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February 3, 1993

Port of Tacoma
P.O. Box 1837
Tacoma, WA 98401

Attn: Suzanne Dudziak

Sample ID: IY-19
Project: 22789.1
Sample Matrix: Soil
Date Sampled: 1-21-93
Date Received: 1-22-93
Spectra Project: S301-151
Spectra #0500

PCB's, mg/Kg Surrogate Recovery - tcm-Xylene 70%	0.20	type 1260

Total Metals, mg/Kg

Arsenic	(As)	<5
Lead	(Pb)	138
Mercury	(Hg)	<3
Copper	(Cu)	399
Zinc	(Zn)	732

PCB's performed by EPA Method 8080
Total Metals testing performed by EPA Method 6010

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Steven G. Hibbs, Chemist

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February 3, 1993

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P.O. Box 1837
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Attn: Suzanne Dudziak

Sample ID: IY-20
Project: 22789.1
Sample Matrix: Soil
Date Sampled: 1-21-93
Date Received: 1-22-93
Spectra Project: S301-151
Spectra #0501

PCB's, mg/Kg	0.18	type 1260
Surrogate Recovery - tcm-Xylene 78%		

Total Metals, mg/Kg

Arsenic	(As)	<5
Lead	(Pb)	166
Mercury	(Hg)	<3
Copper	(Cu)	763
Zinc	(Zn)	1,074

PCB's performed by EPA Method 8080
Total Metals testing performed by EPA Method 6010

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Attn: Suzanne Dudziak

Sample ID: IY-21
Project: 22789.1
Sample Matrix: Soil
Date Sampled: 1-21-93
Date Received: 1-22-93
Spectra Project: S301-151
Spectra #0502

PCB's, mg/Kg	0.13	type 1260
Surrogate Recovery - tcm-Xylene 39%*		

* Out of limits due to sample matrix effects

Total Metals, mg/Kg

Arsenic	(As)	<5
Lead	(Pb)	188
Mercury	(Hg)	<3
Copper	(Cu)	874
Zinc	(Zn)	3,700

PCB's performed by EPA Method 8080
Total Metals testing performed by EPA Method 6010

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Attn: Suzanne Dudziak

Sample ID: IY-22
Project: 22789.1
Sample Matrix: Soil
Date Sampled: 1-21-93
Date Received: 1-22-93
Spectra Project: S301-151
Spectra #0503

PCB's, mg/Kg Surrogate Recovery - tcm-Xylene 72%	0.20	type 1260

Total Metals, mg/Kg

Arsenic	(As)	<5
Lead	(Pb)	220
Mercury	(Hg)	<3
Copper	(Cu)	733
Zinc	(Zn)	951

PCB's performed by EPA Method 8080
Total Metals testing performed by EPA Method 6010

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Attn: Suzanne Dudziak

Sample ID: IY-23
Project: 22789.1
Sample Matrix: Soil
Date Sampled: 1-21-93
Date Received: 1-22-93
Spectra Project: S301-151
Spectra #0504

PCB's, mg/Kg	0.14	type 1260
Surrogate Recovery - tcm-Xylene 83%		

Total Metals, mg/Kg

Arsenic	(As)	<5
Lead	(Pb)	161
Mercury	(Hg)	<3
Copper	(Cu)	449
Zinc	(Zn)	697

PCB's performed by EPA Method 8080
Total Metals testing performed by EPA Method 6010

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Attn: Suzanne Dudziak

Sample ID: IY-24
Project: 22789.1
Sample Matrix: Soil
Date Sampled: 1-21-93
Date Received: 1-22-93
Spectra Project: S301-151
Spectra #0505

PCB's, mg/Kg Surrogate Recovery - tcm-Xylene 78%	0.42	type 1260

Total Metals, mg/Kg

Arsenic	(As)	<5
Lead	(Pb)	468
Mercury	(Hg)	<3
Copper	(Cu)	592
Zinc	(Zn)	879

PCB's performed by EPA Method 8080
Total Metals testing performed by EPA Method 6010

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Attn: Suzanne Dudziak

Sample ID: IY-25
Project: 22789.1
Sample Matrix: Soil
Date Sampled: 1-21-93
Date Received: 1-22-93
Spectra Project: S301-151
Spectra #0506

PCB's, mg/Kg	<0.1
Surrogate Recovery - tcm-Xylene 77%	

Total Metals, mg/Kg

Arsenic	(As)	<5
Lead	(Pb)	398
Mercury	(Hg)	<3
Copper	(Cu)	165
Zinc	(Zn)	872

PCB's performed by EPA Method 8080
Total Metals testing performed by EPA Method 6010

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Attn: Suzanne Dudziak

Sample ID: IY-27
Project: 22789.1
Sample Matrix: Soil
Date Sampled: 1-22-93
Date Received: 1-22-93
Spectra Project: S301-151
Spectra #0511

PCB's, mg/Kg	0.37	type 1260
Surrogate Recovery - tcm-Xylene 92%		

Total Metals, mg/Kg

Arsenic	(As)	<5
Lead	(Pb)	242
Mercury	(Hg)	<3
Copper	(Cu)	363
Zinc	(Zn)	720

PCB's performed by EPA Method 8080
Total Metals testing performed by EPA Method 6010

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Attn: Suzanne Dudziak

Sample ID: IY-28
Project: 22789.1
Sample Matrix: Soil
Date Sampled: 1-22-93
Date Received: 1-22-93
Spectra Project: S301-151
Spectra #0512

PCB's, mg/Kg	0.37	type 1260
Surrogate Recovery - tcm-Xylene 67%		

Total Metals, mg/Kg

Arsenic	(As)	<5
Lead	(Pb)	206
Mercury	(Hg)	<3
Copper	(Cu)	349
Zinc	(Zn)	738

PCB's performed by EPA Method 8080
Total Metals testing performed by EPA Method 6010

