ENVIRONMENT CANADA
CONSERVATION AND PROTECTION
ENVIRONMENTAL PROTECTION
PACIFIC AND YUKON REGION

SEDIMENT METAL CHEMISTRY SURVEY OF ESQUIMALT HARBOUR BRITISH COLUMBIA OCTOBER 1987

REGIONAL DATA REPORT DR-92-03

BY

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1.0 INTRODUCTION

During October 1987, a benthic sediment chemistry survey was conducted at selected sites in Esquimalt Harbour. The need for repeat maintenance dredging at industrial locations and the degree of elevated concentrations of mercury and cadmium in the harbour prompted a comprehensive survey to determine the extent of trace metal contamination. Sample locations are identified in Figures 1 & 2. Data from the analysis of the sample collected during this study is presented herein.

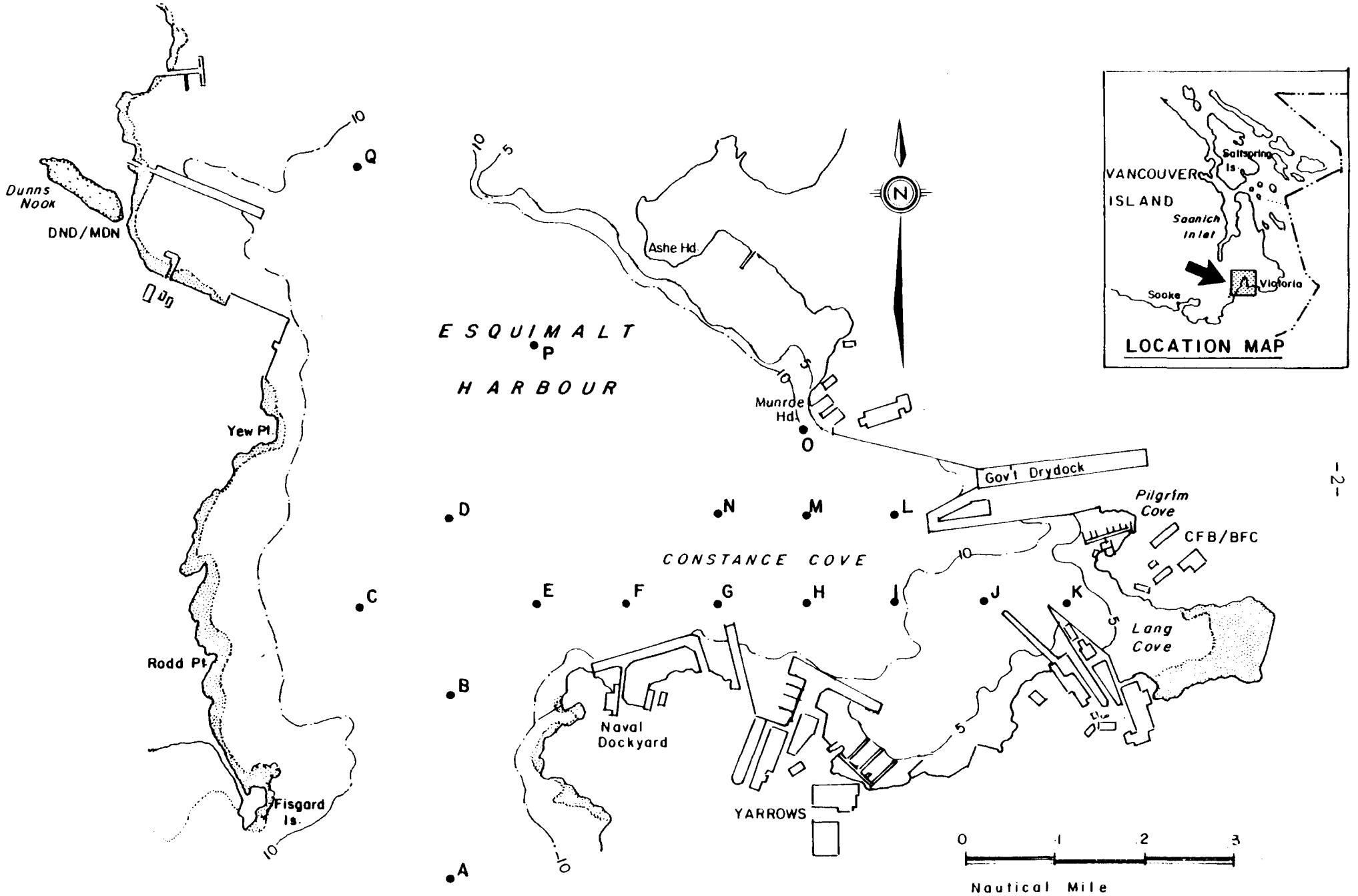

FIGURE 1 ESQUIMALT HARBOUR - BENTHIC SEDIMENT SAMPLING STATIONS

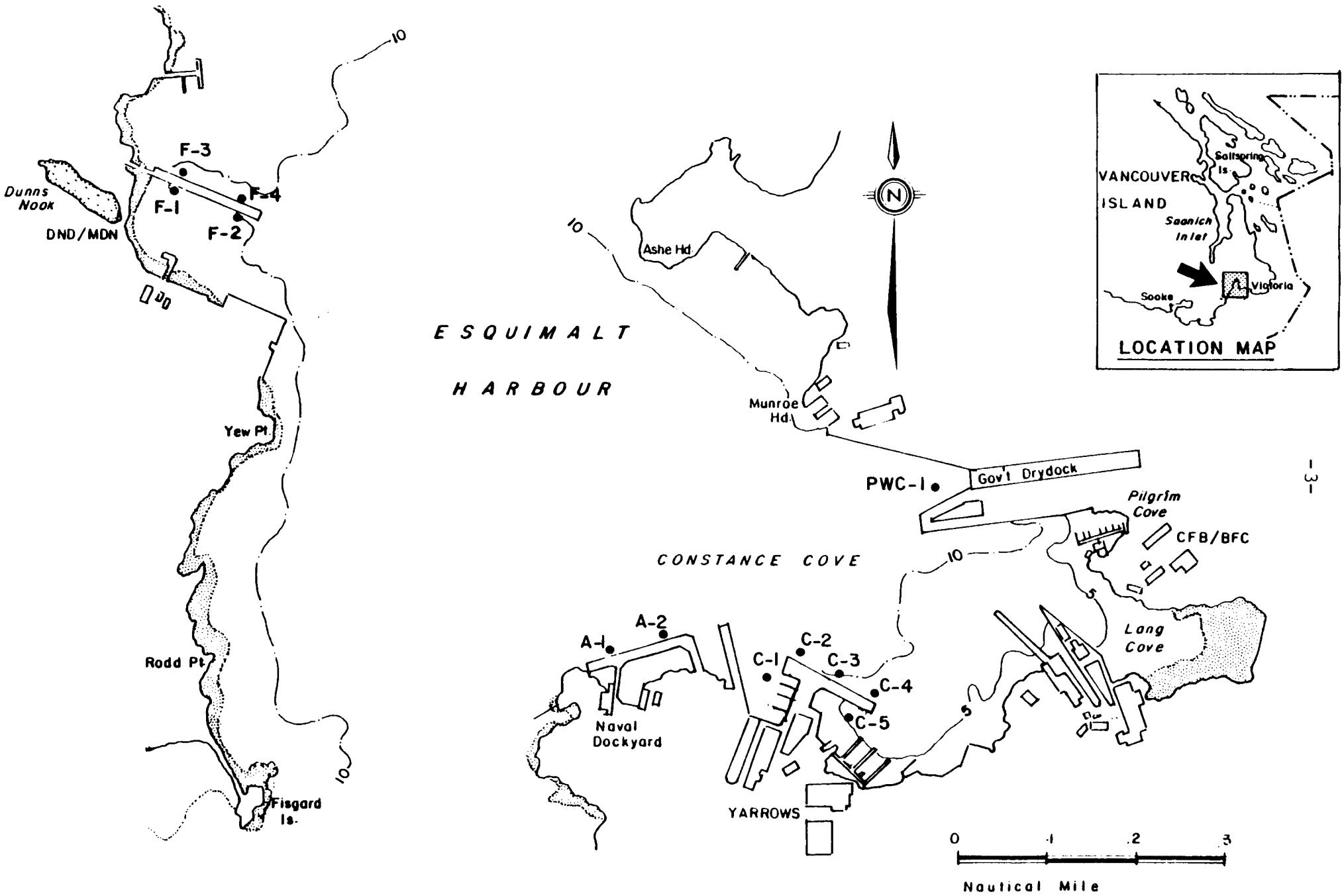

FIGURE 2 ESQUIMALT HARBOUR INDUSTRIAL SITES - BENTHIC SEDIMENT SAMPLING STATIONS

2.0 MATERIALS & METHODS

Grab samples were collected using a Smith McIntyre grab sampler. Upon retrieval, water was siphoned from the sediment surface as necessary. One grab was taken at each station and three representative samples, from 0 cm to 5 cm, were removed for analysis.

