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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
TECHNICAL SUPPORT BRANCH

COMMENCEMENT BAY
WATERWAYS SURVEY

SEPTEMBER 23-24, 1980

DECEMBER 16, 1980

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

DATE: January 6, 1981

SUBJECT: Commencement Bay

FROM: John E. Osborn 
Technical Support Branch

TO: Division Directors

Enclosed for your information is a copy of data and narrative report for EPA's September 23 - 24, 1980 screening survey of Commencement Bay Waterways. If you have questions relative to this report please call me at (206) 442-1296.

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December 16, 1980
Commencement Bay Waterways Survey
September 23-24, 1980

On September 23rd and 24th, EPA collected water samples in the Hylebos and Blair Waterways of Commencement Bay including several bank seepages, storm drains, and other drainages to the waterways. This study was a follow-up and expansion of work reported by memorandum of August 25, 1980 describing EPA's June 3, 1980 field study of the same waterways.

Stations sampled are shown on Figure I and described briefly in Table I. All stations were sampled at the water surface or from bank seepage, except for station number 38301, which was sampled approximately 50 feet off shore and at the bottom of the waterway. The same location was also sampled at the water surface and is reported as station number 38302. Additionally, a sample was collected from the outfall of Tacoma's Central Wastewater Treatment Plant which discharges to the Puyallup River (reported as station number 38212). As in the June survey, all samples were grab (rather than composite) and abbreviated laboratory procedures were used in order to obtain data as expeditiously as possible. Procedures used are referenced in Attachment I to this report. Data obtained is shown in the attached tables as follows:

- Metals--Table II
- Purgeable Halocarbons--Table III
- Chlorinated Hydrocarbons--Table IV
- Aromatics--Table V
- Priority Pollutant Scan for Selected Stations--Table VI (a) & (b)

Where applicable, suggested aquatic life criteria for saltwater species are included in the tables. If criteria have not been established and if data is available for a chemical, then apparent threshold levels for acute and/or chronic effects to saltwater species are shown. The criteria and threshold information are taken from the Federal Register, Volume 45, No. 231, November 28, 1980, page 79318-79379, a publication to announce the availability and provide summaries of water quality criteria documents for 64 of the toxic pollutants or pollutant categories. The recently published criteria supersede those referenced in the June 3, 1980 study memorandum and for some chemicals or groups of chemicals represent significant changes from the previously suggested levels.

Discussion of Data

Of 39 samples collected, 11 were collected in the waterways, only 4 of which could be considered outside the influence of immediate mixing zones from bank seeps, storm drains, discharge pipes or other drainages to the waterways. Those stations are, 38309 and 38313 at which all parameters were measured and 38301 and 38302 at which all but metals were measured.

Metals (Refer to Table II)

- Copper, Nickel, and Mercury concentrations were in excess of the new criteria at most of the waterway stations including 38309 and 38313. This was also the case for June 3rd data where several additional waterway stations were sampled (35 data points).
- Zinc concentrations exceeded suggested criteria at several waterway points including 38309.
- Silver exceeded suggested criteria at one station within a mixing zone area.
- No criteria are available for Lead or Arsenic. The suggested chronic effects threshold level was exceeded for lead at several waterway stations including stations 38309 and 38313. Suggested chronic effects level was exceeded for Arsenic immediately off shore at Pennwalt.
- Many shoreside stations had one or more heavy metals at elevated concentrations. Reference to aquatic life criteria is not appropriate when reviewing these data since high potential for dilution exists. Additional studies over the long term might be considered for several of the shore stations as well as screening investigation of additional sites; however, four locations are recommended for closer scrutiny in the near future based on the September sampling:
 1. Station 38202 (North bank of Hylebos Waterway across from Lincoln Avenue). Elevated Lead, Copper, Zinc, and Nickel as well as other metals in bank seepage.
 2. Area represented by Stations 38204-38210 (Pennwalt). Elevated Arsenic, Chromium, and Mercury as well as other metals in bank seepage and along shoreline.
 3. Station 38310 (U.S. Gypsum). Elevated Copper, Lead, Arsenic, and Zinc as well as other metals in bank seepage.
 4. Station 38313 (Pan Pacific). Elevated Copper, Lead, Arsenic, and Zinc as well as other metals in storm drain.

