

17 July 1990

PORT OF ASTORIA WEST MOORING BASIN

through CREST

1. In late January 1990 Port of Astoria took sediment samples from the West Mooring Boat Basin and had them analyzed physically and chemically. The Port planned to dredge out the basin and dispose of the material via flow lane. The samples were taken and analyzed as part of the permit process. We obtained copies of the data and entered them into our dBase file. So the data is not Corps generated but is useful to us as it extends our information on Oregon sediments.

Jim Britton
x6465

CREST

Columbia River Estuary Study Taskforce

50 Commercial Street, Room 214

Astoria, Oregon 97103-4513

(503) 325-0435

RECEIVED

APR 19 1990

REG & RES BR

April 18, 1990

Jim Goudzwaard
U.S. Army Corps of Engineers
Attn: CENPP-PL-R
P.O. Box 2946
Portland, OR 97208-2946

re: Port of Astoria proposed West Mooring Basin maintenance dredging

Dear Jim:

Attached are the results of the long-awaited sediment tests for the Port of Astoria's proposed flow lane disposal of dredged material from the Port's West Mooring Basin. I sent a permit application to you some time ago, and we discussed the proposed sediment tests on the tenth of January, 1990.

Desired detection limits were not met for the following pesticides:

Delta-BHC
Lindane
Heptachlor
Heptachlor Epoxide
Aldrin
Endosulfan I
Chlordane

The firm that analyzed these reports that interference from inorganic sulfur prevented them from achieving target detection limits. They tried some clean-up procedures on the samples, but the sulfur interference remained. I can get a letter from them explaining this in more detail; or you may want to discuss this with our lab (Andrew Friedman of Friedman and Bruya, Inc., 206/285-8282). Please call me if you have any questions on this material, or wish to discuss it further.

Very truly yours,

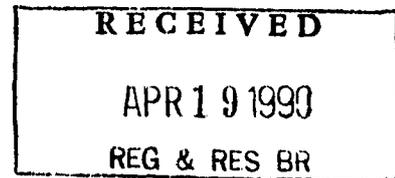


Mark Barnes
Director

copy: Port of Astoria

B:eg
a:letters

FRIEDMAN & BRUYA, INC.
ENVIRONMENTAL CHEMISTS

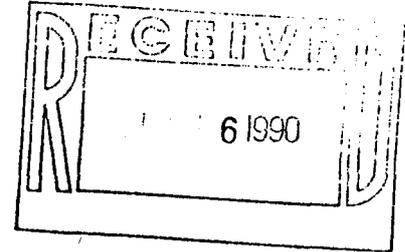


Andrew John Friedman
James E. Bruya, Ph.D.
(206) 285-8282

3008-B 16th Avenue West
Seattle, WA 98119
FAX: (206) 283-5044

April 11, 1990

Mark Barnes, Director
Columbia River Estuary Study Taskforce
750 Commercial Street
Room 214
Astoria, Oregon 97103



Dear Mr. Barnes:

Enclosed are the results of the analyses of samples submitted on January 24, 1990 from Project Port of Astoria Sediment Analysis.

We appreciate this opportunity to be of service to you on this project. If you have any questions regarding this material, or if you just want to discuss any aspect of your projects, please do not hesitate to contact me.