Core samples were collected using a 2 meter BENTHOS gravity corer. The core was extruded into a plastic trough, held at a gentle incline and washed to remove the outer disturbed layer. Samples were removed for analysis from the following depths: 10-20 cm, 30-40 cm, 60-70 cm, and 90-100 cm.

All analyses were conducted by the Conservation and Protection Laboratories in West Vancouver, B.C. The raw data is presented in Appendix II and represents a single analysis for each sample after drying and homogenizing. Copper (Cu), lead (Pb), and zinc (Zn) were analyzed using Inductively Coupled Argon Plasma Atomic Emission (ICAP-AE), cadmium (Cd) using Graphite Furnace Atomic Absorption (GFAA), and mercury (Hg) using flameless Atomic Absorption (AA).

Hg, Cd, Pb, Cu and Zn concentrations are presented in the tables, with the mean and standard deviation.

The accuracy data for each lab submission are given in Appendix I. The raw data printouts, giving the complete ICAP semi-quantitative scan and particle size data (Appendix II), are on microfiche and can be located by matching the sample and lab submission numbers given on the data tables. Precision data for the lab submissions are provided on the data tables, and represent analyses of separate aliquots of dried, homogenized sediments from the sample bag.

ESQUIMALT HARBOUR - STATIONS A-Q

METALS: LAB #890132: A-E,H,I,L-P,Q
DATE SAMPLED: OCTOBER 7, 1987. METALS: LAB #890130: F,G,J,K
PARTICLE SIZE:LAB #880267: 1-22
PARTICLE SIZE:LAB #880268: 77-85

STN	DEPTH (m)	SAMPLE (PARTICLE SIZE)	SEDIMENT DEPTH (cm)	UG/G DRY WEIGHT Hg	Cd	Pb	Cu	Zn
A	15	77 (22)*	0-5	.172	.26	20	23.8	65.8
		78	0-5	.182	.29	20	23.8	67.8
		79	0-5	.194	.28	18	23.4	65.8
			MEAN	.183	.28	19	23.7	66.5
			STD DEV	.011	.02	1	.2	1.2
B	14	74 (21)*	0-5	1.060	.32	27	45.7	83.7
		75	0-5	.409	.35	32	45.1	108.0
		76	0-5	.398	.34	25	41.2	81.0
			MEAN	.622	.34	28	44.0	90.9
			STD DEV	.379	.02	4	2.4	14.9
C	13	51 (14)*	0-5	.350	.47	27	49.6	87.7
		52	0-5	.391	.48	29	47.1	90.3
		57	0-5	.361	.43	32	46.9	92.0
			MEAN	.367	.46	29	47.9	90.0
			STD DEV	.021	.03	3	1.5	2.2
D	14	48 (13)*	0-5	.457	.55	36	56.8	90.3
		49	0-5	.440	.56	37	71.1	94.7
		50	0-5	.544	.48	39	54.3	95.3
			MEAN	.480	.53	37	60.7	93.4
			STD DEV	.056	.04	2	9.1	2.7
E	16	58 (15)*	0-5	.675	.38	42	65.3	99.7
		59	0-5	.641	.41	42	60.3	101.0
		60	0-5	.639	.36	42	63.7	99.7
			MEAN	.652	.38	42	63.1	100.1
			STD DEV	.020	.03	0	2.6	.8
F	14	74 (65)*	0-5	1.300	.66	80	135.0	147.0
		75	0-5	1.200	.57	63	106.0	124.0
		76	0-5	1.100	.51	68	117.0	135.0
			MEAN	1.200	.58	70	119.3	135.3
			STD DEV	.100	.08	9	14.6	11.5
G	11	49 (54)*	0-5	1.600	1.00	140	185.0	264.0
		50	0-5	2.100	1.00	180	192.0	269.0
		51	0-5	1.800	.70	160	244.0	214.0
			MEAN	1.833	.90	160	207.0	249.0
			STD DEV	.252	.17	20	32.2	30.4

ESQUIMALT HARBOUR - STATIONS A-Q (con't)

DATE SAMPLED: OCTOBER 7, 1987.