Purgeable Halocarbons (Refer to Table III)

No saltwater aquatic life criteria are available presently from EPA for the pollutants identified from this group in these studies. For those pollutants where apparent threshold levels for acute and/or chronic effects are given, none were exceeded either in shoreside or waterway samples.

One chemical, chloroform, was present at levels which have been shown to cause chronic effects in some fresh water aquatic species. While sufficient data was not available for the agency to develop saltwater species criteria, or threshold level recommendations toxic effects studies on local species may be justified.

The highest concentrations of this group of chemicals were found in bank seepage samples at Pennwalt and Hooker.

Chlorinated Hydrocarbons (Refer to Table IV)

Saltwater aquatic life criteria are not yet available for the compounds identified from this group. Where apparent threshold levels have been indicated none were exceeded in waterway samples. The only stations where several compounds from this group were found in quantifiable concentrations were bank seeps at Pennwalt and Hooker.

Polynuclear Aromatics (Refer to Table V)

Again, criteria for saltwater aquatic life are not yet available. Apparent threshold levels for acute effects were not exceeded at any station.

Priority Pollutant Scan (Refer to Tables VI (a) and VI (b))

Samples from five of the stations were selected for complete priority pollutant analysis. This scan confirmed the presence of chemicals from groups referenced in Tables III thru V as well as additional chemicals representative of the pesticides group. Additional scans for metals were not made since this group was already analyzed for by priority pollutant methods. Overall 55 of the 129 priority pollutants were identified.

Human Health

Several of the chemicals found in the June and September surveys are considered to be carcinogens or to have potential carcinogenic effects due to ingestion of contaminated water and or contaminated aquatic organisms. The recently published EPA criteria documents include discussion of carcinogenic risk levels for many of the chemicals and suggested risk levels for some of the non-carcinogens where health effects have been demonstrated. The reader is referred to the Federal Register publication cited above for summary information and to the separate "Ambient Water Quality Criteria" documents (EPA 440/5-8-(015 through 079*)) for more in depth discussion of potential health effects.

The agency feels that maximum protection of human health from potential carcinogenic effects can only be obtained with zero concentration of these chemicals, however, zero concentrations may not be obtainable at this time. Therefore, levels for incremental increase of cancer risk are given in the publications, assuming consumption of 6.5 grams/day of fish and shellfish harvested from contaminated waterways. The agency does not represent these risk levels as "acceptable" but, rather guidelines for reference. Examples of chemicals found in these studies for which risk levels are given are; arsenic, carbontetrachloride, chlorinated benzenes, chloroform, DDT, halomethanes, hexachlorobutadiene, and tetrachloroethene (tetrachloroethylene).

*#072 on TCCD should be available early in 1981.

Summary

On September 23-24, 1980 samples were collected at 39 locations in the Commencement Bay area. The screening analytical procedures used were designed to look for 40 chemicals. Many of the chemicals were found at one or more stations in at least trace amounts. However, five locations are worthy of special consideration due to the number of chemicals and/or the concentrations found. These locations are represented by station numbers 38202 (bank seepage on the north bank of the Hylebos, across from Lincoln Avenue--Metals); 38204 through 38210 (Pennwalt waterfront area--Metals and organic toxicants); 38303 (bank seepage at Hooker--organic toxicants); 38310 (bank seepage at U.S. Gypsum--Metals); and 38318 (storm drain at Pan Pacific property on the Blair Waterway--Metals). More intensive evaluations of these sites should be considered as well as discussions with local, State, and Federal agencies with interest in the environmental health of this area as well as effected property owners, aimed at possible abatement of conditions which may be environmentally threatening.

Additionally, continued studies in these and other waterways of Commencement Bay aimed at source detection are suggested over the long term to be coordinated with related fate and effects studies by NOAA as well as other Federal, State, and local efforts to assess the quality and health of these waters.

