ASTORIA DEEP DRAFT
Summary of Existing Sediment Data

Introduction

The proposed deep draft anchorage between the existing turning basin and Pier 1, Port of Astoria will require dredging to a depth of -45 ft. This area appears to be an area in which a sizeable amount of recent sedimentological information is available.

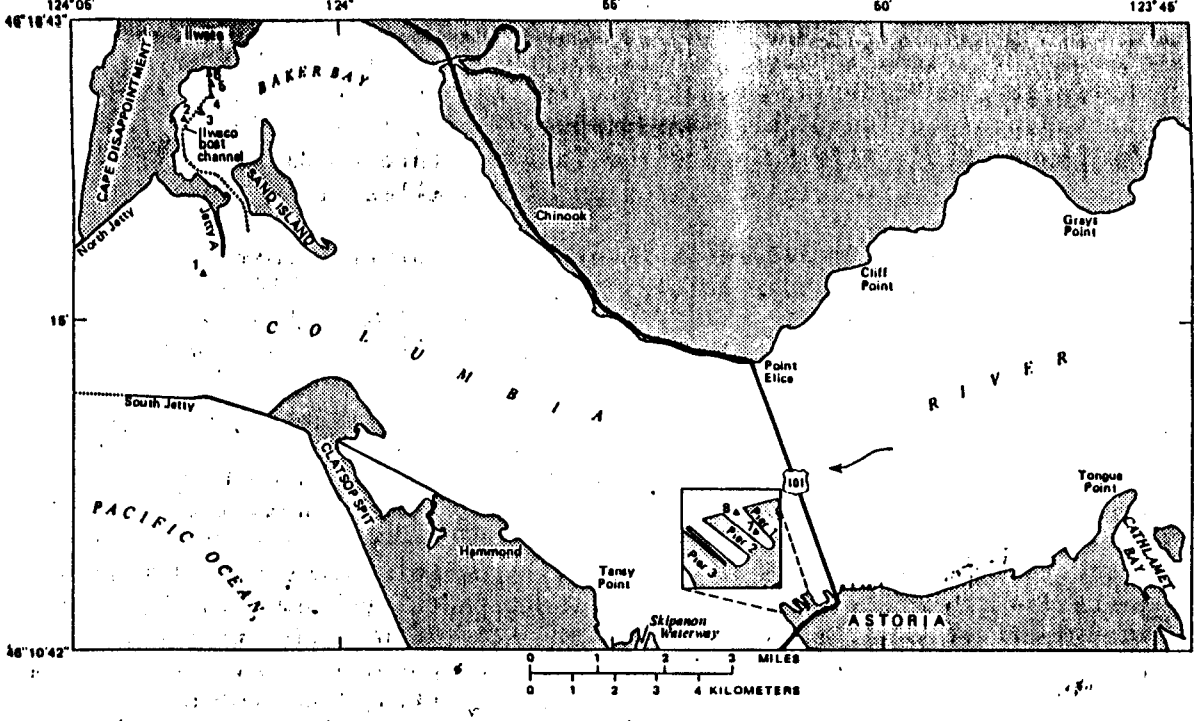
The following summarizes pertinent data and information from previous samples collected in or near the Pier 1 dock area which is currently being considered under option 1 of the feasibility study.

1. CH M Hill, 1984 "Geotechnical Exploration for Pier 1 Rehabilitation Phase 1, Port of Astoria, OR. Twelve cores penetrated to depths exceeding -60 ft. as shown in Figure 1-1. Borings P-1, P-4, P-5, & P-6 are nearest the proposed deep draft project under Option 1. Bottom depth is currently at -38 ft and therefore this option will require a deepening of approxmately 7 ft to achieve project depth. Based on the sedimentological data the material to be removed appears to be composed of well to poorly sorted sand.

2. Fuhrer, G., and F.A. Rinella 1980. "Analysis of Elutriates Native Water and bottom material in selected rivers and estuaries in Western Oregon & Washington. USGS OF-Rpt 82-922.
Elutriate samples taken in May and Dec. 1980 include samples from seven sites from the Astoria boat slips. Stations 5, 7, 8, & 10 nearest to the proposed project (Appendix A-1). Data includes data on sediment particle size, organic carbon, and trace metals (especially lead and zinc). The results are listed in Appendix A-1. In general the samples were elevated in Fe, Mn, and N. Site 8 was elevated in organic carbon.

3. Furher, G. 1984. "Chemical analyses of elutriates, native water, and bottom material from the Chetco, Rogue, and Columbia Rivers in Western Oregon. USGS , OF Rpt 4-133.
In 1982 USGS collected bottom material from dredges and disposal sites in the Columbia River (Appendix A-2). Site 6 was located adjacent to the proposed deep draft anchorage (option 1) and site 7 located in the channel approx. 4 km upstream. The results indicate that Fe was elevated, Zn values were low.

4. Fuhrer G. 1986. "Extractable Cadmium, Mercury, Copper, Lead, and Zinc in the Lower Columbia River Estuary, Oregon and Washington". USGS 86-4088.
In 1983 USGS collected 2 samples at the Astoria pier to evaluate trace metals associated with the sediment-water interface (Appendix A-3). Site #7 and 8 are from the project vicinity . The concentration of trace metals indicates that



Sampling site locations for Baker Bay, Washington and Astoria, Oregon.

Site number	Site designation	Collection date	Site location Latitude	Site location Longitude	Remarks
1	Baker Bay	07-11-83	46°15'36"	124°02'46"	Main navigation channel.
2	do.	07-11-83	46°17'31"	124°02'47"	Ilwaco boat channel.
3	do.	07-11-83	46°17'44"	124°02'31"	Do.
4	do.	07-12-83	46°17'57"	124°02'21"	Do.
5	do.	07-12-83	46°18'08"	124°02'27"	Do.
6	do.	07-12-83	46°18'18"	124°02'30"	Do.
7	Astoria	07-11-83	46°11'20"	123°51'19"	Ship pier
8	do.	07-11-83	46°11'25"	123°51'21"	Do.

Location of sampling sites in Baker Bay, Washington and Astoria, Oregon

Site name	Site no.	Date	TOC <100 -µm, g/kg	TOC, bulk, g/kg	TVS, pct.	Carbon, inorganic, bulk, g/kg	Total mercury µg/g	Total mercury divided by pct TVS, µg/g	Extraction: Cadmium µg/g	Chromium µg/g	Copper µg/g	Iron µg/g	Lead µg/g	Mercury µg/g	Manganese µg/g	Nickel µg/g	Zinc µg/g	Particle-size summary: <100-µm diameter pct.	Silt pct.	Clay pct.
Baker Bay	1	7-11-83	3.1	0.4	--	0.1	--	--	2.2	0.6	2.6	990	2.6	<.08	53	3.2	15	0.8	--	--
Baker Bay	2	7-11-83	6.0	12	5.6	.8	0.17	0.030	1.9	5.9	26.7	11,000	31.8	<.08	314	5.1	131	64	41	20
Baker Bay	3	7-11-83	6.0	12	4.9	.3	.13	.027	0.92	6.0	17.5	7,750	10.5	<.08	128	6.6	93	99.5	73	24
Baker Bay	4	7-12-83	4.7	10	4.6	.5	.14	.030	.68	3.2	20.6	6,670	12.6	<.08	112	5.0	62	99	75	21
Baker Bay	5	7-12-83	6.6	16	5.2	.4	.14	.027	.60	5.8	19.4	7,330	13.3	<.08	116	4.3	62	100	73	25
Baker Bay	6	7-12-83	5.5	15	6.0	.4	.17	.028	.87	5.8	22.8	9,040	16.7	<.08	170	2.2	90	100	69.5	30
Astoria	7	7-11-83	6.2	14	4.7	.3	.09	.019	.91	3.6	21.0	6,630	11.2	<.08	276	5.1	80	100	75	23
Astoria	8	7-11-83	4.6	8.3	3.4	.2	.07	.021	--	--	--	--	--	--	--	--	--	91	66	14

Results of trace metal and organic carbon determinations on bottom materials

[Analyses of bottom material finer than 100 microns; concentration reported per gram or kilogram finer-than-100-micron bottom material, unless otherwise designated as "bulk"; TVS = total volatile solids; see "definition of terms," p. vi-vii for heading notations and abbreviations]

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Table 5.--Total organic carbon concentration in bottom materials of diameter greater than 100 microns and less than 100 microns

Total organic carbon (TOC) in both size fractions is calculated assuming that TOC in a bulk bottom material sample = TOC in bottom material finer than 100 microns plus total organic carbon in bottom material coarser than 100 microns. Concentrations for both size fractions are in units of grams total organic carbon in bottom material finer or coarser than 100 microns per kilogram of bulk sediment

Site description	Site number	Date	TOC in less than 100 μm material g/kg	TOC in greater than 100 μm material g/kg
Baker Bay	1	7-11-83	<0.1	0.4
Baker Bay	2	7-11-83	5.1	6.9
Baker Bay	3	7-11-83	5.9	6.1
Baker Bay	4	7-12-83	4.5	5.5
Baker Bay	5	7-12-83	6.5	9.5
Baker Bay	6	7-12-83	5.5	9.5
Astoria	7	7-11-83	6.1	7.9
Astoria	8	7-11-83	3.7	4.6

Table 8.--Analyses of particle size in percent finer than a specified particle-size diameter in microns

[Sites number 2 and 4 represent duplicate analyses]

Site number	Site name	Date	Sands 700	500	350	250	175	125	88	62.5	Silts 31	16	8	Clays 4	2
1	Baker Bay	7-11-83	--	98	84	38	5	1	0.8	--	--	--	--	--	--
2	Baker Bay	7-11-83	--	--	100	97	76	66	65	63	56	44	30	20	16
2	Baker Bay	7-11-83	--	--	100	96.5	75.5	64.5	63.5	62	56	44	30	21	15
3	Baker Bay	7-11-83	--	--	--	--	--	100	99.5	98.5	79	55	36	24	17
4	Baker Bay	7-12-83	--	--	--	--	100	99	99	98	76	55	32	20	15
4	Baker Bay	7-12-83	--	--	--	--	100	99.5	98.5	95	77	57	33	22	16
5	Baker Bay	7-12-83	--	--	--	--	--	100	99.5	98	83	60	38	25	18
6	Baker Bay	7-12-83	--	--	--	--	--	--	100	99.5	92	72	49	30	22
7	Astoria	7-11-83	--	--	--	--	--	100	99.5	98	82	57	35	23	18
8	Astoria	7-11-83	--	--	100	99.5	98	94	88.5	80	53	33	20	14	10