STN	DEPTH (m)	SAMPLE (PARTICLE SIZE)	SEDIMENT DEPTH (cm)	UG/G DRY WEIGHT Hg	Cd	Pb	Cu	Zn
H	13	61 (16)*	0-5	2.100	1.00	212	245.0	291.0
		62	0-5	1.810	.91	150	252.0	277.0
		63	0-5	1.910	.94	169	249.0	324.0
			MEAN	1.940	.95	177	248.7	297.3
			STD DEV	.147	.05	32	3.5	24.1
		64	10-20	2.320	.77	175	62.1	116.0
		65	30-40	.037	1.50	ND(8)	15.0	52.0
		66	60-70	.027	1.30	8	18.8	62.1
I	12	71 (20)*	0-5	1.950	.86	170	301.0	324.0
		72	0-5	2.310	1.30	214	379.0	669.0
		73	0-5	2.340	.97	166	323.0	364.0
			MEAN	2.300	1.04	183	334.3	452.3
			STD DEV	.332	.23	27	40.2	188.7
J	10	6 (35)*	0-5	3.690	1.40	227	333.0	419.0
		7	0-5	4.330	1.20	586	313.0	340.0
		8	0-5	6.200	1.00	232	412.0	492.0
			MEAN	4.740	1.20	348	352.7	417.0
			STD DEV	1.304	.20	206	52.3	76.0
K	7	1 (32)*	0-5	3.180	1.30	296	412.0	640.0
		2	0-5	7.380	1.50	306	447.0	682.0
		3	0-5	3.250	1.10	534	417.0	663.0
			MEAN	4.603	1.30	379	425.3	661.7
			STD DEV	2.405	.20	135	18.9	21.0
		4 (33)*	10-20	3.920	1.30	214	84.8	127.0
		5 (34)*	20-30	.631	2.20	33	25.5	48.3
L	16	23 (2)*	0-5	2.540	1.68	221	526.0	585.0
		24	0-5	2.590	1.72	281	566.0	654.0
		29	0-5	2.470	1.64	259	486.0	684.0
			MEAN	2.533	1.68	254	526.0	641.0
			STD DEV	.060	.04	30	40.0	50.8
		30 (3)*	10-20	4.820	1.40	180	189.0	147.0
		31 (4)*	30-40	.082	2.20	10	24.1	61.9
		32 (5)*	60-70	.022	1.80	ND(8)	25.8	66.3
		33 (6)*	90-100	.028	1.80	ND(8)	27.6	72.5

ESQUIMALT HARBOUR - STATIONS A-Q (cont'd)

DATE SAMPLED: OCTOBER 7, 1987.

STN	DEPTH (m)	SAMPLE (PARTICLE SIZE)	SEDIMENT DEPTH (cm)	UG/G DRY WEIGHT Hg	Cd	Pb	Cu	Zn
M	14	34 (7)*	0-5	1.780	.65	168	182.0	212.0
		35	0-5	1.480	.60	140	177.0	205.0
		36	0-5	2.560	.75	247	217.0	243.0
			MEAN	1.940	.67	185	192.0	220.0
			STD DEV	.557	.08	55	21.8	20.2
N	12	37 (8)*	0-5	1.210	.75	179	131.0	179.0
		38	0-5	1.370	.45	130	128.0	168.0
		43	0-5	1.260	.44	120	129.0	164.0
			MEAN	1.280	.55	143	129.3	170.3
			STD DEV	.082	.18	32	1.5	7.8
		44 (9)*	10-20	2.880	.89	283	45.3	142.0
		45 (10)*	30-40	.026	1.20	ND(8)	16.8	56.8
		46 (11)*	67-70	.027	1.00	ND(8)	18.9	62.9
		47 (12)*	90-100	.027	.92	ND(8)	17.9	60.8
O	13	17 (85)*	0-5	2.800	.73	174	218.0	225.0
		18	0-5	2.330	.84	181	233.0	316.0
		19	0-5	1.900	.65	150	204.0	277.0
			MEAN	2.343	.74	168	218.3	272.7
			STD DEV	.450	.10	16	14.5	45.7
P	13	6 (85)*	0-5	.854	.46	54	72.8	107.0
		7	0-5	.692	.48	51	72.9	107.0
		8	0-5	.742	.47	50	83.5	106.0
			MEAN	.763	.47	52	76.4	106.7
			STD DEV	.083	.01	2	6.1	.6
		9 (81)*	10-20	.605	1.20	53	33.6	76.0
		10 (82)*	30-40	.037	1.87	ND(8)	18.7	61.0
		15 (83)*	67-70	.027	1.76	ND(8)	19.7	64.9
		16 (84)*	90-100	.020	1.30	ND(8)	22.2	65.7
Q	13	1 (77)*	0-5	.569	1.80	39	61.5	114.0
		2	0-5	.614	1.90	40	63.3	111.0
		3	0-5	.616	2.10	39	60.3	112.0
			MEAN	.600	1.93	39	61.7	112.3
			STD DEV	.027	.15	1	1.5	1.5
		4 (78)*	10-20	.057	2.60	ND(8)	21.4	68.6
		5 (79)*	30-40	.034	2.10	ND(8)	23.4	71.6

