-4. They would float and spread out on the surface of the water contained in the sample. Oil was also noted adhering to the sampling spatula. It was decided that this sample would be tested for oil and grease and then for petroleum hydrocarbons. Subsequent to these analyses additional sampling was conducted on May 4, 1989 using a 2-1/2 inch vibra-corer which would allow greater penetration and sample recovery. Due to high river flows it was not possible to collect a sample at the same location as the previous Sample SH-GC-4. However when sample SH-VC-5 was recovered, oil streaks were noted on the inside of the core liner. This core along with SH-VC-6 was not subsampled in the field but was capped and transported back to the NPDMT Laboratory and refrigerated over night. The next day the core liners were cut in half and channel samples were taken for the entire length of the cores and sent to Battell Pacific NW Marine Laboratory for chemical analysis. Note that sample SH-VC-5 was split prior to shipment to Battell and labeled SH-VC-4 and SH-VC-5 as a blind duplicate for QA/QC purposes.

USACE NPDMT Laboratory conducted physical analyses on ten samples collected during the two sampling trips. These analyses included grain size as well as their standard "Dredge Analysis" which includes resuspended density, void ratio, volatile solids and specific gravity (attachment 2).

Chemical analyses were preformed by both USACE NPDMT Laboratory and Battelle Pacific NW Marine Laboratory. Analyses included metals, oil & grease, petroleum hydrocarbons and PAH (attachment 3).

Discussion

Physical data: The material consists primarily of a clean subangular to subround poorly graded sand. The percent fines were less than 2% except for sample SH-GC-1A which had 4.3% fines. The percent volatile solids of the bulk of the material ranged from 1.2% to 0.8%, while the specific gravity was around 2.70.

Chemical data: Results of analyses performed on sediment sample SH-GC-4 showed oil and grease at 135 mg/Kg and petroleum hydrocarbons to be 70 mg/Kg. The results of the analyses run on SH-VC-5 (Battell's SH-VC-4 and SH-VC-5) and SH-VC-6 for oil and grease were 89, 149 and 78 milligrams per kilogram respectively. These values are well below the 1,000 mg/Kg value for oil and grease which would trigger Tier II testing, however because of the location of the 1984 oil spill and existing outfalls it was decided that limited additional analyses were warranted. Therefore analyses for metals and PAHs were conducted. The concentrations of metals were low and typical of uncontaminated sandy river sediment. Concentrations of total PAHs were 863, 1055.9

and 70 micrograms per kilogram. Levels of PAHs in sample SH-VC-4 and SH-VC-5 are moderately elevated compared to SH-VC-6. PAH levels in sample SH-VC-6 are typical of uncontaminated sandy river sediments. The total concentration of PAHs in all of the samples is below the Tier II level of concern of 1500-2000 microgram per kilogram. It is apparent that sample site SH-VC-5 is contaminated by a petroleum product the most likely source being the 1984 grounding and spill form the tanker SS Mobiloil. The extent of the contaminated area seems to be restricted to the eastern or Columbia River side of the proposed project.

Conclusions

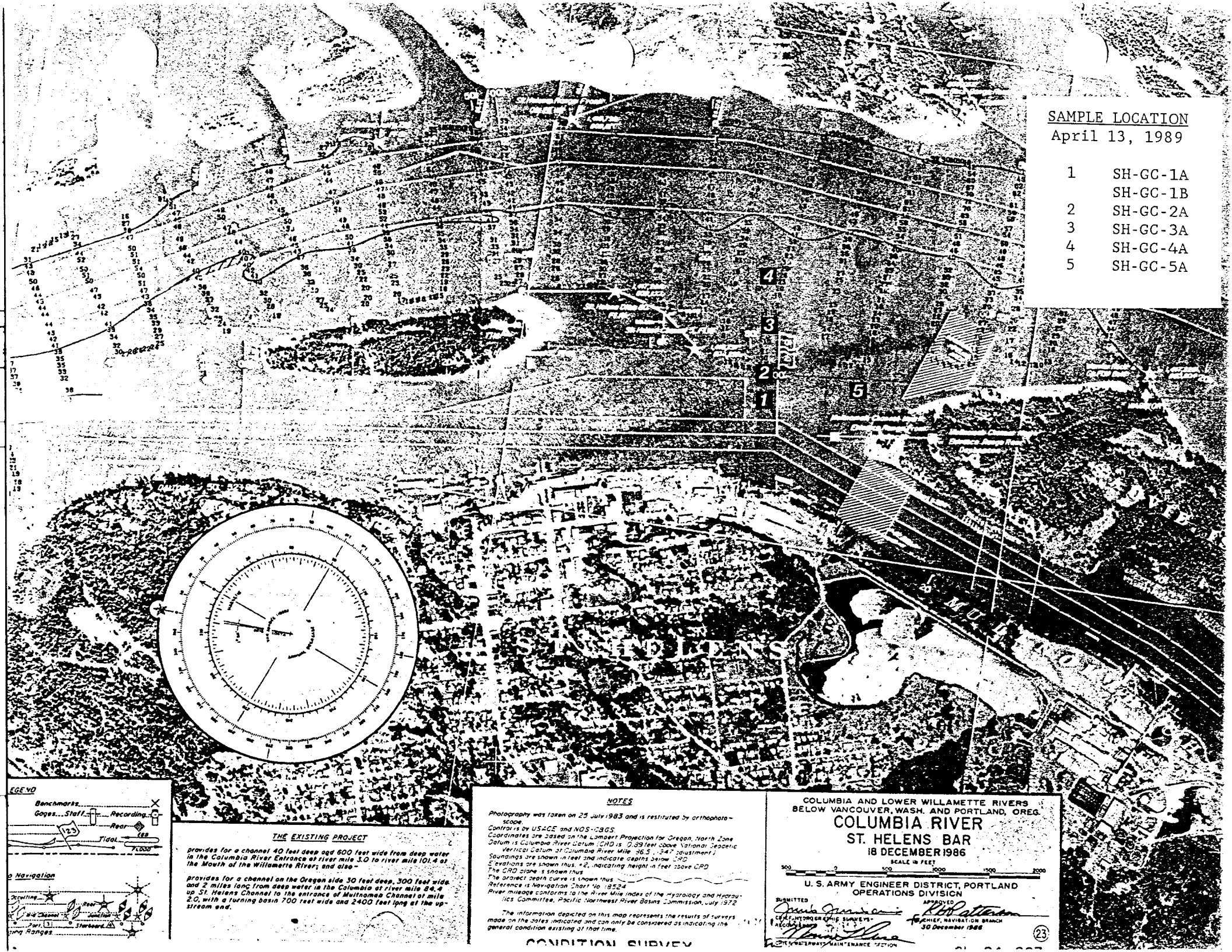
The sediments tested during this evaluation are considered representative of the Federal project sediments to be dredged. The bulk of the material to be dredged can be classified as clean poorly graded sand. The water depth at Station SH-VC-5 was 23.5 feet, vibra-core penetration was 6.5 feet and core recovery was 26 inches. The water level during the time samples were taken was 7.5 feet above Columbia River Datum. Put another way, the water depth below Columbia River Datum was 13 feet. With a proposed dredging depth of 18 feet and an allowed over-depth of 1 foot, a total of 6 feet of material will be removed at station SH-VC-5. Oil contamination was noted throughout the 26 inch core sample. How far below this 26 inches the oil extends cannot be determined with the existing data. Since the area was last dredged in 1967 it can be assumed that the bottom was in equilibrium in 1984 and has not changed significantly since the SS Mobiloil oil spill. It would be expected, therefore, that the oil contamination is limited in extent. Levels of oil and grease and total PAHs are below present established levels of concern for these contaminates. It is recommended that the dredging operation be closely monitored during dredging activities especially when working the Columbia River end of the crossover channel.