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February 3, 1993

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Attn: Suzanne Dudziak

Sample ID: IY-30
Project: 22789.1
Sample Matrix: Soil
Date Sampled: 1-22-93
Date Received: 1-22-93
Spectra Project: S301-151
Spectra #0509

PCB's, mg/Kg Surrogate Recovery - tcm-Xylene 73%	0.26	type 1260

Total Metals, mg/Kg

Arsenic	(As)	<5
Lead	(Pb)	185
Mercury	(Hg)	<3
Copper	(Cu)	373
Zinc	(Zn)	1,280

PCB's performed by EPA Method 8080
Total Metals testing performed by EPA Method 6010

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February 3, 1993

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Attn: Suzanne Dudziak

Sample ID: IY-31
Project: 22789.1
Sample Matrix: Soil
Date Sampled: 1-22-93
Date Received: 1-22-93
Spectra Project: S301-151
Spectra #0508

PCB's, mg/Kg Surrogate Recovery - tcm-Xylene 63%	0.71	type 1260

Total Metals, mg/Kg

Arsenic	(As)	<5
Lead	(Pb)	291
Mercury	(Hg)	<3
Copper	(Cu)	413
Zinc	(Zn)	1,110

PCB's performed by EPA Method 8080
Total Metals testing performed by EPA Method 6010

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Attn: Suzanne Dudziak

Sample ID: IY-32
Project: 22789.1
Sample Matrix: Soil
Date Sampled: 1-22-93
Date Received: 1-22-93
Spectra Project: S301-151
Spectra #0510

PCB's, mg/Kg Surrogate Recovery - tcm-Xylene 95%	0.28	type 1260

Total Metals, mg/Kg

Arsenic	(As)	<5
Lead	(Pb)	138
Mercury	(Hg)	<3
Copper	(Cu)	491
Zinc	(Zn)	788

PCB's performed by EPA Method 8080
Total Metals testing performed by EPA Method 6010

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Attn: Suzanne Dudziak

DUPLICATE
Units: mg/Kg
Spectra Project: S301-151
Applies to Spectra #0502

Compound		Sample Result	Duplicate Result	RPD
Arsenic	(As)	<5	<5	0
Lead	(Pb)	188	184	2
Mercury	(Hg)	<3	<3	0
Copper	(Cu)	874	817	7
Zinc	(Zn)	1140	3700	106*

* Out of limits

Total Metals testing performed by EPA Method 6010

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Attn: Suzanne Dudziak

DUPLICATE
Units: mg/Kg
Spectra Project: S301-151
Applies to Spectra #0494

Compound		Sample Result	Duplicate Result	RPD
Arsenic	(As)	<5	<5	0
Lead	(Pb)	366	286	25*
Mercury	(Hg)	<3	<3	0
Copper	(Cu)	502	473	6
Zinc	(Zn)	550	1530	94*

* Out of limits

Total Metals testing performed by EPA Method 6010

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Attn: Suzanne Dudziak

DUPLICATE
Units: mg/Kg
Spectra Project: S301-151
Applies to Spectra #0488

Compound		Sample Result	Duplicate Result	RPD
Arsenic	(As)	<5	<5	0
Lead	(Pb)	234	125	61*
Mercury	(Hg)	<3	<3	0
Copper	(Cu)	665	646	3
Zinc	(Zn)	1190	967	21

* Out of limits

Total Metals testing performed by EPA Method 6010

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February 3, 1993

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P.O. Box 1837
Tacoma, WA 98401

Attn: Suzanne Dudziak

EPA Method: 6010
Spiked Sample: S301-151-502
Date Extracted: 1-25-93
Date Analyzed: 1-26-93
Units: mg/Kg
Applies to Spectra Project: S301-151

TOTAL METALS ANALYSIS
QUALITY CONTROL RESULTS

Compound	Sample Result	Spike Amount	Spike Result	% Recovery	Dup. Result	Dup. Recovery	% RPD
Arsenic	<5	100	84.2	84	84.2	84	0
Lead	188	1000	1215	103	1037	85	16
Mercury	<3	100	74.3	74	66.6	67	11
Copper	874	1000	1960	109	1673	80	16
Zinc	1140	1000	2110	97	2050	91	3

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February 3, 1993

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Tacoma, WA 98401

Attn: Suzanne Dudziak

EPA Method: 6010
Spiked Sample: S301-151-494
Date Extracted: 1-25-93
Date Analyzed: 1-26-93
Units: mg/Kg
Applies to Spectra Project: S301-151

TOTAL METALS ANALYSIS
QUALITY CONTROL RESULTS

Compound	Sample Result	Spike Amount	Spike Result	% Recovery	Dup. Result	Dup. Recovery	% RPD
Arsenic	<5	98	110	113	108	118	2
Lead	366	1000	1280	91	1175	81	9
Mercury	<3	98	88	90	86	88	2
Copper	502	1000	1375	87	1495	99	8
Zinc	550	1000	1511	96	1575	103	4

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February 3, 1993

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P.O. Box 1837
Tacoma, WA 98401

Attn: Suzanne Dudziak

EPA Method: 6010
Spiked Sample: S301-151-488
Date Extracted: 1-26-93
Date Analyzed: 1-26-93
Units: mg/Kg
Applies to Spectra Project: S301-151

TOTAL METALS ANALYSIS
QUALITY CONTROL RESULTS

Compound	Sample Result	Spike Amount	Spike Result	% Recovery	Dup. Result	Dup. Recovery	% RPD
Arsenic	<5	100	80	80	82	82	2
Lead	234	1000	1020	79	962	73	6
Mercury	<3	100	66	66	75	75	13
Copper	665	1000	1423	76	1432	77	1
Zinc	1190	1000	1940	75	1910	72	2