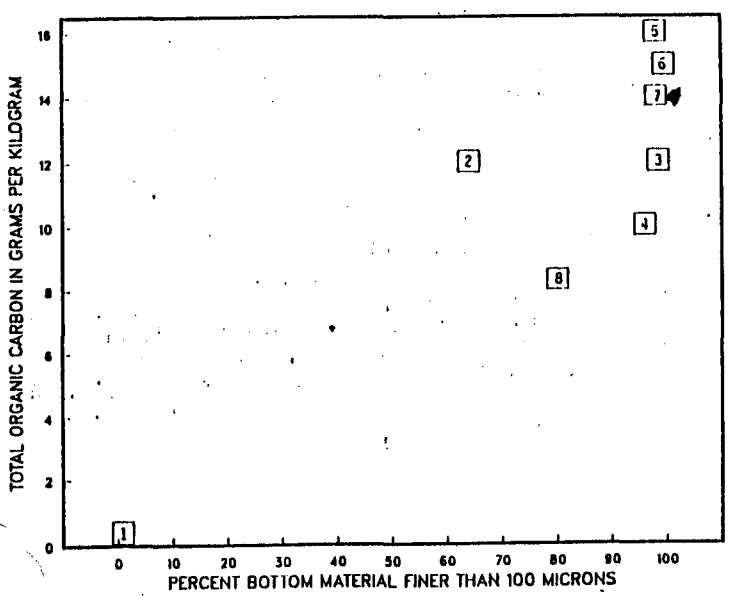

Figure 4.--Total organic carbon in bulk bottom material versus the percent of bottom material finer than 100 microns (numbers inside plotting symbols represent sampling site locations; r = 0.59 and α = 0.05).

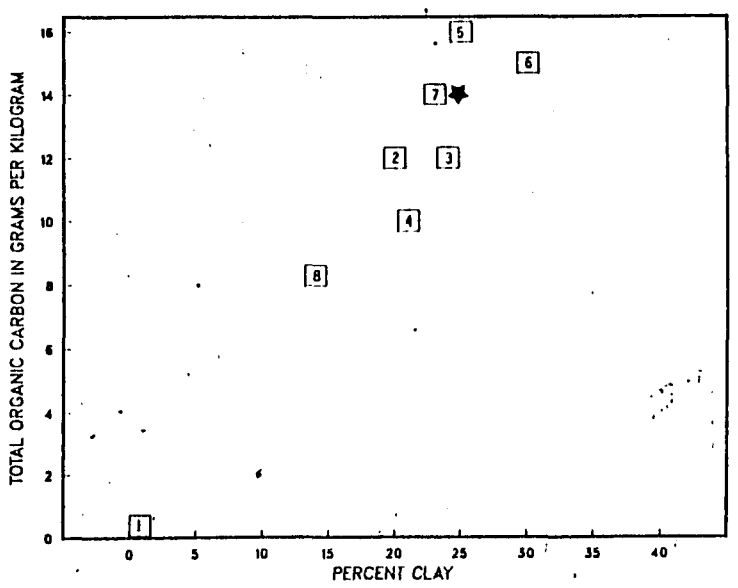

Figure 5.--Total organic carbon in bulk bottom material versus the percent of clays (numbers inside plotting symbols represent sampling site locations; r = 0.76 and α = 0.01).

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Table 6.--Concentrations of trace metals in Columbia River bottom material from earlier reconnaissance studies using a two-step extraction procedure (Fuhrer and Rinella, 1983 and Fuhrer, 1984)

[Soft digestion procedures were used on bulk samples. Some samples were anerobic. The digestion procedure uses a preliminary extraction of trace metals associated with organic matter by oxidation with a 30 percent hydrogen-peroxide solution, followed a second-step extraction of all sorbed metals with a hot 0.3 molar HCl solution. River miles enclosed in parenthesis are for the river shown under site description, not Columbia River miles. Concentrations reported in micrograms per gram]

Site description	River mile no.	Date	Latitude Longitude	Extraction: Cadmium µg/g	Chromium µg/g	Copper µg/g	Iron µg/g	Lead µg/g	Manganese µg/g	Mercury µg/g	Nickel µg/g	Zinc µg/g	Particle size percent <125-µm	Comments
Pacific Ocean	--	8/03/82	46°11'27" 124°02'48"	10	1	1	1,800	<100	40	0.01	--	8	20	Off Columbia River, south jetty.
Columbia River	1	8/03/82	46°15'30" 124°03'32"	<10	--	--	3,400	--	60	--	--	--	3	
Columbia River	3	8/03/82	46°13'33" 124°01'45"	<10	--	--	3,600	--	90	--	--	--	--	
Baker Bay (4)	--	7/23/80	46°17'51" 124°02'43"	1	7	17	6,900	20	130	.06	10	52	--	Near site #3, Ilwaco boat channel.
Baker Bay (6)	--	7/23/80	46°17'48" 124°02'29"	2	15	37	22,000	30	230	.17	10	160	--	Adjacent to Ilwaco boat channel.
Baker Bay (8)	--	7/23/80	46°17'50" 124°02'20"	2	24	43	17,000	40	280	.28	30	190	--	Adjacent to Ilwaco boat channel.
Baker Bay (12)	--	7/23/80	46°18'03" 124°01'37"	<1	5	5	4,000	10	54	.01	10	21	--	Tidal flat in Baker Bay.
Baker Bay (14)	--	7/23/80	46°17'05" 124°01'13"	<1	5	5	3,100	10	52	.01	10	19	--	East of Sand Island in Baker Bay.
Columbia River	6	8/03/82	46°13'33" 123°58'15"	<10	2	2	4,100	<100	55	<.01	--	15	20	
Chinook	--	8/20/80	46°15'58" 123°57'24"	8	18	44	17,000	30	420	.07	20	135	--	Near Columbia River Mile 5.
Columbia River area D	6	8/19/80	46°14'29" 123°56'50"	2	4	4	4,700	10	150	.01	10	22	--	
Columbia River Tansey Point	8	8/19/80	46°11'32" 123°55'17"	2	6	5	4,500	10	87	.02	10	40	--	
Skipanon	(2)	7/22/80	46°09'59" 123°55'11"	7	12	50	19,000	30	160	.0	20	300	--	Confluence at Columbia River Mile 10.7.
Columbia River	11	8/03/82	46°11'32" 123°54'08"	<10	--	--	4,800	--	65	--	--	--	8	
Columbia River	13	8/02/82	46°12'15" 123°51'39"	<10	--	--	4,300	--	65	--	--	--	3	
Astoria Boat Basin	13	12/02/80	46°11'24" 123°51'21"	5	14	31	11,000	10	190	0.09	20	110	--	
Youngs Bay	--	7/22/80	46°10'07" 123°50'44"	4	8	180	11,000+	10	140	0.03	20	35	--	Confluence at Columbia River Mile 12.0
Columbia River	16	8/02/82	46°12'15" 123°48'00"	<10	--	--	3,500	--	80	--	--	--	2	
Columbia River	18	8/02/82	46°13'05" 123°45'50"	<10	2	2	2,600	<100	70	0.02	--	22	2	
Columbia River	18	8/02/82	46°12'34" 123°45'15"	10	--	--	6,000	--	350	--	--	--	80	
Columbia River	18	8/02/82	46°12'14" 123°45'21"	<10	3	19	4,300	<100	160	0.06	--	40	95	
Columbia River	18	8/02/82	46°11'53" 123°45'09"	<10	--	--	4,600	--	140	--	--	--	93	
Columbia River	32.7	5/15/80	46°16'01" 123°28'57"	1	2	5	5,900	10	150	<0.01	10	25	--	
Skamokawa	(0.15)	5/15/80	46°16'09" 123°27'13"	1	10	22	21,000	10	400	0.03	30	60	--	Confluence at Mile 33.3.

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Table 9.--Estimated concentrations of lead in the soft tissues of the deposit-feeding bivalve Scrobicularia plana

(From a relation developed by Luoma (1978) and the ratio of extractable lead to extractable iron in Columbia River bottom material. Concentrations are reported in micrograms or milligrams per gram)

Site description	Site number	Extractable lead µg/g	Extractable iron mg/g	Ratio of lead/iron	Estimated concentration in Scrobicularia plana[1] µg/g (dry weight)
Baker Bay	1	2.6	1.0	2.6	9
Baker Bay	2	31.8	11.0	2.9	10
Baker Bay	3	10.5	7.8	1.4	4
Baker Bay	4	12.6	6.7	1.8	6
Baker Bay	5	13.3	7.3	1.9	6
Baker Bay	6	16.7	9.0	1.9	6
Astoria	7	11.2	6.6	1.7	5

[1] Equation to describe the concentration of lead in Scrobicularia plana is $\log Y = 1.071 \log X + 0.496$, where Y is the lead concentration in µg/g (dry weight) in the deposit feeder, and X is the ratio of extractable lead (µg/g)/extractable iron (mg/g).

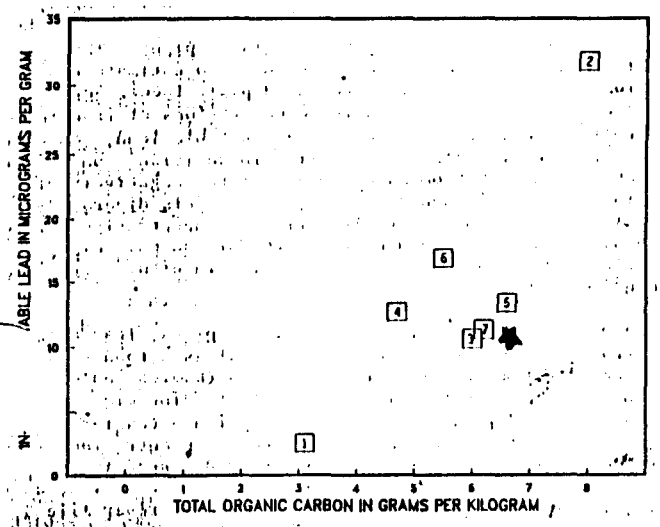

Figure 11.--Total organic carbon versus 1N-HCl extractable lead in bottom materials finer than 100 microns (numbers inside plotting symbols represent sampling site locations; r = 0.52 and α = 0.09).