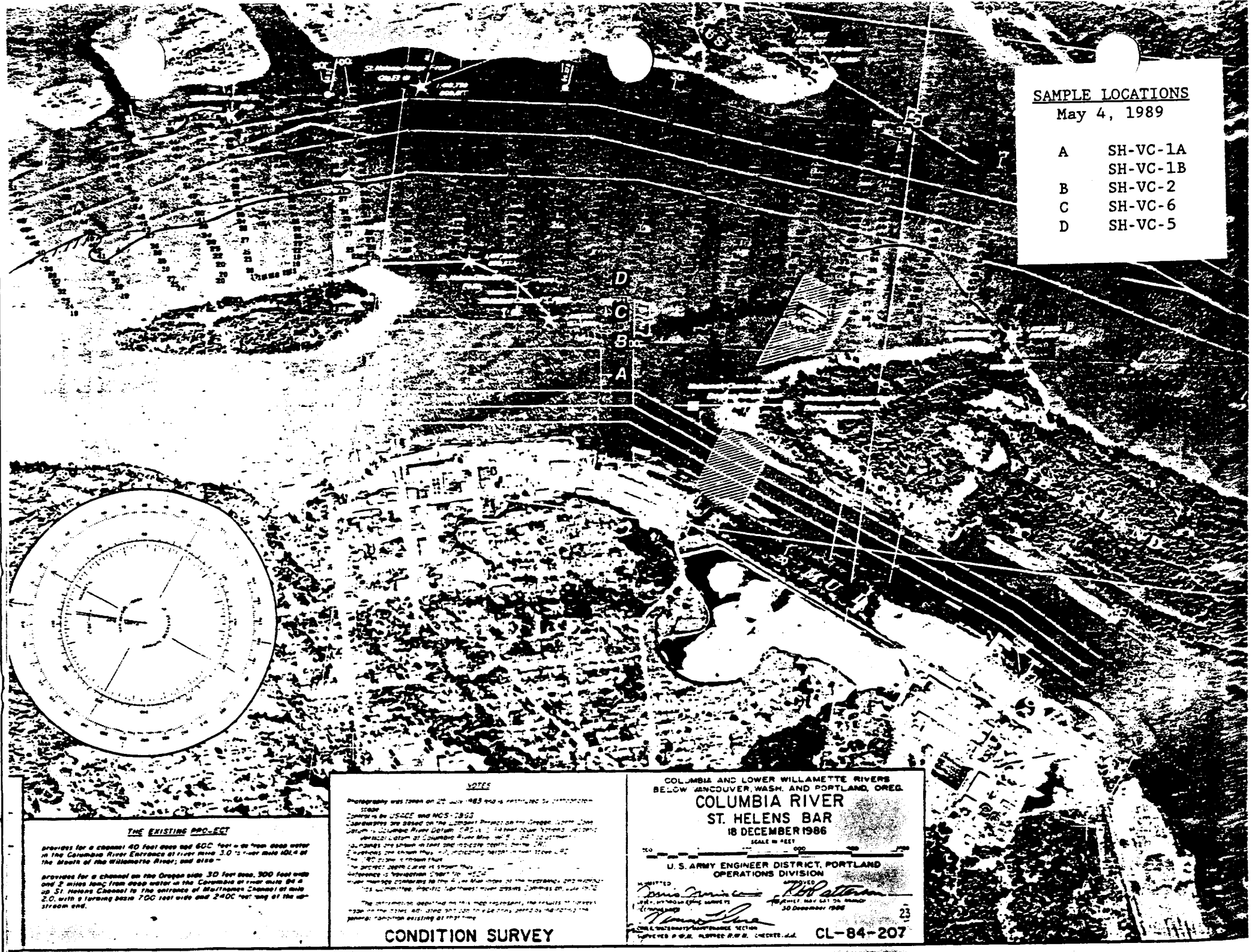
This sediment quality evaluation was completed by Mr. Mark D. Siipola, of the Coastal and Flood Plain Management Branch, Planing Division, USACE Portland District.

References

Cpt. Kirk Greiner, USCG (Ret) 1985. Report Into the Oil Spill Resulting from the Grounding of the SS MOBILOIL at 12:04 AM, March 19, 1984 in the Columbia River. Maritime and Environmental Consultants, 3107 North East 160th Street, Ridgefield, Washington, U.S.A., 98642.