Sincerely,

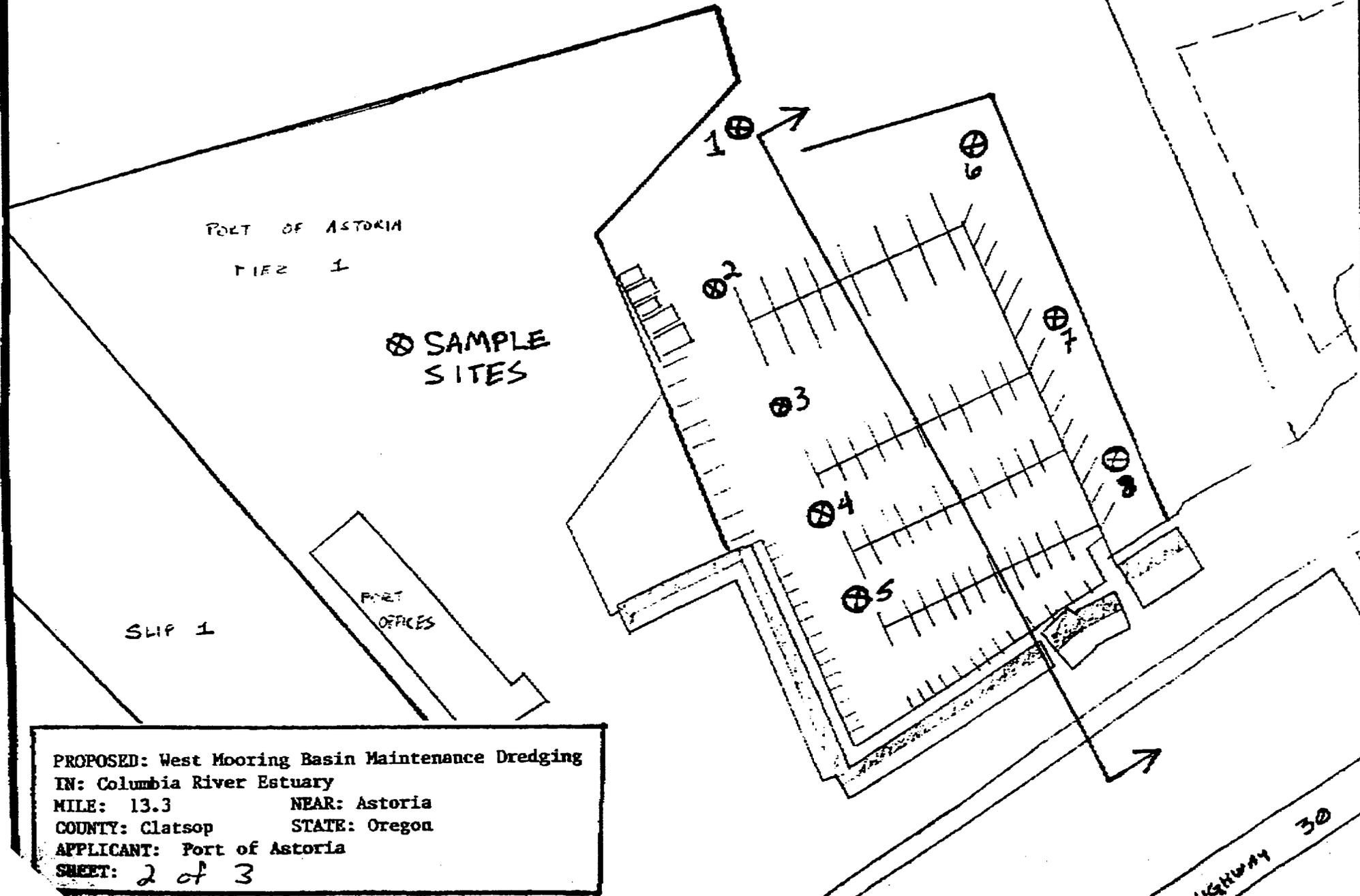

Andrew John Friedman, Chemist

AJF

Enclosures

Columbia River
ebb ↗ flood ↘

• discharge



PORT OF ASTORIA
PIER 1

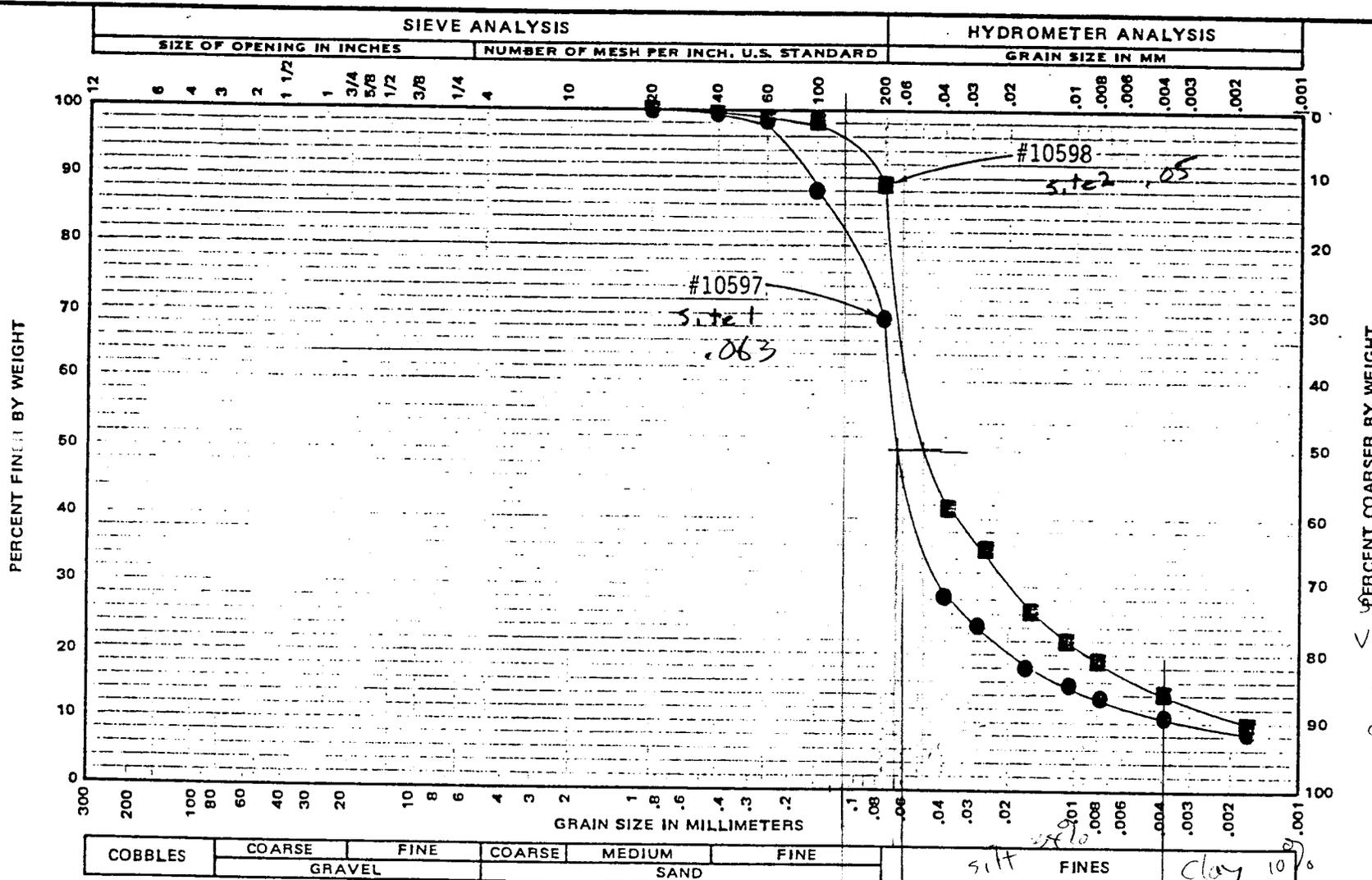
⊕ SAMPLE SITES

SLIP 1

PORT OFFICES

HIGHWAY 30

PROPOSED: West Mooring Basin Maintenance Dredging
IN: Columbia River Estuary
MILE: 13.3 NEAR: Astoria
COUNTY: Clatsop STATE: Oregon
APPLICANT: Port of Astoria
SHEET: 2 of 3