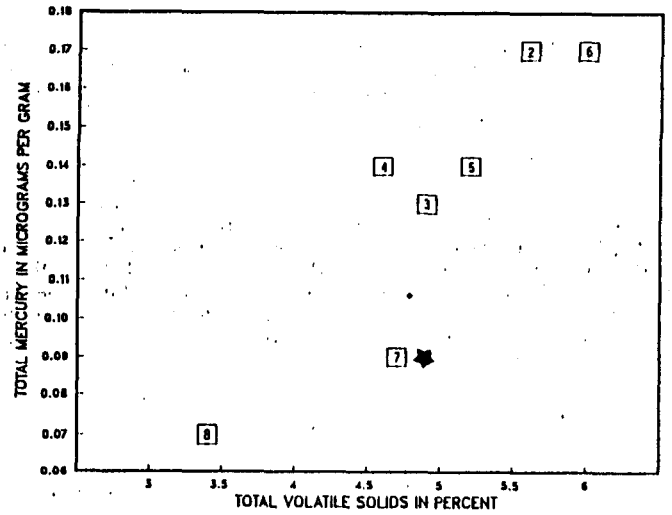

Figure 7.--Total mercury versus total volatile solids in bottom materials finer than 100 microns (numbers inside plotting symbols represent sampling site locations; r = 0.75 and α = 0.02).

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TABLE 16B.--ASTORIA AND YOUNGS BAY, OREGON PROJECT

DISSOLVED INSECTICIDES AND HERBICIDES IN NATIVE WATER AND ELUTRIATES

[FOR TYPE OF SAMPLE, REFER TO CODES: NE=NATIVE ESTUARINE WATER, NM=NATIVE ESTUARINE WATER, NF=NATIVE FRESH WATER, EE=ELUTRIATE WITH ESTUARINE WATER, EM= ELUTRIATE WITH ESTUARINE WATER, EF=ELUTRIATE WITH FRESH WATER, BM=BOTTOM MATERIAL. THE NUMBER FOLLOWING THE TWO DIGIT CODE INDICATES: FOR NATIVE WATER SAMPLES, THE NUMBER OF SAMPLES ANALYZED AND FOR ELUTRIATES, THE RESPECTIVE MIXING WATER. VALUES - '--' INDICATE THAT A CHEMICAL ANALYSES WAS NOT BEEN MADE.]

SITE NO.	SITE DESCRIPTION	CODE	DATE	ALDRIN (UG/L)	ANE-TRYNE (UG/L)	ATRA-TONE (UG/L)	ATRA-ZINE (UG/L)	CHLOR-DANE (UG/L)	CYAN-AZINE (UG/L)	CYPRA-ZINE (UG/L)	DDD (UG/L)	DDE (UG/L)	DDT (UG/L)	DI-ELDRIN (UG/L)	ENDO-SULFAN (UG/L)
1	COLUMBIA RIVER	NE1	12/02/80	<.01	<.1	<.1	<.1	<.1	<.1	<.1	<.01	<.01	<.01	<.01	<.01
2	PACIFIC OCEAN	NE2	12/02/80	<.01	<.1	<.1	<.1	<.1	<.1	<.1	<.01	<.01	<.01	<.01	<.01
3	COLUMBIA RIVER	NM3	07/24/80	<.01	<.1	<.1	<.1	<.1	<.1	<.1	<.01	<.01	<.01	<.01	<.01
4	PACIFIC OCEAN	NE4	07/24/80	<.01	<.1	<.1	<.1	<.1	<.1	<.1	<.01	<.01	<.01	<.01	<.01
7	ASTOR. BOAT BASIN	EE1	12/02/80	<.01	<.1	<.1	<.1	<.1	<.1	<.1	<.01	<.01	<.01	<.01	<.01
7	ASTOR. BOAT BASIN	EE2	12/02/80	<.01	<.1	<.1	<.1	<.1	<.1	<.1	<.01	<.01	<.01	<.01	<.01
14	YOUNGS BAY BM 2.5	EM3	07/22/80	<.01	<.1	<.1	<.1	<.1	<.1	<.1	<.01	<.01	<.01	<.01	<.01
14	YOUNGS BAY BM 2.5	EE4	07/22/80	<.01	<.1	<.1	<.1	<.1	<.1	<.1	<.01	<.01	<.01	<.01	<.01

SITE NO.	SITE DESCRIPTION	CODE	ENDRIN (UG/L)	HEPTA-CHLOR (UG/L)	HEPTA-CHLOR EPOXIDE (UG/L)	LINDANE (UG/L)	METH-OXY-CHLOR (UG/L)	MIREX (UG/L)	PCB (UG/L)	JAPH THA-LENES, POLY-CHLOR. (UG/L)	PER-THANE (UG/L)	PROME-TONE (UG/L)	PROME-TRYNE (UG/L)	PRO-PAZINE (UG/L)
1	COLUMBIA RIVER	NE1	<.01	<.01	<.01	<.01	<.01	<.01	<.1	<.1	<.1	<.1	<.1	<.1
2	PACIFIC OCEAN	NE2	<.01	<.01	<.01	<.01	<.01	<.01	<.1	<.1	<.1	<.1	<.1	<.1
3	COLUMBIA RIVER	NM3	<.01	<.01	<.01	<.01	<.01	<.01	<.1	<.1	<.1	<.1	<.1	<.1
4	PACIFIC OCEAN	NE4	<.01	<.01	<.01	<.01	<.01	<.01	<.1	<.1	<.1	<.1	<.1	<.1
7	ASTOR. BOAT BASIN	EE1	<.01	<.01	<.01	<.01	<.01	<.01	<.1	<.1	<.1	<.1	<.1	<.1
7	ASTOR. BOAT BASIN	EE2	<.01	<.01	<.01	<.01	<.01	<.01	<.1	<.1	<.1	<.1	<.1	<.1
14	YOUNGS BAY BM 2.5	EM3	<.01	<.01	<.01	<.01	<.01	<.01	<.1	<.1	<.1	<.1	<.1	<.1
14	YOUNGS BAY BM 2.5	EE4	<.01	<.01	<.01	<.01	<.01	<.01	<.1	<.1	<.1	<.1	<.1	<.1

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TABLE 16D.--ASTORIA AND YOUNGS BAY, OREGON PROJECT

DISSOLVED INSECTICIDES AND HERBICIDES IN NATIVE WATER AND ELUTRIATES--CONTINUED

SITE NO.	SITE DESCRIPTION	CODE	SILVEX (UG/L)	SIMA-ZINE (UG/L)	SIME-TONE (UG/L)	SIME-TRYNE (UG/L)	TOX-APHENE (UG/L)	2,4-D (UG/L)	2,4-DP (UG/L)	2,4,5-T (UG/L)
1	COLUMBIA RIVER	NE1	<.01	<.1	<.01	<.1	<1	<.01	<.01	<.01
2	PACIFIC OCEAN	NE2	<.01	<.1	<.01	<.1	<1	<.01	<.01	<.01
3	COLUMBIA RIVER	NM3	--	<.1	<.01	<.1	<1	--	--	--
4	PACIFIC OCEAN	NE4	<.01	<.1	<.01	<.1	<1	<.01	<.01	<.01
7	ASTOR. BOAT BASIN	EE1	<.01	<.1	<.01	<.1	<1	<.01	<.01	<.01
7	ASTOR. BOAT BASIN	EE2	<.01	<.1	<.01	<.1	<1	<.01	<.01	<.01
14	YOUNGS BAY BM 2.5	EM3	<.01	<.1	<.01	<.1	<1	<.01	<.01	<.01
14	YOUNGS BAY BM 2.5	EE4	<.01	<.1	<.01	<.1	<1	<.01	<.01	<.01

TABLE 16E.--ASTORIA AND YOUNGS BAY, OREGON PROJECT

TOTAL RECOVERABLE CHEMICALS IN BOTTOM MATERIAL

[FOR TYPE OF SAMPLE, REFER TO CODES: NE=NATIVE ESTUARINE WATER, NM=NATIVE ESTUARINE WATER, NF=NATIVE FRESH WATER, EE=ELUTRIATE WITH ESTUARINE WATER, EM= ELUTRIATE WITH ESTUARINE WATER, EF=ELUTRIATE WITH FRESH WATER, BM=BOTTOM MATERIAL. THE NUMBER FOLLOWING THE TWO DIGIT CODE INDICATES: FOR NATIVE WATER SAMPLES, THE NUMBER OF SAMPLES ANALYZED AND FOR ELUTRIATES, THE RESPECTIVE MIXING WATER. VALUES - '--' INDICATE THAT A CHEMICAL ANALYSES WAS NOT BEEN MADE.]

SITE NO.	SITE DESCRIPTION	CODE	DATE	ARSENIC (UG/G)	BARIUM (UG/G)	BERYL-LIUM (UG/G)	CADMIUM (UG/G)	CHRO-MIUM (UG/G)	COPPER (UG/G)	CYANIDE (UG/G)	IRON (UG/G)	LEAD (UG/G)	MANGA-NESE (UG/G)	MERCURY (UG/G)
7	ASTOR. BOAT BASIN	BM	12/02/80	7	40	1	5	14	31	<0.5	11000	10	190	0.09
14	YOUNGS BAY BM 2.5	BM	07/22/80	10	40	<1	4	8	180	<0.5	11000	10	140	0.05

SITE NO.	SITE DESCRIPTION	CODE	NICKEL (UG/G)	ZINC (UG/G)	CARBON, INOR-GANIC (G/KG)	CARBON, INORG + ORGANIC (G/KG)	NITRO-GEN,NH4 (MG/KG) AS N	NITRO-GEN,NH4 - ORG. (MG/KG) AS N	PHOS-PHORUS (MG/KG)
7	ASTOR. BOAT BASIN	BM	20	110	0.3	16	150	1300	800
14	YOUNGS BAY BM 2.5	BM	20	35	0.6	15	122	760	480

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TABLE 16F.--ASTORIA AND YOUNGS BAY, OREGON PROJECT

TOTAL RECOVERABLE INSECTICIDES AND HERBICIDES IN BOTTOM MATERIAL

[FOR TYPE OF SAMPLE, REFER TO CODES: NE=NATIVE ESTUARINE WATER, NM=NATIVE ESTUARINE WATER, NF=NATIVE FRESH WATER, EE=ELUTRIATE WITH ESTUARINE WATER, EM= ELUTRIATE WITH ESTUARINE WATER, EF=ELUTRIATE WITH FRESH WATER, BM=BOTTOM MATERIAL. THE NUMBER FOLLOWING THE TWO DIGIT CODE INDICATES: FOR NATIVE WATER SAMPLES, THE NUMBER OF SAMPLES ANALYZED AND FOR ELUTRIATES, THE RESPECTIVE MIXING WATER. VALUES - '--' INDICATE THAT A CHEMICAL ANALYSES WAS NOT BEEN MADE.]