Attachment I
Commencement Bay Waterways Survey
Analytical Procedures

<u>Parameters</u>	<u>Procedures</u>	<u>Reference</u>
Priority Pollutants (water)	GC/MS/DS	1
Pesticides	GC	2
Metals	Separation by extraction; atomic absorption	3
Purgeable Halocarbons	GC	4
Chlorination Hydrocarbons	GC	5
Polynuclear Aromatic Hydrocarbons	HPLC	6

References

1. Guidelines Establishing Test Procedures for the Analysis of Pollutants; Proposed Regulations. Federal Register, Vol. 40, No. 233, Dec. 3, 1979, pp 69525-69559.
2. ibid., Method 608, pp 69501-69509.
3. Methods for Chemical Analysis of Water and Wastewater, EPA 600/4-79-020 March 1979 U.S. Environmental Protection Agency, EMSL-Cincinnati, Ohio 45269. Section on Metals. Extraction procedure described on page Metals-15.
4. a. Federal Register Method 602 pp 69474.
b. Control of trihalomethanes in Drinking Water, Federal Register Vol. 44, No. 231, Nov. 29, 1979, pp 68672-68690.
5. Federal Register, Method 612, pp 69522-69525.
6. Waters Associates, Inc. B25/Sept. 1979, Milford, MA 01757.

Table I
Commencement Bay Waterways Survey--September 23-24, 1980
Station Descriptions

Date	Sample Time (DST)	Lab (Station) Number	Station Location
9/23/80	8:53	38200	Surface Runoff to Hylebos North Bank--West of 11th Street
	9:15	38201	Surface Runoff to Hylebos North Bank--East of 11th Street
	9:35	38202	Bank Seepage--North bank of Hylebos--across from Lincoln Ave.
	9:58	38203	Drain Ditch from Kaiser on Taylor Way (E7 June Survey)
	10:31	38204	Waters edge at Pennwalt (See Figure #1)
	10:34	38205	Waters edge at Pennwalt (See Figure #1)
	10:39	38206	Waters edge at Pennwalt (See Figure #1)
	11:18	38207	Bank Runoff at Pennwalt (See Figure #1) (E6 June Survey)
	11:24	38208	Waters edge at Pennwalt (See Figure #1)
	11:38	38209	Bank Runoff at Pennwalt (See Figure #1)
	11:53	38210	Drain Ditch--East edge of Pennwalt Property
	12:19	38211	Tidal Drain--SW corner of Reichhold Property (S1a June Survey)
	13:30	38212	Tacoma-Puyallup River STP effluent
9/24/80	10:15	38213	Drainage Ditch near Jones Chemical
	11:15	38214	Drain ditch from Reichhold--NE of tidegate
	11:45	38215	Lincoln Ave. drain to Blair from South--Vicinity Landscape Bark
	11:53	38216	Lincoln Ave. drain to Blair from South--Vicinity Thorne Rd.
	12:05	38217	Lincoln Ave. drain to Blair from South--Near Milwaukee Way
	12:17	38218	Storm drain at Reichhold near SE property corner above overflow weir
9/23/80	9:30	38300	Drain from north to Lower Turning basin--Hylebos
	10:30	38301	Hylebos Waterway--offshore from old Hooker solvent plant (bottom sample)
	10:35	38302	Hylebos Waterway--offshore from old Hooker solvent plant (surface sample)
	10:15	38303	Bank seepage at Hooker near old solvent plant
	10:45	38304	Hylebos Waterway--surface sample over Hooker outfall
	11:00	38305	Shore drainage to Hylebos--south side across from Sound Refining
	11:10	38306	Shore seepage near Buffelen
	11:15	38307	Heated discharge to Hylebos--South shore upstream from Lincoln Ave.
	11:40	38308	Mouth of drain from Kaiser to Hylebos Waterway
	11:55	38309	Hylebos Waterway--near north shore across from Lincoln Ave. (H6 June Survey)
9/24/80	11:50	38310	Bank seepage near #38307
	10:15	38311	Shore seepage near Zidell--Blair Waterway
	10:40	38312	Shore seepage to Blair--upstream from Zidell
	10:55	38313	Blair Waterway--under 11th St. Bridge
	11:00	38314	Surface drain to Blair at Omtar Chemical
	11:15	38315	Surface runoff to Blair--Stauffer Property
	11:30	38316	Blair Waterway--just offshore from south drain Lincoln Ave.
	11:35	38317	South Drain--Lincoln St. at mouth (Blair)
	11:45	38318	Pan Pacific Drain to Blair (south side)
	12:30	38319	Sound Refining--drainage from bulkhead