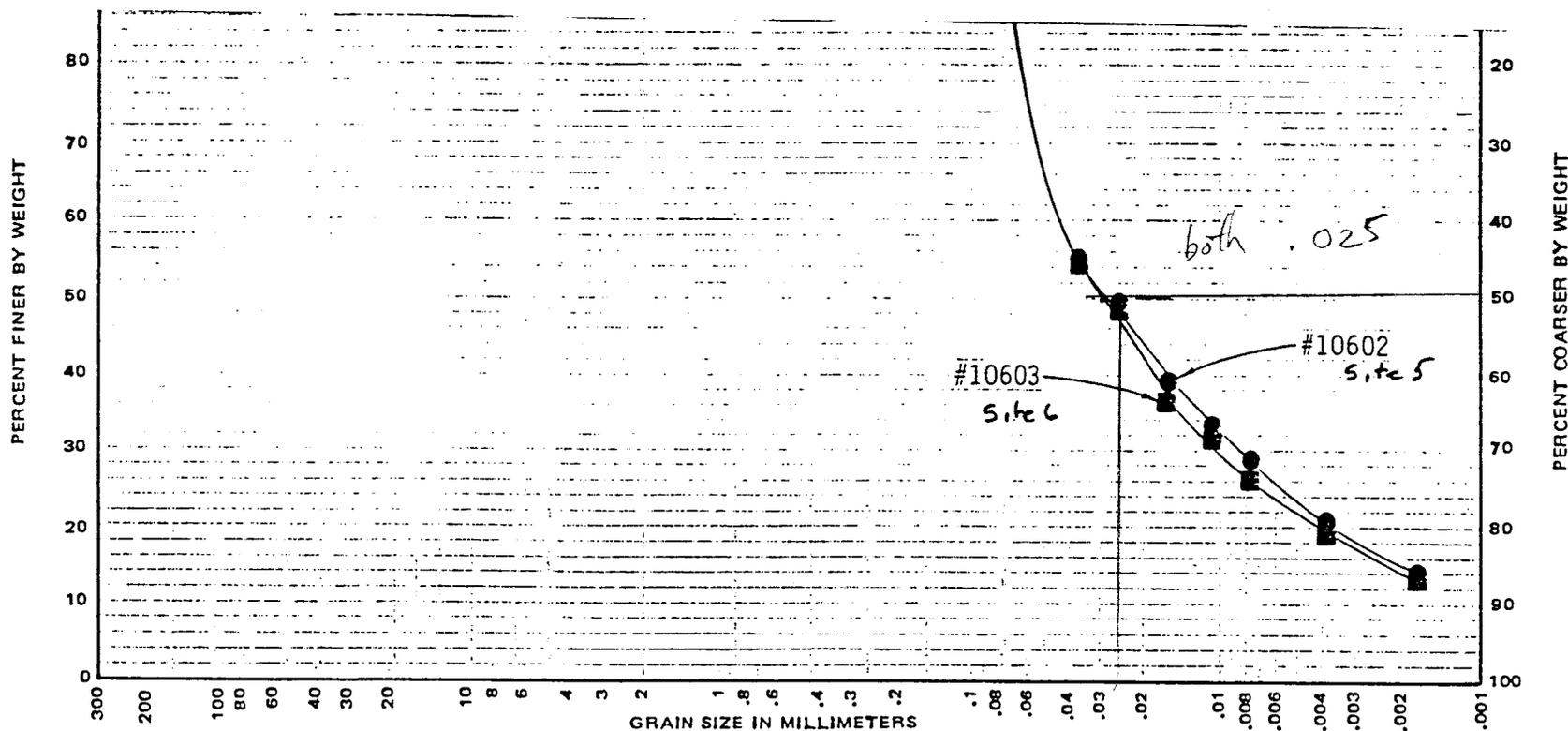


18%
 VFS 38%
 silt 34%
 clay 10%

SAMPLE NO.	DEPTH-FT.	U.S.C.	CLASSIFICATION	NAT. W.C. %	LL	PL	PI
#10597		ML	Dark brown, sandy SILT; numerous organics.	56.7			
#10598		ML	Dark brown, slightly sandy SILT; numerous organics.	81.6			

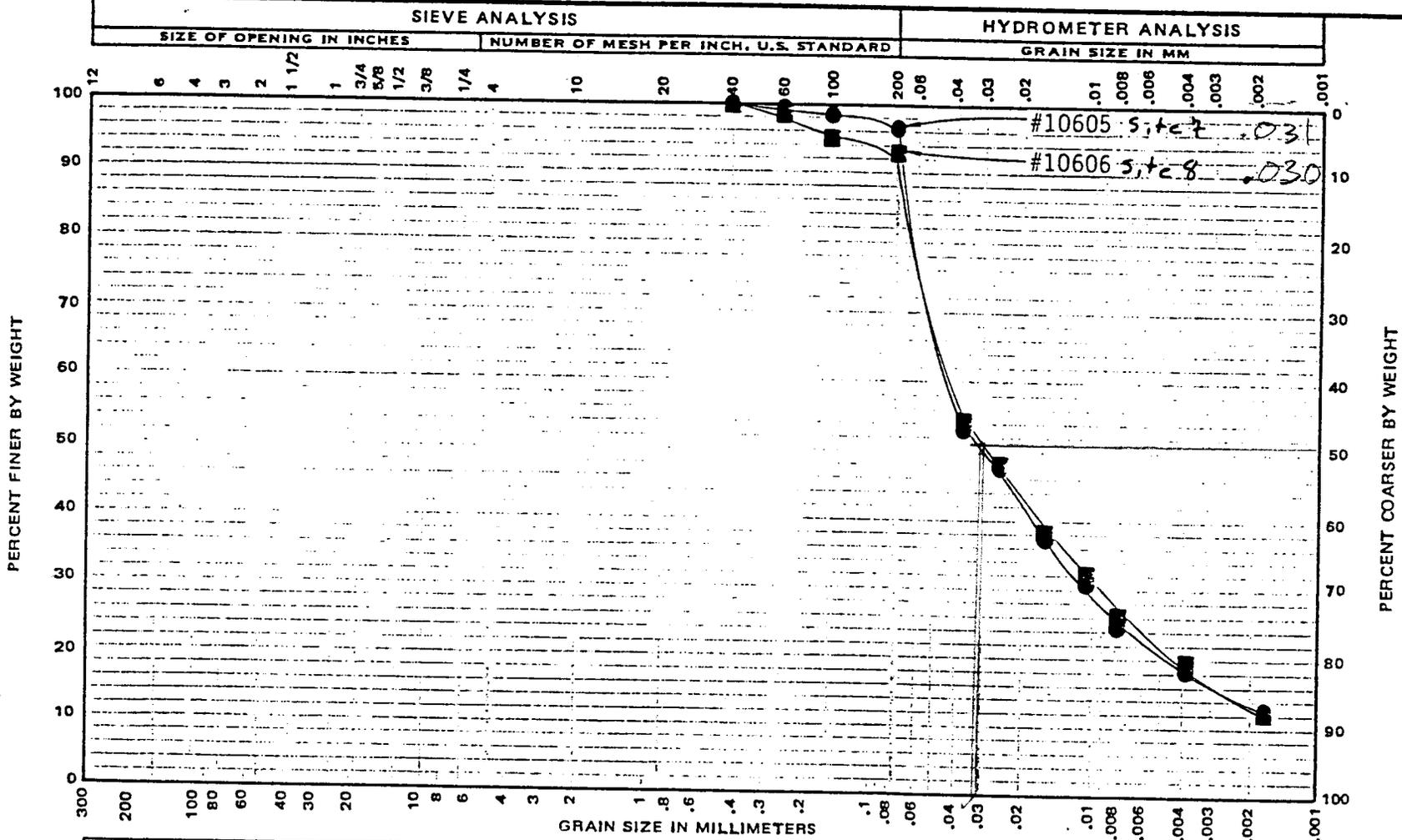
FRIEDMAN & BRUYA, INC.
 SEATTLE, WASHINGTON
 GRAIN SIZE DISTRIBUTION

SAMPLE NO.	DEPTH-FT.	U.S.C.	CLASSIFICATION	NAT. W.C. %	LL	PL	PI	FINES	
#10599		OL	Dark brown, organic SILT.	112.2				FRIEDMAN & BRUYA, INC. SEATTLE, WASHINGTON	
#10601		OL	Dark brown, organic SILT.	86.7				GRAIN SIZE DISTRIBUTION	
								MAR 1990	W-5440-01
								SHANNON & WILSON, INC. Geotechnical Consultants	



COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	FINES
	GRAVEL		SAND			

SAMPLE NO.	DEPTH-FT.	U.S.C.	CLASSIFICATION	NAT. W.C. %	LL	PL	PI	FINES	
#10602		OL	Dark brown, organic SILT.	92.2				FRIEDMAN & BRUYA, INC. SEATTLE, WASHINGTON	
#10603		OL	Dark brown, organic SILT.	111.9				GRAIN SIZE DISTRIBUTION	
								MAR 1990	W-5440-01
								SHANNON & WILSON, INC.	



COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	FINES
	GRAVEL			SAND		

SAMPLE NO.	DEPTH-FT.	U.S.C.	CLASSIFICATION	NAT. W.C. %	LL	PL	PI
#10605		OL	Dark brown, organic SILT.	106.4			
#10606		OL	Dark brown, slightly sandy, organic SILT.	94.5			

FRIEDMAN & BRUYA, INC.
SEATTLE, WASHINGTON

GRAIN SIZE DISTRIBUTION

MAR 1990

SHANNON & WILSON, INC.

10-01

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: April 11, 1990
Date Submitted: January 24, 1990
Project: Port of Astoria Sediment Analysis

RESULTS OF ANALYSES OF SEDIMENT SAMPLES
FOR PERCENT DRY WEIGHT AND VOLATILE SOLIDS

<u>Sample #.</u>	<u>Dry Weight</u> (Percent)	<u>Volatile Solids</u> (Percent)
Site 1	63	4.7
Site 2	57	6.2
Site 3	50	9.0
Site 4	51	7.2
Site 5	55	5.5
Site 6	48	6.7
Site 7	46	5.9
Site 8	48	6.1
<u>Quality Assurance</u>		
Site 6 (Duplicate)	48	6.3

Date of Report: April 11, 1990
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RESULTS OF ANALYSES OF SEDIMENT SAMPLES
FOR METALS IN ACCORDANCE WITH "TEST
METHODS FOR EVALUATING SOLID WASTE"
EPA SW-846, 3rd EDITION
Results Reported as mg/L (ppm)

<u>Sample #:</u>	<u>Site 3</u>	<u>Site 4</u>
<u>Analyte</u>		
Arsenic	<0.1	<0.1
Cadmium	0.9	1.2
Chromium	17.8	14.9
Lead	17.5	10.4
Mercury	0.85	0.13
Silver	<0.1	<0.1
Copper	28.8	24.6
Nickel	8.8	8.1
Zinc	127	84.4

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**RESULTS OF ANALYSES OF SEDIMENT SAMPLES
FOR METALS IN ACCORDANCE WITH "TEST
METHODS FOR EVALUATING SOLID WASTE"
EPA SW-846, 3rd EDITION
Results Reported as mg/L (ppm)**

<u>Sample #:</u>	<u>Site 5</u>	<u>Site 6</u>
<u>Analyte</u>		
Arsenic	<0.1	<0.1
Cadmium	0.8	1.0
Chromium	16.0	17.6
Lead	11.0	16.3
Mercury	<0.02	0.29
Silver	<0.1	<0.1
Copper	25.6	29.1
Nickel	11.0	7.8
Zinc	73.5	95.4

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RESULTS OF ANALYSES OF SEDIMENT SAMPLES
 FOR METALS IN ACCORDANCE WITH "TEST
 METHODS FOR EVALUATING SOLID WASTE"
 EPA SW-846, 3rd EDITION
 Results Reported as mg/L (ppm)

<u>Sample #:</u>	<u>Site 7</u>	<u>Site 8</u>
<u>Analyte</u>		
Arsenic	<0.1	<0.1
Cadmium	0.6	0.5
Chromium	14.7	14.3
Lead	14.3	10.7
Mercury	0.15	0.11
Silver	<0.1	<0.1
Copper	24.0	23.7
Nickel	6.8	8.0
Zinc	74.7	75.6

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 Results Reported as mg/L (ppm)
Quality Assurance

<u>Sample #:</u>	<u>Site 4</u> <u>Duplicate</u>	<u>Method</u> <u>Blank</u>
<u>Analyte</u>		
Arsenic	<0.1	<0.1
Cadmium	1.0	<0.1
Chromium	14.2	<0.1
Lead	9.6	<0.1
Mercury	0.16	<0.02
Silver	<0.1	<0.1
Copper	21.4	<0.1
Nickel	7.8	<0.1
Zinc	82.3	<0.2

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 EPA SW-846, 3rd EDITION
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Quality Assurance

<u>Sample #:</u>	Site 4 <u>(Matrix Spike)^a</u> % Recovery	Site 4 <u>(Matrix Spike Duplicate)^a</u> % Recovery
<u>Analyte</u>		
Arsenic	110%	100%
Cadmium	120%	120%
Chromium	b	b
Lead	b	b
Mercury	120%	120%
Silver	100%	110%
Copper	b	b
Nickel	b	b
Zinc	b	b

^a - All spikes were at 2.8 ppm each metal, except for mercury which was spiked at 1.0 ppm.