SITE NO.	SITE DESCRIPTION	CODE	DATE	ALDRIN (UG/KG)	CHLOR-DANE (UG/KG)	DDD (UG/KG)	DDE (UG/KG)	DDT (UG/KG)	DI-ELDRIN (UG/KG)	ENDO-SULFAN (UG/KG)	ENDRIN (UG/KG)	HEPTA-CHLOR (UG/KG)	HEPTA-CHLOR EPOXIDE (UG/KG)	LINDANE (UG/KG)
7	ASTOR. BOAT BASIN	BM	12/02/80	<.1	<1	<.1	2.9	<.1	0.1	<.1	<.1	<.1	<.1	<.1
14	YOUNGS BAY BM 2.5	BM	07/22/80	<.1	<1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1

SITE NO.	SITE DESCRIPTION	CODE	METH-OXY-CHLOR (UG/KG)	MIREX (UG/KG)	PCB (UG/KG)	PCN (UG/KG)	PER-THANE (UG/KG)	SILVEX (UG/KG)	TOXA-PHENE (UG/KG)	2,4-D (UG/KG)	2,4,5-T (UG/KG)	2,4-DP (UG/KG)
7	ASTOR. BOAT BASIN	BM	<.1	<.1	11	--	<1	<.1	<1	<.1	--	<.1
14	YOUNGS BAY BM 2.5	BM	<.1	<.1	<1	<1	<1	<.1	<1	<.1	<.1	<.1

Estuarine Files

Elutriates

A:2

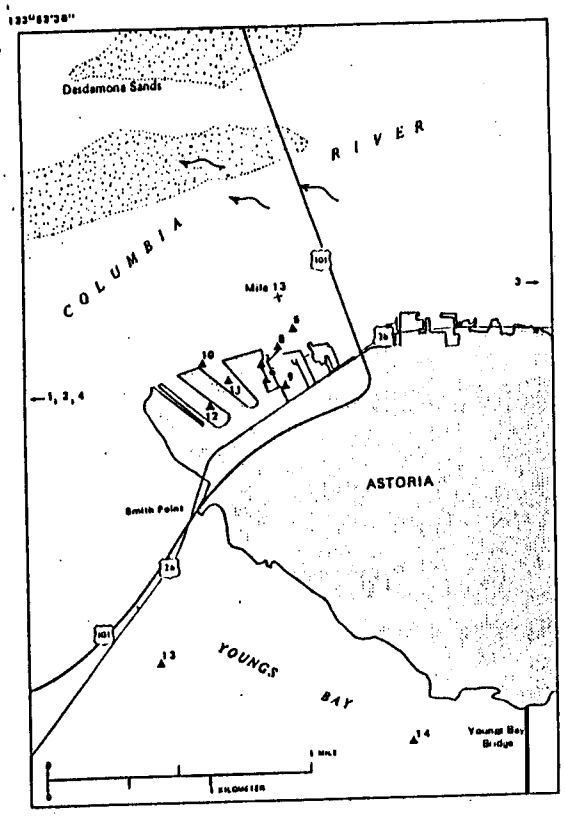


Figure 11. – Map of sampling sites for the Astoria boat slips and Youngs Bay, OR, project.

Table 16a.--Location of sampling sites, Astoria boat slips and Youngs Bay, Oreg., project

Site no.	Site designation	Collection date	Site location Latitude	Site location Longitude	Remarks
1	Columbia River, Area D	12-02-80	46°14'30"	123°57'25"	
2	Pacific Ocean	do.	46°13'37"	124°04'27"	
3	Columbia River, Tongue Point	07-24-80	46°12'52"	123°45'12"	Same as site 16 in figure 7 and table 12.
4	Pacific Ocean	do.	46°13'27"	124°06'32"	Same as site 1 in figure 7 and table 12.
5	Astoria boat basin	12-02-80	46°11'32"	123°51'12"	
6	do.	do.	46°11'21"	123°51'20"	
7	do.	do.	46°11'24"	123°51'21"	
8	do.	do.	46°11'28"	123°51'16"	
9	do.	do.	46°11'20"	123°51'14"	
10	do.	do.	46°11'27"	123°51'10"	
11	do.	07-25-80	46°11'22"	123°51'31"	
12	do.	do.	46°11'17"	123°51'35"	
13	Youngs Bay RM 1.5	07-22-80	46°10'26"	123°51'51"	
14	Youngs Bay RM 2.5	do.	46°10'07"	123°50'44"	

TABLE 16B.--ASTORIA AND YOUNGS BAY, OREGON PROJECT

DISSOLVED CHEMICALS IN NATIVE WATER AND ELUTRIATES

[FOR TYPE OF SAMPLE, REFER TO CODES: NE=NATIVE ESTUARINE WATER, NM=NATIVE EURYHALINE WATER, NF=NATIVE FRESH WATER, EE=ELUTRIATE WITH ESTUARINE WATER, EM= ELUTRIATE WITH EURYHALINE WATER, EF=ELUTRIATE WITH FRESH WATER, BM=BOTTOM MATERIAL. THE NUMBER FOLLOWING THE TWO DIGIT CODE INDICATES: FOR NATIVE WATER SAMPLES, THE NUMBER OF SAMPLES ANALYZED AND FOR ELUTRIATES, THE RESPECTIVE MIXING WATER. VALUES - '--' INDICATE THAT A CHEMICAL ANALYSES HAS NOT BEEN MADE.]

SITE NO.	SITE DESCRIPTION	CODE	DATE	CADMIUM (UG/L AS CD)	CHROMIUM (UG/L AS CR)	COPPER (UG/L AS CU)	IRON (UG/L AS FE)	LEAD (UG/L AS PB)	MANGANESE (UG/L AS MN)	MERCURY (UG/L AS HG)	ZINC (UG/L AS ZN)	CARBON, ORGANIC (MG/L AS C)	NITROGEN, AMMONIA (MG/L AS N)
1	COLUMBIA RIVER	NE1	12/02/80	<1	4	<1	140	<1	30	0.1	30	3.2	0.03
2	PACIFIC OCEAN	NE2	12/02/80	3	<1	6	165	4	40	<0.1	50	2.7	0.05
3	COLUMBIA RIVER	NM3	07/24/80	1/ <0.04	<1	3	20	2	10	<0.1	<10	3.4	<.01
4	PACIFIC OCEAN	NE4	07/24/80	<1	<1	--	--	4	60	0.1	50	2.7	<.01
5	ASTOR. BOAT BASIN	EE1	12/02/80	<1	<1	1	160	<1	920	<0.1	30	5.0	4.7
6	ASTOR. BOAT BASIN	EE1	12/02/80	<1	<1	2	2700	<1	5700	0.1	40	5.6	33
7	ASTOR. BOAT BASIN	EE1	12/02/80	<1	<1	7	2400	<1	9300	<0.1	50	13.0	53
7	ASTOR. BOAT BASIN	EE2	12/02/80	<1	<1	1	4300	<1	10000	0.1	50	9.6	44
8	ASTOR. BOAT BASIN	EE1	12/03/80	<1	<1	8	210	<1	1500	0.1	30	6.0	29
8	ASTOR. BOAT BASIN	EE2	12/03/80	<1	<1	<1	200	<1	6200	0.2	50	5.5	16
9	ASTOR. BOAT BASIN	EE1	12/02/80	<1	<1	<1	560	<1	3800	<0.1	50	12.0	46
10	ASTOR. BOAT BASIN	EE1	12/02/80	<1	<1	<1	480	<1	5600	<0.1	50	4.4	23
11	ASTOR. BOAT BASIN	EM3	07/25/80	1	<1	6	50	<1	1200	0.1	40	24.0	8
12	ASTOR. BOAT BASIN	EM3	07/25/80	1	<1	1	30	1	130	0.2	30	31.0	8.2
13	YOUNGS BAY RM 1.5	EM3	07/22/80	<1	<1	2	10	<1	10	<0.1	20	13.0	7.6
14	YOUNGS BAY RM 2.5	EM3	07/22/80	<1	<1	2	20	<1	10	0.2	10	15.0	7.1
14	YOUNGS BAY RM 2.5	EE4	07/22/80	<1	<1	2	140	<1	230	<0.1	30	8.8	1.6

1/ CADMIUM ANALYSIS FOR SITE NUMBER 3 HAS A LOWER DETECTION LIMIT OF .01 UG/L.

TABLE 16B.--ASTORIA AND YOUNGS BAY, OREGON PROJECT

DISSOLVED CHEMICALS IN NATIVE WATER AND ELUTRIATES--CONTINUED

SITE NO.	SITE DESCRIPTION	CODE	PHOSPHORUS ORTHOPHOSPHATE (UG/L AS P)	PHENOLS (UG/L)
1	COLUMBIA RIVER	NE1	53	6
2	PACIFIC OCEAN	NE2	48	9
3	COLUMBIA RIVER	NM3	36	3
4	PACIFIC OCEAN	NE4	43	9
5	ASTOR. BOAT BASIN	EE1	32	120
6	ASTOR. BOAT BASIN	EE1	35	84
7	ASTOR. BOAT BASIN	EE1	38	110
7	ASTOR. BOAT BASIN	EE2	60	140
8	ASTOR. BOAT BASIN	EE1	27	30
8	ASTOR. BOAT BASIN	EE2	32	98
9	ASTOR. BOAT BASIN	EE1	32	160
10	ASTOR. BOAT BASIN	EE1	19	28
11	ASTOR. BOAT BASIN	EM3	35	120
12	ASTOR. BOAT BASIN	EM3	143	170
13	YOUNGS BAY RM 1.5	EM3	28	31
14	YOUNGS BAY RM 2.5	EM3	38	37
14	YOUNGS BAY RM 2.5	EE4	25	--

TABLE 16C.--ASTORIA AND YOUNGS BAY, OREGON PROJECT

ADDITIONAL DISSOLVED CHEMICALS IN NATIVE WATER AND ELUTRIATES

[FOR TYPE OF SAMPLE, REFER TO CODES: NE=NATIVE ESTUARINE WATER, NM=NATIVE EURYHALINE WATER, NF=NATIVE FRESH WATER, EE=ELUTRIATE WITH ESTUARINE WATER, EM= ELUTRIATE WITH EURYHALINE WATER, EF=ELUTRIATE WITH FRESH WATER, BM=BOTTOM MATERIAL. THE NUMBER FOLLOWING THE TWO DIGIT CODE INDICATES: FOR NATIVE WATER SAMPLES, THE NUMBER OF SAMPLES ANALYZED AND FOR ELUTRIATES, THE RESPECTIVE MIXING WATER. VALUES - '--' INDICATE THAT A CHEMICAL ANALYSES HAS NOT BEEN MADE.]