Commencement Bay Waterways Survey--September 23-24, 1980
Table II--Metals* Data

Lab (Station) Number	Lead	Cadmium	Copper	Beryllium	Silver	Thallium	Selenium	Antimony	Arsenic	Zinc	Chromium	Nickel	Mercury
38200	30	.7	17	.6	<.4	< 3	7	<2	16	100	3	25	.14
38201	28	.3	37	.6	<.4		2	<2	82	150	5	23	.07
38202	1750	34	1240	2.4	<.4		8	<2	262	11800	115	435	1.4
38203	26	3.2	64	.3	<.4		<2	<2	65	100	10	66	.21
38204	40	.4	37	.6	<.4		7	16	970	800	14	18	.14
38205	43	.4	22	.8	<.4		10	4	1990	780	<1	41	.35
38206	10	<.2	37	.6	<.4		7	17	3815	50	5	66	.84
38207	43	<.2	11	.6	1.1		3	7	62	230	700	12	3.6
38208	75	<.2	14	.9	<.4		10	<2	150	50	14	26	.63
38209	105	<.2	31	1.2	<.4		22	62	5505	80	1850	18	16.2
38210	10	<.2	19	<.3	<.4		<2	3	545	30	24	12	.91
38211	80	<.2	19	.5	<.4		4	<2	140	50	5	26	.56
38212	45	7.9	35	<.3	<.4		<2	7	10	150	34	33	.63
38213	73	2.1	41	<.3	1.3		<2	<2	7	450	18	65	.49
38214	25	<.2	19	.6	<.4		7	<2	75	40	6	21	.35
38215	15	.5	12	<.3	<.4		<2	<2	283	<20	7	11	.35
38216	95	1.4	87	<.3	<.4		<2	<2	752	530	20	29	2.9
38217	90	1.6	68	<.3	<.4		<2	<2	154	160	12	14	1.6
38218	2	.5	3	<.3	<.4		<2	<2	4	40	<1	23	.07
38300	24	.7	15	<.3	<.4		<2	<2	14	200	4	17	.07
38301	No sample for Metals.												
38302	No sample for Metals.												
38303	630	1.2	533	15.3	3.0		12	6	105	1550	320	373	5.3
38304	68	1.1	5	1.8	7.1		22	9	106	<20	1	15	.14
38305	130	.4	372	3.6	2.8		15	20	130	1780	210	179	1.6
38306	70	.5	341	3.6	3.0		4	7	112	1350	320	179	.63
38307	4	.8	6	<.3	<.4		<2	<2	30	60	<1	7	.21
38308	30	.4	15	.3	.4		<2	<2	12	60	1	n	.21
38309	63	<.2	16	.8	1.5		7	<2	10	80	1	14	.49
38310	920	<.2	1637	2.4	2.8		3	515	2100	17200	210	172	.35
38311	100	<.2	397	2.4	1.3		4	<2	66	650	170	191	1.5

*All data in micrograms per liter.

Commencement Bay Waterways Survey--September 23-24, 1980

Table 11--Metals* Data Continued

Lab (Station) Number	Lead	Cadmium	Copper	Beryllium	Silver	Thallium	Selenium	Antimony	Arsenic	Zinc	Chromium	Nickel	Mercury
38312	44	<.2	136	.9	1.1	3	3	<2	36	220	58	47	.63
38313	67	↓	14	.9	1.7	↓	13	4	8	40	2	32	.21
38314	61	↓	19	.8	1.5	↓	7	5	10	30	3	20	.21
38315	58	↓	19	2.6	1.3	↓	11	5	36	70	4	43	.21
38316	33	↓	19	<.3	.8	↓	4	5	25	90	18	33	.21
38317	8	↓	14	<.3	<.4	↓	<2	<2	60	40	12	12	.21
38318	640	3.2	496	1.4	3.4	↓	<2	189	66000	1780	12	221	.49
38319	10	.5	14	<.3	<.4	↓	<2	<2	74	<20	2	22	.21

Suggested Criteria for
Saltwater Aquatic Life

24 hr. Avg.	?	4.5	4.0	?	2.3	?	54	?	?	58	18**	7.1	0.025
Max.	?	59	23	?	2.3	?	410	?	?	170	1260	140	3.7

Apparent Threshold Level

Acute Effects	668			?		2130		?	508		10300***		
Chronic Effects	25			?		?		?	?		?		