ATTACHMENT 1


SAMPLE LOCATION
April 13, 1989
1 SH-GC-1A
SH-GC-1B
2 SH-GC-2A
3 SH-GC-3A
4 SH-GC-4A
5 SH-GC-5A
1
2
3
4
5
ST. HELENS
MULTNOMAH
LEGEND
Benchmarks
Gages...Staff
Recording
Rear
Tidal
Navigation
Port
Starboard
Ranges
THE EXISTING PROJECT
provides for a channel 40 feet deep and 600 feet wide from deep water in the Columbia River Entrance at river mile 3.0 to river mile 101.4 at the Mouth of the Willamette River; and also—
provides for a channel on the Oregon side 30 feet deep, 300 feet wide, and 2 miles long from deep water in the Columbia at river mile 84.4 up St. Helens Channel to the entrance of Multnomah Channel at mile 2.0, with a turning basin 700 feet wide and 2400 feet long at the upstream end.
NOTES
Photography was taken on 25 July 1983 and is restituted by orthophotoscope.
Control is by USACE and NOS-CGGS.
Coordinates are based on the Lambert Projection for Oregon, North Zone
Datum is Columbia River Datum (CRD is 0.39 feet above National Geodetic Vertical Datum at Columbia River Mile 36.5, 1947 adjustment)
Soundings are shown in feet and indicate depths below CRD
Elevations are shown thus +2, indicating height in feet above CRD
The CRD plane is shown thus
The project depth curve is shown thus
Reference is Navigation Chart No. 18524
River mileage conforms to the River Mile Index of the Hydrology and Hydraulics Committee, Pacific Northwest River Basins Commission, July 1972
The information depicted on this map represents the results of surveys made on the dates indicated and can only be considered as indicating the general condition existing at that time.
CONDITION SURVEY
COLUMBIA AND LOWER WILLAMETTE RIVERS
BELOW VANCOUVER, WASH. AND PORTLAND, OREG.
COLUMBIA RIVER
ST. HELENS BAR
18 DECEMBER 1986
SCALE IN FEET
500 0 500 1000 1500 2000
U. S. ARMY ENGINEER DISTRICT, PORTLAND
OPERATIONS DIVISION
SUBMITTED
APPROVED
CHIEF, HYDROGRAPHIC SURVEYS
CHIEF, NAVIGATION BRANCH
30 December 1986
CHIEF, WATERWAYS MAINTENANCE SECTION
23


SAMPLE LOCATIONS
May 4, 1989
A SH-VC-1A
SH-VC-1B
B SH-VC-2
C SH-VC-6
D SH-VC-5
D
C
B
A
THE EXISTING PROJECT
provides for a channel 40 feet deep and 600 feet wide from deep water in the Columbia River Entrance at river mile 3.0 to river mile 101.4 at the Mouth of the Willamette River; and also –
provides for a channel on the Oregon side 30 feet deep, 300 feet wide and 2 miles long from deep water in the Columbia at river mile 94.4 up St. Helens Channel to the entrance of Multnomah Channel at mile 2.0, with a turning basin 700 feet wide and 2400 feet long at the upstream end.
NOTES
CONDITION SURVEY
COLUMBIA AND LOWER WILLAMETTE RIVERS
BELOW VANCOUVER, WASH. AND PORTLAND, OREG.
COLUMBIA RIVER
ST. HELENS BAR
18 DECEMBER 1986
U. S. ARMY ENGINEER DISTRICT, PORTLAND
OPERATIONS DIVISION
23
CL-84-207

ATTACHMENT 2

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

CENPD-EN-G-L (1110-1-8100c) MAY - 2 1989

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

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

Project: ST. HELENS CHANNEL - O & M DREDGING
Intended Use: O & M Dredging
Source of Material: St. Helens Channel
Submitted by: CENPP-PL-CH (Hansen)
Date Sampled: -- Date Received: 13 Apr 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, dated 13 Mar 89.
b) NPD Form 300, Sample Transmittal, dated 13 Apr 89, covering the samples tested.

1. Enclosed are:

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

b. Enclosure 2, a-c, five gradation analysis summary sheets.

2. This completes all work to date.

Encls

JAMES PAXTON
Director

Copy Furnished: CENPD-EN-G

ST.HELENS CHANNEL - O & M DREDGING

Results of Physical Analyses of Sediment

Sample No.	Resuspended Density, gms/L	Volatile Solids, %	Void Ratio	Specific Gravity	Roundness Grade
SH-GC-1A	1802	1.2	1.120	2.70	Subangular-subrounded
SH-GC-1B	1838	0.9	1.016	2.69	Subangular-subrounded
SH-GC-2A	1841	0.9	1.004	2.69	Subangular-subrounded
SH-GC-3A	1824	0.8	1.065	2.70	Subangular-subrounded
SH-GC-4A	1840	0.8	1.011	2.69	Subangular-subrounded
SH-GC-5A	1781	1.1	1.143	2.67	Subangular-subrounded

Received : 13 Apr 89

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

ST. HELENS CHANNEL (89-SHM-716)

Boring: --- Sample: SH-GC-1A Depth: --- Lab No.: 716

------ 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	2.10	99.7
Pan	606.40	0.0
No. 18	9.80	93.6
No. 35	35.30	77.9
No. 60	64.30	60.0
No. 120	138.10	14.4
No. 230	160.20	0.8
Pan	161.50	0.0

No hydrometer analysis.

$\bar{x} = 0.25$

D85: 0.66 D60: 0.25 D50: 0.22 D30: 0.16 D15: 0.13 D10: 0.10 mm

Cu: 2.50 Cc: 1.01

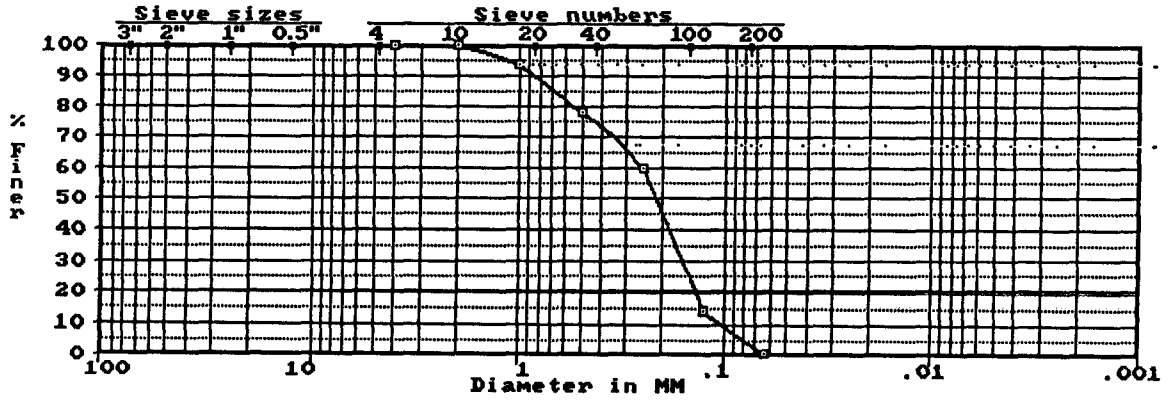
Gravel: 0.0% Sand: 95.7% Fines: 4.3%

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

SP Poorly graded SAND

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

- VOLATILE SOLIDS = 1.2%



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

ST. HELENS CHANNEL (89-SHM-716)

Boring: --- Sample: **SH-GC-1B** Depth: --- Lab No.: 716007

------ 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	0.10	100.0
No. 10	0.80	99.9
Pan	1188.70	0.0
No. 18	0.70	99.4
No. 35	15.20	89.3
No. 60	100.20	29.6
No. 120	137.00	3.7
No. 230	141.50	0.6
Pan	142.30	0.0

No hydrometer analysis.