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February 3, 1993

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Tacoma, WA 98401

Attn: Suzanne Dudziak

METHOD BLANK
Date Analyzed: 1-26-93
Applies to Spectra Project: S301-151

Total Metals, mg/Kg

Arsenic	(As)	<5
Lead	(Pb)	<4
Mercury	(Hg)	<3
Copper	(Cu)	0.3
Zinc	(Zn)	1.8

Total Metals testing performed by EPA Method 6010

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February 3, 1993

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Tacoma, WA 98401

Attn: Suzanne Dudziak

EPA Method: PCB's 8080
Sample Matrix: Soil
Spectra Project: S301-151
Applies to Spectra #'s
0484 through 0490

PCB ANALYSIS
QUALITY CONTROL RESULTS

MS/MSD

Spiked Sample: Method Blank
Units: mg/Kg

Date Extracted: 12-28-92
Date Analyzed: 12-28-92

Compound	Sample Result	Spike Amount	Spike Result	% Recovery	Dup. Result	Dup. Recovery	% RPD
Type 1260	<0.1	4.70	4.36	93	4.15	88	5

METHOD BLANK

Date Extracted: 1-25-93

Date Analyzed: 1-25-93

PCB's, mg/Kg <0.1

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February 3, 1993

Port of Tacoma
P.O. Box 1837
Tacoma, WA 98401

Attn: Suzanne Dudziak

EPA Method: PCB's 8080
Sample Matrix: Soil
Spectra Project: S301-151
Applies to Spectra #'s
0491 through 0512

PCB ANALYSIS
QUALITY CONTROL RESULTS

MS/MSD

Spiked Sample: Method Blank
Units: mg/Kg

Date Extracted: 1-28-93
Date Analyzed: 1-28-93

Compound	Sample Result	Spike Amount	Spike Result	% Recovery	Dup. Result	Dup. Recovery	% RPD
Type 1260	<0.1	4.70	3.53	75	3.55	76	1

METHOD BLANK

Date Extracted: 1-28-93

Date Analyzed: 1-28-93

PCB's, mg/Kg <0.1

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Steven G. Hibbs, Chemist

ATT. E

Harding Lawson Associates

November 15, 1993

22789.1

Ms. Suzanne Dudziak
Port of Tacoma
Post Office Box 1837
Tacoma, Washington 98401

Interim Catch Basin Sediment Report
Port of Tacoma Industrial Yard

Dear Ms. Dudziak

This letter report describes methods and analytical results for the second round of catch basin sediment sampling conducted September 27 and 28, 1993 in the Port of Tacoma's Industrial Yard. Sediments in the catch basins sampled in January during the first round were removed using a vacuum truck on March 23, 1993, and are stockpiled on site awaiting disposal by the Port of Tacoma. Results from the first sampling round are summarized in Harding Lawson Associate's letter report "Interim Catch Basin Sediment Report, Port of Tacoma Industrial Yard", dated April 21, 1993. This work was performed to fulfill a Washington Department of Ecology (Ecology) request (letter from Dave Smith to Leslie Sacha, December 10, 1992).

Methods

Catch basin sediment sampling was performed September 27 and 28 , 1993 in the twenty-seven catch basins within the Port of Tacoma's Industrial Yard which drain to the Hylebos Waterway (Figure 1). Two catch basins (IY-3 and IY-10) previously sampled were not accessible during the sampling event due to stockpiled construction materials. Catch basins were located using a site map provided by the Port of Tacoma. Two of the identified catch basins had apparently been paved over and could therefore not be sampled (IY-9 and -29), and an additional two were located which were not on the site map (IY-24 and -32).

Sampling was performed with a polyethylene cup attached to an extendible pole. Four representative sediment subsamples from each catch basin with sufficient sediment volumes were composited in a stainless steel bowl. At catch basins where sediment accumulation since the March 1993 cleanout was insufficient for subsampling, a single sample was collected and submitted for analysis. The cup and bowl were rinsed with deionized water between samples. The samples were delivered to Spectra Laboratory for analysis of total arsenic, lead, mercury, copper, zinc and polychlorinated biphenyls (PCBs).

Sediment thickness was estimated by obtaining the total catch basin depth with a sounding pole and estimating the depth to the sediment with a weighted disk attached to a rope. The volume was

Engineering and
Environmental Services

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calculated by multiplying this thickness by the measured basin area, and weights were calculated assuming a specific gravity near 1.0 due to the high moisture content of the sediment.

Results

Volumes, weights, and analytical results are provided on Table 1. The total weight of the sediments in the twenty-seven basins was approximately 0.7 tons. Each sediment sample had arsenic and mercury levels below reported detection limits. Lead, copper, and zinc levels were variable, and averaged approximately 300, 470 and 830 mg/kg, respectively. Results from the January sampling event indicated that IY-16, which drains a portion of the area containing sand blast grit, had the highest lead level and second highest copper and zinc levels. Reported results for IY-16 from the September event show the second highest levels for lead, copper and zinc. The average PCB concentration was below 1 mg/kg.

Please call if you have any questions concerning this letter report.