* = All data in micrograms per liter.

** = Hexavalent chromium.

*** = Trivalent chromium.

Commencement Bay Waterways Survey--September 23-24, 1980
Table III--Purgeable Halocarbons*

Lab. Number	Chloro- form	Dichloro- bromo- methane	Chloro- dibromo- methane	Bromo- form	Carbon- tetra- chloride	1,2-Di- chloro- ethane	1,2-(trans) Dichloro- ethene	Methylene chloride	Tetra- chloro- ethene	1,1,1-Tri- chloro- ethane	Tri- chloro- ethene
38200	6.8	--	--	--	--	--	--	--	--	--	3.3
01	--	--	--	--	--	--	--	--	--	--	2.0
02	--	--	--	--	--	--	--	--	--	--	2.0
03	7.7	--	--	--	--	--	--	--	1.3	--	1.9
04	7.8	--	--	--	--	--	--	--	--	--	1.9
05	8.3	--	--	--	--	--	--	--	1.4	--	1.9
06	9.7	--	--	--	--	--	--	--	1.5	--	2.6
07	6740+	390+	140+	90+	--	410+	--	--	71+	11+	21+
08	380	2.5	3.4	16	--	--	--	--	140	16	4.0
09	1400	3.8	--	--	19	--	--	--	385	--	10
10	120	4.1	3.1	--	--	--	--	--	1.8	--	2.4
11	7.1+	--	--	--	--	--	--	--	1.7	--	1.8+
12	28+	--	--	--	--	--	--	19	3.9+	1.2+	5.3+
13	9.1	--	--	--	--	--	--	--	1.3	--	--
14	--	--	--	--	--	--	--	--	--	--	--
15	--	--	--	--	--	--	--	--	--	--	--
16	--	--	--	--	--	--	--	--	--	--	--
17	8.9	--	--	--	--	--	--	--	--	--	2.7
18	7.2	--	--	--	--	--	4.4	--	--	1.2	50
38300	--	--	--	--	--	--	--	--	--	--	--
01	26	--	--	--	--	--	14	--	8.1	--	37
02	26	--	--	--	--	--	20	--	60	--	93
03	950+	3.6	7.6	--	--	35+	130+	--	240+	--	57+
04	9.3	--	--	--	--	--	3.8	--	2.8	--	3.4
05	--	--	--	--	--	--	--	--	--	--	--
06	--	--	--	--	--	--	3.7	--	--	--	2.7
07	8.4	--	--	--	--	--	--	--	--	--	1
08	7.8	--	--	--	--	--	--	--	--	--	1.9
09	7.5	--	--	--	--	--	--	--	--	--	2.2

* = Results expressed in micrograms per liter.

-- = Less than 1 microgram per liter (not detected).

I = Detected at less than 1 microgram per liter but quantitation unreliable.

+ = Presence confirmed by GC/MS.

Commencement Bay Waterways Survey--September 23-24, 1980

Table III--Purgeable Halocarbons* Continued

Lab. Number	Chloro- form	Dichloro- bromo- methane	Chloro- dibromo- methane	Bromo- form	Carbon- tetra- chloride	1,2-Di- chloro- ethane	1,2-(trans) Dichloro- ethene	Methylene chloride	Tetra- chloro- ethene	1,1,1-Tri- chloro- ethane	Tri- chloro- ethene
38310	--	--	--	--	--	--	--	--	--	--	--
11	--	--	--	--	--	--	--	--	--	--	--
12	--	--	--	--	--	--	--	--	--	--	--
13	7.0	--	--	--	--	--	--	--	--	--	--
14	--	--	--	--	--	--	--	--	--	--	--
15	--	--	--	--	--	--	--	--	--	--	--
16	7.3	--	--	--	--	2.8	--	--	1.4	2.6	--
17	7.6+	--	--	--	--	3.4+	--	--	2.1+	3.7+	--
18	--	--	--	--	--	--	--	--	--	--	--
19	--	--	--	--	--	--	--	--	--	1.1	--

Suggested Criteria for
Saltwater Aquatic Life

24 hr. Avg. (ug/l)

Max. (ug/l)

?	?	?	?	?	?	?	?	?	?	?	?
?	?	?	?	?	?	?	?	?	?	?	?