$\bar{x} = 0.29$

D85: 0.47 D60: 0.35 D50: 0.31 D30: 0.25 D15: 0.19 D10: 0.16 mm

Cu: 2.18 Cc: 1.11

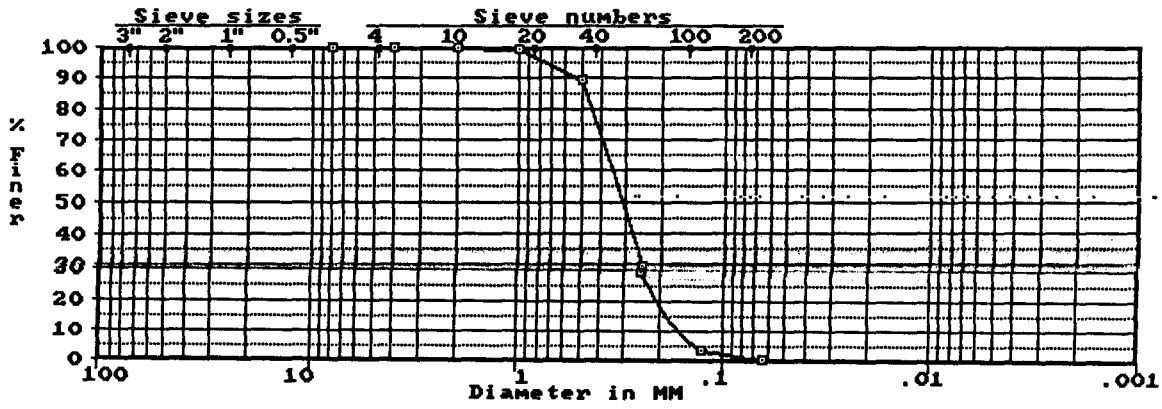
Gravel: 0.0% Sand: 98.6% Fines: 1.4%

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

SP Poorly graded SAND

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

- VOLATILE SOLIDS = 0.9%



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

ST. HELENS CHANNEL (89-SHM-716)

Boring: --- Sample: **SH-GC-2A** Depth: --- Lab No.: 716008

------ 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	0.50	100.0
Pan	1446.20	0.0
No. 18	1.80	98.0
No. 35	22.20	75.2
No. 60	77.00	14.0
No. 120	88.30	1.3
No. 230	89.20	0.3
Pan	89.50	0.0

No hydrometer analysis.

$\bar{X} = 0.36$

D85: 0.61 D60: 0.42 D50: 0.38 D30: 0.30 D15: 0.25 D10: 0.20 mm

Cu: 2.11 Cc: 1.07

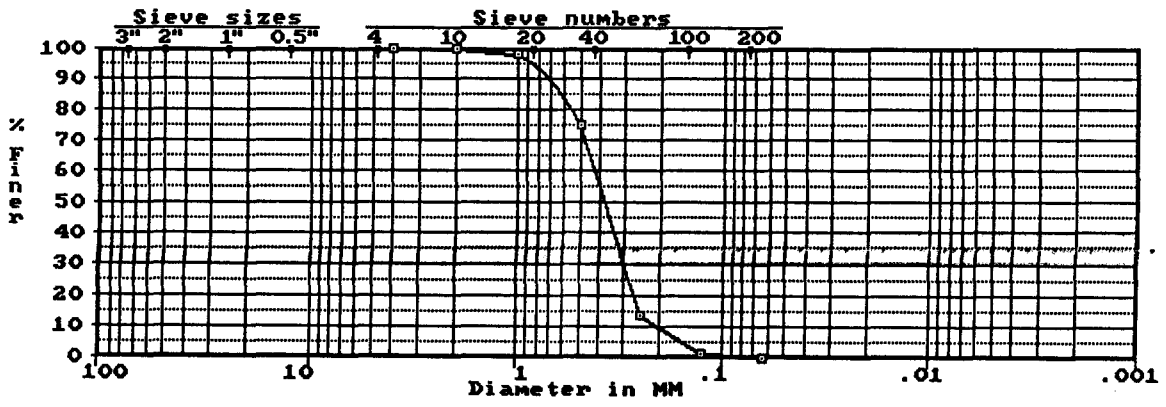
Gravel: 0.0% Sand: 99.4% Fines: 0.6%

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

SP Poorly graded SAND

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

- VOLATILE SOLIDS = 0.9%



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

ST. HELENS CHANNEL (89-SHM-716)

Boring: --- Sample: **SH-GC-3A** Depth: --- Lab No.: 716009

------ 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.	6.80	99.2
No. 5	7.80	99.1
No. 10	8.00	99.1
Pan	849.10	0.0
No. 18	1.50	97.5
No. 35	2.70	96.3
No. 60	56.00	42.7
No. 120	96.30	2.1
No. 230	98.20	0.2
Pan	98.40	0.0

No hydrometer analysis.