SITE NO.	SITE DESCRIPTION	CODE	DATE	ARSENIC (UG/L AS AS)	BARIUM (UG/L AS BA)	BERYLLIUM (UG/L AS BE)	1/ CYANIDE (UG/L AS CN)	NICKEL (UG/L AS NI)	NITROGEN, AMMONIA + ORGANIC (MG/L AS N)	PH (UNITS)	SPECIFIC CONDUCTANCE (MICROMHOS/CM)	PHOSPHORUS, (UG/L AS P)
1	COLUMBIA RIVER	NE1	12/02/80	1	<100	<10	1	3	0.9	8.1	42900	60
2	PACIFIC OCEAN	NE2	12/02/80	1	<100	<10	1	3	0.9	8.2	47200	60
3	COLUMBIA RIVER	NM3	07/24/80	1	<100	--	2	4	0.4	7.9	1650	37
4	PACIFIC OCEAN	NE4	07/24/80	1	<100	10	0	2	0.5	8.0	42100	54
7	ASTOR. BOAT BASIN	EE1	12/02/80	2	1500	20	3	4	--	7.0	39300	68
7	ASTOR. BOAT BASIN	EE2	12/02/80	2	1100	20	3	4	--	7.0	41600	11
14	YOUNGS BAY RM 2.5	EM4	07/22/80	2	<100	10	--	<1	7.3	8.7	2520	56
14	YOUNGS BAY RM 2.5	EE4	07/22/80	2	1300	20	--	1	15.0	7.9	35200	56

1/ LOWER DETECTION LIMIT FOR CYANIDE IS NOT AVAILABLE.

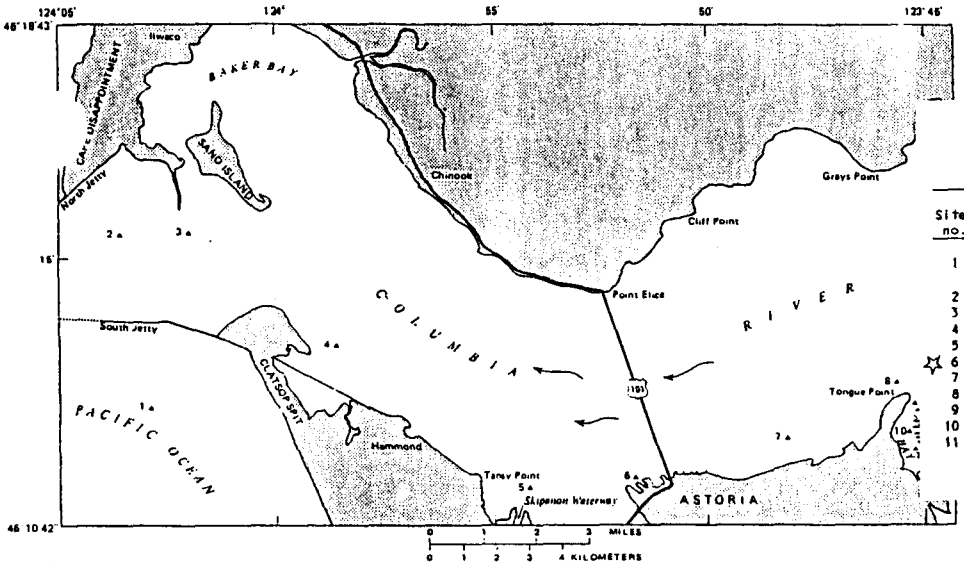


Figure 9.--Sampling sites for the Columbia River.

Table 6a.--Location of sampling sites, Columbia River, Oreg., project

Site no.	Site designation	Collection date	Site location Latitude	Longitude	Remarks
1	Pacific Ocean	08-03-82	46°11'27"	124°02'48"	Water and sediment sampl
2	Columbia River	do.	46°15'30"	124°03'32"	RM 1.8.
3	do.	do.	46°15'20"	124°01'45"	RM 3.2.
4	do.	do.	46°13'33"	123°58'15"	RM 6.6.
5	do.	do.	46°11'32"	123°54'08"	RM 11.
☆ 6	do.	08-02-82	46°11'30"	123°51'39"	RM 13.
7	do.	do.	46°12'15"	123°48'08"	RM 16.
8	do.	do.	46°13'05"	123°45'50"	RM 18.1.
9	Cathlamet Bay	do.	46°12'34"	123°45'15"	
10	do.	do.	46°12'14"	123°45'21"	Near pier 6.
11	do.	do.	46°11'53"	123°45'09"	

TABLE 6e.--COLUMBIA RIVER, OREGON PROJECT

TOTAL RECOVERABLE CHEMICALS IN BOTTOM MATERIAL

[FOR TYPE OF SAMPLE, REFER TO CODES: NE=NATIVE ESTUARINE WATER, NH=NATIVE EURYHALINE WATER, NF=NATIVE FRESH WATER, EE=ELUTRIATE WITH ESTUARINE WATER, EH=ELUTRIATE WITH EURYHALINE WATER, EF=ELUTRIATE WITH FRESH WATER, BM=BOTTOM MATERIAL. VALUES = '--' INDICATE THAT AN ANALYSES HAS NOT BEEN MADE.]

Estuarine files

SITE NO.	SITE DESCRIPTION	CODE	DATE	ARSENIC (UG/G)	CADMIUM (UG/G)	CHROMIUM (UG/G)	COPPER (UG/G)	IRON (UG/G)	LEAD (UG/G)	MANGANESE (UG/G)	MERCURY (UG/G)	ZINC (UG/G)
1	PACIFIC OCEAN	BM	08/03/82	3	10	1	1	1800	<100	40	0.01	8
2	COLUMBIA RM 1.8	BM	08/03/82	2	<10	--	--	3400	--	60	--	--
3	COLUMBIA RM 3.2	BM	08/03/82	5	<10	--	--	3600	--	90	--	--
4	COLUMBIA RM 6.6	BM	08/03/82	2	<10	2	2	4100	<100	55	<0.01	15
5	COLUMBIA RM 11	BM	08/03/82	2	<10	--	--	4800	--	65	--	--
☆ 6	COLUMBIA RM 13	BM	08/02/82	4	<10	--	--	4300	--	65	--	--
7	COLUMBIA RM 16	BM	08/02/82	4	<10	--	--	3500	--	80	--	--
8	COLUMBIA RM 18	BM	08/02/82	2	<10	2	2	2600	<100	70	0.02	22
9	CATHLAMET BAY	BM	08/02/82	8	10	--	--	6000	--	350	--	--
10	CATHLAMET BAY	BM	08/02/82	3	<10	3	19	4300	<100	160	0.06	40
11	CATHLAMET BAY	BM	08/02/82	3	<10	--	--	4600	--	140	--	--

TABLE 6g.--COLUMBIA RIVER, OREGON PROJECT

PARTICLE-SIZE DISTRIBUTION AND PERCENT MOISTURE OF BOTTOM MATERIAL

[FOR TYPE OF SAMPLE, REFER TO CODES: NE=NATIVE ESTUARINE WATER, NH=NATIVE EURYHALINE WATER, NF=NATIVE FRESH WATER, EE=ELUTRIATE WITH ESTUARINE WATER, EH=ELUTRIATE WITH EURYHALINE WATER, EF=ELUTRIATE WITH FRESH WATER, BM=BOTTOM MATERIAL. VALUES = '--' INDICATE THAT AN ANALYSES HAS NOT BEEN MADE.]

SITE NO.	SITE DESCRIPTION	CODE	DATE	PERCENT FINER THAN .125 MM	PERCENT FINER THAN .250 MM	PERCENT FINER THAN .500 MM	PERCENT FINER THAN 1.00 MM	PERCENT FINER THAN 2.00 MM	PERCENT FINER THAN 4.00 MM	PERCENT FINER THAN 8.00 MM	PERCENT FINER THAN 16.00 MM	PERCENT MOISTURE
1	PACIFIC OCEAN	BM	08/03/82	20	55	99	100	--	--	--	--	20
2	COLUMBIA RM 1.8	BM	08/03/82	3	67	98	100	--	--	--	--	19
3	COLUMBIA RM 3.2	BM	08/03/82	--	21	99	99	100	--	--	--	24
4	COLUMBIA RM 6.6	BM	08/03/82	20	43	90	98	100	--	--	--	25
5	COLUMBIA RM 11	BM	08/03/82	8	32	97	99	100	--	--	--	26
☆ 6	COLUMBIA RM 13	BM	08/02/82	3	90	100	--	--	--	--	--	28
7	COLUMBIA RM 16	BM	08/02/82	2	25	62	87	90	97	99	100	18
8	COLUMBIA RM 18	BM	08/02/82	2	20	80	95	96	97	99	100	23
9	CATHLAMET BAY	BM	08/02/82	80	97	99	100	--	--	--	--	39
10	CATHLAMET BAY	BM	08/02/82	95	98	99	100	--	--	--	--	35
11	CATHLAMET BAY	BM	08/02/82	93	98	99	100	--	--	--	--	33

Copy to John Malek

COFFEY LABORATORIES, INC.
4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

NOV 21

November 20, 1987
Log #H870923-D1-9
PO# None

Crest
750 Commercial Street
Room 214
Astoria, OR 97103

ANALYSIS	Site 3	Site 4	Site 5
PCBs (A-1016-1242)	< 0.5*	< 0.5*	< 0.5*
PCBs (A-1254 & 1260)	< 0.02	< 0.02	< 0.02

Results in mg/Kg

The less than "<" symbol means none detected at or above the indicated value and represents the detection limit for the method.