NOTE: numbers in brackets are limits of detection. (cf:SCPESQAQ)
ND - not detected
* denotes particle size data in appendix (use # in brackets).

ESQUIMALT HARBOUR - STATIONS A-Q (con't)

DATE SAMPLED: OCTOBER 7, 1987.

PRECISION DATA

SAMPLE	Hg	Cd	Pb	Cu	Zn
79	.194	.29	18	23	65.8
80	.191	.28	18	24	66.8
81	.310	.31	10	22.9	65.9
82	.310	.31	20	23.6	63.9
83	.290	.29	20	23.3	65.6
MEAN	.259	.30	20	23.4	65.6
STD DEV	.061	.01	4	.3	1.1
52	.391	.48	29	47.1	90.3
53	.365	.41	34	48.0	93.0
54	.377	.42	29	47.7	91.3
55	.383	.44	30	48.1	93.7
56	.387	.43	30	46.8	92.0
MEAN	.381	.44	30	47.5	92.1
STD DEV	.010	.03	2	.6	1.3
66	.027	1.30	8	18.8	62.1
67	.025	1.30	ND(8)	17.7	59.7
68	.027	1.30	ND(8)	17.9	59.8
69	.022	1.40	ND(8)	18.4	63.6
70	.024	1.30	ND(8)	18.2	61.5
MEAN	.025	1.32		18.2	61.3
STD DEV	.002	.04		.4	1.6
10	.037	1.87	ND(8)	18.7	61.0
11	.029	1.76	ND(8)	18.4	61.8
12	.029	1.77	8	18.1	59.8
13	.038	1.76	10	19.6	62.3
14	.035	1.79	ND(8)	18.5	61.3
MEAN	.034	1.79	9	18.7	61.2
STD DEV	.004	.05	1	.6	.9
24	2.590	1.72	281	566.0	654.0
25	2.630	1.72	230	566.0	628.0
26	2.750	1.66	240	533.0	664.0
27	2.630	1.60	243	558.0	704.0
28	2.620	1.66	255	577.0	680.0
MEAN	2.644	1.67	250	560.0	656.0
STD DEV	.061	.05	20	16.5	31.0
38	1.370	.45	130	128.0	168.0
39	1.920	.44	140	124.0	168.0
40	1.200	.48	150	127.0	192.0
41	1.210	.40	110	126.0	158.0
42	1.510	.45	208	138.0	164.0
MEAN	1.442	.44	148	128.6	170.0
STD DEV	.296	.03	37	5.5	13.0

NOTE: numbers in brackets are limits of detection. (cf:SCPESQAQ)
ND - not detected

ESQUIMALT HARBOUR, INDUSTRIAL SITES

METALS: LAB #890131: PAC-1
METALS: LAB #890130: 1-8, 49-53
METALS: LAB #870753: 9-48
PARTICLE SIZE : LAB #880268: 1, 33-75

DATE SAMPLED: OCTOBER 7, 1987.