$\bar{x} = 0.25$

D85: 0.42 D60: 0.30 D50: 0.27 D30: 0.21 D15: 0.16 D10: 0.15 mm

Cu: 2.04 Cc: 0.97

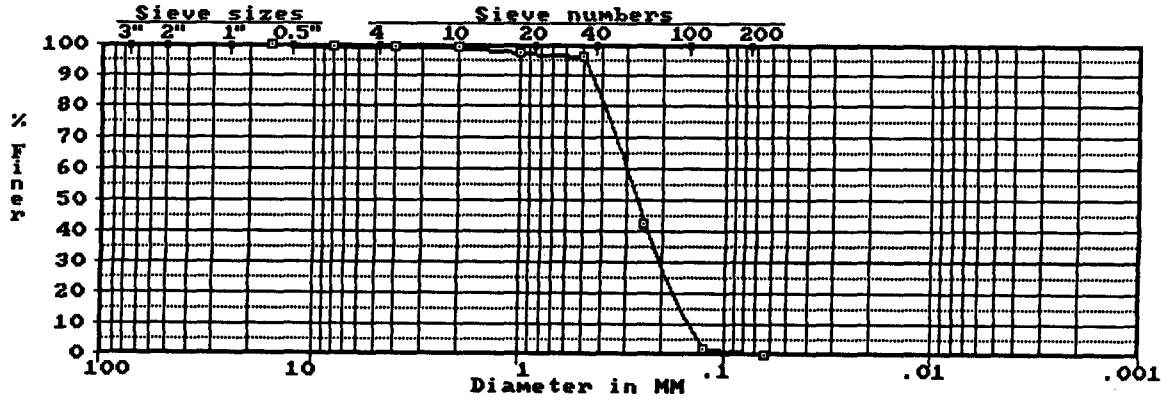
Gravel: 0.9% Sand: 98.4% Fines: 0.7%

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

SP Poorly graded SAND

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

- VOLATILE SOLIDS = 0.8%



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

ST. HELENS CHANNEL (89-SHM-716)

Boring: --- Sample: **SH-GC-4A** Depth: --- Lab No.: 716010

------ 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	0.10	100.0
No. 10	1.40	99.9
Pan	1440.30	0.0
No. 18	0.90	99.4
No. 35	5.50	96.8
No. 60	135.70	23.4
No. 120	176.60	0.3
No. 230	177.10	0.1
Pan	177.20	0.0

No hydrometer analysis.

$\bar{x} = 0.30$

D85: 0.44 D60: 0.35 D50: 0.32 D30: 0.27 D15: 0.21 D10: 0.19 mm

Cu: 1.83 Cc: 1.06

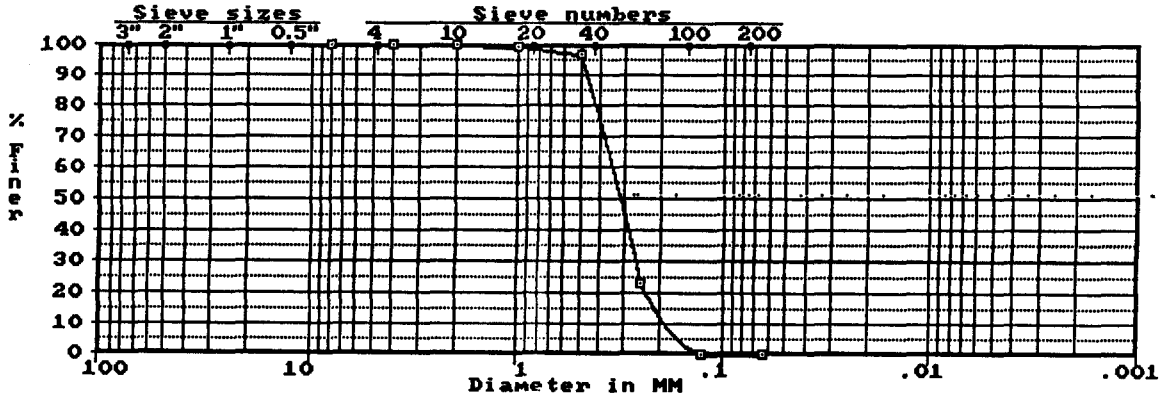
Gravel: 0.0% Sand: 99.8% Fines: 0.2%

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

SP Poorly graded SAND

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

- VOLATILE SOLIDS = 0.8%



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

ST. HELENS CHANNEL (89-SHM-716)

Boring: --- Sample: **SH-GC-5A** Depth: --- Lab No.: 716011

------ 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	2.50	99.8
Pan	1402.40	0.0
No. 18	1.50	98.1
No. 35	8.50	90.2
No. 60	55.10	37.2
No. 120	83.90	4.5
No. 230	86.80	1.2
Pan	87.90	0.0

No hydrometer analysis.

$\bar{x} = 0.27$

D85: 0.46 D60: 0.33 D50: 0.29 D30: 0.22 D15: 0.17 D10: 0.15 mm

Cu: 2.24 Cc: 1.02

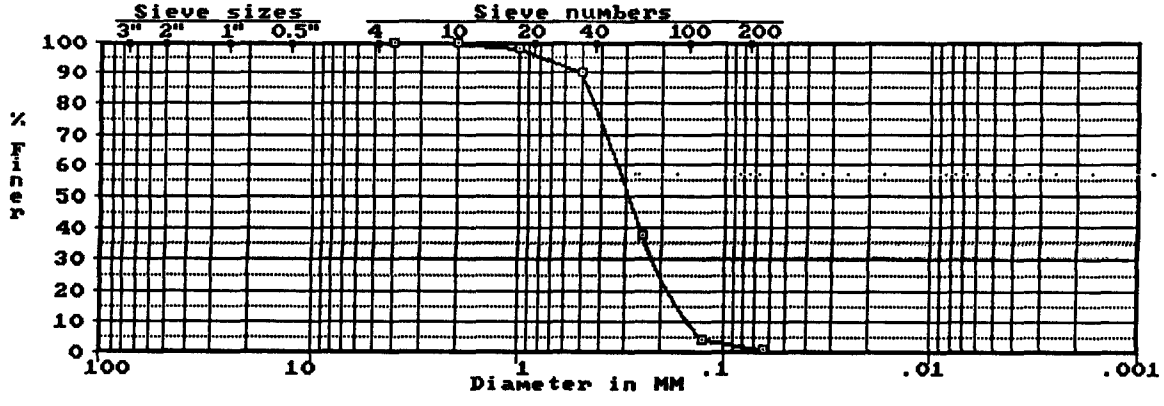
Gravel: 0.0% Sand: 98.0% Fines: 2.0%

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

SP Poorly graded SAND

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

- VOLATILE SOLIDS = 1.1%



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

]ENPD-EN-G-L (1110-1-8100c)

MAY 17 1989

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

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

Project: ST. HELENS CHANNEL - O & M DREDGING
Intended Use: O & M Dredging
Source of Material: St. Helens Channel
Submitted by: CENPP-PL-CH (Siipola)
Date Sampled: -- Date Received: 4 May 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, dated 13 Mar 89.
b) NPD Form 300, Sample Transmittal, dated 13 Apr 89, covering the samples tested.
c) Our report, this subject, dated 2 May 89.