Yours Very Truly,

HARDING LAWSON ASSOCIATES

Mark B. Winters

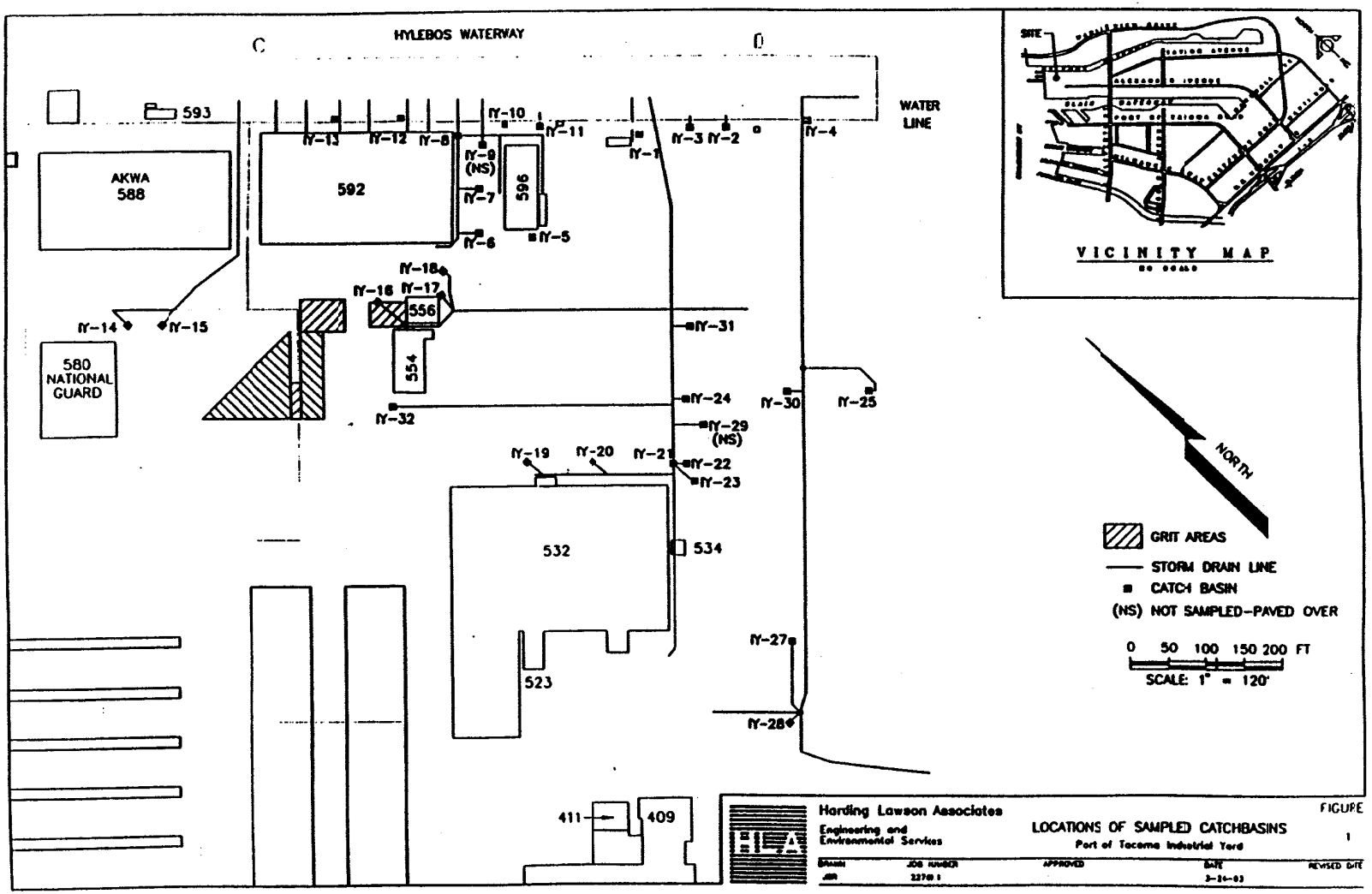
Mark B. Winters
Senior Geologist

Daniel Balbiani

Daniel A. Balbiani, P.E.
Managing Principal Engineer

MBW:DAB:gt\93gt0921.ltr

Enclosures



Harding Lawson Associates
Engineering and Environmental Services

LOCATIONS OF SAMPLED CATCHBASINS
Port of Tacoma Industrial Yard

FIGURE 1

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
JBR	32700 1		3-24-93	

TABLE 1

PORT OF TACOMA INDUSTRIAL YARD
CATCH BASIN SEDIMENT SAMPLING RESULTS

SAMPLE	VOLUME (Cu.Ft.)		WEIGHT (lb.)		ARSENIC (mg/kg)		LEAD (mg/kg)		MERCURY (mg/kg)		COPPER (mg/kg)		ZINC (mg/kg)		PCBs (mg/kg)	
	1/93	9/93	1/93	9/93	1/93	9/93	1/93	9/93	1/93	9/93	1/93	9/93	1/93	9/93	1/93	9/93
IY-1	0.23	0.07	14	4	<5	<5	205	200	<3	<3	541	214	809	765	0.27	0.32
IY-2	0.39	0.40	24	25	<5	<5	205	84	<3	<3	136	92.6	962	364	0.61	0.24
IT-3	0.25	–	16	–	<5	–	126	–	<3	–	204	–	538	–	0.20	–
IY-4	0.39	NA	24	NA	<5	<5	40	56	<3	<3	30	352	275	367	0.36	2.05
IY-5	5.35	NA	334	NA	<5	<5	335	650	<3	<3	618	283	1580	1450	1.50	0.81
IY-6	2.97	1.39	185	87	<5	<5	234	310	<3	<3	665	483	1190	686	0.57	0.35
IY-7	1.19	1.27	74	79	<5	<5	449	360	<3	<3	748	488	1085	852	0.61	0.56
IY-8	2.28	1.96	142	122	<5	<5	464	470	<3	<3	841	580	1340	1150	0.41	0.51
IY-9	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
IY-10	0.60	–	37	–	<5	–	302	–	<3	–	482	–	1110	–	0.46	–
IY-11	2.66	NA	166	NA	<5	<5	775	490	<3	<3	732	467	1740	1200	0.81	0.16
IY-12	0.60	0.15	37	9	<5	<5	417	240	<3	<3	549	414	1030	825	0.13	0.10
IY-13	1.80	0.69	112	44	<5	<5	366	350	<3	<3	502	639	1530	745	0.38	0.12
IY-14	3.79	NA	236	NA	<5	<5	188	220	<3	<3	1600	1230	445	853	<0.1	<0.05
IY-15	3.50	NA	218	NA	<5	<5	265	340	<3	<3	1800	1070	565	1180	<0.1	0.10
IY-16	1.79	1.79	112	112	<5	<5	1090	660	<3	<3	1630	1010	2140	1370	<0.1	0.20
IY-17	1.01	NA	63	NA	<5	<5	325	230	<3	<3	819	548	1030	1040	0.41	0.18
IY-18	0.30	0.15	19	9	<5	<5	150	120	<3	<3	737	516	873	623	0.13	0.27
IY-19	2.70	0.60	168	37	<5	<5	138	150	<3	<3	399	728	732	120	0.20	0.08
IY-20	2.70	0.90	168	56	<5	<5	166	160	<3	<3	763	112	1074	279	0.18	0.08
IY-21	1.87	0.49	117	31	<5	<5	188	290	<3	<3	874	382	3700	991	0.13	0.13
IY-22	1.20	2.67	75	166	<5	<5	220	300	<3	<3	733	435	951	692	0.20	0.14
IY-23	3.93	3.74	245	233	<5	<5	161	370	<3	<3	449	357	697	849	0.14	0.10
IY-24	1.57	0.69	98	43	<5	<5	468	160	<3	<3	592	164	879	699	0.42	0.18
IY-25	3.30	0.90	206	56	<5	<5	396	240	<3	<3	165	111	872	759	<0.1	<0.05
IY-27	2.10	NA	131	NA	<5	<5	242	830	<3	<3	363	377	720	948	0.37	0.16