Apparent Threshold Level

Acute Effects

Chronic Effects

?	(a)	(a)	(a)	50,000	113,000	224,000	(a)	10,200	31,200	2,000
?	(b)	(b)	(b)	?	?	?	(b)	450	?	?

* = Results expressed in micrograms per liter.

-- = Less than 1 microgram per liter (not detected).

+ = Presence confirmed by GC/MS.

(a) = 12,000 for this group (Halomethanes).

(b) = 6,400 for this group (Halomethanes).

Commencement Bay Waterways Survey--September 23-24, 1980
 Table IV--Chlorinated Hydrocarbons*

Lab Number	1,2-Di- chloro- benzene	1,3-Di- chloro- benzene	1,4-Di- chloro- benzene	Hexa- chloro- ethane	Hexa- chloro- butadiene	1,2,4-Tri- chloro- benzene	2-Chloro- naphtha- lene	Hexa- chloro- benzene
38200	--	--	--	--	--	--	--	--
01	--	--	--	--	--	--	--	--
02	--	--	--	--	--	--	--	--
03	--	--	--	--	--	--	--	--
04	--	--	--	--	--	--	--	--
05	--	--	--	--	--	--	--	--
06	--	--	--	--	--	--	--	--
07	--	--	--	12.2+	4.6+	8.6	8.4+	--
08	--	--	--	--	--	--	--	--
09	--	--	--	21.3	T	--	--	--
10	--	--	--	--	--	--	--	--
11	--	--	--	--	--	--	--	--
12	--	--	--	--	--	--	--	--
13	--	--	--	--	--	--	--	--
14	--	--	--	--	--	--	--	--
15	--	--	--	--	--	--	--	--
16	--	--	--	--	--	--	--	--
17	--	--	--	--	--	--	--	1.1
18	5.4	--	--	--	--	--	--	--
38300	--	--	--	--	--	--	--	--
01	--	--	--	--	--	--	--	--
02	--	--	--	--	--	--	--	--
03	T	T	T	3.4+	1.9+	6.9	4.5	T
04	--	--	--	--	--	--	--	--
05	--	--	--	--	--	--	--	--
06	--	--	--	--	--	--	--	--
07	--	--	--	--	--	--	--	--

* = Results expressed in micrograms per liter.

-- = Less than 1 microgram per liter (not detected).

T = Detected at less than 1 microgram per liter but quantitation unreliable.

+ = Presence confirmed by GC/MS.

Commencement Bay Waterways Survey--September 23-24, 1980
Table IV--Chlorinated Hydrocarbons* Continued

Lab Number	1,2-Di- chloro- benzene	1,3-Di- chloro- benzene	1,4-Di- chloro- benzene	Hexa- chloro- ethane	Hexa- chloro- butadiene	1,2,4-Tri- chloro- benzene	2-Chloro- naphtha- lene	Hexa- chloro- benzene
38308	--	--	--	--	--	--	--	--
09	--	--	--	--	--	--	--	--
10	--	--	--	--	--	--	--	--
11	--	--	--	--	--	--	--	--
12	--	--	--	--	--	--	--	--
13	--	--	--	--	--	--	--	--
14	--	--	--	--	--	--	--	--
15	--	--	--	--	--	--	--	--
16	10.4	T	T	T	--	T	--	T
17	6+	--	--	--	--	--	--	--
18	--	--	--	--	--	--	--	--
19	--	--	--	--	--	--	--	--
Detection Limits								
(for 1.5 liters extracted)								
	3	8	8	1	1	3	5	.8
Suggested Criteria for								
Saltwater Aquatic Life								
24 hr. Avg. (ug/l)	?	?	?	?	?	?	?	?
Max. (ug/l)	?	?	?	?	?	?	?	?
Apparent Threshold Level								
Acute Effects	(a)	(a)	(a)	940	32	(b)	7.5	(b)
Chronic Effects	?	?	?	?	?	(c)	?	(c)

* = Results expressed in micrograms per liter.

-- = Less than 1 microgram per liter (not detected).

T = Detected at less than 1 microgram per liter but quantitation unreliable.

+ = Presence confirmed by GC/MS.