1. Enclosed are:

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

b. Enclosure 2, a-c, five gradation analysis summary sheets.

2. This completes all work to date.

Encls

Timothy J. Seeman
For JAMES RAXTON
Director

Copy Furnished: CENPD-EN-G

ST. HELENS CHANNEL - O & M DREDGING

Results of Dredge Test Analysis

CENPP Sample Number	Resuspended Density, gms/L	Void Ratio	Volatile Solids, %	Specific Gravity	Roundness Grading
SH-VC-1A	1814	1.075	0.8	2.69	Subangular to Subround
SH-VC-1B	1847	1.013	0.8	2.70	Subangular to Subround
SH-VC-2	1877	0.959	0.8	2.72	Subangular to Subround
SH-VC-5	1851	0.977	0.8	2.68	Subangular to Subround
SH-VC-6	1875	0.939	0.7	2.70	Subangular to Subround

ved : 4 May 89

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

ST. HELEN'S CHANNEL (89-SHM-716)

Boring: -- Sample: **SH-VC-1A** Depth: -- Lab No.: 716200

------ 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	2.60	99.7
Pan	1005.10	0.0
No. 18	2.50	97.5
No. 35	23.20	79.2
No. 60	87.90	21.8
No. 120	109.40	2.7
No. 230	111.30	1.1
Pan	112.50	0.0

No hydrometer analysis.

$\bar{x} = 0.33$

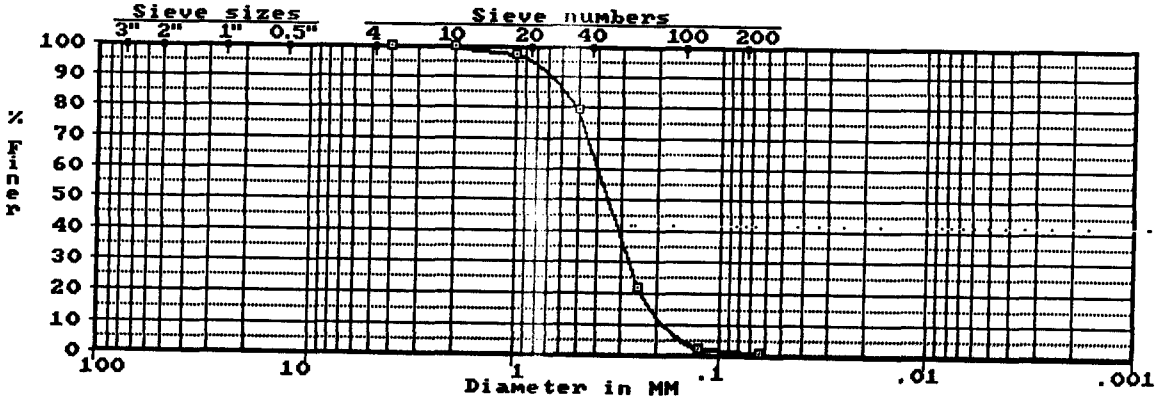
D85: 0.57 D60: 0.40 D50: 0.35 D30: 0.28 D15: 0.21 D10: 0.18 mm

Cu: 2.15 Cc: 1.04

Gravel: 0.0% Sand: 98.5% Fines: 1.5%

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

SP Poorly graded SAND



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

ST. HELEN'S CHANNEL (89-SHM-716)

Boring: -- Sample: **SH-VC-1B** Depth: -- Lab No.: 716201

------ 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	0.20	100.0
No. 10	5.10	99.8
Pan	2069.00	0.0
No. 18	2.00	98.0
No. 35	19.50	82.8
No. 60	85.30	25.4
No. 120	112.00	2.2
No. 230	113.70	0.7
Pan	114.50	0.0

No hydrometer analysis.

$\bar{x} = 0.31$

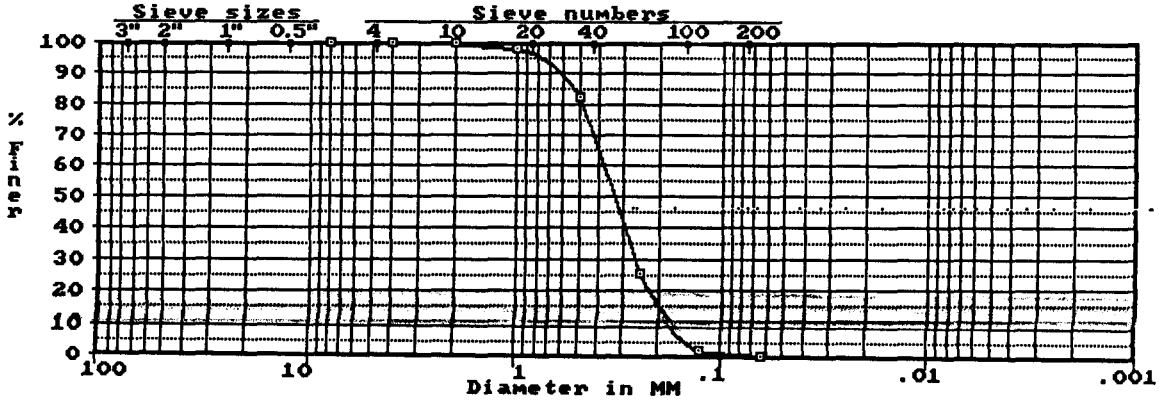
D85: 0.53 D60: 0.38 D50: 0.33 D30: 0.26 D15: 0.20 D10: 0.18 mm

Cu: 2.15 Cc: 1.05

Gravel: 0.0% Sand: 98.9% Fines: 1.1%

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

SP Poorly graded SAND



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ST. HELEN'S CHANNEL (89-SHM-716)

Boring: -- Sample: **SH-VC-2** Depth: -- Lab No.: 716202

------ 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	2.50	99.8
No. 10	15.60	98.4
Pan	1001.10	0.0
No. 18	5.30	94.0
No. 35	16.90	84.1
No. 60	84.10	27.3
No. 120	113.70	2.2
No. 230	116.10	0.2
Pan	116.30	0.0

No hydrometer analysis.