IY-28	3.90	NA	243	NA	<5	<5	206	170	<3	<3	349	276	738	554	0.37	0.09
IY-29	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
IY-30	0.67	NA	42	NA	<5	<5	185	200	<3	<3	373	346	1280	1190	0.26	0.24
IY-31	1.05	0.33	66	21	<5	<5	291	200	<3	<3	413	423	1110	974	0.71	0.28
IY-32	3.50	3.57	218	222	<5	<5	138	270	<3	<3	491	669	788	973	0.28	0.07
Avg.	1.99	1.21	124	7.5	<5	<5	301	301	<3	<3	641	473	1096	833	0.36	0.28
Total	57.59	21.76	3594	1356												

Notes:
1. Sampling was performed on January 20, 21, and 22, and September 27 and 28, 1993.
2. Weights assume sediment had a specific gravity of 1.0.

NA Not applicable due to an insufficient accumulation of sediment to determine volumes since the March 1993 cleanout of the catch basins.

– Sample not collected due to inaccessibility of catch basin.

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October 19, 1993

Port of Tacoma
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Tacoma WA 98401

Attn: Suzanne Dudziak

Project: 22789.1
Sample Matrix: Soil
Date Sampled: 9-28-93
Date Received: 9-28-93
Spectra Project: S309-196

Spectra #	ID	PCB's, mg/Kg	Surrogate Recovery, tetra-Xylene
5395	IY0993-05	0.81	72%
5396	IY0993-04	2.05*	63%
5397	IY0993-11	0.16	88%
5398	IY0993-01	0.32	69%
5399	IY0993-02	0.24	74%
5400	IY0993-18	0.27	82%
5402	IY0993-17	0.18	80%
5403	IY0993-19	0.08	69%
5404	IY0993-32	0.07	24%**

All PCB's detected are type 1260, except as indicated.
*Type 1254
**Out of limits due to sample matrix effects.

PCB's by EPA Method 8080

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Cont. pg. 3
Project: 22789.1
Sample Matrix: Soil
Date Sampled: 9-28-93
Date Received: 9-28-93
Spectra Project: S309-196

Spectra #	ID	PCB's, mg/Kg	Surrogate Recovery tcm-Xylene
5414	IY0993-27	0.16	78%
5415	IY0993-30	0.24	82%
5416	IY0993-25	<0.05	75%
5417	IY0993-31	0.28	79%
5318	IY0993-24	0.18	77%
5419	IY0993-21	0.13	80%
5420	IY0993-22	0.14	69%
5421	IY0993-23	0.10	75%
5422	IY0993-20	0.08	62%

All PCB's detected are type 1260.

PCB's by EPA Method 8080

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Cont. pg. 2
Project: 22789.1
Sample Matrix: Soil
Date Sampled: 9-28-93
Date Received: 9-28-93
Spectra Project: S309-196

Spectra #	ID	PCB's, mg/Kg	Surrogate Recovery tcm-Xylene
5405	IY0993-15	0.10	76%
5406	IY0993-14	<0.05	68%
5407	IY0993-16	0.20	76%
5408	IY0993-13	0.12	79%
5309	IY0993-12	0.10	65%
5410	IY0993-08	0.51	105%
5411	IY0993-07	0.56	72%
5412	IY0993-06	0.35	74%
5413	IY0993-28	0.09	55%

All PCB's detected are type 1260.