STN	DEPTH (m)	SAMPLE (PARTICLE SIZE)	SEDIMENT DEPTH (cm)	UG/G DRY WEIGHT Hg	Cd	Pb	Cu	Zn
A-1	14	63 (60)*	0-5	1.690	1.40	160	170.0	333.0
		64	0-5	2.310	1.40	140	190.0	235.0
		65	0-5	2.720	1.60	130	155.0	204.0
			MEAN	1.900	1.47	143	171.7	284.0
			STD DEV	.355	.12	15	17.6	31.5
		56 (61)*	10-20	3.740	1.90	454	172.0	416.0
		71 (62)*	30-40	.058	1.30	10	18.3	57.1
		72 (63)*	60-70	.019	1.40	ND(8)	15.0	49.8
		73 (64)*	90-100	.019	1.30	ND(8)	16.0	49.1
A-2	11	52 (55)*	0-5	2.000	.92	140	164.0	190.0
		57	0-5	3.050	.99	1170	183.0	239.0
		58	0-5	1.720	1.10	120	184.0	198.0
			MEAN	2.257	1.00	477	177.0	209.3
			STD DEV	.701	.09	601	11.3	26.3
C-1	8	46 (53)*	0-5	11.300	1.99	404	930.0	1040.0
		47	0-5	9.180	2.04	330	810.0	810.0
		48	0-5	12.800	2.20	418	1010.0	942.0
			MEAN	11.093	2.08	384	916.7	897.3
			STD DEV	1.813	.11	47	102.7	89.1
C-2	12	35 (48)*	0-5	1.180	1.56	857	182	322.0
		36	0-5	.750	1.43	141	125.0	217.0
		37	0-5	.800	1.68	120	149.0	259.0
			MEAN	.910	1.56	373	152.0	266.0
			STD DEV	.235	.13	420	28.6	52.8
		38 (49)*	10-20	1.270	1.50	72	34.0	114.0
		43 (50)*	30-40	.028	2.30	12	14.9	56.0
		44 (51)*	60-70	.035	2.20	18	14.1	53.5
		45 (52)*	90-100	.030	1.23	ND(6)	14.6	54.6
C-3	12	24 (43)*	0-5	1.800	3.69	710	741.0	6100.0
		29	0-5	2.120	2.80	502	704.0	1880.0
		30	0-5	1.250	3.20	430	753.0	2060.0
			MEAN	1.057	3.23	547	732.7	3680.0
			STD DEV	.292	.45	145	25.5	2135.5
		31 (44)*	10-20	.036	1.52	10	15.3	59.8
		32 (45)*	30-40	.030	1.59	8	15.1	55.3
		33 (46)*	60-70	.045	1.89	14	15.3	54.3
		34 (47)*	90-100	.032	1.49	ND(8)	13.9	50.3

ESQUIMALT HARBOUR, INDUSTRIAL SITES (cont'd)

DATE SAMPLED: OCTOBER 7, 1987.

STN	DEPTH (m)	SAMPLE (PARTICLE SIZE)	SEDIMENT DEPTH (cm)	UG/G DRY WEIGHT Hg	Cd	Pb	Cu	Zn
C-4	10	18 (39)*	0-5	2.560	4.20	376	608.0	985.0
		19	0-5	2.480	6.10	380	463.0	1040.0
		20	0-5	4.850	5.40	430	633.0	1080.0
			MEAN	3.297	5.23	395	568.0	1035.3
			STD DEV	1.346	.96	30	91.8	47.2
		21 (40)*	10-20	3.370	4.00	1360	591.0	1600.0
		22 (41)*	30-40	.050	2.80	13	14.1	84.2
		23 (42)*	60-70	.027	1.69	ND(8)	12.3	48.6
C-5	9	9 (36)*	0-5	1.260	2.10	989	716.0	2840.0
		10	0-5	1.220	3.80	1110	782.0	2700.0
		15	0-5	1.230	2.83	928	948.0	2340.0
			MEAN	1.237	2.91	1009	815.3	2626.7
			STD DEV	.021	.85	93	119.5	257.9
		16 (37)*	10-20	7.820	3.60	592	666.0	680.0
		17 (38)*	30-40	3.770	1.37	181	66.9	120.0
F	14	74 (65)*	0-5	1.300	.66	80	135.0	147.0
		75	0-5	1.200	.57	63	106.0	124.0
		76	0-5	1.100	.51	68	117.0	135.0
			MEAN	1.200	.58	70	119.3	135.3
			STD DEV	.100	.08	9	14.6	11.5
F-1	12	91 (72)*	0-5	.184	1.90	18	48.2	90.3
		92	0-5	.200	1.90	22	48.0	81.1
		93	0-5	.721	2.70	20	74.2	265.0
			MEAN	.368	2.17	20	56.8	145.5
			STD DEV	.306	.46	2	15.1	103.6
F-2	13	94 (73)*	0-5	.300	2.50	22	50.5	97.4
		99	0-5	.354	2.80	25	53.1	115.0
		100	0-5	.402	2.30	26	54.6	102.0
			MEAN	.352	2.53	24	52.7	104.8
			STD DEV	.051	.25	2	2.1	9.1
		101 (74)*	10-20	.296	2.30	19	36.1	81.5
		102 (75)*	30-40	.145	2.60	ND(8)	28.5	64.1
		103 (76)*	60-70	.023	.60	ND(8)	14.0	33.2