$\bar{X} = 0.31$

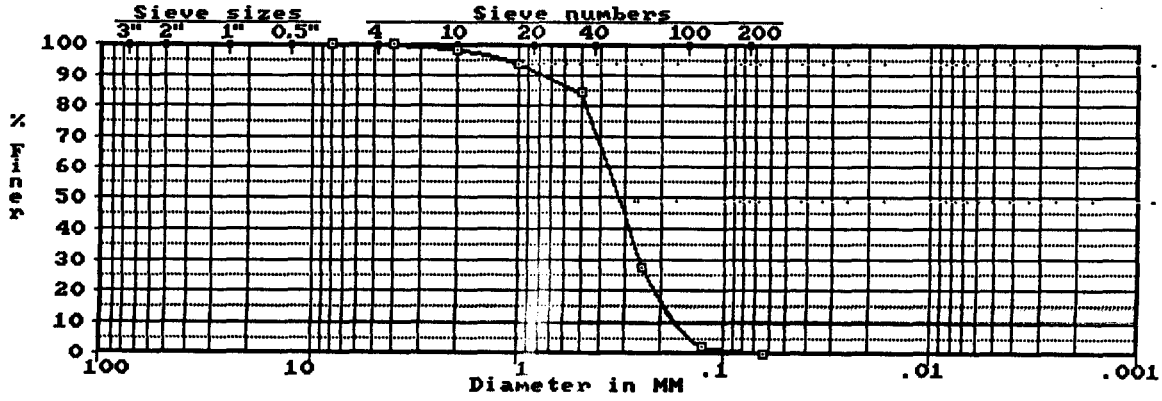
D85: 0.53 D60: 0.37 D50: 0.33 D30: 0.26 D15: 0.19 D10: 0.17 mm

Cu: 2.16 Cc: 1.06

Gravel: 0.2% Sand: 99.1% Fines: 0.7%

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

SP Poorly graded SAND



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

ST. HELEN'S CHANNEL (89-SHM-716)

Boring: -- Sample: **SH-VC-5** Depth: -- Lab No.: 716203

------ 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	13.70	98.5
Pan	928.31	0.0
No. 18	7.90	92.3
No. 35	20.50	82.3
No. 60	105.30	15.3
No. 120	123.30	1.0
No. 230	124.40	0.2
Pan	124.60	0.0

No hydrometer analysis.

$\bar{x} = 0.35$

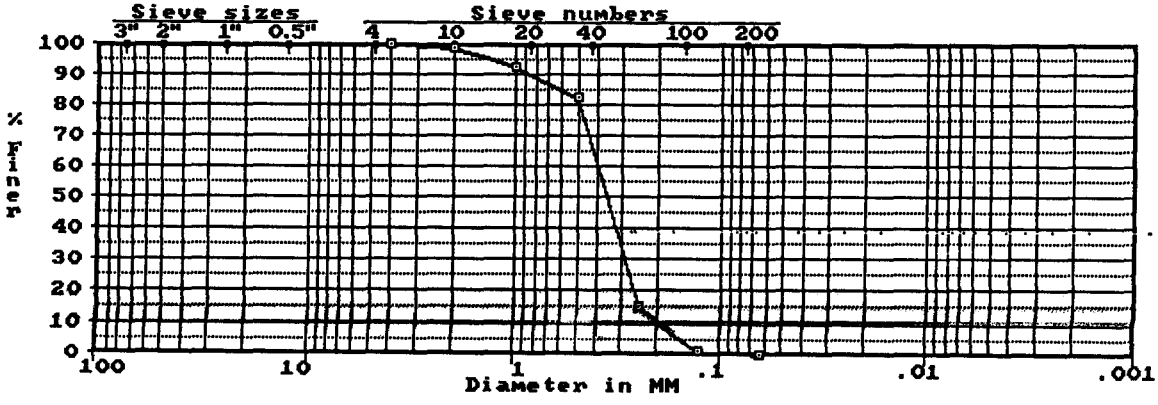
D85: 0.60 D60: 0.40 D50: 0.36 D30: 0.29 D15: 0.25 D10: 0.19 mm

Cu: 2.05 Cc: 1.10

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

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

SP Poorly graded SAND



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

ST. HELEN'S CHANNEL (89-SHM-716)

Boring: -- Sample: **SH-VC-6** Depth: -- Lab No.: 716204

------ 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	1.40	99.8
No. 10	8.50	98.8
Pan	716.60	0.0
No. 18	3.70	94.8
No. 35	16.20	81.3
No. 60	72.00	21.1
No. 120	89.80	1.9
No. 230	91.40	0.2
Pan	91.60	0.0

No hydrometer analysis.

$\bar{x} = 0.34$

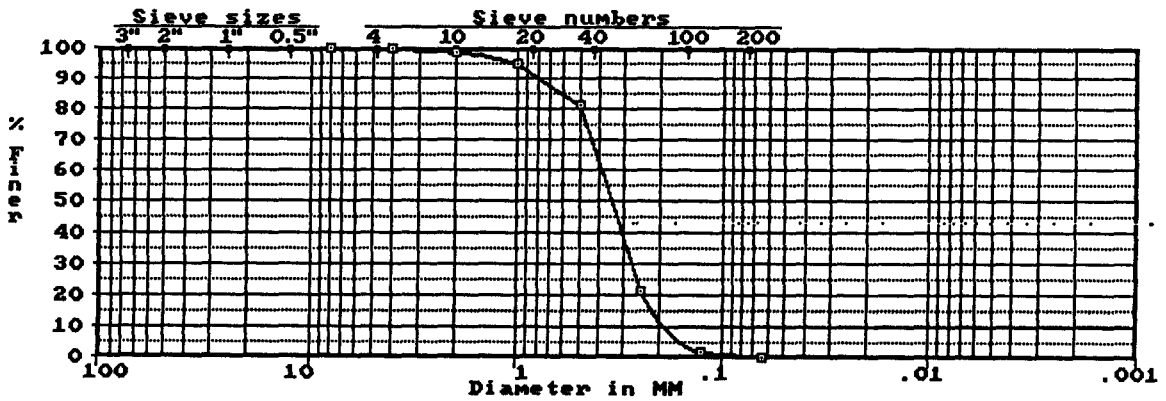
D85: 0.60 D60: 0.39 D50: 0.35 D30: 0.28 D15: 0.22 D10: 0.19 mm

Cu: 2.05 Cc: 1.03

Gravel: 0.2% Sand: 99.2% Fines: 0.6%

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

SP Poorly graded SAND



ATTACHMENT 3

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

June 16, 1989

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

Dear Mark:

Recently Pacific Northest Laboratory (Battelle-Northwest) conducted chemical analyses of sediments from the Portland District dredging project (St. Helens) collected by your organization. Battelle received, in good condition, on May 9, 1989, three sediment samples from the COE Troutdale Laboratory. These samples were analyed for metals (Ag, As, Cd, Cr, Cu, Pb, Hg, Ni, and Zn), PAHs, oil and grease. 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.