PCB's by EPA Method 8080

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Attn: Suzanne Dudziak

Sample ID: IY0993-05
Project: 22789.1
Sample Matrix: Soil
Date Sampled: 9-28-93
Date Received: 9-28-93
Spectra Project: S309-196
Spectra #5395

Total Metals, mg/Kg - Wet Weight

Arsenic	(As)	<5
Lead	(Pb)	650
Mercury	(Hg)	<3
Copper	(Cu)	283
Zinc	(Zn)	1450

Total Metals testing performed by EPA Method 6010

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Attn: Suzanne Dudziak

Sample ID: IY0993-04
Project: 22789.1
Sample Matrix: Soil
Date Sampled: 9-28-93
Date Received: 9-28-93
Spectra Project: S309-196
Spectra #5396

Total Metals, mg/Kg - Wet Weight

Arsenic	(As)	<5
Lead	(Pb)	56
Mercury	(Hg)	<3
Copper	(Cu)	352
Zinc	(Zn)	367

Total Metals testing performed by EPA Method 6010

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Attn: Suzanne Dudziak

Sample ID: IY0993-11
Project: 22789.1
Sample Matrix: Soil
Date Sampled: 9-28-93
Date Received: 9-28-93
Spectra Project: S309-196
Spectra #5397

Total Metals, mg/Kg - Wet Weight

Arsenic	(As)	<5
Lead	(Pb)	490
Mercury	(Hg)	<3
Copper	(Cu)	467
Zinc	(Zn)	1200

Total Metals testing performed by EPA Method 6010

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Attn: Suzanne Dudziak

Sample ID: IY0993-01
Project: 22789.1
Sample Matrix: Soil
Date Sampled: 9-28-93
Date Received: 9-28-93
Spectra Project: S309-196
Spectra #5398

Total Metals, mg/Kg - Wet Weight

Arsenic	(As)	<5
Lead	(Pb)	200
Mercury	(Hg)	<3
Copper	(Cu)	214
Zinc	(Zn)	765

Total Metals testing performed by EPA Method 6010

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Attn: Suzanne Dudziak

Sample ID: IY0993-02
Project: 22789.1
Sample Matrix: Soil
Date Sampled: 9-28-93
Date Received: 9-28-93
Spectra Project: S309-196
Spectra #5399

Total Metals, mg/Kg - Wet Weight

Arsenic	(As)	<5
Lead	(Pb)	84
Mercury	(Hg)	<3
Copper	(Cu)	92.6
Zinc	(Zn)	364

Total Metals testing performed by EPA Method 6010

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Attn: Suzanne Dudziak

Sample ID: IY0993-18
Project: 22789.1
Sample Matrix: Soil
Date Sampled: 9-28-93
Date Received: 9-28-93
Spectra Project: S309-196
Spectra #5400

Total Metals, mg/Kg - Wet Weight

Arsenic	(As)	<5
Lead	(Pb)	120
Mercury	(Hg)	<3
Copper	(Cu)	516
Zinc	(Zn)	623

Total Metals testing performed by EPA Method 6010

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Attn: Suzanne Dudziak

Sample ID: IY0993-17
Project: 22789.1
Sample Matrix: Soil
Date Sampled: 9-28-93
Date Received: 9-28-93
Spectra Project: S309-196
Spectra #5402

Total Metals, mg/Kg - Wet Weight

Arsenic	(As)	<5
Lead	(Pb)	230
Mercury	(Hg)	<3
Copper	(Cu)	548
Zinc	(Zn)	1040

Total Metals testing performed by EPA Method 6010

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Attn: Suzanne Dudziak

Sample ID: IY0993-19
Project: 22789.1
Sample Matrix: Soil
Date Sampled: 9-28-93
Date Received: 9-28-93
Spectra Project: S309-196
Spectra #5403

Total Metals, mg/Kg - Wet Weight

Arsenic	(As)	<5
Lead	(Pb)	150
Mercury	(Hg)	<3
Copper	(Cu)	728
Zinc	(Zn)	120

Total Metals testing performed by EPA Method 6010

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Attn: Suzanne Dudziak

Sample ID: IY0993-32
Project: 22789.1
Sample Matrix: Soil
Date Sampled: 9-28-93
Date Received: 9-28-93
Spectra Project: S309-196
Spectra #5404

Total Metals, mg/Kg - Wet Weight

Arsenic	(As)	<5
Lead	(Pb)	270
Mercury	(Hg)	<3
Copper	(Cu)	669
Zinc	(Zn)	973

Total Metals testing performed by EPA Method 6010

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Attn: Suzanne Dudziak

Sample ID: IY0993-15
Project: 22789.1
Sample Matrix: Soil
Date Sampled: 9-28-93
Date Received: 9-28-93
Spectra Project: S309-196
Spectra #5405

Total Metals, mg/Kg - Wet Weight

Arsenic	(As)	<5
Lead	(Pb)	340
Mercury	(Hg)	<3
Copper	(Cu)	1070
Zinc	(Zn)	1180

Total Metals testing performed by EPA Method 6010

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Attn: Suzanne Dudziak

Sample ID: IY0993-14
Project: 22789.1
Sample Matrix: Soil
Date Sampled: 9-28-93
Date Received: 9-28-93
Spectra Project: S309-196
Spectra #5406

Total Metals, mg/Kg - Wet Weight

Arsenic	(As)	<5
Lead	(Pb)	220
Mercury	(Hg)	<3
Copper	(Cu)	1230
Zinc	(Zn)	853

Total Metals testing performed by EPA Method 6010

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Attn: Suzanne Dudziak

Sample ID: IY0993-16
Project: 22789.1
Sample Matrix: Soil
Date Sampled: 9-28-93
Date Received: 9-28-93
Spectra Project: S309-196
Spectra #5407

Total Metals, mg/Kg - Wet Weight

Arsenic	(As)	<5
Lead	(Pb)	660
Mercury	(Hg)	<3
Copper	(Cu)	1010
Zinc	(Zn)	1370

Total Metals testing performed by EPA Method 6010

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Attn: Suzanne Dudziak

Sample ID: IY0993-13
Project: 22789.1
Sample Matrix: Soil
Date Sampled: 9-28-93
Date Received: 9-28-93
Spectra Project: S309-196
Spectra #5408