*Interferences in the chromatographic region where the Arochlors 1016 to 1242 appear could not be cleaned up by official and unofficial EPA cleanup procedures. As a result, detection limits for these arochlors must be established at o.5 mg/Kg.

Analysis by EPA8080 (GC/ECD)

Sincerely,

Susan M. Coffey

Susan M. Coffey,
President

SMC/lws

This report is for the sole and exclusive use of the above client. Samples are retained a maximum of 15 days from the date of this letter.

HEADER SHEET FOR SEDIMENT SAMPLING TRIP

PROJECT LOCATION: ASTORIA (DEEP DRAFT ANCHORAGE SITE)

SAMPLING DATE: MARCH 11, 1987

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

SAMPLING ANALYSIS (SAMPLE NUMBERS ANALYZED)

GRAIN SIZE: A-I(2), A-II(1), A-III(1)

OIL/GREASE:

AMMONIA (NH4):

SULFIDE:

TOTAL ORGANIC CARBON (TOC):

VOLATILE SOLIDS: A-I(2), A-II(1), A-III(1)

METALS: A-II(2)

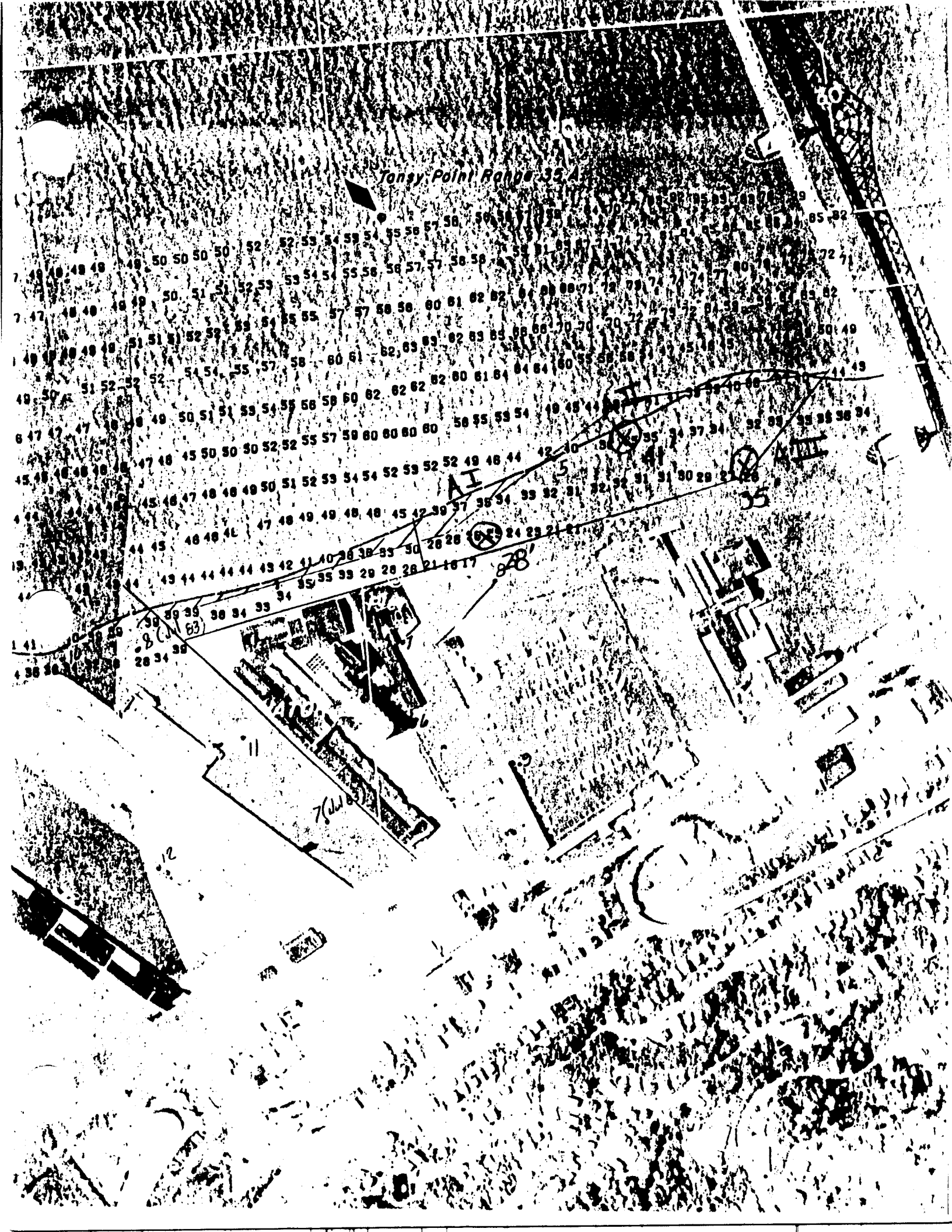
PESTICIDES: A-II(2)

PAH'S:

ELUTRIATES:

BIOLOGICAL:

SEDIMENT QUALITY DBASE FILES: ESTUARIES : A II (2)


Tansy Point Range 35 A
AI
AIII
35
28'
8 (Jul 83)
7 (Jul 83)

"ADVANCE COPY"

North Pacific Division Corps of Engineers Soils Lab ==== Date: 03-20-1987

Project: ASTORIA ANCHORAGE SITE (87-SH-347)
Boring No. --- Sample No. A-I(2) Depth: 28 feet

Sieve Sizes	Cum. Wt. Ret.	Percent Finer
10-in.	0.0	100.0
5-in.	0.0	100.0
3-in.	0.0	100.0
2-1/2-in.	0.0	100.0
1-1/4-in.	0.0	100.0
5/8-in.	0.0	100.0
5/16-in.	0.0	100.0
No. 5	0.0	100.0
Pan	0.0	
No. 10	0.0	100.0
No. 18	0.1	99.9
No. 35	0.2	99.8
No. 60	1.6	98.5
No. 120	64.8	41.0
No. 230	94.7	13.8
Pan	109.9	

Meniscus Correction: 0
Dispersing Agent Corr: 0
Sample Wt. 109.9
Start Time 0800

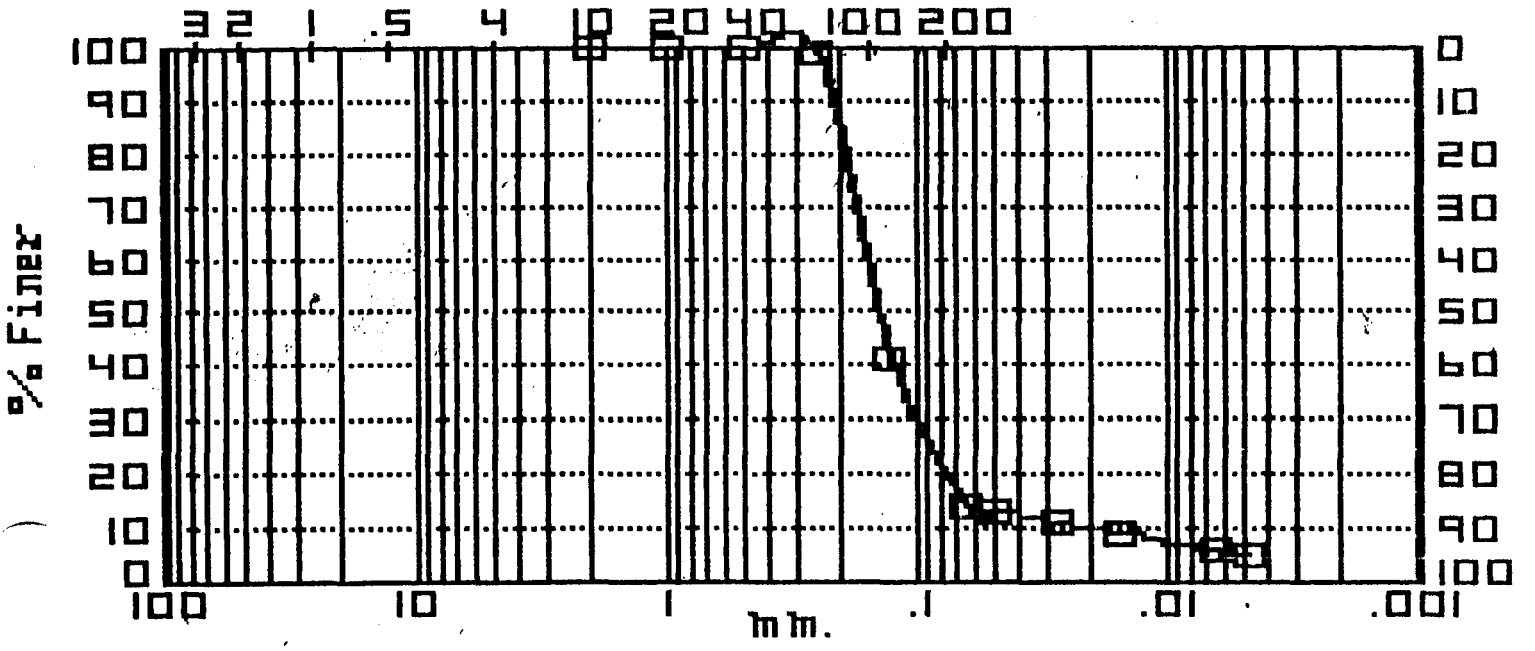
Time	Reading	Temp. (F)	p'	D
0801	14.7	68.0	13.24	0.0485
0803	12.2	68.0	10.99	0.0280
0810	10.2	68.0	9.19	0.0155
0900	6.2	68.0	5.59	0.0065
1000	5.2	68.0	4.68	0.0046

LL= --- PI= ---
Organic Content: 1.4 %
Water Content: --- %

Comments: sampled on 3-11-87 @ 1220 hr

Gravel = 0.0 D60 = 0.160 mm.
% Sand = 86.2 D30 = 0.103 mm. Cu = 7.45
% Fines = 13.8 D10 = 0.021 mm. Cc = 3.09

*** ATTERBERG LIMITS REQUIRED FOR CLASSIFICATION ***



"ADVANCE COPY"

==== North Pacific Division Corps of Engineers Soils Lab ==== Date: 03-20-1987

oject: ASTORIA ANCHORAGE SITE (87-SH-347)