(a) = 1970 for dichlorobenzenes group.

(b) = 160 for chlorinated benzenes group.

(c) = 129 for chlorinated benzenes group.

Commencement Bay Waterways Survey--September 23-24, 1980
Table V--Aromatics Data*

Lab Number	Fluorene	Fluoranthene	Naphthalene	Acenaphthylene/ Phenanthrene	Anthracene	Pyrene	Chrysene	Other Polynuclear Aromatics	Remarks
38200	T	T	--	--	--	--	--	--	
01	--	--	--	--	T	--	--	--	Other PNA's present, not identified.
02	--	--	4.9	--	--	--	--	--	
03	--	--	--	3.4	--	--	10	--	Other PNA's present, not identified.
04	--	--	0.93	--	T	--	--	--	
05	--	--	--	--	--	--	T	--	
06	1.4	--	1.0	--	--	--	--	--	
07	--	--	5.8	T	T	--	--	--	
08	--	--	1.0	T	--	--	--	--	
09	--	--	--	0.64	--	--	--	--	
10	--	--	--	T	--	--	--	--	
11	1.0	--	--	0.53	--	--	--	--	
12	--	2.4	83	--	--	--	--	--	
13	--	--	1.5	--	--	--	--	--	
14	--	--	--	--	--	--	--	--	
15	--	--	--	--	--	--	--	--	
16	--	--	5.1	2.7	--	--	--	--	
17	--	4.8	8.8	2.5	--	6.8	--	--	Other PNA's present, not identified. Large quantities of other organics present.
18	--	--	--	--	--	--	--	--	
38300	--	--	--	--	--	--	--	--	
01	--	--	--	--	--	--	--	--	
02	--	--	--	--	--	--	--	--	
03	--	7.3	6.6	--	T	10	--	--	
04	--	T	--	--	--	--	--	--	
05	--	--	--	--	--	--	--	--	

* = Results expressed as micrograms per liter.

-- = Less than 0.5 micrograms per liter.

T = Detected at less than 0.5 ug/l but quantitation at this level is unreliable.

Commencement Bay Waterways Survey--September 23-24, 1980
Table V--Aromatics Data* Continued

Lab Number	Fluorene	Fluoranthene	Naphthalene	Acenaphthylene/ Phenanthrene	Anthracene	Pyrene	Chrysene	Other Polynuclear Aromatics	Remarks
38306	--	--	--	--	--	23	--	--	Large concentration of unidentified PNA's present.
07	--	--	--	--	--	--	--	--	
08	T	0.53	T	T	T	--	1.6	--	Large concentration of unidentified PNA's present.
09	--	--	--	--	--	--	--	--	
10	0.62	--	1.3	0.64	--	--	--	--	
11	--	--	--	--	--	--	--	--	
12	--	--	2.9	--	--	--	--	--	
13	--	--	--	--	--	--	--	--	
14	--	--	--	--	--	--	--	--	
15	--	--	--	--	--	--	--	--	
16	--	--	--	--	--	--	--	--	
17	--	--	--	--	--	--	--	--	
18	--	--	--	--	--	--	--	--	
19	--	--	--	T	--	--	--	--	
Suggested Criteria for Saltwater Aquatic Life									
24 hr. Avg.	?	?	?	1/1	?	?	?	?	
Max.	?	?	?	1/1	?	?	?	?	
Apparent Threshold Level									
Acute Effects	(a)	40	2350	(a)	(a)	(a)	(a)	(a)	
Chronic Effects	?	16	?	?	?	?	?	?	

* = Results expressed as micrograms per liter.

(a) = Acute effects from representatives of this group have been noted at concentrations as low as 300.