Total Metals, mg/Kg - Wet Weight

Arsenic	(As)	<5
Lead	(Pb)	350
Mercury	(Hg)	<3
Copper	(Cu)	639
Zinc	(Zn)	745

Total Metals testing performed by EPA Method 6010

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Attn: Suzanne Dudziak

Sample ID: IY0993-12
Project: 22789.1
Sample Matrix: Soil
Date Sampled: 9-28-93
Date Received: 9-28-93
Spectra Project: S309-196
Spectra #5409

Total Metals, mg/Kg - Wet Weight

Arsenic	(As)	<5
Lead	(Pb)	240
Mercury	(Hg)	<3
Copper	(Cu)	414
Zinc	(Zn)	825

Total Metals testing performed by EPA Method 6010

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Attn: Suzanne Dudziak

Sample ID: IY0993-08
Project: 22789.1
Sample Matrix: Soil
Date Sampled: 9-28-93
Date Received: 9-28-93
Spectra Project: S309-196
Spectra #5410

Total Metals, mg/Kg - Wet Weight

Arsenic	(As)	<5
Lead	(Pb)	470
Mercury	(Hg)	<3
Copper	(Cu)	580
Zinc	(Zn)	1150

Total Metals testing performed by EPA Method 6010

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Attn: Suzanne Dudziak

Sample ID: IY0993-07
Project: 22789.1
Sample Matrix: Soil
Date Sampled: 9-28-93
Date Received: 9-28-93
Spectra Project: S309-196
Spectra #5411

Total Metals, mg/Kg - Wet Weight

Arsenic	(As)	<5
Lead	(Pb)	360
Mercury	(Hg)	<3
Copper	(Cu)	488
Zinc	(Zn)	852

Total Metals testing performed by EPA Method 6010

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Attn: Suzanne Dudziak

Sample ID: IY0993-06
Project: 22789.1
Sample Matrix: Soil
Date Sampled: 9-28-93
Date Received: 9-28-93
Spectra Project: S309-196
Spectra #5412

Total Metals, mg/Kg - Wet Weight

Arsenic	(As)	<5
Lead	(Pb)	310
Mercury	(Hg)	<3
Copper	(Cu)	483
Zinc	(Zn)	686

Total Metals testing performed by EPA Method 6010

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Attn: Suzanne Dudziak

Sample ID: IY0993-28
Project: 22789.1
Sample Matrix: Soil
Date Sampled: 9-28-93
Date Received: 9-28-93
Spectra Project: S309-196
Spectra #5413

Total Metals, mg/Kg - Wet Weight

Arsenic	(As)	<5
Lead	(Pb)	170
Mercury	(Hg)	<3
Copper	(Cu)	276
Zinc	(Zn)	554

Total Metals testing performed by EPA Method 6010

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Attn: Suzanne Dudziak

Sample ID: IY0993-27
Project: 22789.1
Sample Matrix: Soil
Date Sampled: 9-28-93
Date Received: 9-28-93
Spectra Project: S309-196
Spectra #5414

Total Metals mg/Kg - Wet Weight

Arsenic	(As)	<5
Lead	(Pb)	830
Mercury	(Hg)	<3
Copper	(Cu)	377
Zinc	(Zn)	948

Total Metals testing performed by EPA Method 6010

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Attn: Suzanne Dudziak

Sample ID: IY0993-30
Project: 22789.1
Sample Matrix: Soil
Date Sampled: 9-28-93
Date Received: 9-28-93
Spectra Project: S309-196
Spectra #5415

Total Metals, mg/Kg - Wet Weight

Arsenic	(As)	<5
Lead	(Pb)	200
Mercury	(Hg)	<3
Copper	(Cu)	346
Zinc	(Zn)	1190

Total Metals testing performed by EPA Method 6010

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Attn: Suzanne Dudziak

Sample ID: IY0993-25
Project: 22789.1
Sample Matrix: Soil
Date Sampled: 9-28-93
Date Received: 9-28-93
Spectra Project: S309-196
Spectra #5416

Total Metals, mg/Kg - Wet Weight

Arsenic	(As)	<5
Lead	(Pb)	240
Mercury	(Hg)	<3
Copper	(Cu)	111
Zinc	(Zn)	759

Total Metals testing performed by EPA Method 6010

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Attn: Suzanne Dudziak

Sample ID: IY0993-31
Project: 22789.1
Sample Matrix: Soil
Date Sampled: 9-28-93
Date Received: 9-28-93
Spectra Project: S309-196
Spectra #5417

Total Metals, mg/Kg - Wet Weight

Arsenic	(As)	<5
Lead	(Pb)	200
Mercury	(Hg)	<3
Copper	(Cu)	423
Zinc	(Zn)	974

Total Metals testing performed by EPA Method 6010

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Attn: Suzanne Dudziak

Sample ID: IY0993-24
Project: 22789.1
Sample Matrix: Soil
Date Sampled: 9-28-93
Date Received: 9-28-93
Spectra Project: S309-196
Spectra #5418

Total Metals, mg/Kg - Wet Weight

Arsenic	(As)	<5
Lead	(Pb)	160
Mercury	(Hg)	<3
Copper	(Cu)	164
Zinc	(Zn)	699

Total Metals testing performed by EPA Method 6010

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Attn: Suzanne Dudziak

Sample ID: IY0993-21
Project: 22789.1
Sample Matrix: Soil
Date Sampled: 9-28-93
Date Received: 9-28-93
Spectra Project: S309-196
Spectra #5419