^b - The amount spiked was insufficient to give meaningful recovery data.

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RESULTS OF ANALYSES OF SEDIMENT SAMPLES
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EPA SW-846, 3rd EDITION
Results Reported as mg/L (ppm)

<u>Sample #:</u>	<u>Site 1</u>	<u>Site 2</u>
<u>Analyte</u>		
Arsenic	<0.1	<0.1
Cadmium	0.7	0.5
Chromium	8.8	11.9
Lead	7.8	9.2
Mercury	0.11	0.41
Silver	<0.1	<0.1
Copper	14.8	23.9
Nickel	5.9	6.7
Zinc	40.8	57.5

ENVIRONMENTAL CHEMISTS

Date of Report: April 11, 1990
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RESULTS OF ANALYSES OF SEDIMENT SAMPLES
 FOR SELECTED PESTICIDES BY GC/ECD
 Results Reported as ng/g (ppb)

<u>Sample #:</u>	<u>Site 1</u>	<u>Site 2</u>	<u>Site 3</u>	<u>Site 4</u>
<u>Analyte:</u>				
α -BHC/ β -BHC	<1	<1	<1	<1
δ -BHC/ γ -BHC	<4 ^a	<20 ^a	<6 ^a	<4 ^a
Heptachlor	<2	<2	<2	<2
Heptachlor Epoxide	<2	<2	<2	<2
Aldrin	<10 ^a	<60 ^a	<20 ^a	<10 ^a
Endosulfan I	<2	<2	<2	<2
Endosulfan II	<2	<2	<2	<2
Dieldrin	<2	<2	<2	<2
o,p'-DDE	<2	<2	<2	<2
p,p'-DDE	<2	<2	<2	<2
Endrin	<2	<2	<2	<2
o,p'-DDD	<3	<3	<3	<3
p,p'-DDD	<3	<3	<3	<3
o,p'-DDT	<3	<3	<3	<3
p,p'-DDT	<3	<3	<3	<3
Chlordane	<10	<10	<10	<10
Toxaphene	<150	<150	<150	<150

^a - Interferences were present which precluded analyzing to the desired detection limit.

ENVIRONMENTAL CHEMISTS

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RESULTS OF ANALYSES OF SEDIMENT SAMPLES
 FOR SELECTED PESTICIDES BY GC/ECD
 Results Reported as ng/g (ppb)

<u>Sample #:</u>	<u>Site 5</u>	<u>Site 6</u>	<u>Site 7</u>	<u>Site 8</u>
<u>Analyte:</u>				
α -BHC/ β -BHC	<1	<1	<1	<1
δ -BHC/ γ -BHC	<5 ^a	<2 ^a	<20 ^a	<50 ^a
Heptachlor	<2	<2	<2	<2
Heptachlor Epoxide	<2	<2	<2	<2
Aldrin	<10 ^a	<15 ^a	<30 ^a	<70 ^a
Endosulfan I	<2	<2	<2	<2
Endosulfan II	<2	<2	<2	<2
Dieldrin	<2	<2	<2	<2
o,p'-DDE	<2	<2	<2	<2
p,p'-DDE	<2	<2	<2	<2
Endrin	<2	<2	<2	<2
o,p'-DDD	<3	<3	<3	<3
p,p'-DDD	<3	<3	<3	<3
o,p'-DDT	<3	<3	<3	<3
p,p'-DDT	<3	<3	<3	<3
Chlordane	<10	<10	<10	<10
Toxaphene	<150	<150	<150	<150

^a - Interferences were present which precluded analyzing to the desired detection limit.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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RESULTS OF ANALYSES OF SEDIMENT SAMPLES
 FOR SELECTED PESTICIDES BY GC/ECD
 Results Reported as ng/g (ppb)

<u>Sample #:</u>	<u>Site 6 Duplicate</u>	<u>Site 6 Matrix Spike</u>	<u>Blank</u>	<u>Spike Level</u>
<u>Analyte:</u>				
α-BHC/β-BHC	<1	100%	<1	50 ^b
δ-BHC/γ-BHC	<1	75%	<1	50 ^b
Heptachlor	<2	140%	<2	50
Heptachlor Epoxide	<2	110%	<2	50
Aldrin	<15 ^a	72%	<2	50
Endosulfan I	<2	120%	<2	50
Endosulfan II	<2	120%	<2	50
Dieldrin	<2	140%	<2	50
o,p'-DDE	<2	140%	<2	50
p,p'-DDE	<2	150%	<2	50
Endrin	<2	80% ^c	<2	50
o,p'-DDD	<3	80%	<3	50
p,p'-DDD	<3	80% ^c	<3	50
o,p'-DDT	<3	100%	<3	50
p,p'-DDT	<3	100%	<3	50
Chlordane	<10	37% ^d	<10	200
Toxaphene	<150	37% ^d	<150	2,000

^a - Interferences were present which precluded analyzing to the desired detection limit.