Commencement Bay Waterways Survey--September 23-24, 1980

Table VI(a)

GC/MS Analysis of Selected Samples**
For Priority Pollutant Compounds

Fraction/Compound	Lab (Station) Number				
	38207	38211	38212	38303	38317
<u>Acid</u>					
2,4,6-trichlorophenol	16	ND	62	ND	ND
2-chlorophenol	ND	ND	19	ND	ND
2,4-dichlorophenol	ND	ND	15	ND	ND
pentachlorophenol	ND	ND	4	ND	ND
phenol	ND	ND	30	1	ND
t-butylphenol	ND	200*	ND	ND	ND
benzeneacetic acid	ND	ND	60*	ND	ND
<u>Base/Neutral</u>					
hexachloroethane	170	ND	ND	9	ND
dichlorobenzene	ND	ND	5	ND	10
fluoranthene	1	ND	ND	1	ND
hexachlorobutadiene	9	ND	ND	2	ND
naphthalene	3	ND	1	ND	ND
bis(2-ethylhexyl) phthalate	3	5	7	20	8
di-n-butyl phthalate	ND	ND	3	1	ND
diethyl phthalate	ND	ND	7	ND	2
chrysene/benzo(a)anthracene	1	ND	ND	1	ND
pyrene	ND	ND	1	ND	ND
anthracene/phenanthrene	1	ND	1	ND	ND
fluorene	ND	1	ND	ND	ND
indole	ND	ND	20*	ND	ND
benzeneacetonitrile	5*	ND	ND	ND	ND
<u>VOA</u>					
benzene	ND	0.3	0.5	ND	ND
carbon tetrachloride	6	ND	ND	ND	ND
chlorobenzene	ND	ND	ND	ND	7.1
1,2-dichloroethane	ND	ND	ND	2	1.9
1,1,1-trichloroethane	4	ND	1.3	ND	6
1,1-dichloroethane	1	ND	0.2	ND	3.4
1,1,2-trichloroethane	ND	ND	ND	2	ND
1,1,2,2-tetrachloroethane	ND	0.9	1.1	1400	2.3
chloroethane	10	ND	2	5	ND
chloroform	50000	1	21	8	2
1,1-dichloroethylene	1	ND	ND	5	ND
1,2-trans-dichloroethylene	ND	1	1	1800	1.4
ethylbenzene	ND	ND	2	ND	ND
methylene chloride	ND	ND	7	ND	ND
bromoform	15	ND	ND	ND	ND
bromodichloromethane	300	ND	0.8	ND	ND
tetrachloroethylene	100	ND	5.2	100	0.6
toluene	ND	ND	13	ND	0.5
trichloroethylene	1	0.7	6	53	0.5
dibromochloromethane	70	ND	ND	ND	ND
1,4-dichloro-2-butyne	ND	ND	ND	10*	ND
dimethyldisulfide	ND	ND	10*	ND	ND
2-ethyl-4-methyl-1,3-dioxolane or					
dimethyl-1,4-dioxane	ND	200*	20*	ND	ND

ND = Not detected (priority pollutant compounds are not listed if not detected in any of the 5 selected samples).

* = Non-priority pollutant compounds presence confirmed by EPA/NIH MSSS. No standard available, therefore RF = 1 used to estimate concentration.

** = Results expressed in micrograms per liter. Refer to Table II for metals data.

Commencement Bay Waterways Survey--September 23-24, 1980
 Table VI(b)
 GC/Electron Capture Analysis of Selected Samples for Pesticides*

Lab Number	4,4'DDT	4,4'DDE	4,4'DDD	Alpha BHC	Gamma BHC (Lindane)	Toxaphene	PCB(1242)	Other PCB's
38207	.046	.019	.021	<.005	<.005	<.10	<.05	<.05
38211	<.005	<.005	<.005	.045	<.005	<.10	6.9	<.05
38212	.033	<.005	.020	.018	.057	<.10	<.05	<.05
38303	.101	.110	.086	<.005	<.005	<.10	<.05	<.05
38317	.022	.005	.016	<.005	<.005	<.10	<.05	<.05

Suggested Criteria for
 Saltwater Aquatic Life

24 hr. Avg.	.001	?	?	?	?	0.07	0.03	0.03
Max.	0.13	?	?	?	?	0.07	10	10

Apparent Threshold Level

Acute Effects	14	3.6	(a)	(a)
Chronic Effects	?	?	(b)	(b)

*All pesticides on EPA's priority pollutant list were analyzed for except Endosulfan Sulfate. Results expressed as micrograms per liter. Compounds not detected at 0.005 ug/l are not listed, those with higher limits are listed with their respective detection limits. Extraction per priority pollutant protocol. Analysis by GC/EC.

(a) = 160 for chlorinated benzene group.
 (b) = 129 for chlorinated benzene group.