Boring No. --- Sample No. A-II(1) Depth: 41 feet

Estuaries files

Sieve Sizes	Cum. Wt.Ret.	Percent Finer
10-in.	0.0	100.0
5-in.	0.0	100.0
3-in.	0.0	100.0
2-1/2-in.	0.0	100.0
1-1/4-in.	0.0	100.0
5/8-in.	0.0	100.0
5/16-in.	0.0	100.0
No. 5	0.0	100.0
Pan	0.0	
No. 10	0.0	100.0
No. 18	0.0	100.0
No. 35	0.4	99.4
No. 60	16.8	75.7
No. 120	39.3	43.1
No. 230	48.8	29.4
Pan	69.1	

Meniscus Correction: 0
Dispersing Agent Corr: 0
Sample Wt. 69.1
Start Time 0800

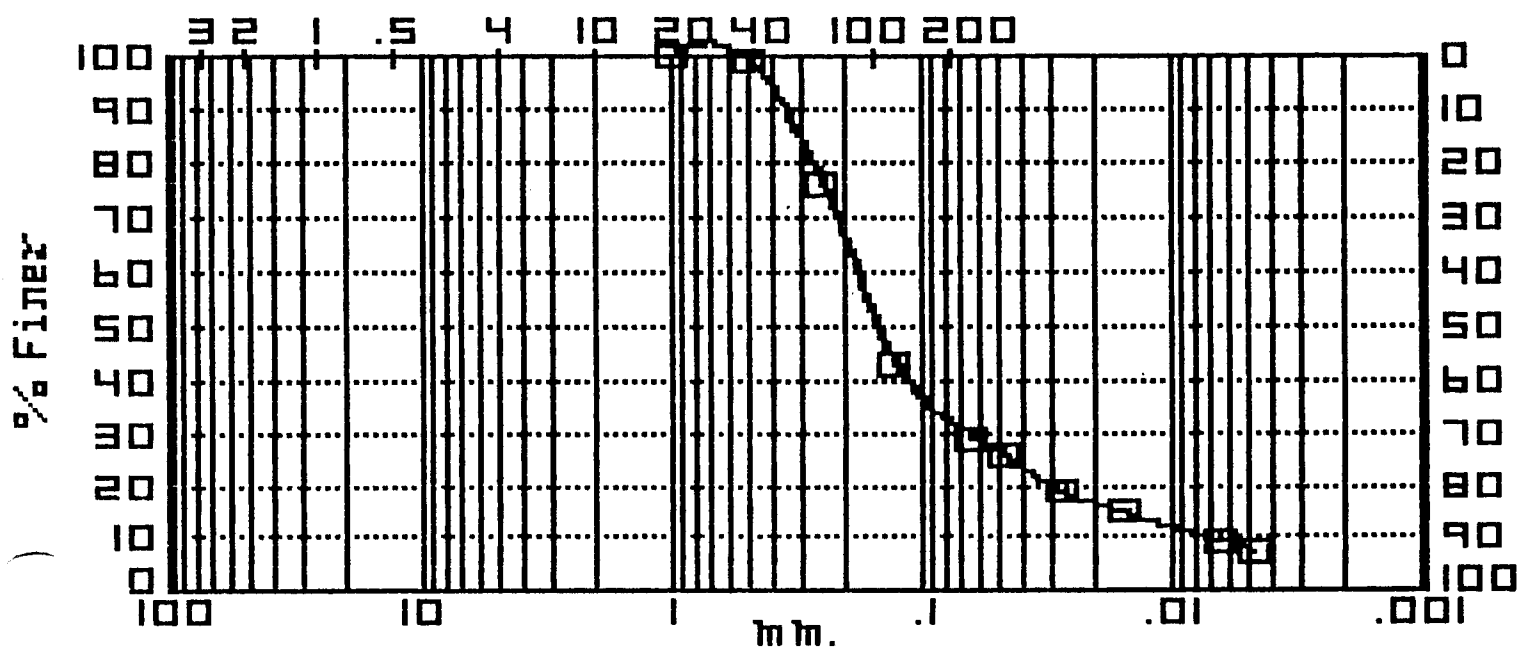
Time	Reading	Temp.(F)	p'	D
0801	18.2	68.0	26.08	0.0474
0803	13.2	68.0	18.91	0.0278
0810	10.2	68.0	14.61	0.0155
0900	6.2	68.0	8.88	0.0065
1000	5.2	68.0	7.45	0.0046

LL= --- PI= ---
Organic Content: 1.4 %
Water Content: --- %

Comments: sampled on 3-11-87 @ 1130 hr

Gravel =	0.0	D60 =	0.182 mm.	% -.02 mm =	17.00
Sand =	70.6	D30 =	0.065 mm.	Cu =	22.48
% Fines =	29.4	D10 =	0.008 mm.	Cc =	2.87

*** ATTERBERG LIMITS REQUIRED FOR CLASSIFICATION ***



"ADVANCE COPY"

North Pacific Division Corps of Engineers Soils Lab ==== Date: 03-20-1987

Project: ASTORIA ANCHORAGE SITE (87-SH-347)
Boring No. --- Sample No. A-III(1) Depth: 35 feet

Sieve Sizes	Cum. Wt. Ret.	Percent Finer
10-in.	0.0	100.0
5-in.	0.0	100.0
3-in.	0.0	100.0
2-1/2-in.	0.0	100.0
1-1/4-in.	0.0	100.0
5/8-in.	0.0	100.0
5/16-in.	0.0	100.0
No. 5	0.0	100.0
Pan	0.0	
No. 10	0.0	100.0
No. 18	0.0	100.0
No. 35	0.1	99.9
No. 60	4.5	93.8
No. 120	51.0	29.6
No. 230	64.3	11.2
Pan	72.4	

Meniscus Correction: 0
Dispersing Agent Corr: 0
Sample Wt. 72.4
Start Time 0800

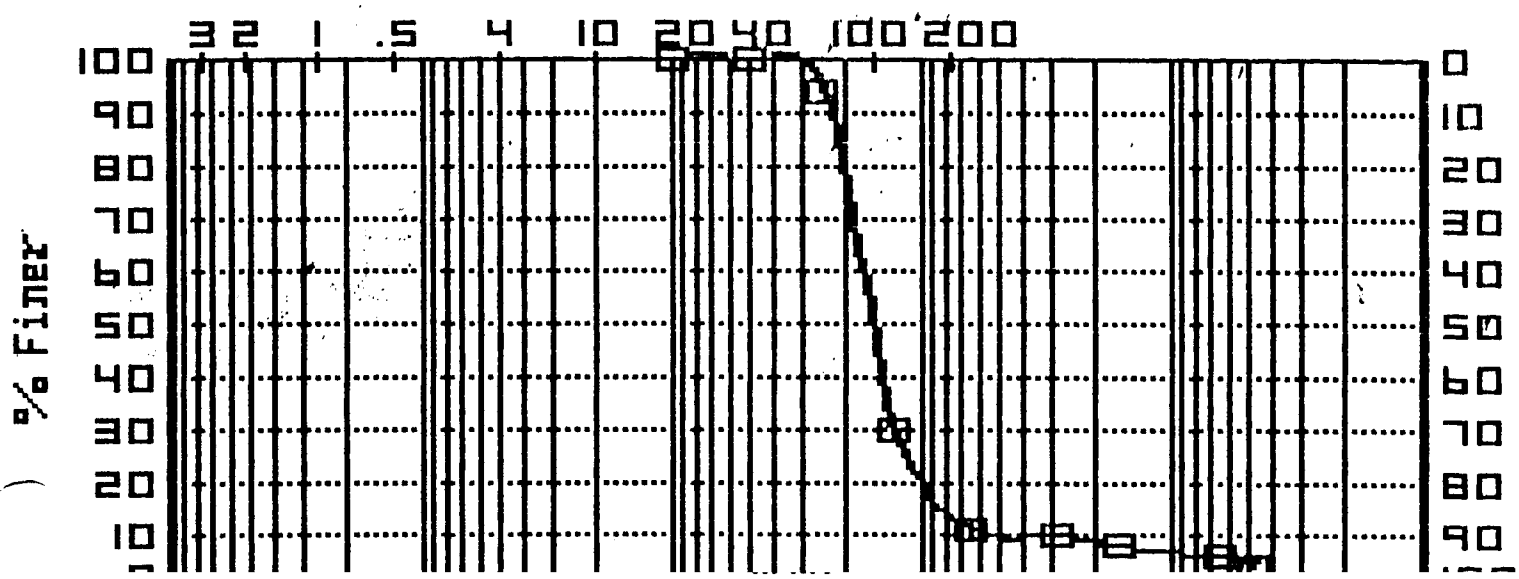
Time	Reading	Temp. (F)	p'	D
0801	8.2	68.0	11.21 *	0.0504
0803	7.2	68.0	9.85	0.0288
0810	5.7	68.0	7.79	0.0159
0900	4.2	68.0	5.74	0.0066
1000	3.2	68.0	4.38	0.0047

LL= --- PI= ---
Organic Content: 1.2 %
Water Content: --- %

Comments: sampled on 3-11-87 @ 1045 hr

% Gravel = 0.0 D60 = 0.175 mm. % -.02 mm = 9.00
% Sand = 88.8 D30 = 0.130 mm. Cu = 3.09
% Fines = 11.2 D10 = 0.057 mm. Cc = 1.70

*** ATTERBERG LIMITS REQUIRED FOR CLASSIFICATION ***



DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION, CORPS OF ENGINEERS

1491 N. W. GRAHAM AVE.
TROUTDALE, OREGON 97060-9503

added into Estuarine D-Base file

APR 21 1987

ATTN: NPPPL-AP-FP

W.O. 87-H-347

Subject: Results of Chemical Analyses on Sample A-II_2, Sediment
Project: ASTORIA ANCHORAGE
Intended Use: Potential dredge material.
Submitted by: NPPPL-AP-FP
Date Sampled: --- Date Received: 12 Mar 87
Method of Test or Specification: Enclosures 1 and 3
Reference: a) DA Form 2544, Order No. E86-87-0073, dated 12 Dec 86, and Change Order No. R1, dated 16 Mar 87.
b) Telecon, 9 Apr 87, to Turner (NPPPL-AP-FP) from Cagney (NPDEN-G-L); wherein, test results were reported.