^b - Spike level is for each analyte.

^c - Endrin and p,p'-DDD co-eluted. The value reported is calculated from an average response for both compounds.

^d - The sample may have been spiked at one-half the desired level.

ENVIRONMENTAL CHEMISTS

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RESULTS OF ANALYSES OF SEDIMENT
 SAMPLES FOR PCB BY GC/ECD
 Results Reported as ng/g (ppb)

<u>Sample #:</u>	<u>Site 1</u>	<u>Site 2</u>	<u>Site 3</u>	<u>Site 4</u>
<u>Analyte:</u>				
Arochlor 1016	<20	<20	<20	<20
Arochlor 1242	<20	<20	<20	<20
Arochlor 1248	<20	<20	<20	<20
Arochlor 1254	<20	<20	<20	<20
Arochlor 1260	<20	<20	<20	<20
Arochlor 1262	<20	<20	<20	<20

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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RESULTS OF ANALYSES OF SEDIMENT
SAMPLES FOR PCB BY GC/ECD
Results Reported as ng/g (ppb)

<u>Sample #:</u>	<u>Site 5</u>	<u>Site 6</u>	<u>Site 7</u>	<u>Site 8</u>
<u>Analyte:</u>				
Arochlor 1016	<20	<20	<20	<20
Arochlor 1242	<20	<20	<20	<20
Arochlor 1248	<20	<20	<20	<20
Arochlor 1254	<20	<20	<20	<20
Arochlor 1260	<20	<20	<20	<20
Arochlor 1262	<20	<20	<20	<20

ENVIRONMENTAL CHEMISTS

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RESULTS OF ANALYSES OF SEDIMENT
 SAMPLES FOR PCB BY GC/ECD
 Results Reported as ng/g (ppb)

<u>Sample #:</u>	<u>Site 6 Duplicate</u>	<u>Site 6^a Mat. Sp.</u>	<u>Blank</u>
<u>Analyte:</u>			
Arochlor 1016	<20	84%	<20
Arochlor 1242	<20	b	<20
Arochlor 1248	<20	b	<20
Arochlor 1254	<20	b	<20
Arochlor 1260	<20	b	<20
Arochlor 1262	<20	110%	<20

a - Spiked at 500 ppb Arochlor 1016 and 500 ppb Arochlor 1262.

b - Analyte not added to Matrix Spike sample.

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RESULTS OF ANALYSES OF SEDIMENT SAMPLES
FOR SELECTED AROMATIC COMPOUNDS
BY GC/MS
Results Reported as ng/g (ppb)

<u>Sample #:</u>	<u>Site 1</u>	<u>Site 2</u>	<u>Site 3</u>	<u>Site 4</u>
<u>Analyte:</u>				
Naphthalene	<500	<500	<500	<500
2-Methylnaphthalene	<500	<500	<500	<500
Acenaphthylene	<500	<500	<500	<500
Acenaphthene	<500	<500	<500	<500
Dibenzofuran	<500	<500	<500	<500
Fluorene	<500	<500	<500	<500
Phenanthrene	<500	<500	<500	<500
Anthracene	<500	<500	<500	<500
Fluoranthene	<500	<500	<500	<500
Pyrene	<500	<500	<500	<500
Benzo[a]anthracene	<500	<500	<500	<500
Chrysene	<500	<500	<500	<500
Benzofluoranthenes	<500	<500	<500	<500
Benzo[a]pyrene	<500	<500	<500	<500
Indeno[1,2,3-cd]pyrene/ Dibenz[a,h]anthracene	<500	<500	<500	<500
Benzo[ghi]perylene	<500	<500	<500	<500

ENVIRONMENTAL CHEMISTS

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RESULTS OF ANALYSES OF SEDIMENT SAMPLES
FOR SELECTED AROMATIC COMPOUNDS
BY GC/MS
Results Reported as ng/g (ppb)

<u>Sample #:</u>	<u>Site 5</u>	<u>Site 6</u>	<u>Site 7</u>	<u>Site 8</u>
<u>Analyte:</u>				
Naphthalene	<500	<500	<500	<500
2-Methylnaphthalene	<500	<500	<500	<500
Acenaphthylene	<500	<500	<500	<500
Acenaphthene	<500	<500	<500	<500
Dibenzofuran	<500	<500	<500	<500
Fluorene	<500	<500	<500	<500
Phenanthrene	<500	<500	<500	<500
Anthracene	<500	<500	<500	<500
Fluoranthene	<500	<500	<500	<500
Pyrene	<500	<500	<500	<500
Benzo[a]anthracene	<500	<500	<500	<500
Chrysene	<500	<500	<500	<500
Benzofluoranthenes	<500	<500	<500	<500
Benzo[a]pyrene	<500	<500	<500	<500
Indeno[1,2,3-cd]pyrene/ Dibenz[a,h]anthracene	<500	<500	<500	<500
Benzo[ghi]perylene	<500	<500	<500	<500