ESQUIMALT HARBOUR, INDUSTRIAL SITES (cont'd)

DATE SAMPLED: OCTOBER 7, 1987.

STN	DEPTH (m)	SAMPLE (PARTICLE SIZE)	SEDIMENT DEPTH (cm)	UG/G DRY WEIGHT Hg	Cd	Pb	Cu	Zn
-3	11	77 (66)*	0-5	.718	3.70	59	95.8	231.0
		78	0-5	.671	3.50	78	91.8	230.0
		79	0-5	1.040	3.80	80	106.0	265.0
			MEAN	.810	3.67	72	97.9	242.0
			STD DEV	.201	.15	12	7.3	19.9
F-4	10	80 (67)*	0-5	.292	3.10	21	51.4	104.0
		85	0-5	.248	2.80	22	42.7	102.0
		86	0-5	.237	2.70	20	45.7	119.0
			MEAN	.259	2.87	21	46.6	108.3
			STD DEV	.029	.21	1	4.4	9.3
PWC-1	14	20 (1)*	0-5	7.100	1.30	293	356.0	721.0
		21	0-5	3.040	1.90	500	672.0	1740.0
		22	0-5	5.420	1.30	437	469.0	1340.0
			MEAN	3.343	1.50	410	499.0	1267.0
			STD DEV	2.406	.35	106	160.1	513.4

NOTE: numbers in brackets are limits of detection. (cf:SCPESQIN)
ND - not detected
* denotes particle size data in appendix (use # in brackets).

PRECISION DATA

SAMPLE	Hg	Cd	Pb	Cu	Zn
66	3.740	1.90	454	172.0	416.0
67	2.700	2.00	454	158.0	437.0
68	2.300	2.00	326	139.0	346.0
69	3.700	2.10	487	156.0	506.0
70	2.200	2.10	622	134.0	484.0
MEAN	2.928	2.02	469	151.8	437.8
STD DEV	.747	.08	106	15.4	62.6
52	2.000	.92	140	164.0	190.0
53	1.900	.94	130	198.0	218.0
54	2.400	.98	130	192.0	204.0
55	1.900	.90	179	196.0	202.0
56	1.900	.96	629	173.0	209.0
MEAN	2.020	.93	242	184.6	203.6
STD DEV	.217	.03	218	15.2	8.7
38	1.270	1.50	72	34.0	114.0
39	1.130	1.39	73	32.2	86.0
40	1.230	1.40	85	31.0	83.9
41	1.070	1.39	85	32.3	84.1
42	1.150	1.33	77	31.8	80.6
MEAN	1.170	1.40	78	32.3	89.7
STD DEV	.080	.06	6	1.1	13.7

ESQUIMALT HARBOUR, INDUSTRIAL SITES

DATE SAMPLED: OCTOBER 7, 1987.