1. Attached, confirming telecon report, are results of 33 chemical analyses made on one sediment sample and 74 batch quality control tests for this sample. Included are:

a. Enclosure 1, one summary sheet, "Organochlorine Pesticides and PCB's."

b. Enclosure 2, one summary sheet, "Organochlorine Pesticides and PCB's Batch Quality Control," with results for three duplicate, spiked, and method blank samples.

c. Enclosure 3, one summary sheet, "Metals Analyses."

d. Enclosure 4, one summary sheet, "Batch Quality Control for Metals Analyses of Sediments," with results for six calibration verification, duplicate and blank samples.

2. Sediment samples analyzed for all metals except mercury were first digested with redistilled nitric acid and hydrogen peroxide, as outlined in Method 3050, SW-846, "Test Methods for Evaluating Solid Waste," Second Edition, U.S. Environmental Protection Agency, July 1982. For mercury analysis, a separate aliquot was digested according to Method 245.5: Mercury in Sediment (Manual Cold Vapor Technique). Concentration of metals was determined by atomic absorption spectrophotometric methods, using the furnace for arsenic and direct aspiration (flame) for cadmium, chromium, copper, lead, and zinc. Mercury analysis was by the cold vapor method.

3. We were unable to attain the desired detection limits for PCB's 1242, 1248, 1254, and 1260 due to matrix interference; however, the reported values are below EPA action levels.

NPDEN-G-L
SUBJECT: Results of Chemical Analyses on Sample A-II_2, Sediment

4. A sample has been sent to Laucks Testing Laboratories, Inc., Seattle Washington, for total organic carbon analysis. Results will be forwarded as available.

Atchs (dupe)

JAMES PAXTON
Director

Copy Furnished: NPDEN-G

NPDEN-G-L (87-H-347)

ASTORIA ANCHORAGE
Organochlorine Pesticides and PCB's
SW-846 Method 8080

Estuaries

NPP Sample No: A-II$_2$, Sediment — Concentration, ug/Kg (ppb)

CAS Number	Analyte	Test Result	Detection Limit
319-84-6	Alpha-BHC	<10	10
319-85-7	Beta-BHC	<10	10
319-86-8	Delta-BHC	<10	10
58-89-9	Gamma-BHC (Lindane)	<10	10
76-44-8	Heptachlor	<10	10
309-00-2	Aldrin	<10	10
1024-57-3	Heptachlor Epoxide	<10	10
959-98-8	Endosulfan I	7.1	10
60-57-1	Dieldrin	<10	10
72-55-9	4,4'-DDE	<10	10
72-20-8	Endrin	<10	10
33213-65-9	Endosulfan II	<10	10
72-54-8	4,4'-DDD	<10	10
1031-07-8	Endosulfan Sulfate	<10	10
50-29-3	4,4'-DDT	22.6	10
72-43-5	Methoxychlor	<10	10
1421-93-4	**Endrin** Aldehyde	451.7	10
57-74-9	Chlordane	<80	80
8001-35-2	Toxaphene	<80	80
12674-11-2	Aroclor-1016	<80	80
11104-28-2	Aroclor-1221	<80	80
11141-16-5	Aroclor-1232	<80	80
53469-21-9	Aroclor-1242	<150	150
12672-29-6	Aroclor-1248	<150	150
11097-69-1	Aroclor-1254	<150	150
11096-82-5	Aroclor-1260	<150	150

PROBABLY NOT REAL— [redacted] FALSE POSITIVES OCCURRED ON CHINOOK SAMPLES RUN BY THIS LAB AT THIS TIME. RJ

Enclosure 1

ASTORIA ANCHORAGE
Organochlorine Pesticides and PCB's
Batch Quality Control

1. Duplicate Sample

CAS Number	Analyte	Concentration, ug/Kg (ppb) Sample No. D1	Duplicate	Relative Difference, %
319-84-6	Alpha-BHC	<10	10	0
319-85-7	Beta-BHC	<10	10	0
319-86-8	Delta-BHC	<10	10	0
58-89-9	Gamma-BHC (Lindane)	<10	10	0
76-44-8	Heptachlor	<10	10	0
309-00-2	Aldrin	<10	10	0
1024-57-3	Heptachlor Epoxide	<10	10	0
959-98-8	Endosulfan I	<10	10	0
60-57-1	Dieldrin	<10	10	0
72-55-9	4,4'-DDE	<10	10	0
72-20-8	Endrin	<10	10	0
33213-65-9	Endosulfan	<10	10	0
72-54-8	4,4'-DDD	<10	10	0
1031-07-8	Endosulfan Sulfate	<10	10	0
50-29-3	4,4'-DDT	<10	10	0
72-43-5	Methoxychlor	<10	10	0
1421-93-4	Endrin Aldehyde	<10	10	0
57-74-9	Chlordane	<80	80	0
8001-35-2	Toxaphene	<80	80	0
12674-11-2	Aroclor-1016	<80	80	0
11104-28-2	Aroclor-1221	<80	80	0
11141-16-5	Aroclor-1232	<80	80	0
53469-21-9	Aroclor-1242	<80	80	0
12672-29-6	Aroclor-1248	<80	80	0
11097-69-1	Aroclor-1254	<100	100	0
11096-82-5	Aroclor-1260	<100	100	0

NPDEN-G-L (87-H-347)
Project: ASTORIA ANCHORAGE

Organochlorine Pesticides and PCB's
Batch Quality Control

2. Method Blank

CAS Number	Analyte	Concentration, ug/Kg (ppb) Test Result	Detection Limit
319-84-6	Alpha-BHC	<10	10
319-85-7	Beta-BHC	<10	10
319-86-8	Delta-BHC	<10	10
58-89-9	Gamma-BHC (Lindane)	<10	10
76-44-8	Heptachlor	<10	10
309-00-2	Aldrin	<10	10
1024-57-3	Heptachlor Epoxide	<10	10
959-98-8	Endosulfan I	<10	10
60-57-1	Dieldrin	<10	10
72-55-9	4,4'-DDE	<10	10
72-20-8	Endrin	<10	10
33213-65-9	Endosulfan II	<10	10
72-54-8	4,4'-DDD	<10	10
1031-07-8	Endosulfan Sulfate	<10	10
50-29-3	4,4'-DDT	<10	10
72-43-5	Methoxychlor	<10	10
7421-93-4	Endrin Aldehyde		10
57-74-9	Chlordane	<80	80
8001-35-2	Toxaphene	<80	80
12674-11-2	Aroclor-1016	<80	80
11104-28-2	Aroclor-1221	<80	80
11141-16-5	Aroclor-1232	<80	80
53469-21-9	Aroclor-1242	<80	80
12672-29-6	Aroclor-1248	<80	80
11097-69-1	Aroclor-1254	<100	100
11096-82-5	Aroclor-1260	<100	100

3. Spiked Sample Recovery

Sample No. D1
Matrix: Sediment

Concentration, ug/L				
Analyte	Spiked Sample Results (SSR)	Sample Results (SR)	Spike Added (SA)	Recovery %, a/
PCB-1248	100	<80 b/	100	99

NOTES:

a/ Recovery, % = [(SSR - SR)/SA] x 100

b/ For calculation purposes the sample result is assumed to be 0.

NPDEN-G-L (87-H-347)

ASTORIA ANCHORAGE

Metals Analyses

NPPPL-AP-FP Sample No. A-II2

Sample Matrix: sediment

Analyte	Concentration, dry wt. basis, mg/Kg (ppm) Test Result	Detection Limit	AA Method
arsenic	29	0.1	furnace
cadmium	1.5	0.5	flame
chromium	0.2	1.0	flame
copper	140	1.0	flame
lead	4	1.0	flame
mercury	<0.01	0.01	cold vapor
zinc	64	1.0	flame

NOTE : Digestion was performed in accordance with Method 3050, SW-846 to prepare digestates for analysis of arsenic, cadmium, chromium, copper, lead, and zinc. A separate sample was digested for mercury analysis in accordance with Method 245.5, EPA-600/4-79-020

Received: 12 Mar 87

Enclosure 3

ASTORIA ANCHORAGE
Batch Quality Control
for Metals Analyses of Sediments

1. Calibration Verification

Initial calibrations:

Initial calibrations were performed with standards prepared from 20 mg/l (ppm) stock solutions, which were originally prepared by NPDEN-G-L from the highest purity metals and compounds generally available.

Continuing calibrations:

Analyte	True Value, ug/L (ppb)	Found, ug/L	R, %	Method, AA
Arsenic	10	10.5	105	furnace
Cadmium	39.0	40	103	flame
Chromium	261	250	96	flame
Copper	339	310	91	flame
Lead	435	430	99	flame
Mercury	5.0	4.13	83	cold vapor
Zinc	418	393	94	flame

Continuing Calibration Source: EPA QC sample WP 284, concentration 2 (WP 386/10 for arsenic, WP 386 for mercury). This source has metal concentrations similar to those that would be anticipated in sediment digestates.

Control Limits: Mercury 80 to 120-percent; other metals 90 to 110-percent recovery.

2. Duplicate Samples

Sample No. NPD-IH2, sediment digestate

Analyte	Control Limit, %	Concentration, ug/L (ppb) Sample (S)	Duplicate (D)	Relative * Difference, %
Arsenic	±20	17.1	16.8	2
Cadmium	±20	170	155	9
Chromium	±20	250	270	8
Copper	±20	700	700	0
Lead	±20	77	78	1
Zinc	±20	775	78	1

Sample No. A-II2, sediment wet wt. basis, mg/Kg

Analyte	Control Limit, %	Concentration, ug/L (ppb) Sample (S)	Duplicate (D)	Relative * Difference, %
mercury	±20	12.3	11.5	7

* Relative difference, % = [(S-D)/((S+D)/2)] x 100. Control limits are ±20-percent relative difference for sample values greater than five times the detection limit. A control limit of ± the detection limit used for sample values less than five time the detection limit.

3. Blanks for Sediment Analyses

Analyte	Concentration, ug/L Det.Limit	Initial Cal. Blank	Continuing Cal. Blank	Preparation Blank
Arsenic	1	<1	<1	<1
Cadmium	5	<5	<5	<5
Chromium	10	<10	<10	<10
Copper	10	<10	<10	<10
Lead	10	<10	<10	<10
Mercury	0.1	<0.1	<0.1	<0.1
Zinc	10	<10	<10	<10

NOTE: Reporting units and values are for sediment digestates. The values for sediment on a dry weight basis would be 100 times these values; since one gram of sample is diluted to 100 mls of digestate during processing for AA analysis.