ENVIRONMENTAL CHEMISTS

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RESULTS OF ANALYSES OF SEDIMENT SAMPLES
 FOR SELECTED AROMATIC COMPOUNDS
 BY GC/MS
 Results Reported as ng/g (ppb)
Quality Assurance

<u>Sample #:</u>	<u>Blank</u>	<u>Site 6 Duplicate</u>	<u>Site 6^a Mat. Sp.</u>	<u>Site 6^a Mat. Sp. Dup.</u>
<u>Analyte:</u>				
Naphthalene	<500	<500	170%	160%
2-Methylnaphthalene	<500	<500	b	b
Acenaphthylene	<500	<500	100%	96%
Acenaphthene	<500	<500	100%	100%
Dibenzofuran	<500	<500	b	b
Fluorene	<500	<500	100%	97%
Phenanthrene	<500	<500	79%	78%
Anthracene	<500	<500	110%	100%
Fluoranthene	<500	<500	87%	86%
Pyrene	<500	<500	96%	94%
Benzo[a]anthracene	<500	<500	87%	69%
Chrysene	<500	<500	84%	100%
Benzofluoranthenes	<500	<500	76%	74%
Benzo[a]pyrene	<500	<500	80%	86%
Indeno[1,2,3-cd]pyrene/ Dibenz[a,h]anthracene	<500	<500	76%	72%
Benzo[ghi]perylene	<500	<500	70%	68%

a - Spiked at 2 ppm wet weight (ca 4 ppm dry), except for the benzofluoranthenes which were spiked at 4 ppm.

b - The analyte indicated was not added to the matrix spike sample.

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RESULTS OF ANALYSES OF SEDIMENT SAMPLES
FOR SELECTED PHENOLIC COMPOUNDS
BY GC/MS
Results Reported as ng/g (ppb)

<u>Sample #:</u>	<u>Site 1</u>	<u>Site 2</u>	<u>Site 3</u>	<u>Site 4</u>
<u>Analyte:</u>				
Phenol	<100	<100	<100	<100
2-Chlorophenol	<100	<100	<100	<100
2-Methylphenol	<100	<100	<100	<100
4-Methylphenol	<100	<100	<100	<100
2-Nitrophenol	<100	<100	<100	<100
2,4-Dinitrophenol	<100	<100	<100	<100
2,4-Dichlorophenol	<100	<100	<100	<100
4-Chloro-3-Methylphenol	<100	<100	<100	<100
2,4,6-Trichlorophenol	<100	<100	<100	<100
2,4,5-Trichlorophenol	<100	<100	<100	<100

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BY GC/MS
Results Reported as ng/g (ppb)

<u>Sample #:</u>	<u>Site 5</u>	<u>Site 6</u>	<u>Site 7</u>	<u>Site 8</u>
<u>Analyte:</u>				
Phenol	<100	<100	<100	<100
2-Chlorophenol	<100	<100	<100	<100
2-Methylphenol	<100	<100	<100	<100
4-Methylphenol	<100	<100	<100	<100
2-Nitrophenol	<100	<100	<100	<100
2,4-Dinitrophenol	<100	<100	<100	<100
2,4-Dichlorophenol	<100	<100	<100	<100
4-Chloro-3-Methylphenol	<100	<100	<100	<100
2,4,6-Trichlorophenol	<100	<100	<100	<100
2,4,5-Trichlorophenol	<100	<100	<100	<100

Date of Report: April 11, 1990
 Date Submitted: January 24, 1990
 Project: Port of Astoria Sediment Analysis

RESULTS OF ANALYSES OF SEDIMENT SAMPLES
 FOR SELECTED PHENOLIC COMPOUNDS
 BY GC/MS
 Results Reported as ng/g (ppb)
Quality Assurance

<u>Sample #:</u>	<u>Blank</u>	<u>Site 7 (Duplicate)</u>	<u>Site 7^a (Mat. Sp.) % Recovery</u>	<u>Site 7^b (Mat. Sp. Dup.) % Recovery</u>
<u>Analyte:</u>				
Phenol	<100	<100	87%	71%
2-Chlorophenol	<100	<100	89%	77%
2-Methylphenol	<100	<100	59%	73%
4-Methylphenol	<100	<100	62%	71%
2-Nitrophenol	<100	<100	32%	51%
2,4-Dinitrophenol	<100	<100	36%	46%
2,4-Dichlorophenol	<100	<100	66%	89%
4-Chloro-3-Methylphenol	<100	<100	74%	52%
2,4,6-Trichlorophenol	<100	<100	85%	71%
2,4,5-Trichlorophenol	<100	<100	91%	89%

a - Spiking level was 328 ppm each analyte.

b - Spiking level was 434 ppm each analyte.