PRECISION DATA

SAMPLE	Hg	Cd	Pb	Cu	Zn
24	1.800	3.69	710	741.0	6100.0
25	2.090	4.15	362	523.0	2990.0
26	1.900	3.40	359	511.0	6020.0
27	2.270	3.35	331	501.0	2260.0
28	2.000	3.36	326	593.0	2760.0
MEAN	2.012	3.59	418	573.8	4026.0
STD DEV	.180	.34	164	100.2	1875.7
10	1.220	3.80	1110	782.0	2700.0
11	1.160	3.20	842	647.0	2450.0
12	1.070	2.96	969	702.0	2700.0
13	1.020	2.98	1050	781.0	3030.0
14	.898	3.71	928	704.0	2720.0
MEAN	1.074	3.33	980	723.2	2720.0
STD DEV	.125	.40	104	57.9	206.0
94	.300	2.50	22	50.5	97.4
95	.336	2.30	20	49.5	97.9
96	.335	2.50	20	48.0	97.9
97	.318	2.40	24	50.1	99.2
98	.305	2.40	18	46.8	92.6
MEAN	.319	2.42	21	49.0	97.0
STD DEV	.017	.08	2	1.5	2.5
80	.292	3.10	21	51.4	104.0
81	.254	3.40	22	56.2	105.0
82	.262	3.30	23	50.5	102.0
83	.241	3.10	21	55.3	110.0
84	.268	3.00	25	51.7	111.0
MEAN	.263	3.18	22	53.0	106.4
STD DEV	.019	.16	2	2.6	3.9

(cf:SCPESQIN)

APPENDIX I

ACCURACY DATA

ACCURACY DATA LAB #870753

	Hg	Cd	Pb	Cu	Zn
MESS-1					
CERTIFIED:	0.171 +/- 0.014	0.59 +/- 0.10	34.0 +/- 6.1	25.1 +/- 3.8	191 +/- 17
FOUND:	.200	.76	35	23.9	182.0
	.212	.74	36	24.7	186.0
	.212	.75	32	24.3	183.0
	.215	.74	40	24.8	187.0
	.221	.68	43	25.0	185.0
MEAN	.212	.73	37	24.5	184.6
STD DEV	.008	.03	4	.4	2.1
BCSS-1					
CERTIFIED:	0.129 +/- .012	0.25 +/- .04	22.7 +/- 3.4	18.5 +/- 2.7	119 +/- 12
FOUND:	.159	.27	31	16.2	109.0
	.149	.32	35	17.5	108.0
	.163	.31	33	17.1	108.0
	.162	.33	29	15.7	107.0
	.170	.33	31	16.5	107.0
MEAN	.161	.31	32	16.6	107.8
STD DEV	.008	.02	2	.7	.8

(cf:AC870753)

ACCURACY DATA LAB #890130

	Hg	Cd	Pb	Cu	Zn
MESS-1					
CERTIFIED:	0.171 +/- 0.014	0.59 +/- 0.10	34.0 +/- 6.1	25.1 +/- 3.8	191 +/- 17
FOUND:	.177	.77	29	26.7	189.0
	.174	.73	28	25.9	185.0
	.174	.67	27	25.2	180.0
	.187	.67	25	25.8	179.0
	.189	.66	24	25.7	179.0
MEAN	.180	.70	27	25.9	181.2
STD DEV	.007	.05	2	.5	6.1
BCSS-1					
CERTIFIED:	0.129 +/- .012	0.25 +/- .04	22.7 +/- 3.4	18.5 +/- 2.7	119 +/- 12
FOUND:	.140	.23	18	17.1	106.0
	.150	.22	19	17.2	107.0
	.140	.19	20	17.4	105.0
	.160	.20	19	17.1	108.0
	.150	.26	22	18.3	109.0
MEAN	.148	.22	20	17.4	107.0
STD DEV	.008	.03	2	.5	1.6

(cf: AC890130)

ACCURACY DATA

LAB #890132

	Hg	Cd	Pb	Cu	Zn
MESS-1					
CERTIFIED:	0.171 +/- 0.014	0.59 +/- 0.10	34.0 +/- 6.1	25.1 +/- 3.8	191 +/- 17
FOUND:	.200	.67	36	27.0	182.0
	.193	.64	30	25.2	181.0
	.194	.70	29	24.7	183.0
	.204	.61	32	25.3	184.0
	.207	.66	31	25.8	184.0
MEAN	.200	.66	32	25.6	182.8
STD DEV	.006	.03	3	.9	1.3
BCSS-1					
CERTIFIED:	0.129 +/- .012	0.25 +/- .04	22.7 +/- 3.4	18.5 +/- 2.7	119 +/- 12
FOUND:	.164	.21	22	17.1	113.0
	.130	.19	23	17.1	115.0
	.150	.21	23	17.2	119.0
	.150	.24	23	17.3	112.0
	.150	.23	23	17.2	113.0
MEAN	.149	.22	23	17.2	114.4
STD DEV	.012	.02	0	.1	2.8

(cf:AC890132)

APPENDIX II

RAW DATA