PAH - By method of Krahn et al. (1988), which includes solvent extraction, column clean-up, and quantification by GC-FID.

For quality control (QC) surrogates were added to the sediments analyzed for organic compounds. The surrogate recoveries for PAHs ranged from 36% to 165%.

The chemical results in the enclosed tables indicate metal concentrations are low but PAHs are elevated in two of the sediment samples. The concentrations of metals are typical for uncontaminated sandy river sediment. The concentrations of PAHs in sample numbers 4 and 5 are moderately elevated compared to sample 6. PAH levels in sample 6 are typical of uncontaminated sandy river sediments. Samples 4 and 5 are apparently contaminated by a petroleum product and sample 5 had a petroleum odor.

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

Sincerely,

Eric

Eric Crecelius
Senior Research Scientist

:at

Enclosures

Reference:

Krahn, M. M. C. A. Wigren, R. W. Pearce, L. K. Moore, R. G. Boger, and W. D. MacLeod, Jr. 1988. Standard Analytical Procedures of the NOAA National Analytical Facility, 1988--New HPLC Cleanup and Revised Extraction Procedures for Organic Contaminants. Prepared for NOAA National Status and Trends Program and the Outer Continental Shelf Environmental Assessment Program by Environmental Conservation Division, Northwest and Alaska Fisheries Center, National Marine Fisheries Service.

Concentrations of Metals and Oil and Grease in St. Helens Sediments
(May 1989)

Parameter	mg/kg dry weight		
	SH-VC-4	SH-VC-5	SH-VC-6
Ag	0.03	0.05	0.03
As	2.1	2.6	2.8
Cd	0.14	0.16	0.21
Cr	6.4	7.2	9.1
Cu	6.9	6.0	6.3
Pb	3.8	3.9	4.2
Hg	0.08	0.02	0.02
Ni	8.3	7.7	9.4
Zn	44	48	51
Oil and Grease	89	149	78

Concentrations of PAHs in St. Helens Sediments
(May 1989)

Sample	µg/kg			
	SH-VC-4	SH-VC-5	SH-VC-6	Blank
Naphthalene	48	66	50	93
2-methylnaphthalene	37	70	20	48
Acenaphthylene	<11	21	<9.5	<8.5
Acenaphthene	<11	19	<8.9	<8.0
Fluorene	84	102	<9.1	<8.2
Phenanthrene	224	332	<9.2	<8.3
Anthracene	26	14	<10	<8.8
Fluoranthene	46	52	<4.0	<3.5
Pyrene	165	115	<4.3	<3.7
Benzo (a) anthracene	34	37	<4.2	<3.6
Chrysene	125	129	<4.4	<3.8
Benzo (b) fluoranthene	<4.8	6.9	<4.2	<3.6
Benzo (k) fluoranthene	27	6.7	<4.2	<3.6
Benzo (a) pyrene	36	50	<4.4	<3.8
Indeno (1,2,3-cd) pyrene	<4.9	6.4	<4.3	<3.7
Dibenz (a,h) anthracene	<5.7	7.9	<5.0	<4.4
Benzo (g,h,i) perylene	11	21	<4.3	<3.8
Total	863	1055.9	70	
Spike Recovery				
d8-Naphthalene	36	46	54	62
d10-Acenaphthalene	52	61	63	72
d12-Perylene	118	117	137	165

both from core SH-VC-5

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

CENPD-EN-G-L (1110-1-8100c) APR 18 1989

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

SUBJECT: W.O.#89-SHM-716, Results of Chemical Analyses

Project: ST. HELENS
Intended Use: Evaluate condition of site
Source of Material: Above site
Submitted by: CENPP-PL-CH
Date Sampled: 13 Apr 89 Date Received: 13 Apr 89
Method of Test or Specification: USEPA 9071/413.2/418.1 (Soxhlet extraction/infrared analysis)
Reference: a) DA Form 2544, Order No. E86-89-0069, dated 29 Nov 88.
b) Telecon 18 Apr 89 between Siipola (CENPP-PL-CH) and Van den Akker (CENPD-EN-G-L); wherein, test results were reported.

1. Following, confirming telecon report, are results of analyses performed on one sediment sample labeled SH-GC-4A:

Analyte	Test Result	Analysis Complete
Oil and grease, total recoverable, dry wt. basis, mg/Kg	135	17 Apr 89
Petroleum hydrocarbons, total recoverable, dry wt. basis, mg/Kg	70	17 Apr 89
Moisture content, %	29	17 Apr 89

2. This completes all work requested.

Encls (dupe)

JAMES PAXTON
Director

Copy Furnished: CENPD-EN-G

CENWP-PE-HR (1110-2-1143a)

MEMORANDUM FOR CHIEF CENWP-CO-N ATTN CENWP-CO-NW

SUBJECT: Transmittal of Completed Report for the 1998 Sediment Evaluation of Federal Channel at Westport Ferry (Wahkiukum)..

1. Reference CENWP-CO-NW 13 November 1997 funding letter, subject: FY98 Funding Letter for Sediment Quality.

2. Four stations were sampled June 4, 1998. All material was classified as "sandy silt". Median grain size for all material was 0.10mm, with 75.0% sand and 25.0% fines. No screening levels for chemical analyses were exceeded. Material represented by these samples is suitable for open unconfined in-water disposal.

3. A copy of the completed report has been delivered to the project manager for the study in CO-NW. The study file is located in PE-HR, marks number: 1110-2-1403a.

4. Any further questions should be directed to either Tim Sherman (808-4883) or Mark Siipola (808-4885).

HOWARD B. JONES, P.E.
Chief, Planning and Engineering Division

CF:
CHIEF, CENWP-CO
CENWP-PE-H (KIDO)

CENWP-PE-T
CEN FILES

CENWP-PE-H
TO COMPLETE

CENWP-PE
JONES

CENWP-PE-H
MASON

CENWP-PE-HR
CASSIDY
SHERMAN
SIIPOLA

LLLX4871
30 Sep 98