Total Metals, mg/Kg - Wet Weight

Arsenic	(As)	<5
Lead	(Pb)	290
Mercury	(Hg)	<3
Copper	(Cu)	382
Zinc	(Zn)	991

Total Metals testing performed by EPA Method 6010

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Attn: Suzanne Dudziak

Sample ID: IY0993-22
Project: 22789.1
Sample Matrix: Soil
Date Sampled: 9-28-93
Date Received: 9-28-93
Spectra Project: S309-196
Spectra #5420

Total Metals, mg/Kg - Wet Weight

Arsenic	(As)	<5
Lead	(Pb)	300
Mercury	(Hg)	<3
Copper	(Cu)	435
Zinc	(Zn)	692

Total Metals testing performed by EPA Method 6010

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Attn: Suzanne Dudziak

Sample ID: IY0993-23
Project: 22789.1
Sample Matrix: Soil
Date Sampled: 9-28-93
Date Received: 9-28-93
Spectra Project: S309-196
Spectra #5421

Total Metals, mg/Kg - Wet Weight

Arsenic	(As)	<5
Lead	(Pb)	370
Mercury	(Hg)	<3
Copper	(Cu)	357
Zinc	(Zn)	849

Total Metals testing performed by EPA Method 6010

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Attn: Suzanne Dudziak

Sample ID: IY0993-20
Project: 22789.1
Sample Matrix: Soil
Date Sampled: 9-28-93
Date Received: 9-28-93
Spectra Project: S309-196
Spectra #5420

Total Metals, mg/Kg - Wet Weight

Arsenic	(As)	<5
Lead	(Pb)	160
Mercury	(Hg)	<3
Copper	(Cu)	112
Zinc	(Zn)	279

Total Metals testing performed by EPA Method 6010

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Attn: Suzanne Dudziak

METHOD BLANK
Date Analyzed: 9-30-93
Spectra Project: S309-196
Applies to Spectra Project:
S309-196

Total Metals, mg/Kg

Arsenic	(As)	<5
Lead	(Pb)	<4
Mercury	(Hg)	<3
Copper	(Cu)	<0.2
Zinc	(Zn)	<0.6

Total Metals testing performed by EPA Method 6010

SPECTRA LABORATORIES, INC.

Steven G. Hibbs, Chemist

SPECTRA Laboratories, Inc.

2221 Ross Way • Tacoma, WA 98421 • (206) 272-4850

October 19, 1993

Port of Tacoma
PO Box 1837
Tacoma WA 98401

Attn: Suzanne Dudziak

EPA Method: PCB's 8080
Sample Matrix: Soil
Spectra Project: S309-196
Applies to Spectra #'s
5395 through 5400

PCB ANALYSIS
QUALITY CONTROL RESULTS

MS/MSD

Spiked Sample: Method Blank
Units: mg/Kg

Date Extracted: 9-17-93
Date Analyzed: 9-17-93

Compound	Sample Result	Spike Amount	Spike Result	% Recovery	Dup. Result	Dup. % Recovery	RPD
Type 1260	<0.05	4.70	4.77	101	4.95	105	4

METHOD BLANK

Date Extracted: 10-8-93

Date Analyzed: 10-8-93

PCB's, mg/Kg <0.05

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PO Box 1837
Tacoma WA 98401

Attn: Suzanne Dudziak

EPA Method: PCB's 8080
Sample Matrix: Soil
Spectra Project: S309-196
Applies to Spectra #'s
5402 through 5422

PCB ANALYSIS
QUALITY CONTROL RESULTS

MS/MSD

Spiked Sample: Method Blank
Units: mg/Kg

Date Extracted: 10-6-93
Date Analyzed: 10-6-93

Compound	Sample Result	Spike Amount	Spike Result	% Recovery	Dup. Result	Dup. % Recovery	RPD
Type 1260	<0.05	4.70	4.76	101	4.71	100	1

METHOD BLANK

Date Extracted: 10-8-93

Date Analyzed: 10-8-93

PCB's, mg/Kg <0.05

SPECTRA LABORATORIES, INC.

Steven G. Hibbs, Chemist

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October 19, 1993

Port of Tacoma
PO Box 1837
Tacoma WA 98401

Attn: Suzanne Dudziak

Sample Matrix: Soil
Sample Spiked: Method Blank
Date Analyzed: 9-30-93
Units: mg/Kg
Spectra Project: S309-196
Applies to Spectra #5422

TOTAL METALS
QUALITY CONTROL RESULTS
MS/MSD

	Sample Result	Spike Added	MS Conc.	MS % Rec.	MSD Conc.	MSD Rec.	RPD
Arsenic (As)	<5	200	171	86	174	87	2
Lead (Pb)	<4.0	200	179	90	180	90	1
Mercury (Hg)	<3.0	200	153	77	153	77	0
Copper (Cu)	<0.2	200	181	91	178	89	2
Zinc (Zn)	<0.6	200	170	85	170	85	0

SPECTRA LABORATORIES, INC.

Richard J. Forrester
Manager, Organic Chemistry

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October 19, 1993

Northwest EnviroService
PO Box 24443
Seattle WA 98124

Attn: Suzanne Dudziak

DUPLICATE
Duplicate Sample: #5410
Units: mg/Kg
Date Extracted: 9-30-93
Date Analyzed: 9-30-93
Applies to Spectra Project:
S309-196

Compound		Result	Dup. Result	% RPD
Arsenic	(As)	<5	<5	0
Copper	(Cu)	580	595	3
Lead	(Pb)	470	1000	72*
Mercury	(Hg)	<3	<3	0
Zinc	(Zn)	1150	1210	5

* Out of Limits

SPECTRA LABORATORIES, INC.

Steven G. Hibbs, Chemist